

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate AC Control Circuit High	B2A01	<p>This DTC will detect when the sensed voltage of HVACHMI FFP AC Switch is Out of Range High (OORH).</p> <p>The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the AC switch raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating.</p> <p>If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	Front Faceplate Request Compressor Setting Raw Voltage	$\geq 2.80 \text{ V}$	<p>Diagnostic is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	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 Illum.
Front Faceplate AC Control Circuit Low	B2A02	This DTC will detect when the sensed voltage of HVACHMI FFP AC Switch is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the AC switch raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to OORL threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Compressor Setting Raw Voltage	$\leq 0.60 \text{ V}$	Diagnostc is Enabled No Active Communication DTC	U0164, U0424	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 Illum.
Front Faceplate AC Control Performance Rationality	B2A04	<p>This DTC will detect when the HVAC HMI FFP AC Switch is stuck on for more than a calibrated amount of time.</p> <p>The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the AC switch raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the upper fault threshold and is greater than or equal to lower fault threshold, and the wait timer is expired then the diagnostic will report a FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	<p>Front Faceplate Request Compressor Setting Raw Voltage is between</p> <p>AND</p> <p>for</p>	<p>$\leq 2.70\text{ V}$</p> <p>$\geq 1.30\text{ V}$</p> <p>$>90.00\text{ sec}$</p>	<p>Diagnostics is Enabled</p> <p>No Active DTCs</p>	B2A01, B2A02, U0164, U0424	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 Illum.
Front Faceplate (FFP)Air Distribution Discrete Control Front Left (1) Circuit High	B2A16	This DTC will detect when the sensed voltage of HVACHMI Air Distribution Discrete Control Front Left Switch is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Air distribution discrete controls front left switch raw voltage signals to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Air Distribution Front left Raw Voltage 1 is	>= 2.80 V	Diagnostic is Enabled No Active Communication DTC	U0164, U0424	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 Illum.
Front Faceplate (FFP)Air Distribution Discrete Control Front Left (1) Circuit Low	B2A17	This DTC will detect when the sensed voltage of HVACHMI Air Distribution Discrete Control Front Left Switch is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Air distribution discrete controls front left switch raw voltage signals to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to OORL threshold then the BCM shall set the fault status to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Air Distribution Front Left Raw Voltage 1 is	<= 0.60 V	Diagnostic is Enabled No Active Communication DTC	U0164, U0424	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 Illum.
Front Faceplate (FFP)Air Distribution Discrete Control Front Left (1) Performance	B2A19	This DTC will detect when the HVAC HMI FFP Air Distribution Discrete Control Switch Front Left is stuck on for more than a calibrated amount of time. The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Air distribution discrete control front left switch raw voltage signals to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the upper fault threshold and is greater than or equal to lower fault threshold, and the wait timer is expired then the diagnostic will report a FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Air Distribution Front Left Raw Voltage 1 is between AND FOR	 >= 1.30 V <= 2.70V >90.00 sec	Diagnostics is Enabled No DTCs	 B2A16, B2A17, U0164, U0424	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 Illum.
Front Faceplate (FFP)Air Distribution Discrete Control Front Left (2) Circuit High	B2A1A	This DTC will detect when the sensed voltage of HVACHMI Air Distribution Discrete Control Front Left Switch is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Air distribution discrete controls front left switch raw voltage signals to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Air Distribution Front left Raw Voltage 2 is	>= 2.80 V	Diagnostic is Enabled No Active Communication DTC	U0164, U0424	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 Illum.
Front Faceplate (FFP)Air Distribution Discrete Control Front Left (2) Circuit Low	B2A1B	This DTC will detect when the sensed voltage of HVACHMI Air Distribution Discrete Control Front Left Switch is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Air distribution discrete controls front left switch raw voltage signals to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to OORL threshold then the BCM shall set the fault status to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Air Distribution Front Left Raw Voltage 2 is	<= 0.60 V	Diagnostic is Enabled No Active Communication DTC	U0164, U0424	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 Illum.
Front Faceplate (FFP) Air Distribution Discrete Control Front Left (2) Performance	B2A1D	This DTC will detect when the HVAC HMI FFP Air Distribution Discrete Control Switch Front Left is stuck on for more than a calibrated amount of time. The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Air distribution discrete control front left switch raw voltage signals to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the upper fault threshold and is greater than or equal to lower fault threshold, and the wait timer is expired then the diagnostic will report a FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Air Distribution Front Left Raw Voltage 2 is between AND FOR	>= 1.30 V <= 2.70 V >90.00 sec	Diagnostic is Enabled No Active DTCs	B2A1A, B2A1B, U0164, U0424	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 Illum.
Front Faceplate (FFP)Air Distribution Discrete Control Front Left (3) Circuit High	B2A1E	This DTC will detect when the sensed voltage of HVACHMI Air Distribution Discrete Control Front Left Switch is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Air distribution discrete controls front left switch raw voltage signals to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Air Distribution Front left Raw Voltage 3 is	>= 2.80 V	Diagnostic is Enabled No Active Communication DTC	U0164, U0424	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 Illum.
Front Faceplate (FFP)Air Distribution Discrete Control Front Left (3) Circuit Low	B2A1F	This DTC will detect when the sensed voltage of HVACHMI Air Distribution Discrete Control Front Left Switch is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Air distribution discrete controls front left switch raw voltage signals to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to OORL threshold then the BCM shall set the fault status to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Air Distribution Front Left Raw Voltage 3	<= 0.60 V	Diagnostic is Enabled No Active Communication DTC	U0164, U0424	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 Illum.
Front Faceplate (FFP)Air Distribution Discrete Control Front Left (3) Performance	B2A21	This DTC will detect when the HVAC HMI FFP Air Distribution Discrete Control Switch Front Left is stuck on for more than a calibrated amount of time. The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Air distribution discrete control front left switch raw voltage signals to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the upper fault threshold and is greater than or equal to lower fault threshold, and the wait timer is expired then the diagnostic will report a FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Air Distribution Front Left Raw Voltage 3 is between AND FOR	 >= 1.30 V <= 2.70 V 90.00 sec	Diagnostic is Enabled No Active DTCs	 B2A1E, B2A1F, U0164, U0424	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 Illum.
Front Faceplate Front HVAC AUTO Control Circuit High	B2A36	<p>This DTC will detect when the sensed voltage of HVACHMI FFPAUTO Switch is Out of Range High (OORH).</p> <p>The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the AUTO switch raw voltage signal to the BCM for fault maturation. This DTC is an X out of Y diagnostic. The diagnostic will run continuously if serial data is operating.</p> <p>If the voltage is greater than or equal to the Out of Range High threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	Front Faceplate Request Front HVAC AUTO Raw Voltage	$\geq 2.80\text{ V}$	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	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 Illum.
Front Faceplate Front HVAC AUTO Control Circuit Low	B2A37	<p>This DTC will detect when the sensed voltage of HVACHMI FFPAUTO Switch is Out of Range Low (OORL).</p> <p>The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the AUTO switch raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to Out of Range Low threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	Front Faceplate Request Front HVAC AUTO Raw Voltage	<= 0.60 V	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	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 Illum.
Front Faceplate Front HVAC AUTO Control Performance	B2A39	<p>This DTC will detect when the HVAC HMI FFPAUTO switch is stuck on for more than a calibrated amount of time.</p> <p>The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the AUTO switch raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the upper fault threshold and is greater than or equal to lower fault threshold, and the wait timer value is expired then the diagnostic will report a FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	<p>Front Faceplate Request Front HVAC AUTO Raw Voltage is between</p> <p>AND</p> <p>FOR</p>	<p>$\geq 1.30\text{ V}$</p> <p>$\leq 2.70\text{ V}$</p> <p>$>90.00\text{ sec}$</p>	<p>Diagnostics is Enabled</p> <p>No Active DTCs</p>	B2A36, B2A37, U0164, U0424	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 Illum.
Front Faceplate Blower Continuous Control Front (1) Circuit High	B2A3E	This DTC will detect when the sensed voltage of HVACHMI FFP Blower Continuous Toggle is Out of Range High (OORH).The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Blower Continuous Toggle raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Face Plate Request Blower Level Front Raw Voltate(1)is	>= 2.80 V	Diagnostics is Enabled No Active Communication DTC	U0164, U0424	4 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 Illum.
Front Faceplate Blower Continuous Control Front (1) Circuit Low	B2A3F	This DTC will detect when the sensed voltage of HVACHMI FFP Blower Continuous Toggle is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Blower Continuous Toggle raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to OORL threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Face Plate Request Blower Level Front Raw Voltate(1)is	<= 0.60 V	Diagnostics is Enabled No Active Communication DTC	U0164, U0424	4 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 Illum.
Front Faceplate Blower Continuous Control Front (1) Performance	B2A41	This DTC will detect when the HVAC HMI FFP Blower Continuous Toggle is stuck on for more than a calibrated amount of time. The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Blower Continuous Toggle raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the upper fault threshold and is greater than or equal to lower fault threshold, and the wait timer is expired then the diagnostic will report a FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Blower Level Front Raw Voltage is between AND FOR	<= 2.70 V >= 1.30 V >90.00 sec	Diagnostics is Enabled No Active DTCs	B2A3E, B2A3F, U0164, U0424	4 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 Illum.
Front Faceplate Blower Continuous Control Front (2) Circuit High	B2A42	This DTC will detect when the sensed voltage of HVACHMI FFP Blower Continuous Toggle is Out of Range High (OORH).The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Blower Continuous Toggle raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Face Plate Request Blower Level Front Raw Voltate (2) is	>= 2.80 V	Diagnostics is Enabled No Active Communication DTC	U0164, U0424	4 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 Illum.
Front Faceplate Blower Continuous Control Front (2) Circuit Low	B2A43	This DTC will detect when the sensed voltage of HVACHMI FFP Blower Continuous Toggle is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Blower Continuous Toggle raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to OORL threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Face Plate Request Blower Level Front Raw Voltate (2) is	$\leq 0.60 \text{ V}$	Diagnostics is Enabled No Active Communication DTC	U0164, U0424	4 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 Illum.
Front Faceplate Blower Continuous Control Front (2) Performance	B2A45	This DTC will detect when the HVAC HMI FFP Blower Continuous Toggle is stuck on for more than a calibrated amount of time. The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Blower Continuous Toggle raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the upper fault threshold and is greater than or equal to lower fault threshold, and the wait timer is expired then the diagnostic will report a FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Blower Level Front Raw Voltage is between AND FOR	<= 2.70 V >= 1.30 V >90.00 sec	Diagnostics is Enabled No Active DTCs	B2A42, B2A43, U0164, U0424	4 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 Illum.
Front Faceplate Max Defrost Control Circuit High	B2A67	This DTC will detect when the sensed voltage of HVACHMI FFP Max Defrost Switch is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Max Defrost switch raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Front Defrost Raw Voltage is	$\geq 2.80\text{ V}$	Diagnostics is Enabled No Active Communication DTC	U0164, U0424	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 Illum.
Front Faceplate Max Defrost Control Circuit Low	B2A68	This DTC will detect when the sensed voltage of HVACHMI FFP Max Defrost Switch is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the Max Defrost switch raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the voltage is less than or equal to OORL threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Front Defrost Raw Voltage is	$\leq 0.60 \text{ V}$	Diagnostics is Enabled No Active Communication DTC	U0164, U0424	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 Illum.
Front Faceplate Max Defrost Control Performance	B2A6A	This DTC will detect when the HVAC HMI FFP Max Defrost Switch is stuck on for more than a calibrated amount of time. The DTC is enabled when the enable criteria is met, and the FFP monitors and sends Max Defrost switch raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the voltage is less than or equal to the upper fault threshold and is greater than or equal to lower fault threshold, and the wait timer value is greater the required threshold then the diagnostic will report a FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Front Defrost Raw Voltage is between AND FOR	 >= 2.70 V AND ≤ 1.30 V FOR 90.00 sec	Diagnostics is Enabled No Active DTCs	 B2A67, B2A68, U0164, U0424	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 Illum.
Front Faceplate Power Front Control Circuit High	B2A6B	<p>This DTC will detect when the sensed voltage of HVACHMI FFP Power Switch is Out of Range High (OORH). The DTC is enabled when the enable criteria is met and will run continuously. The BCM monitors the raw voltage signal and matures the fault. This DTC is a X out of Y diagnostic.</p> <p>If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	Front Faceplate Request Front HVAC Power Voltage is	> 4.30 V	<p>Diagnostics is Enabled</p> <p>ECU initialization for</p>	>=0.25 sec	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 Illum.
Front Faceplate Power Front Control Circuit Lower	B2A6C	<p>This DTC will detect when the sensed voltage of HVACHMI FFP Power Switch is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met and will run continuously. The BCM monitors the raw voltage signal and matures the fault. This DTC is a X out of Y diagnostic.</p> <p>If the voltage is less than or equal to OORL threshold then the BCM shall set the fault status to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	Front Faceplate Request Front HVAC Power Voltage is	<1.40V	<p>Diagnostics is Enabled</p> <p>ECU initialization for</p>	>=0.25 sec	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 Illum.
Front Faceplate Power Front Control Performance	B2A6E	<p>This DTC will detect when the HVAC HMI FFP Power Switch is stuck on for more than a calibrated amount of time.</p> <p>The DTC is enabled when the enable criteria is met and will run continuously. The BCM monitors the raw voltage signal and matures the fault. This DTC is a X out of Y diagnostic.</p> <p>If the voltage is less than or equal to the upper fault threshold and is greater than or equal to lower fault threshold, and the wait timer is expired then the diagnostic will report a FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	<p>Front Faceplate Request Front HVAC Power Voltage is between</p> <p>AND</p> <p>FOR</p>	<p>$\geq 1.40\text{ V}$</p> <p>$\leq 3.00\text{ V}$</p> <p>$>90.00\text{ sec}$</p>	<p>Diagnostics is Enabled</p> <p>No Active DTC</p> <p>ECU initialization for</p>	<p>B2A6B, B2A6C</p> <p>$\geq 0.25\text{ sec}$</p>	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 Illum.
Front Faceplate Temperature Control Front 1 Left Circuit High	B2A87	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORH status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is greater than or equal to the OORH threshold, the FFP will send the OORH status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front Left Out of Range High (1) is</p> <p>Front Faceplate Temperature Continuous DECECU Front High Delta X(1) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Failure Ratio (1) is</p> <p>AND</p>	<p>= TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 1 Left Circuit Low	B2A88	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORL status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the OORL threshold, the FFP will send the OORL status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front Left Out of Range Low (1) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Low Delta X (1) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Failure Ratio (1) is</p> <p>AND</p>	<p>= TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 1 Left Performance	B2A8A	This DTC will detect when there is a malfunction with the HVAC FFP Temperature Continuous Knob, such as when either of the two output circuits for the encoder fail Out of Range or become stuck in range. The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 and 2 as well as the Circuit Correlation status signal (Pass Criteria met, Fail Criteria met, Intermediate) to the BCM. The BCM accumulates the number of Pass Criteria met signals versus Fail Criteria met signals and when the number of failures from the FFP exceed the calibrated failure threshold, then a FAIL is reported by the BCM. The BCM reports a PASS only when the accumulated number of FAILs go below the calibrated failure threshold and the last	Number of failure criteria met in the Front Faceplate Request Temperature Front Left Correlation Array is	>= 5.00	Diagnostics is Disabled Front Faceplate Request Temperature Front Left Correlation is not No Active DTC	Indeterminate B2A87, B2A88, U0164, U0424		Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Circuit Correlation status signal received by the BCM is a Pass Criteria met. This DTC is not an X out of Y diagnostic. It uses an accumulation of Passes and Fails to determine diagnostic maturation in the BCM (DECECU).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 2 Left Circuit High	B2A8B	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORH status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is greater than or equal to the OORH threshold, the FFP will send the OORH status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front (2) Left Raw Voltage is Front Faceplate Request Temperature Level Front Left Out of Range High (2) is</p> <p>Front Faceplate Temperature Continuous DECECU Front High Delta X (2) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Failure Ratio (2) is</p> <p>AND</p>	<p>=TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 2 Left Circuit Low	B2A8C	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range Low (OORL).</p> <p>The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORL status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the OORL threshold, the FFP will send the OORL status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front (2) Left Raw Voltage is Front Faceplate Request Temperature Level Front Left Out of Range Low (2) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Low Delta X (2) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Failure Ratio (2) is</p> <p>AND</p>	<p>= TRUE</p> <p>>= 400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 3 Left Circuit High	B2A8F	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORH status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is greater than or equal to the OORH threshold, the FFP will send the OORH status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front (3) Left Raw Voltage is Front Faceplate Request Temperature Level Front Left Out of Range High (3) is</p> <p>Front Faceplate Temperature Continuous DECECU Front High Delta X (3) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Failure Ratio (3) is</p> <p>AND</p>	<p>=TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 3 Left Circuit Low	B2A90	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORL status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the OORL threshold, the FFP will send the OORL status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front Left Out of Range Low (3) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Low Delta X (3) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Failure Ratio (3) is</p> <p>AND</p>	<p>= TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	4 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 Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 1 Right Circuit High	B2A93	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORH status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is greater than or equal to the OORH threshold, the FFP will send the OORH status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front Right Out of Range High (1) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right High Delta X(1) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right Failure Ratio (1) is</p> <p>AND</p>	<p>= TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 1 Right Circuit Low	B2A94	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORL status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the OORL threshold, the FFP will send the OORL status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front Right Out of Range Low (1) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right High Delta X(1) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Failure Ratio (1) is</p> <p>AND</p>	<p>= TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 1 Right Performance	B2A96	This DTC will detect when there is a malfunction with the HVAC FFP Temperature Continuous Knob, such as when either of the two output circuits for the encoder fail Out of Range or become stuck in range. The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 and 2 as well as the Circuit Correlation status signal (Pass Criteria met, Fail Criteria met, Intermediate) to the BCM. The BCM accumulates the number of Pass Criteria met signals versus Fail Criteria met signals and when the number of failures from the FFP exceed the calibrated failure threshold, then a FAIL is reported by the BCM. The BCM reports a PASS only when the accumulated number of FAILs go below the calibrated failure threshold and the last	Number of failure criteria met in the Front Faceplate Request Temperature Front Left Correlation Array is	>= 5.00	Diagnostics is Disabled Front Faceplate Request Temperature Front Left Correlation is not No Active DTC	Indeterminate B2A93, B2A94, U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Circuit Correlation status signal received by the BCM is a Pass Criteria met. This DTC is not an X out of Y diagnostic. It uses an accumulation of Passes and Fails to determine diagnostic maturation in the BCM (DECECU).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 2 Right Circuit High	B2A97	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORH status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is greater than or equal to the OORH threshold, the FFP will send the OORH status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front Right Out of Range Low (4) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right Low Delta X (4) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right Failure Ratio (4) is</p> <p>AND</p>	<p>= TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 2 Right Circuit Low	B2A98	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORL status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the OORL threshold, the FFP will send the OORL status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front Right Out of Range Low (2) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right Low Delta X (2) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right Failure Ratio (2) is</p> <p>AND</p>	<p>= TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 3 Right Circuit High	B2A9B	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORH status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is greater than or equal to the OORH threshold, the FFP will send the OORH status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front Right Out of Range High (3) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right High Delta X (3) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right Failure Ratio (3) is</p> <p>AND</p>	<p>= TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Control Front 3 Right Circuit Low	B2A9C	<p>This DTC will detect when the sensed voltage of HVAC FFP Temperature Continuous Knob is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Continuous Knob raw voltage signals for circuits 1 thru 4 as well as the OORL status signals to the BCM. The FFP also sends the accumulated fail and sample counts to the BCM for fault maturation. This DTC is a modified X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the OORL threshold, the FFP will send the OORL status signal, the accumulated fail and sample counts, as well as the raw voltage to the BCM. The BCM will use these signals in determining the maturation of the diagnostic to a PASS or</p>	<p>Front Faceplate Request Temperature Level Front Right Out of Range Low (3) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right Low Delta X (3) is</p> <p>Front Faceplate Temperature Continuous DECECU Front Right Failure Ratio (3) is</p> <p>AND</p>	<p>= TRUE</p> <p>>=400.00</p> <p>>=0.40</p> <p><= 1</p>	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	20 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		FAIL status. When the accumulated FAIL counts exceed the calibrated failure threshold within the calibrated sample threshold, then a FAIL is reported.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Circuit Performance	B2AFF	<p>This DTC will detect when difference between Blower Motor commanded speed and feedback speed exceeds threshold.</p> <p>X out of Y will determine fault maturation and when to set the DTC.</p>	Difference between Front blower speed commanded duty cycle and Front blower speed feedback actual duty cycle	<p>$\geq 20\%$</p> <p>AND</p> <p>$\leq -20\%$</p>	<p>All of the following conditions are met:</p> <p>Front Blower Speed Diagnostic Enabled calibration is TRUE</p> <p>Front Blower Check Performance Diagnostic Enabled calibration is TRUE</p> <p>Controller is awake</p> <p>Front blower power short fault status</p> <p>Front blower ground short fault status</p> <p>Front blower open fault status</p> <p>Front blower feedback Duty Cycle percent</p> <p>Front blower feedback Duty Cycle percent</p> <p>Front blower feedback frequency (Hz)</p> <p>No Active DTC</p> <p>Commanded front blower speed current and previous duty cycle has changed by:</p>	<p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p># Fault</p> <p># Fault</p> <p># Fault</p> <p>!(>= 0.00 & <= 10.00)</p> <p>!(>= 90.00 & <= 100.00)</p> <p>(>45.00 & < 250.00)</p> <p>B2B00, B2B01, B2B02, B2B03, B2B0B, B2B0C</p> <p><= 1 %</p>	8.00 seconds out of a 10.00 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					wait for: Commanded front blower Speed Duty cycle All of the following conditions are met for: Condition 1: Climate System Mode is changed to: then Wait for: or Condition 2: Outside Air Temperature Filtered Condition 3: Commanded front blower Speed duty cycle	>= 10.0 sec >10.0% Propulsion or Ignition On >=30.0 sec <= 30.0 degC <= 50.0 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Circuit High	B2B00	<p>Blower Motor Speed Circuit High Diagnostic will detect short-to-voltage circuit fault on the Blower Motor Speed Command wire between the blower motor and the BCM.</p> <p>X out of Y will determine fault maturation and when to set the DTC.</p>	Front blower power short fault status (BSP signal)	= CeHVC_FBFD_FAULT	<p>All of the following conditions are met:</p> <p>Front Blower Speed Diagnostic Enabled calibration is TRUE</p> <p>Front Blower Check High Diagnostic Enabled calibration is TRUE</p> <p>Controller is awake</p> <p>Front blower power short fault status</p> <p>Commanded Front Blower Speed Duty Cycle</p>	<p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p># Indeterminate</p> <p>> 0 %</p>	0.15 seconds out of a 0.20 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Circuit Low	B2B01	Blower Motor Speed Circuit Low Diagnostic will detect short-to- ground and open circuit faults on the Blower Motor Speed Command wire between the blower motor and the BCM. X out of Y will determine fault maturation and when to set the DTC.	Any of the following conditions are met: Front blower ground short fault status Front blower open fault status (BSP signals)	= CeHVC_FBFD_FAULT = CeHVC_FBFD_FAULT	All of the following conditions are met: Front Blower Speed Diagnostic Enabled calibration is TRUE Front Blower Check High Diagnostic Enabled calibration is TRUE Controller is awake Front blower ground short fault status Front blower open fault status Commanded Front Blower Speed Duty Cycle	= TRUE = TRUE = TRUE # Indeterminate # Indeterminate = 0 %	4.00 seconds out of a 5.00 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Return Circuit High	B2B02	Blower Motor Speed Return Circuit High Diagnostic will detect short-to-voltage and open circuit faults on the Blower Speed Feedback wire between the blower motor and the BCM. X out of Y will determine fault maturation and when to set the DTC.	Front Blower Feedback Duty Cycle	>= 0 % And <= 10 %	All of the following conditions are met: Front Blower Speed Diagnostic Enabled calibration is TRUE Front Blower Return Check High Diagnostic Enabled calibration is TRUE Controller is awake Commanded Front Blower Speed Duty Cycle	= TRUE = TRUE = TRUE >10.0%	8.00 seconds out of a 10.00 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Return Circuit Low	B2B03	Blower Motor Speed Return Circuit Low Diagnostic will detect short-to-ground circuit faults on the Blower Speed Feedback wire between the blower motor and the BCM. X out of Y will determine fault maturation and when to set the DTC.	Front Blower Feedback Duty Cycle	<= 100 % And >= 90 %	All of the following conditions are met: Front Blower Speed Diagnostic Enabled calibration is TRUE Front Blower Return Check Low Diagnostic Enabled calibration is TRUE Controller is awake Commanded Front Blower Speed Duty Cycle	= TRUE = TRUE = TRUE >10.0%	8.00 seconds out of a 10.00 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Left Front Temp Actuator Performance Diagnostic	B2B05	<p>This DTC will detect when the Temp Door travels to its commanded position within the full dynamic range and fails to reach the end of the commanded position short of a calibrated tolerance.</p> <p>This DTC is enabled when the enable criteria of this diagnostics is met and it is an X of Y diagnostic. This is a continuous diagnostic and runs during normal operation of vehicle. This DTC runs when the actuator door is commanded to move to a desired position, the request of which comes from customer through HVAC Actuator Controls algorithm.</p>	<p>Failure Case 1:</p> <p>All of the conditions are met:</p> <p>Front Left Temp Actuator LIN Actuator Retry Number</p> <p>Front Left Temp Actuator Actual Position</p> <p>Front Left Temp Actuator Performance Diagnostic Allowable Stalled Movement Range</p> <p>Front Left Temp Actuator Performance Diagnostic Stall Detected</p> <p>Actuator travel must not be moving toward an end stop within a margin:</p> <p>Low End</p> <p>High End</p>	<p>> 3</p> <p># Front Left Temp Actuator Future Position Desired</p> <p># Normal</p> <p>= End Stop Detected</p> <p>< 10.00 pct</p> <p>> 90.00 pct</p>	<p>Diagnostic is Enabled</p> <p>Front Left Temp Actuator Diagnostics Global enable Calibration is TRUE</p> <p>No Active Loss of Communication DTC's</p> <p>Front Left Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active</p> <p>Only one of the following condition (a) or (b) is met:</p> <p>a) Diagnostic failure is True</p> <p>b) All of the following are met:</p> <p>i) Front Left Temp Actuator Performance Diagnostic Allowable Stalled Movement Range is equal to Normal</p> <p>"ii) Front Left Temp Actuator Actual position ></p> <p>"iii) Front Left Temp Actuator Actual position <</p>	<p>= TRUE</p> <p>U0659</p> <p>B2B2A</p> <p>=TRUE</p> <p>=Normal</p> <p>> Front Left Temp Actuator Performance Diagnostic Future Position Desired MINUS 5,000.00</p> <p>< Left Front Temp Actuator Performance Diagnostic Future Position Desired PLUS 5,000.00</p>	Upto 4.80 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					iv) Front Left Temp Actuator Learn Retry Count (counter has not expired)	<3		
			Failure Case 2: All of the conditions are met: Front Left Temp Actuator Learn Retry Count Front Left Temp Actuator Performance Diagnostic Stall Detected	> 3 = End Stop Detected	Diagnostic is Enabled Front Left Temp Actuator Diagnostics Global enable Calibration is TRUE No Active Loss of Communication DTC's Front Left Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is True b) All of the following are met: i) Front Left Temp Actuator Performance Diagnostic Allowable Stalled Movement Range is equal to Normal "ii) Front Left Temp Actuator Actual position >	= TRUE U0659 B2B2A =TRUE =Normal > Front Left Temp	Up to 4.80 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					"iii) Front Left Temp Actuator Actual position < iv) Front Left Temp Actuator Learn Retry Count (counter has not expired)	Actuator Performance Diagnostic Future Position Desired MINUS 5,000.00 < Left Front Temp Actuator Performance Diagnostic Future Position Desired PLUS 5,000.00 <3		
			Failure Case 3: All of the conditions are met: Front Left Temp Actuator Future Position Performance Fail Timer Any of the conditions below are satisfied: a) Front Left Temp Actuator Actual Position b) Front Left Temp Actuator Actual Position	 > 120.00 s < Front Left Temp Actuator Future Position Commanded - 5,000 steps > Front Left Temp Actuator Future Position Commanded+ 5,000 steps	Diagnostic is Enabled Front Left Temp Actuator Diagnostics Global enable Calibration is TRUE No Active Loss of Communication DTC's Front Left Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is True b) All of the following are met: i) Front Left Temp Actuator Performance Diagnostic Allowable Stalled Movement Range	 = TRUE U0659 B2B2A =TRUE	120.00 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					is equal to Normal "ii) Front Left Temp Actuator Actual position > "iii) Front Left Temp Actuator Actual position < iv) Front Left Temp Actuator Learn Retry Count (counter has not expired)	=Normal > Front Left Temp Actuator Performance Diagnostic Future Position Desired MINUS 5,000.00 < Left Front Temp Actuator Performance Diagnostic Future Position Desired PLUS 5,000.00 <3		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Right Front Temp Actuator Performance Diagnostic	B2B06	<p>This DTC will detect when the Temp Door travels to its commanded position within the full dynamic range and fails to reach the end of the commanded position short of a calibrated tolerance.</p> <p>This DTC is enabled when the enable criteria of this diagnostics is met and it is an X of Y diagnostic. This is a continuous diagnostic and runs during normal operation of vehicle. This DTC runs when the actuator door is commanded to move to a desired position, the request of which comes from customer through HVAC Actuator Controls algorithm.</p>	<p>Failure Case 1:</p> <p>All of the conditions are met:</p> <p>Front Right Temp Actuator LIN Actuator Retry Number</p> <p>Front Right Temp Actuator Actual Position</p> <p>Front Right Temp Actuator Performance Diagnostic Allowable Stalled Movement Range</p> <p>Front Right Temp Actuator Performance Diagnostic Stall Detected</p> <p>Actuator travel must not be moving toward an end stop within a margin:</p> <p>Low End</p> <p>High End</p>	<p>> 3</p> <p># Front Right Temp Actuator Future Position Desired</p> <p># Normal</p> <p>= End Stop Detected</p> <p>< 10.00 pct</p> <p>> 90.00 pct</p>	<p>Diagnostic is Enabled</p> <p>Front Right Temp Actuator Diagnostics Global enable Calibration is TRUE</p> <p>No Active Loss of Communication DTC's</p> <p>Front Right Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active</p> <p>Only one of the following condition (a) or (b) is met:</p> <p>a) Diagnostic failure is True</p> <p>b) All of the following are met:</p> <p>i) Front Right Temp Actuator Performance Diagnostic Allowable Stalled Movement Range is equal to Normal</p> <p>"ii) Front Right Temp Actuator Actual position ></p> <p>"iii) Front Right Temp Actuator Actual position <</p>	<p>= TRUE</p> <p>U065A</p> <p>B2B2D</p> <p>=TRUE</p> <p>=Normal</p> <p>> Front Right Temp Actuator Performance Diagnostic Future Position Desired MINUS 5,000.00</p> <p>< Front Right Temp Actuator Performance Diagnostic Future Position Desired PLUS 5,000.00</p>	Up to 4.80 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					iV) Front Right Temp Actuator Learn Retry Count (counter has not expired)	<3		
			Failure Case 2: All of the conditions are met: Front Right Temp Actuator Learn Retry Count Front Right Temp Actuator Performance Diagnostic Stall Detected	> 3 = End Stop Detected	Diagnostic is Enabled Front Right Temp Actuator Diagnostics Global enable Calibration is TRUE No Active Loss of Communication DTC's Front Right Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is True b) All of the following are met: i) Front Right Temp Actuator Performance Diagnostic Allowable Stalled Movement Range is equal to Normal "ii) Front Right Temp Actuator Actual position >	= TRUE U065A B2B2D =TRUE =Normal > Front Right Temp Actuator Performance Diagnostic Future Position Desired MINUS 5,000.00	Up to 4.80 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					"iii) Front Right Temp Actuator Actual position <	< Front Right Temp Actuator Performance Diagnostic Future Position Desired PLUS 5,000.00		
					iV) Front Right Temp Actuator Learn Retry Count (counter has not expired)	<3		
			Failure Case 3: All of the conditions are met: Front Right Temp Actuator Future Position Performance Fail Timer Any of the conditions below are satisfied: a) Front Right Temp Actuator Actual Position b) Front Right Temp Actuator Actual Position	> 120.00 s < Front Right Temp Actuator Future Position Commanded - 5,000 steps > Front Right Temp Actuator Future Position Commanded+ 5,000 steps	Diagnostic is Enabled Front Right Temp Actuator Diagnostics Global enable Calibration is TRUE No Active Loss of Communication DTC's Front Right Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is True b) All of the following are met: i) Front Right Temp Actuator Performance Diagnostic Allowable Stalled Movement Range is equal to Normal "ii) Front Right Temp	= TRUE U065A B2B2D =TRUE =Normal	120.00 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Actuator Actual position > "iii) Front Right Temp Actuator Actual position < iV) Front Right Temp Actuator Learn Retry Count (counter has not expired)	> Front Right Temp Actuator Performance Diagnostic Future Position Desired MINUS 5,000.00 < Front Right Temp Actuator Performance Diagnostic Future Position Desired PLUS 5,000.00 <3		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Return Feedback Circuit Out of Range High	B2B0B	<p>This DTC will detect when the blower motor feedback sensor is reporting a value above the maximum allowed.</p> <p>Blower Motor Speed Feedback Circuit Out of Range High Diagnostic will consume the Climate Control Front Blower Fan Speed Feedback Frequency from the OBD Smart Device "BCM" and increment the failure counter when a fail occurs. X of Y will determine fault maturation and when to set the DTC.</p>	Front Blower Feedback frequency	> 250.00 Hz	<p>All of the following conditions are met:</p> <p>Front Blower Speed Diagnostic Enabled calibration is TRUE</p> <p>Front Blower Feedback Check Out of Range High Diagnostic Enabled calibration is TRUE</p> <p>Controller is awake</p> <p>No Active DTC</p> <p>Commanded Front Blower Speed Duty Cycle</p>	<p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>B2B02.B2B03</p> <p>>10.0%</p>	8.00 seconds out of a 10.00 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Blower Motor Speed Return Feedback Circuit Out of Range Low	B2B0C	<p>This DTC will detect when the blower motor feedback sensor is reporting a value less than the minimum allowed.</p> <p>X out of Y will determine fault maturation and when to set the DTC.</p>	Front Blower Feedback DC frequency	< 45.00 Hz	<p>All of the following conditions are met:</p> <p>Front Blower Speed Diagnostic Enabled calibration is TRUE</p> <p>Front Blower Feedback Check Out of Range Low Diagnostic Enabled calibration is TRUE</p> <p>Controller is awake</p> <p>No Active DTC</p> <p>Commanded Front Blower Speed Duty Cycle</p>	<p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>B2B02.B2B03</p> <p>> 10.0%</p>	8.00 seconds out of a 10.00 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate INFO Touchscreen CSM Performance Rationality (For CSS Engine)	B2B16	<p>This DTC will detect when the Alive Rolling Count and/or Check Sum fails for the CAN Messages containing HVAC OBD required signals from the Touchscreen/CSM. The DTC is enabled when the enable criteria is met, and this DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the Alive Rolling Count and/or Check Sum fails for any of the above-mentioned signals are set then the BCM shall set the fault status to set to Fail. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p> <p>Refer to Section N for Emissions Neutral Default Action</p>	<p>Any of the following conditions are met:</p> <p>a) Multiple HVAC HMI requests provided by Touchscreen/CSM received in a single serial data frame</p> <p>b) HVAC HMI requests provided by Touchscreen/CSM received during Off Power Mode</p> <p>c) Active Alive Rolling Count DTC</p>	U0485	<p>Diagnostics is Enabled</p> <p>ECU Initialization</p> <p>No Active Communication DTC</p>	<p>>=0.25 sec</p> <p>U0184</p>		Type C, 1 Trip No MIL Emissions Neutral

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Left Front Temp Actuator Out of Range High Diagnostic	B2B28	This DTC will detect when the Temp Door actuator travels its full dynamic range and will fail if a Stall Detected signal from the LIN smart actuator is not received before a calibrated timer has expired or exceeds expected full dynamic range plus calibrated tolerance. This DTC is enabled when the enable criteria of this diagnostics is met and it is an X of Y diagnostic. This DTC runs during actuator Learn initiated by HVAC actuator Controls algorithm. The actuator Learn is a process where the actuator is commanded to perform its full dynamic range check. Actuator Learn primarily occurs during OFF Power Mode after a calibrated timer is expired.	Fail Case 1: The failure condition latch is set to True when all the following failure conditions are met for at least one execution: Front Left Temp Actuator Actual position is less than Front Left Temp Actuator Actual position Front Left Temp Actuator Stop Movement Commanded Front Left Temp Actuator High End Stall Timer Front Left Temp Actuator Learn Retry Count Front Left Temp Actuator Expired Retry Timer Front Left Temp Actuator Suspend Learn The failure condition latch will be cleared all the following conditions are met for at least one execution: Failure conditions above are no longer	< Front Left Temp Actuator Future Position Commanded > 12,556 steps = Stop > 0 msec > 3 > 3 = True	Diagnostic is Enabled Front Left Temp Actuator Diagnostics Global enable Calibration is TRUE Front Left Temp Actuator Learn Active signal is TRUE No Active Loss of Communication DTC's No Front Left Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is latched b) All of the following are met: i) Front Left Temp Actuator Stall Timer > msec ii) Front Left Temp Actuator Stop Movement Commanded iii) Front Left Temp Actuator Actual position	= TRUE = TRUE U0659 B2B2A TRUE >0 msec —Stop ≤ 12,556 steps	Upto 4.80 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			met					
			Front Left Temp Actuator Suspend Learn	= False	iv) Front Left Temp Actuator Actual Position	>= 11,556 steps		
			Fail Case 2: The failure condition latch is set to True when all the following failure conditions are met for at least one execution: Front Left Temp Actuator Low End Stall Timer Front Left Temp Actuator Stall Detected Front Left Temp Actuator Suspend Learn The failure condition latch will be cleared all the following conditions are met for at least one execution: Failure conditions above are no longer met Front Left Temp Actuator Suspend Learn	= 0 msec = No End Stop Detected = True = False	Diagnostic is Enabled Front Left Temp Actuator Diagnostics Global enable Calibration Front Left Temp Actuator Learn Active signal No Active Loss of Communication DTC's Front Left Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is latched b) All of the following are met: i) Front Left Temp Actuator Stall Timer > msec ii) Front Left Temp Actuator Stop Movement Commanded	= TRUE = TRUE U0659 B2B2A =TRUE >0 msec —Stop	Up to 30.00 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	

24OBDG03D Part 1 BCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					iii) Front Left Temp Actuator Actual position iv) Front Left Temp Actuator Actual Position	<= 12,556 steps >= 11,556 steps		
			Fail Case 3: The failure condition latch is set to True when all the following failure conditions are met for at least one execution:All of the conditions are met: Front Left Temp Actuator High End Stall Timer Front Left Temp Actuator Learn Retry Count Front Left Temp Actuator Stall Detected Front Left Temp Actuator Suspend Learn The failure condition latch will be cleared all the following conditions are met for at least one execution: Failure conditions above are no longer met	= 0 msec > 3 = No End Stop Detected = True	Diagnostic is Enabled Front Left Temp Actuator Diagnostics Global enable Calibration is TRUE Front Left Temp Actuator Learn Active signal is TRUE No Active Loss of Communication DTC's Front Left Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is latched b) All of the following are met: i) Front Left Temp Actuator Stall Timer > msec ii) Front Left Temp	= TRUE = TRUE U0659 B2B2A =TRUE >0 msec	Upto 120.00 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Front Left Temp Actuator Suspend Learn	= False	Actuator Stop Movement Commanded iii) Front Left Temp Actuator Actual position iv) Front Left Temp Actuator Actual Position	—Stop ≤ 12,556 steps ≥ 11,556 steps		

24OBDG03D Part 1 BCM Summary Tables

[illegible]

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			above are no longer met. Front Left Temp Actuator Suspend Learn	=False	Actuator Actual position iv) Front Left Temp Actuator Actual Position	<= 12,556 steps >= 11,556 steps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Left Front Temperature Data Message Counter Incorrect	B2B2A	This DTC monitors for an internal error or error in communication with the Left Front Temperature Actuator	Any of the Alive Rolling Counts signal values listed below are incorrect for: AHDA02_ARC:	8 fail counts out of 10 sample counts	Time since power-up reset, running reset, recovery from under/over voltage condition All the following conditions are met for Partial Network is active Power Mode Battery Voltage	>= 5,000 milliseconds >= 3,000 milliseconds = Run >11.00 Volts	LIN bus communication executes in 600ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Right Front Temp Actuator Out of Range High Diagnostic	B2B2B	<p>This DTC will detect when the Temp Door actuator travels its full dynamic range and will fail if a Stall Detected signal from the LIN smart actuator is not received before a calibrated timer has expired or exceeds expected full dynamic range plus calibrated tolerance.</p> <p>This DTC is enabled when the enable criteria of this diagnostics is met and it is an X of Y diagnostic. This DTC runs during actuator Learn initiated by HVAC actuator Controls algorithm. The actuator Learn is a process where the actuator is commanded to perform its full dynamic range check. Actuator Learn primarily occurs during OFF Power Mode after a calibrated timer is expired.</p>	<p>Failure Case 1:</p> <p>The failure condition latch is set to True when all the following failure conditions are met for at least one execution:</p> <p>Front Right Temp Actuator Actual position is less than</p> <p>Front Right Temp Actuator Actual position</p> <p>Front Right Temp Actuator Stop Movement Commanded</p> <p>Front Right Temp Actuator High End Stall Timer</p> <p>Front Right Temp Actuator Learn Retry Count</p> <p>Front Right Temp Actuator Expired Retry Timer</p> <p>Front Right Temp Actuator Suspend Learn</p> <p>The failure condition latch will be cleared all the following conditions are met for at least one execution:</p> <p>Failure conditions above are no longer met</p>	<p>< Front Right Temp Actuator Future Position Commanded</p> <p>> 12,653 steps</p> <p>= Stop</p> <p>> 0 msec</p> <p>> 3</p> <p>> 3</p> <p>= True</p>	<p>Diagnostic is Enabled</p> <p>Front Right Temp Actuator Diagnostics Global enable Calibration is TRUE</p> <p>Front Right Temp Actuator Learn Active signal is TRUE</p> <p>No Active Loss of Communication DTC's</p> <p>Front Right Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active</p> <p>Only one of the following condition (a) or (b) is met:</p> <p>a) Diagnostic failure is latched</p> <p>b) All of the following are met:</p> <p>i) Front Right Temp Actuator Stall Timer > msec</p> <p>ii) Front Right Temp Actuator Stop Movement Commanded</p> <p>iii) Front Right Temp Actuator Actual position</p> <p>iv) Front Right Temp Actuator Actual</p>	<p>= TRUE</p> <p>= TRUE</p> <p>U065A</p> <p>B2B2D</p> <p>=TRUE</p> <p>>0 msec</p> <p>—Stop</p> <p><= 12,653 steps</p>	Upto 4.80 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Front Right Temp Actuator Suspend Learn	= False	Position	>= 11,653.00 steps		
			Failure Case 2: The failure condition latch is set to True when all the following failure conditions are met for at least one execution:All of the conditions are met: Front Right Temp Actuator Low End Stall Timer Front Right Temp Actuator Stall Detected Front Right Temp Actuator Suspend Learn The failure condition latch will be cleared all the following conditions are met for at least one execution: Failure conditions above are no longer met Front Right Temp Actuator Suspend Learn	= 0 msec = No End Stop Detected = True = False	Diagnostic is Enabled Front Right Temp Actuator Diagnostics Global enable Calibration is TRUE Front Right Temp Actuator Learn Active signal is TRUE No Active Loss of Communication DTC's Front Right Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is latched b) All of the following are met: i) Front Right Temp Actuator Stall Timer > msec ii) Front Right Temp Actuator Stop Movement Commanded iii) Front Right Temp	= TRUE = TRUE U065A B2B2D =TRUE >0 msec —Stop	Up to 30.00 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	

24OBDG03D Part 1 BCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Actuator Actual position	<= 12,653 steps		
					iv) Front Right Temp Actuator Actual Position	>= 11,653.00 steps		
			Failure Case 3: The failure condition latch is set to True when all the following failure conditions are met for at least one execution: All of the conditions are met: All of the conditions are met: Front Right Temp Actuator High End Stall Timer Front Right Temp Actuator Learn Retry Count Front Right Temp Actuator Stall Detected Front Right Temp Actuator Suspend Learn The failure condition latch will be cleared all the following conditions are met for at least one execution: Failure conditions above are no longer met	= 0 msec > 3 = No End Stop Detected = True	Diagnostic is Enabled Front Right Temp Actuator Diagnostics Global enable Calibration is TRUE Front Right Temp Actuator Learn Active signal is TRUE No Active Loss of Communication DTC's Front Right Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is latched b) All of the following are met: i) Front Right Temp Actuator Stall Timer > msec ii) Front Right Temp Actuator Stop Movement Commanded	= TRUE = TRUE U065A B2B2D =TRUE >0 msec —Stop	Up to 120.00 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Front Right Temp Actuator Suspend Learn	= False	iii) Front Right Temp Actuator Actual position iv) Front Right Temp Actuator Actual Position	<= 12,653 steps >= 11,653.00 steps		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Right Front Temp Actuator Out of Range Low Diagnostic	B2B2C	This DTC will detect when the Temp Door is commanded to move to the higher end of its dynamic range and fails to reach the end of the commanded position short of a calibrated tolerance. This DTC is enabled when the enable criteria of this diagnostics is met and it is an X of Y diagnostic. This DTC runs during Actuator Learn initiated by HVAC Actuator Controls algorithm. The Actuator Learn is a process where the actuator is commanded to perform its full dynamic range check. Actuator Learn primarily occurs during OFF Power Mode after a calibrated timer is expired. After the actuator is commanded to the lower end of its dynamic range and the BCM has received End Stop Detected from the LIN smart actuator and the calibrated timer is not expired then the actuator is commanded to the high end of its dynamic range.	Failure Case 1: The failure condition latch is set to True when all the following failure conditions are met for at least one execution: All of the conditions are met: Front Right Temp Actuator Actual position Front Right Temp Actuator Actual position Front Right Temp Actuator Stop Movement Commanded Front Right Temp Actuator High End Stall Timer Front Right Temp Actuator Learn Retry Count Front Right Temp Actuator Expired Retry Timer Front Right Temp Actuator Suspend Learn The failure condition latch will be cleared when all the following conditions are met for at least one execution: Failure conditions above are no longer met.	= 11,653 steps < Front Right Temp Actuator Future Position Commanded = Stop > 0 msec > 3 > 3 = True	Diagnostic is Enabled Front Right Temp Actuator Diagnostics Global enable Calibration is TRUE Front Right Temp Actuator Learn Active signal is TRUE No Active Loss of Communication DTC's Front Right Temp Actuator Actual Position Signal - Failed Continuous Operation Fault Active Only one of the following condition (a) or (b) is met: a) Diagnostic failure is latched b) All of the following are met: i) Front Right Temp Actuator Stall Timer > msec ii) Front Right Temp Actuator Stop Movement Commanded iii) Front Right Temp Actuator Actual position iv) Front Right Temp	= TRUE = TRUE U065A B2B2D =TRUE >0 msec —Stop <= 12,653 steps >=11,653.00 steps	Up to 4.80 Seconds (includes time for the actuator to perform the retries referenced in the fail criteria)	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Front Right Temp Actuator Suspend Learn	=False	Actuator Actual Position			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Right Front Temperature Data Message Counter Incorrect	B2B2D	This DTC monitors for an internal error or error in communication with the Right Front Temperature Actuator	Any of the Alive Rolling Counts signal values listed below are incorrect for: AHDA03.ARC:	8 fail counts out of 10 sample counts	Time since power-up reset, running reset, recovery from under/over voltage condition All the following conditions are met for Partial Network is active Power Mode Battery Voltage	>= 5,000 milliseconds >= 3,000 milliseconds = Run >11.00 Volts	LIN bus communication executes in 600ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Park Switch Stuck Closed	B2BA2	Controller specific software that diagnoses the Shifter Park Switch Stuck Closed (in park state) condition. In this monitor, Shifter Park Switch state is compared against the Transmission Shift Lever Position signal from TCM. If Transmission Shift Lever Position signal is not in Park but Shifter Park Switch is in closed state for X out of Y counts then this DTC gets set.	Shifter Park Switch is	= PARK	<p>All of the following conditions are met: Park Switch Closed Diagnostic Enable is CbTRUE</p> <p>No Active Lost Communication with Transmission Control Module DTC</p> <p>System 12V Battery Voltage is above threshold</p> <p>System 12V Battery Voltage Out of Range Delay has Elapsed</p> <p>Transmission Shift Lever Position is NOT equal to Park</p>	<p>= TRUE</p> <p>U0101</p> <p>> 11.00volts (with hysteresis disable < 10.00 volts)</p> <p>> 0.00 milliseconds</p> <p>NOT equal to PARK</p>	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 Illum.
Park Switch Stuck Open	B2BA3	Controller specific software that diagnoses the Shifter Park Switch Stuck Open (not in park state) condition. In this monitor, Shifter Park Switch state is compared against the Transmission Shift Lever Position signal from TCM. If Transmission Shift Lever Position signal is in Park but Shifter Park Switch is in open state for calibratable fail threshold count, then this DTC gets set. And, if Transmission Shift Lever Position signal is in Park and Shifter Park Switch is in closed state for consecutively calibratable pass threshold counts then this diagnostic is passed.	Shifter Park Switch is	NOT equal to PARK	<p>All of the following conditions are met: Park Switch Closed Diagnostic Enable is CbTRUE</p> <p>No Active Lost Communication with Transmission Control Module DTC</p> <p>System 12V Battery Voltage is above threshold</p> <p>System 12V Battery Voltage Out of Range Delay has Elapsed</p> <p>Transmission Shift Lever Position is equal to PARK</p>	<p>= TRUE</p> <p>U0101</p> <p>> 11.00volts (with hysteresis disable < 10.00 volts)</p> <p>> 0.00 milliseconds</p> <p>= PARK</p>	<p>Diagnostic will fail with 120.00 seconds of continuous fail counts</p> <p>Diagnostic will pass with 0.03 seconds of continuous pass counts</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning (A/C) Evaporator Temperature Sensor Circuit	P0535	This DTC will determine whether the rate of change of the evaporator air temperature as sensed by the EAT sensor as read by the BCM has exceeded a calibrated value. The DTC is enabled when the enable criteria is met. This DTC is an X out of Y diagnostic. The diagnostic will run continuously. The fail criteria of the diagnostic shall be met after the following: 1. Take the absolute value of the difference between the current EAT value and previous EAT value. 2. Calculate the calibrated threshold for the EAT sensor rate of change by taking the calibrated value for maximum allowable rate of change for EAT sensor and divide by the number of executions per second. Check that the absolute value of the difference between the current EAT value and previous EAT value exceeds the calibrated threshold for the EAT sensor rate of change. When the fail	The absolute value of the difference between current Raw Evaporator Air Temperature value and previous Raw Evaporator Air Temperature value is	> 40.00 Changes per Execution (deg C)	Diagnostic is Enabled Evaporator Air Temperature Diagnostics Global Enable Calibration is TRUE Evaporator Air Temperature Sensor Present is TRUE 12 Volt System Voltage in Range Status Electronic Control Unit (ECU) Wakeup Pass No Active AC_Evaporator Air Temperature (EAT) Out of Range High Fault Active No Active AC_Evaporator Air Temperature (EAT) Out of Range Low Fault Active	= TRUE = TRUE = TRUE = TRUE P0538 P0537	8 seconds out of a 20 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		criteria is met, the fault status shall equal FAIL. This will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold in the same fault maturation cycle, the DTC shall set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning (A/C) Evaporator Temperature Sensor Circuit Low	P0537	This DTC will detect the Evaporator Air Temperature Sensor that is too low and out of the expected operating temperature sensor range. The DTC is enabled when the enable criteria is met. This DTC is an X out of Y diagnostic. The diagnostic will run continuously. When the voltage is less than or equal to Out of range Low threshold then fail criteria shall be met and the fault status shall equal FAIL. This will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold in the same fault maturation cycle, the DTC shall set.	Debounced Raw Evaporator Air Temperature Voltage is	< 0.17 (Volts)	Diagnostic is Enabled Evaporator Air Temperature Diagnostics Global Enable Calibration is TRUE Evaporator Air Temperature Sensor Present is TRUE Electronic Control Unit (ECU) Wakeup Pass	= TRUE = TRUE = TRUE	7.92 seconds out of a 9.9 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning (A/C) Evaporator Temperature Sensor Circuit High	P0538	This DTC will detect the Evaporator Air Temperature Sensor that is too high and out of the expected operating temperature sensor range. The DTC is enabled when the enable criteria is met. This DTC is an X out of Y diagnostic. The diagnostic will run continuously. If the voltage is greater than or equal to the Out of range High threshold then fail criteria shall be met and the fault status shall equal FAIL. This will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold in the same fault maturation cycle, the DTC shall set.	Debounced Raw Evaporator Air Temperature Voltage is	> 4.75 (Volts)	Diagnostic is Enabled Evaporator Air Temperature Diagnostics Global Enable Calibration is TRUE Evaporator Temperature Sensor Present is TRUE Electronic Control Unit (ECU) Wakeup Pass	= TRUE = TRUE = TRUE	7.92 seconds out of a 9.9 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Performance	P058A	The battery monitor module performance diagnostic is required to diagnose if the IBS sensor has any internal faults. The IBS checks a list of performance parameters as part of this diagnostic: reference voltage, voltage calibration check, current clibration check, NVM static data checksum, NVM dynamic data checksum, page 0 checksum, and wakeup timer check. Once all checks are completed in IBS the result is transmitted to BCM where appropriate DTC will be reported to DFIR. This diagnostic occurs once upon LIN wakeup, and the result is transmitted to BCM within 6 seconds.	IBS Sensor Internal Fault is TRUE (Internal IBS diagnostic)	= CeEM_e_IBS_DiagFailed	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is TRUE Battery Monitor Module Performance Diagnostic Enable is TRUE No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC	> 11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE U01B000 P15FF00	6 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current Monitoring Performance	P058B	The Battery Monitor Module Current Performance diagnostic is required to ensure there is not an open circuit fault at the shunt resistor. This diagnostic is performed within IBS and status is communicated to BCM where results are reported to DFIR. . IBS monitors the shunt resistor for open circuit while asleep and record historical result. This result is sent to BCM upon LIN wakeup. The BCM receives the historical result and reports to DIFR within 1 second of LIN wakeup. The continuous portion of this diagnostic does not run while the historical portion is running. The internal IBS diagnostic for the continuous portion uses 4 fails out of 5 samples at a rate of 16 second per sample.	IBS has open shunt condition, Battery Current Rationality Diagnostic Determination equals Diagnostic Failed (Internal IBS diagnostic)	= CeEM_e_IBS_DiagFailed	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>IBS Current Performance Diagnostic Enable is TRUE</p> <p>IBS Current Performance Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Battery Current Rationality Historical Diagnostic Enable is FALSE</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B00</p> <p>= P15FF00</p> <p>= FALSE</p>	80 seconds (4 fails out of 5 samples at 16 seconds per sample)	Type B, 2 Trips
			IBS has open shunt condition: Battery Current Rationality Diagnostic Determination equals Diagnostic Failed	= CeEM_e_IBS_DiagFailed	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p>	> 11.00 volts (with	1 second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			(Internal IBS diagnostic)	ed	<p>IBS NormalCommEnable is TRUE</p> <p>IBS Current Performance Diagnostic Enable is TRUE</p> <p>IBS Current Performance Historical Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Monitoring Performance	P058C	The battery monitor module temperature monitoring performance is required to diagnose if the difference between IBS NTC raw temperature and IBS ASIC raw temperature is within a rational threshold. This diagnostic is performed in BCM by comparing the difference between NTC and ASIC temperature values sent by IBS with a calibratable threshold. IBS records up to 24 temperature samples at a rate of 1 set of sample per 30min while LIN is off. These 24 sets of samples are used in historical diagnostic, which occurs immediately after LIN wakeup. The historical diagnostic only runs once per LIN wakeup, while the continuous diagnostic runs repeatedly. BCM uses a X of Y strategy for both types of diagnostics.	Absolute difference between ASIC Raw Temperature and NTC Raw Temperature is above threshold	> 10.00 degrees Celsius	<p>All of the following conditions are met:</p> <p>System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is within range</p> <p>IBS Temperature Performance Diagnostic Enable is TRUE</p> <p>IBS Temperature Performance Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>No Active IBS Temperature Out of Range DTCs</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>= P058E00, P058F00, P16DE00, P16DF00</p>	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 Illum.
			Absolute difference between ASIC Raw Temperature and NTC Raw Temperature is above threshold	> 10.00 degrees Celsius	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is within range</p> <p>IBS Temperature Performance Diagnostic Enable is TRUE</p> <p>IBS Temperature Performance Historical Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Historical Temperature Data Down Count is in range</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>> 0 AMn</p>	8 seconds out of a 10 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No Active IBS Temperature Out of Range DTCs	<= 24 = P058E00, P058F00, P16DE00, P16DF00		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Voltage Monitoring Performance	P058D	The Battery Monitor Module Voltage Performance diagnostic is required to diagnose if the IBS Battery Voltage Sensor is accurately sensing the 12V Battery Voltage. The IBS battery voltage high resolution will be transmitted via LIN message from the sensor indicating what its internal sensor is reading for voltage. This voltage is compared with BCM's internal voltage reading (12V System Voltage). If the difference between the two voltages is greater than a calibratable threshold, then the fail counter will increment. Due to the high fluctuation of voltage during cranking event, this diagnostic is disabled from beginning of crank to a calibratable time delay after the end of crank. This diagnostic uses an X of Y strategy.	Absolute difference between Battery Monitor Module Voltage and BCM System Voltage is above threshold	>5.00 Volts	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Battery Monitor Module Voltage Performance Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>No Active Battery Voltage Out of Range DTCs</p> <p>Powertrain Crank Active is FALSE</p> <p>Post-Crank Time Delay has elapsed</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>= P16D400, P16D500</p> <p>= FALSE</p> <p>>5,000.00 seconds</p>	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 Illum.
Battery Monitor Module Temperature High	P058E	The Battery Monitor Module Temperature Out of Range High diagnostic is required to diagnose if the IBS ASIC Raw Temperature is above selected threshold value. This diagnostic is performed in BCM by comparing raw ASIC temperature values sent by IBS with a calibratable threshold. IBS records up to 24 temperature samples at a rate of 1 sample per 30min while LIN is off. These 24 samples are used in historical diagnostic, which occurs immediately after LIN wakeup. The historical diagnostic only runs once per LIN wakeup, while the continuous diagnostic runs repeatedly. BCM uses a X of Y strategy for both types of diagnostics.	Battery Monitor Module ASIC Temperature above threshold	> 120.00 degrees Celsius	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is within range</p> <p>IBS Temperature High Diagnostic Enable is TRUE</p> <p>IBS Temperature High Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>	4 seconds out of a 5 seconds window	Type B, 2 Trips
			Battery Monitor Module ASIC Temperature above threshold	> 120.00 degrees Celsius	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p>	<p>> 11.00 volts (with hysteresis disable <</p>	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 Illum.
					<p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is in range</p> <p>IBS Temperature High Diagnostic Enable is TRUE</p> <p>IBS Temperature High Historical Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Historical Temperature Data Down Count is in range</p>	<p>10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>> 0 AND <= 24</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Low	P058F	The Battery Monitor Module Temperature Out of Range Low diagnostic is required to diagnose if the IBS ASIC Raw Temperature is above selected threshold value. This diagnostic is performed in BCM by comparing raw ASIC temperature values sent by IBS with a calibratable threshold. IBS records up to 24 temperature samples at a rate of 1 sample per 30min while LIN is off. These 24 samples are used in historical diagnostic, which occurs immediately after LIN wakeup. The historical diagnostic only runs once per LIN wakeup, while the continuous diagnostic runs repeatedly. BCM uses a X of Y strategy for both types of diagnostics.	Battery Monitor Module ASIC Temperature below threshold	<-43.00degrees Celsius	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is within range</p> <p>IBS Temperature Low Diagnostic Enable is TRUE</p> <p>IBS Temperature Low Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>	4 seconds out of a 5 seconds window	Type B, 2 Trips
			Battery Monitor Module ASIC Temperature below threshold	<-43.00degrees Celsius	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p>	<p>> 11.00 volts (with hysteresis disable <</p>	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 Illum.
					<p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is in range</p> <p>IBS Temperature Low Diagnostic Enable is TRUE</p> <p>IBS Temperature Low Historical Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Historical Temperature Data Down Count is in range</p>	<p>10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>> 0 AND <= 24</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Driver Mode Select Switch A Circuit Low	P05D1	This DTC will detect an OBD-compliant analog switch bank 1 input that is too low (out-of-range low).	Analog Mode Switch low voltage threshold	< 0.5280 V	VehicleSwitchBankI Diagnostic Enable calibration is TRUE VehicleSwitchBankI Circuit Diagnostic Enable calibration is TRUE VehicleSwitchBankI Circuit Out-Of-Range Low Diagnostic Enable calibration is TRUE	= TRUE = TRUE = TRUE	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 Illum.
Driver Mode Select Switch A Circuit High	P05D2	This DTC will detect an OBD-compliant analog switch bank 1 input that is too high (out-of-range high).	Analog Mode Switch high voltage threshold	> 4.7170 V	VehicleSwitchBankI Diagnostic Enable calibration is TRUE VehicleSwitchBankI Circuit Diagnostic Enable calibration is TRUE VehicleSwitchBankI Circuit Out-Of-Range High Diagnostic Enable calibration is TRUE	= TRUE = TRUE = TRUE	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 Illum.
Driver Mode Select Switch A Range/ Performance	P05D3	This DTC will detect an OBD-compliant analog switch bank 1 input that is invalid within its performance range (in-range deadband).	Analog Mode Switch indeterminate (deadband) regions for 8-state analog resistor ladder	0.5280 < sensed voltage < 0.6280 1.0250 < sensed voltage < 1.1025 1.5220 < sensed voltage < 1.5976 2.0350 < sensed voltage < 2.11 2.57 < sensed voltage < 2.64 3.10 < sensed voltage < 3.18 3.61 < sensed voltage < 3.69 4.13 < sensed voltage < 4.20 4.62 < sensed voltage < 4.72	VehicleSwitchBankI Diagnostic Enable calibration is TRUE VehicleSwitchBankI Circuit Diagnostic Enable calibration is TRUE VehicleSwitchBankI Circuit Performance Diagnostic Enable calibration is TRUE	= TRUE = TRUE = TRUE	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 Illum.
Control Module Read Only Memory (ROM)	P0601	This DTC will be stored if the calibration/ software checksum 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 failures if the fault occurs after the first pass is complete.			Diagnostic runs continuously in the background.	Type B, 2 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	ROM ECC diagnostic enable is CbTRUE	= CbTRUE	Diagnostic runs continuously via the flash hardware.	
				In all cases, the failure count is cleared when controller shuts down				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Long Term Memory Reset	P0603	This DTC detects an invalid NVM which includes Static NVM, Cumulative NVM, and SSAR NVM invalidities at start up.	Static NVM region error detected during initialization		Static NVM fault on default diagnostic enable is CbTRUE Allow blank BINVDN must be CbFALSE	= CbTRUE = CbFALSE	Diagnostic runs at controller power up.	Type B, 2 Trips
			Cumulative NVM region error detected during initialization		Cumulative NVM fault on default diagnostic enable is CbTRUE Allow blank BINVDN must be CbFALSE	= CbTRUE = CbFALSE	Diagnostic runs at controller power up.	
			SSAR NVM region error detected during initialization.		SSAR NVM fault on default diagnostic enable is CbTRUE Allow blank BINVDN must be CbFALSE	= CbTRUE = CbFALSE	Diagnostic runs at controller power up.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module RAM Failure	P0604	Indicates that the control module has detected a RAM fault. This includes read/write failures such as a Primary Processor System RAM Fault, Primary Processor Cache RAM Fault, and Primary Processor eTPU 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			Fault indication fed from HWIO-diagnostic runs continuously (background loop)	Type B, 2 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			Fault indication fed from HWIO-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	>= 3 counts			Fault indication fed from HWIO - diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Processor Integrity Fault	P0606	Indicates that the control module has detected an internal processor integrity fault. These include diagnostics done on the SPI Communication as well as a host of diagnostics for the primary processor.	2 fails in a row in the MAIN processor's ALU check		ALU diagnostic enable per CPU is CbTRUE	= CbTRUE	Run periodically at 25 ms loop rate	Type B, 2 Trips
			Checks number of stack over/under flow since last powerup reset	>=5	Stack Llimit Test diagnostic enable is CbTRUE	= CbTRUE	Run periodically at 100ms loop rate	
			Voltage deviation	> 0.4500 V	ADC Test diagnostic enable is CbTRUE A2D Test voltages used in diagnosis: Test Voltage 1 Test Voltage 2 Test Voltage 3 Test Voltage 4 Arbitrated Battery Voltage	= CbTRUE = 0 = 0 = 1 = 1 (1 means enabled, 0 means disabled) > 7.00 V	16 / 20 counts or 0.819 seconds continuous - Note: 50 ms/ count	
			MAIN processor DMA transfer test failures:	16/20 counts	DMA Transfer Test diagnostic enable is CbTRUE	= CbFALSE	Run periodically at 50ms loop rate	
			Safety critical software is not executed in proper order. End task calculation does not match expected value for failures	>= 1 incorrect sequence	Program Sequence Watch diagnostic enable calibration per task rate is CbTRUE 5ms 10ms 25ms 50ms 100ms	= CbTRUE = CbTRUE = CbTRUE = CbTRUE = CbTRUE	Fail time interval determined per task rate: 5ms: 12/16 counts 10ms: 12/16 counts 25ms: 12/16 counts 50ms: 6/8 counts	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							100ms: 3/4 counts Note: 50 ms/ count	
			MAIN processor determines a Program Sequence Watch seed has not changed within a specified time period.	Current seed value equals previous seed value.	Last Seed Timeout diagnostic enable is CbTRUE	= CbTRUE	Fail tolerant time set per task rate enabled through the Program Sequence Watch function: 5ms: 822 ms 10ms: 822 ms 25ms: 822 ms 50ms: 822 ms 100ms: 1,000 ms Note: 50 ms monitoring task rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Processor Integrity Performance	P0607	Indicates that the ECM has detected an internal processor integrity performance.	Checks for ECC (error correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occurred since last controller initialization. Counter	$\geq 3/10$ (results in MIL) or $\geq 5/10$ (results in MIL and remedial action)	Flash ECC diagnostic enable is CbTRUE	= CbTRUE	Fail indication from HWIO, variable failure dependent on time to access corrupt flash memory	Type B, 2 Trips
			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 occurred since last controller initialization. Counter	≥ 3 (results in MIL) / 10 5 (results in MIL and remedial action) / 10	RAM ECC diagnostic enable is CbTRUE	= CbTRUE	Fail indication from HWIO, variable failure dependent on time to access corrupt RAM variables	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #3 Circuit	P0697	Detects a continuous or intermittent short on the 5 volt reference circuit #3 by monitoring the reference percent Vref3 and failing the diagnostic when the percent Vref3 is too low or 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.	BCM percent Vref3 < or BCM percent Vref3 > or the difference between BCM filtered percent Vref3 and percent Vref3 >	78.13% Vref3 89.96 % Vref3 7.0000 % Vref3	Diagnostic enabled	= CbTRUE	0.8 seconds out of a 1 seconds window or 200.00 sec continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Temperature Erratic	P100C	The Battery Monitor Module Temperature Erratic diagnostic is required to diagnose if the IBS ASIC Raw Temperature sensor is erratic, caused by sudden short to ground or short to high. This diagnostic is performed in BCM by adding the absolute raw ASIC temperature values sent by IBS over a period of time and comparing with a calibratable threshold. This diagnostic uses the X of Y strategy.	Sum of the absolute difference between 10.00 ASIC Raw Temperature samples is above threshold	> 70.00 degrees Celsius	<p>All of the following conditions are met:</p> <p>System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is within range</p> <p>Temperature Erratic Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>	40 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Internal Temperature Erratic	P100D	The Battery Monitor Module Internal Temperature Erratic diagnostic is required to diagnose if the IBS NTC Raw Temperature sensor is erratic, caused by sudden short to ground or short to high. This diagnostic is performed in BCM by adding the absolute raw NTC temperature values sent by IBS over a period of time and comparing with a calibratable threshold. This diagnostic uses the X of Y strategy.	Sum of the absolute difference between 10.00 NTC Raw Temperature samples is above threshold	> 70.00 degrees Celsius	<p>All of the following conditions are met:</p> <p>System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is within range</p> <p>Temperature Circuit Erratic Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>	40 seconds out of a 50 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Air Conditioning (A/C) Evaporator Temperature Sensor Not Plausible - Sensor Rationality	P153B	<p>This DTC will compare EAT (Evaporator Air Temperature) with IAT (Inlet Air Temperature) and OAT (Outside Air Temperature) after a long soak</p> <p>The DTC is enabled when the enable criteria is met. This diagnostic will run once per drive cycle.</p> <p>The fail criteria of the diagnostic shall be met after All the following are true:</p> <ul style="list-style-type: none"> • The difference between the absolute value of the Evaporator Air Temperature and Inlet Air Temperature sensor values exceeds a calibrated value. • The difference between the absolute value of the Evaporator Air Temperature and Outside Air Temperature sensors values exceeds the calibrated value. <p>When the fail criteria is met during the 1st increment, the fault status shall equal FAIL. This will cause the DTC to set.</p>	<p>If the absolute value of the differences between Raw Evaporator Air Temperature and the Inlet Air Temperature Sensor Value is</p> <p>If the absolute value of the differences between Raw Evaporator Air Temperature and the Outside Air Temperature Sensor Value is</p>	<p>> 20.00 (degC)</p> <p>> 15.00 (degC)</p>	<p>Diagnostic is Enabled</p> <p>Evaporator Air Temperature Diagnostics Global Enable Calibration is TRUE</p> <p>Evaporator Temperature Sensor Present</p> <p>Electronic Control Unit (ECU) Wakeup Pass</p> <p>OBD Bias Check Enable</p> <p>Loss of Communiation of Propulsion System Off Time</p> <p>Invalidity Indication of Propulsion System Off Time</p> <p>Do Not Use Data Mas of Propulsion System Off Time</p> <p>Invalidity Indications of Inlet Air Temperature Sensor Value</p> <p>Status Indication of Inlet Air Temperature Sensor Value Loss of Communiatcation</p> <p>Outside Air Temperature Sensor Diagnosti Bundle Fault Active</p> <p>Outside Air Temperature</p>	<p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= FALSE</p> <p>= VALID</p> <p>= FALSE</p> <p>= VALID</p> <p>= FALSE</p> <p>= FALSE</p>	Diagnostic runs in 0.050 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Rationalized State Value of Propulsion System Off Timer is No Active AC_Evaporator Air Temperature (EAT) Out of Range High Fault Active No Active AC_Evaporator Air Temperature (EAT) Out of Range Low Fault Active No Active AC_Evaporator Air Temperature (EAT) Circuit Fault Active	= NORMAL > 28,800.00 (Seconds) P0538 P0537 P0535		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Sensor Signal Message Counter Incorrect	P15FF	This DTC monitors for an internal error or error in communication with the Battery Monitor Signal	Any of the Alive Rolling Counts signal values listed below are incorrect for: AmpHrsChrgdARC: AmpHrsDischrgdARC: BatCrnkDatARC: BatLINOFFDatARC: BatStsDatARC: CfgWkupDatARC: IBSCurrOORAndRatIFOM ARC: IBSDiagDetARC: MsrdTempARC: MinCrnkgDatARC: MVIAndSOFDatARC: BatSOCDatARC:	8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts	Time since power-up reset, running reset, recovery from under/over voltage condition All the following conditions are met for Partial Network is active Power Mode Battery Voltage	>= 5,000 milliseconds >= 3,000 milliseconds = Run >11.00 Volts	Fastest periodic communication rate to Battery Monitor Module on LIN bus executes at 250ms.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			IBSVItgFOMARC:	8 fail counts out of 10 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Circuit Voltage Low	P16D4	The Battery Monitor Module Circuit Low Voltage diagnostic is performed within intelligent battery sensor and is required to diagnose if the Sensor Voltage is out of range low. Once diagnostic determination is reached in IBS, the status is communicated to BCM where results are reported to DIFR. IBS monitors the battery voltage while asleep and record historical result. This result is sent to BCM upon LIN wakeup. The BCM receives the historical result and reports to DIFR within 1 second of LIN wakeup. The continuous portion of this diagnostic does not run while the historical portion is running. The internal IBS diagnostic for the continuous portion uses 200 fails out of 250 samples at a rate of 0.001 second per sample. The diagnostic result is sent to BCM continuously once per 0.25 seconds.	Battery Monitor Module Circuit Voltage below threshold (Internal IBS Diagnostic)	< 3 Volts	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Battery Voltage Out of Range Low Diagnostic Enable is TRUE</p> <p>Battery Voltage Out of Range Low Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Battery Voltage Out of Range Low Historical Diagnostic Enable is FALSE</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>= FALSE</p>	0.25 seconds (200 fails out of 250 samples at 0.001 second loop rate)	Type B, 2 Trips
			Battery Monitor Module Circuit Voltage below threshold (Internal IBS Diagnostic)	< 3 Volts	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p>	> 11.00 volts (with	1 second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>IBS NormalCommEnable is TRUE</p> <p>Battery Voltage Out of Range Low Diagnostic Enable is TRUE</p> <p>Battery Voltage Out of Range Low Historical Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Circuit Voltage High	P16D5	The Battery Monitor Module Circuit High Voltage diagnostic is performed within intelligent battery sensor and is required to diagnose if the Sensor Voltage is out of range high. Once diagnostics determination is reached in IBS, the status is communicated to BCM where results are reported to DIFR. IBS monitors the battery voltage while asleep and record historical result. This result is sent to BCM upon LIN wakeup. The BCM receives the historical result and reports to DIFR within 1 second of LIN wakeup. The continuous portion of this diagnostic does not run while the historical portion is running. The internal IBS diagnostic for the continuous portion uses 200 fails out of 250 samples at a rate of 0.001 second per sample. The diagnostic result is sent to BCM continuously once per 0.25 seconds.	Battery Monitor Module Circuit Voltage above threshold (Internal IBS Diagnostic)	> 26 Volts	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Battery Voltage Out of Range High Diagnostic Enable is TRUE</p> <p>Battery Voltage Out of Range High Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Battery Voltage Out of Range High Historical Diagnostic Enable is FALSE</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>= FALSE</p>	0.25 seconds (200 fails out of 250 samples at 0.001 second loop rate)	Type B, 2 Trips
			Battery Monitor Module Circuit Voltage above threshold (Internal IBS Diagnostic)	> 26 Volts	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p>	> 11.00 volts (with	1 second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					IBS NormalCommEnable is TRUE Battery Voltage Out of Range High Diagnostic Enable is TRUE Battery Voltage Out of Range High Historical Diagnostic Enable is TRUE No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC	hysteresis disable < 10.00) = TRUE = TRUE = TRUE = U01B000 = P15FF00		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current Low	P16D6	The Battery Monitor Module Current Out of Range Low diagnostic is performed within intelligent battery sensor and is required to diagnose if the sensor current is out of range low. Once diagnostic determination is reached in IBS, the status is communicated to BCM where results are reported to DIFR. IBS monitors the battery current while asleep and record historical result. This result is sent to BCM upon LIN wakeup. The BCM receives the historical result and reports to DIFR within 1 second of LIN wakeup. The continuous portion of this diagnostic does not run while the historical portion is running. The internal IBS diagnostic for the continuous portion uses 200 fails out of 250 samples at a rate of 0.001 second per sample. The diagnostic result is sent to BCM continuously once per 0.25 seconds.	Battery Monitor Module Current below threshold (Internal IBS diagnostic)	< -1400 Amps	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>IBS Current Out of Range Low Diagnostic Enable is TRUE</p> <p>IBS Current Out of Range Low Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Shunt Voltage Out of Range Low Historical Diagnostic Enable is FALSE</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>= FALSE</p>	0.25 seconds (200 fails out of 250 samples at 0.001 second loop rate)	Type B, 2 Trips
			Battery Monitor Module Current below threshold (Internal IBS diagnostic)	< -1400 Amps	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p>	> 11.00 volts (with	1 second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>IBS NormalCommEnable is TRUE</p> <p>IBS Current Out of Range Low Diagnostic Enable is TRUE</p> <p>IBS Current Out of Range Low Historical Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Current High	P16DD	The Battery Monitor Module Current Out of Range High diagnostic is performed within intelligent battery sensor and is required to diagnose if the sensor current is out of range high. Once diagnostic determination is reached in IBS, the status is communicated to BCM where results are reported to DIFR. IBS monitors the battery current while asleep and record historical result. This result is sent to BCM upon LIN wakeup. The BCM receives the historical result and reports to DIFR within 1 second of LIN wakeup. The continuous portion of this diagnostic does not run while the historical portion is running. The internal IBS diagnostic for the continuous portion uses 200 fails out of 250 samples at a rate of 0.001 second per sample. The diagnostic result is sent to BCM continuously once per 0.25 seconds.	Battery Monitor Module Current above threshold (Internal IBS diagnostic)	> 1400 Amps	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>IBS Current Out of Range High Diagnostic Enable is TRUE</p> <p>IBS Current Out of Range High Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Shunt Voltage Out of Range High Historical Diagnostic Enable is FALSE</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>= FALSE</p>	0.25 seconds (200 fails out of 250 samples at 0.001 second loop rate)	Type B, 2 Trips
			Battery Monitor Module Current above threshold (Internal IBS diagnostic)	> 1400 Amps	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p>	> 11.00 volts (with	1 second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>IBS NormalCommEnable is TRUE</p> <p>IBS Current Out of Range High Diagnostic Enable is TRUE</p> <p>IBS Current Out of Range High Historical Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Internal Temperature Circuit Low	P16DE	The Battery Monitor Module Internal Temperature Out of Range High diagnostic is required to diagnose if the IBS NTC Raw Temperature is above selected threshold value. This diagnostic is performed in BCM by comparing raw NTC temperature values sent by IBS with a calibratable threshold. IBS records up to 24 temperature samples at a rate of 1 sample per 30min while LIN is off. These 24 samples are used in historical diagnostic, which occurs immediately after LIN wakeup. The historical diagnostic only runs once per LIN wakeup, while the continuous diagnostic runs repeatedly. BCM uses a X of Y strategy for both types of diagnostics.	Battery Monitor Module NTC Temperature above threshold	> 120.00 degrees Celsius	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is within range</p> <p>Temperature Circuit Low Diagnostic Enable is TRUE</p> <p>Temperature Circuit Low Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>	4 seconds out of a 5 seconds window	Type B, 2 Trips
			Battery Monitor Module NTC Temperature above threshold	> 120.00 degrees Celsius	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p>	> 11.00 volts (with	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 Illum.
					<p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is in range</p> <p>Temperature Circuit Low Diagnostic Enable is TRUE</p> <p>Temperature Circuit Low Historical Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Historical Temperature Data Down Count is in range</p>	<p>hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>> 0 AND <= 24</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Internal Temperature Circuit High	P16DF	The Battery Monitor Module Internal Temperature Out of Range High diagnostic is required to diagnose if the IBS NTC Raw Temperature is above selected threshold value. This diagnostic is performed in BCM by comparing raw NTC temperature values sent by IBS with a calibratable threshold. IBS records up to 24 temperature samples at a rate of 1 sample per 30min while LIN is off. These 24 samples are used in historical diagnostic, which occurs immediately after LIN wakeup. The historical diagnostic only runs once per LIN wakeup, while the continuous diagnostic runs repeatedly. BCM uses a X of Y strategy for both types of diagnostics.	Battery Monitor Module NTC Temperature below threshold	<-43.00degrees Celsius	<p>All of the following conditions are met: System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is within range</p> <p>Temperature Circuit High Diagnostic Enable is TRUE</p> <p>Temperature Circuit High Continuous Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>	4 seconds out of a 5 seconds window	Type B, 2 Trips
			Battery Monitor Module NTC Temperature below threshold	<-43.00degrees Celsius	<p>All of the following conditions are met: System 12V Battery Voltage is above</p>		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 Illum.
					<p>threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Outside Air Temperature is within range</p> <p>Temperature Circuit High Diagnostic Enable is TRUE</p> <p>Temperature Circuit High Historical Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p> <p>Historical Temperature Data Down Count is in range</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>> -30.00 degrees Celsius AND < 50.00 degrees Celsius</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p> <p>> 0 AND <= 24</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Random Access Memory (RAM) Error	P16E1	The battery Monitor Module performance (RAM) error diagnostic is required to diagnose if the IBS sensor has any internal RAM faults. This diagnostic is performed within IBS and the status is transmitted to BCM where results are reported to DFIR. This diagnostic takes approximately 10 seconds to complete upon LIN wakeup, and is only run once per wakeup. The result is immediately transmitted to BCM after.	IBS Sensor Internal RAM Fault detected: IBS Internal Fault RAM Determination equals DiagFailed (internal IBS diagnostic)	= CeEM_e_IBS_DiagFailed	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS LIN Normal Communication Enable is TRUE Battery Monitor Module RAM Error Diagnostic Enable is TRUE No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC	> 11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE = U01B000 = P15FF00	10 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Random Access Memory (ROM) Error	P16E2	The battery Monitor Module performance (ROM) error diagnostic is required to diagnose if the IBS sensor has any internal ROM faults. This diagnostic is performed within IBS and the status is transmitted to BCM where results are reported to DFIR. This diagnostic takes approximately 60 seconds to complete upon LIN wakeup, and is only run once per wakeup. The result is immediately transmitted to BCM after.	<p>IBS Sensor Internal ROM Fault detected:</p> <p>IBS Internal Fault RAM Determination equals DiagFailed (internal IBS diagnostic)</p>	= CeEM_e_IBS_DiagFailed	<p>All of the following conditions are met:</p> <p>System 12V Battery Voltage is above threshold</p> <p>IBS NormalCommEnable is TRUE</p> <p>Battery Monitor Module ROM Error Diagnostic Enable is TRUE</p> <p>No Active Lost Communication with Intelligent Battery Sensor Module DTC</p> <p>No Active Battery Sensor Signal Message Counter Incorrect DTC</p>	<p>> 11.00 volts (with hysteresis disable < 10.00)</p> <p>= TRUE</p> <p>= TRUE</p> <p>= U01B000</p> <p>= P15FF00</p>	60 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Battery Monitor Module Data Incompatible Diagnostic	P16E3	The Battery Monitor Module Data Incompatible diagnostic is required to diagnose if the IBS is using the correct configuration information being transmitted by the Host controller to it. The IBS reads and transmits the configuration values it has loaded internally back to the host controller for verification. The historical test evaluates the IBS configuration return values to check if they are equal to the host controller's values. The diagnostic is executed once per host controller wakeup and checks only the first transmitted LIN message containing the IBS return configuration message. The continuous test compares the IBS configuration return values to those sent by BCM and uses X of Y maturation strategy to determine diagnostic state.	Any of the following criteria are met:		All of the following conditions are met: System 12V Battery Voltage is above threshold	> 11.00 volts (with hysteresis disable < 10.00)	5 seconds out of a 6 seconds window	Type B, 2 Trips
			IBS Config Return Battery Type is NOT equal to Vehicle Battery Type Configuration Battery Nominal Return C20 is above threshold IBS Config Return Battery Cal #1 U40% is above threshold IBS Config Return Battery Cal #2 U80% is above threshold IfSOC Bounding Limit Configuration check is TRUE then following conditions are included SOC Bounding Limit Hr3 Difference is above the threshold SOC Bounding Limit Hr8 Difference is above the threshold SOC Bounding Limit Hr24 Difference is above threshold	NOT equal to Vehicle Battery Type Configuration CeEPM_ADV_BATT_TECH-AGM >5.00 >0.50 >0.50 = TRUE >0.01 >0.01 >0.01	IBS NormalCommEnable is TRUE IBS Configuration Diagnostic Continuous Enable is TRUE Battery Monitor Module Data Incompatible Determination Historical Diagnostic Enable is FALSE No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC	= TRUE = TRUE = FALSE = U01B000 = P15FF00	1 second	
			Any of the following criteria are met		All of the following conditions are met: System 12V Battery Voltage is above			
			IBS Config Return					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Battery Type is NOT equal to Vehicle Battery Type Configuration Battery Nominal Return C20 is above threshold IBS Config Return Battery Cal #1 U40% is above threshold IBS Config Return Battery Cal #2 U80% is above threshold IfSOC Bounding Limit Configuration check is TRUE then following conditions are included SOC Bounding Limit Hr8 Difference is above the threshold SOC Bounding Limit Hr8 Difference is above the threshold SOC Bounding Limit Hr24 Difference is above threshold	NOT equal to Vehicle Battery Type Configuration CeEPM_ADV_BATT_ TECH_AGM >5.00 >0.50 >0.50 = TRUE >0.01 >0.01 >0.01	threshold IBS NormalCommEnable is TRUE IBS Configuration Diagnostic Historical Enable is TRUE No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC	> 11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE = U01B000 = P15FF00		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Wake-Up Not Detected	P16FD	Detects when a control module did not wake-up at time scheduled by the wake-up alarm at shutdown.	Real Time Clock has exceeded expected wake-up time as defined by alarms scheduled at shutdown	>= 1 failure to meet scheduled controller wake-up	Control Module wake-up not detected Diagnostic Enable calibration is CbTRUE	= CbTRUE	Variable, dependent on scheduled controller wake-up times at shutdown	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Power Off Timer Performance	P262B	<p>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).</p> <p>Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment.</p> <p>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.</p>	<p>Count Up Test:</p> <p>Time difference between the current value and the previous value of the timer</p> <p>Range Test:</p> <p>The variation of the HWIO timer and mirror timer is</p>	<p>> 1.50 seconds</p> <p>> 0.25%.</p>			<p>Count Up Test: 4 failures out of 20 samples</p> <p>1 sec / sample</p> <p>Continuous while run/crank is not active and until controller sleep occurs</p> <p>Range Test: Once or twice per trip, performed when controller shutdown is initiated or run/crank becomes active</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Security Peripheral Performance	P3186	This DTC indicates the security peripheral has experienced an internal fault indicating that MAC verification results are unreliable.	MAC verification has falsely passed a configurable number of times.	3.00	Calibration enable	= CbTRUE		Type A, 1 Trips

24OBDG03D Part 1 BCM Summary Tables

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Lost Communicati on With TCM	U0101	This DTC monitors for a loss of communication with the Transmission Control Module.	<p>Message is not received from controller for</p> <p>Message \$02E</p> <p>Message \$031</p> <p>Message \$452</p>	<p>>10,031.25 milliseconds</p> <p>>10,031.25 milliseconds</p> <p>>12,500.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>Time since power-up reset, running reset, recovery from under/over voltage condition</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p>	<p>>=5,000 milliseconds</p> <p>>=3,000 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 10 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If power mode = Run/Propulsion/Start:</p> <p>Power Mode is run</p> <p>If power mode = Accessory:</p> <p>Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/ crank</p> <p>Battery voltage</p>	<p>CbFALSE (CbTRUE indicates enabled)</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Gateway A	U0146	This DTC monitors for a loss of communication with Gateway A.	<p>Message is not received from controller for</p> <p>Message \$425</p> <p>Message \$427</p> <p>Message \$20D</p> <p>Message \$209</p> <p>Message \$561</p> <p>Message \$562</p>	<p>> 12,500.00 milliseconds</p> <p>> 12,500.00 milliseconds</p> <p>> 10,625.00 milliseconds</p> <p>> 10,250.00 milliseconds</p> <p>> 12,500.00 milliseconds</p> <p>> 12,500.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>Time since power-up reset, running reset, recovery from under/over voltage condition</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p>	<p>>=5,000 milliseconds</p> <p>>=3,000 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 10 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If power mode = Run/Propulsion/Start:</p> <p>Power Mode is run</p> <p>If power mode = Accessory:</p> <p>Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/ crank</p> <p>Battery voltage</p>	<p>CbFALSE (CbTRUE indicates enabled)</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With HVAC Control Module	U0164	This DTC monitors for a loss of communication with the HVAC Control Module.	<p>Message is not received from controller for</p> <p>Message \$49A</p> <p>Message \$551</p> <p>Message \$553</p> <p>Message \$555</p> <p>Message \$557</p> <p>Message \$559</p> <p>Message \$55C</p> <p>Message \$0B9</p> <p>Message \$0BA</p> <p>Message \$550</p> <p>Message \$552</p> <p>Message \$554</p> <p>Message \$558</p>	<p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>10,625.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>Time since power-up reset, running reset, recovery from under/over voltage condition</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller</p> <p>Or</p> <p>Battery Voltage</p> <p>Controller type: OBD Controller</p>	<p>>=5,000 milliseconds</p> <p>>=3,000 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 10 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>Message \$55A</p> <p>Message \$55B</p> <p>Message \$55D</p>	<p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p>	<p>If power mode = Run/Propulsion/Start:</p> <p>Power Mode is run</p> <p>If power mode = Accessory:</p> <p>Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/ crank</p> <p>Battery voltage</p>	<p>CbFALSE (CbTRUE indicates enabled)</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Radio	U0184	This DTC monitors for a loss of communication with the CSM	<p>Message is not received from controller for</p> <p>Message \$54E</p> <p>Message \$54F</p>	<p>> 12,500 milliseconds</p> <p>> 12,500 milliseconds</p>	<p>General Enable Criteria:</p> <p>Time since power-up reset, running reset, recovery from under/over voltage condition</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p>	<p>>=5,000 milliseconds</p> <p>>=3,000 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 10 ms loop	Type C, 1 Trip No MIL Emissio ns Neutral "Emissio ns Neutral Diagnost ic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If power mode = Run/Propulsion/Start: Power Mode is run 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	CbFALSE (CbTRUE indicates enabled) >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Battery Monitor Module	U01B0	This DTC monitors for a loss of communication with the Battery Monitor Module on the LIN bus.	<p>Message is not received from device for</p> <p>IBSAmpHrChrg_Rsp_PDU</p> <p>IBSAmpHrDisChrg_Rsp_PDU</p> <p>IBSBattCrnkData_Rsp_PDU</p> <p>IBSBattLINOffData_Rsp_PDU</p> <p>IBSBattStatusData_Rsp_PDU</p> <p>IBSCfgWakeupData_Rsp_PDU</p> <p>IBSCurrentFOMData_Rsp_PDU</p> <p>IBSDiagDet_Rsp_PDU</p> <p>IBSMMeasuredTemp_Rsp_PDU</p> <p>IBSMinCrnkData_Rsp_PDU</p> <p>IBSMVISOFData_Rsp_PDU</p> <p>IBSSOCData_Rsp_PDU</p> <p>IBSVoltageFOMData_Rsp</p>	<p>>=12,600.00 milliseconds</p> <p>>=12,600.00 milliseconds</p> <p>>=12,600.00 milliseconds</p> <p>>=12,600.00 milliseconds</p> <p>>=12,600.00 milliseconds</p> <p>>=12,600.00 milliseconds</p> <p>>=12,600.00 milliseconds</p> <p>>=10,725.00 milliseconds</p> <p>>=10,725.00 milliseconds</p> <p>>=12,600.00 milliseconds</p> <p>>=10,725.00 milliseconds</p> <p>>=12,600.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>Diagnostic is enabled</p> <p>LIN channel is enabled</p> <p>LIN module is initialized</p> <p>Slave is calibrated as present</p> <p>Time since power-up reset, running reset, recovery from under/over voltage condition</p> <p>All below criteria have been met for</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/Propulsion/Start:</p> <p>Power Mode is run</p> <p>If power mode = Accessory:</p>	<p>CbTRUE (CbTRUE indicates enabled)</p> <p>CbTRUE (CbTRUE indicates enabled)</p> <p>CbTRUE (CbTRUE indicates present)</p> <p>>=5,000 milliseconds</p> <p>>=3,000 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	LIN bus communication executes in 250ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			_PDU	milliseconds	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	CbFALSE (CbTRUE indicates enabled) >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From ECM/ PCM	U0401	This DTC monitors for an error in communication with the ECM.	Any of the Alive Rolling Counts, Protection Values, Checksum Values, or Cyclic Redundancy Check signal values listed below are incorrect for:		Time since power-up reset, running reset, recovery from under/over voltage condition	>= 5,000 milliseconds	Executes in 10ms loop.	Type B, 2 Trips
			ESP_ARC:	8 fail counts out of 10 sample counts	All the following conditions are met for Partial Network is active	>= 3,000 milliseconds		
			ECXCI1_ARC:	8 fail counts out of 10 sample counts	Power Mode	= Run		
			DRCDNDP_ARC:	8 fail counts out of 10 sample counts	Battery Voltage	>11.00 Volts		
			PSP_ARC:	8 fail counts out of 10 sample counts				
			VSADP_ARC:	8 fail counts out of 10 sample counts				
			OATP_ARC:	8 fail counts out of 10 sample counts				
			EHCCI_ARC:	8 fail counts out of 10 sample counts				
			EHCCI_CS:	14 fail counts out of 18 sample counts				
			ESP_MAC:	14 fail counts out of 18 sample counts				
			DRCDNDP_MAC:	14 fail counts out of 18 sample counts				
			PSP_MAC:	14 fail counts out of 18 sample counts				
				14 fail counts out of				

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Transmissio n Control Module	U0402	This DTC monitors for an error in communication with the TCM.	Any of the Alive Rolling Counts, Protection Values, Checksum Values, or Cyclic Redundancy Check signal values listed below are incorrect for: TEGP_ARC: TEGP_MAC:	15 fail counts out of 16 sample counts 15 fail counts out of 16 sample counts	Time since power-up reset, running reset, recovery from under/over voltage condition All the following conditions are met for Partial Network is active Power Mode Battery Voltage	>= 5,000 milliseconds >= 3,000 milliseconds = Run >11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Brake System Control Module	U0418	This DTC monitors for an error in communication with the BSCM.	Any of the Alive Rolling Counts, Protection Values, Checksum Values, or Cyclic Redundancy Check signal values listed below are incorrect for: DMCP_ARC: DMCP_MAC: EPBSP_ARC: EPBSP_MAC:	 8 fail counts out of 10 sample counts 14 fail counts out of 18 sample counts 15 fail counts out of 16 sample counts 15 fail counts out of 16 sample counts	Time since power-up reset, running reset, recovery from under/over voltage condition All the following conditions are met for Partial Network is active Power Mode Battery Voltage	 >= 5,000 milliseconds >= 3,000 milliseconds = Run >11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From HVAC Control Module	U0424	This DTC monitors for an error in communication with the HVAC Control Module.	Any of the Alive Rolling Counts, Protection Values, Checksum Values, or Cyclic Redundancy Check signal values listed below are incorrect for: HVACFCRTLCLFI2_ARC: HVACFCRTLCLFRI2_ARC : HVACFCRACH_ARC: HVACFCRADSCF_ARC: HVACFCRADSF_ARC: HVACFCRBLCFOR_ARC : HVACFCRBLCF_ARC: HVACFCRBLF_ARC: HVACFCRDP_ARC: HVACFCRRFA_ARC: HVACFCRTLCLFLOR1n2_	 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts 8 fail counts out of 10 sample counts	Time since power-up reset, running reset, recovery from under/over voltage condition All the following conditions are met for Partial Network is active Power Mode Battery Voltage OBD Manufacturer Enable Counter (MEC)	 >= 5,000 milliseconds >= 3,000 milliseconds = Run >11.00 Volts = 0	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			ARC:	8 fail counts out of 10 sample counts				
			HVACFCRTL CFL_ARC:	8 fail counts out of 10 sample counts				
			HVACFCRTL CFOR3_AR C:	8 fail counts out of 10 sample counts				
			HVACFCRTL CFOR1 n2_ ARC:	8 fail counts out of 10 sample counts				
			HVACFCRTL CFR_ARC:	8 fail counts out of 10 sample counts				
			HVACFCRTL F_ARC:	14 fail counts out of 18 sample counts				
			HVACFCRTL CFLI2_CS:	14 fail counts out of 18 sample counts				
			HVACFCRTL CFRI2_CS:	14 fail counts out of 18 sample counts				
			HVACFCRADSCF_CS:	14 fail counts out of 18 sample counts				
			HVACFCRADSF_CS:	14 fail counts out of 18 sample counts				
			HVACFCRBL CFOR_CS:	14 fail counts out of 18 sample counts				
			HVACFCRBL CF_CS:	14 fail counts out of 18 sample counts				
			HVACFCRBL F_CS:	14 fail counts out of 18 sample counts				
			HVACFCRDP_CS:	14 fail counts out of 18 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			HVACFCRRFA-CS: HVACFCRTLCLFLOR1 n2_ CS: HVACFCRTLCLFL_CS: HVACFCRTLCLFOR3_CS: HVACFCRTLCLFROR1 n2_ CS: HVACFCRTLCLFR_CS: HVACFCRTLCLF_CS:	14 fail counts out of 18 sample counts 14 fail counts out of 18 sample counts 14 fail counts out of 18 sample counts 14 fail counts out of 18 sample counts 14 fail counts out of 18 sample counts 14 fail counts out of 18 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Gateway A	U0447	This DTC monitors for an error in communication with the CGM.	Any of the Alive Rolling Counts, Protection Values, Checksum Values, or Cyclic Redundancy Check signal values listed below are incorrect for: BSPMP_ARC: BSPMP_MAC:	15 fail counts out of 16 sample counts 15 fail counts out of 16 sample counts	Time since power-up reset, running reset, recovery from under/over voltage condition All the following conditions are met for Partial Network is active Power Mode Battery Voltage	>= 5,000 milliseconds >= 3,000 milliseconds = Run >11.00 Volts	Executes in 10ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Radio	U0485	This DTC monitors for an error in communication with the CSM	Any of the Alive Rolling Counts, Protection Values, Checksum Values, or Cyclic Redundancy Check signal values listed below are incorrect for: HVACICR1_ARC: HVACICR1_CS: HVACICR2_ARC: HVACICR2_CS:	 8 fail counts out of 10 sample counts 14 fail counts out of 18 sample counts 8 fail counts out of 10 sample counts 14 fail counts out of 18 sample counts	Time since power-up reset, running reset, recovery from under/over voltage condition All the following conditions are met for Partial Network is active Power Mode Battery Voltage	 ≥ 5,000 milliseconds ≥ 3,000 milliseconds = Run >11.00 Volts	Executes in 10ms loop.	Type C, 1 Trip No MIL Emissio ns Neutral "Emissio ns Neutral Diagnost ic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Left Front Temperature Actuator	U0659	This DTC monitors for a loss of communication with the Left Front Temperature Actuator on the LIN bus.	Message is not received from device for AHDA02_Rsp_PDU	 >= 11,500 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Time since power-up reset, running reset, recovery from under/over voltage condition All below criteria have been met for Accessory mode to off mode not pending Battery voltage Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If power mode = Accessory:	CbTRUE (CbTRUE indicates enabled) CbTRUE (CbTRUE indicates enabled) CbTRUE (CbTRUE indicates enabled) >=5,000 milliseconds >=3,000 milliseconds >11.00 Volts <=18.00 Volts	LIN bus communication executes in 600ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	CbFALSE (CbTRUE indicates enabled) >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Right Front Temperature Actuator	U065A	This DTC monitors for a loss of communication with the Right Front Temperature Actuator on the LIN bus.	Message is not received from device for AHDA03_Rsp_PDU	 >= 11,500 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized Slave is calibrated as present Time since power-up reset, running reset, recovery from under/over voltage condition All below criteria have been met for Accessory mode to off mode not pending Battery voltage Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run If power mode = Accessory:	CbTRUE (CbTRUE indicates enabled) CbTRUE (CbTRUE indicates enabled) CbTRUE (CbTRUE indicates enabled) >=5,000 milliseconds >=3,000 milliseconds >11.00 Volts <=18.00 Volts	LIN bus communication executes in 600ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	CbFALSE (CbTRUE indicates enabled) >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Body Control Module Local Interconnect Network 6	U152A	This DTC monitors for a loss of communication on the LIN bus.	<p>Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus</p> <p>Or</p> <p>LIN channel Wakeup Method: LIN channel wakeup repetition counter</p>	<p>= Total number of slave nodes on LIN Bus that have reported lost communications DTCs</p> <p>>= 10 counts</p>	<p>General Enable Criteria:</p> <p>Diagnostic is enabled</p> <p>LIN channel is enabled</p> <p>LIN module is initialized</p> <p>Time since power-up reset, running reset, recovery from under/over voltage condition</p> <p>All below criteria have been met for</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p> <p>If power mode = Accessory:</p> <p>Off key cycle diagnostics are enabled Or</p>	<p>CbTRUE (CbTRUE indicates enabled)</p> <p>CbTRUE (CbTRUE indicates enabled)</p> <p>>=5,000 milliseconds</p> <p>>=3,000 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p> <p>CbFALSE (CbTRUE indicates enabled)</p>	<p>LIN bus communication executes in 600ms loop.</p> <p>Dependent on bus loading.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Body Control Module Local Interconnect Network 9	U152D	This DTC monitors for a loss of communication on the LIN bus.	<p>Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus</p> <p>Or</p> <p>LIN channel Wakeup Method: LIN channel wakeup repetition counter</p>	<p>= Total number of slave nodes on LIN Bus that have reported lost communications DTCs</p> <p>>= 10 counts</p>	<p>General Enable Criteria:</p> <p>Diagnostic is enabled</p> <p>LIN channel is enabled</p> <p>LIN module is initialized</p> <p>Time since power-up reset, running reset, recovery from under/over voltage condition</p> <p>All below criteria have been met for</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p> <p>If power mode = Accessory:</p> <p>Off key cycle diagnostics are enabled</p>	<p>CbTRUE (CbTRUE indicates enabled)</p> <p>CbTRUE (CbTRUE indicates enabled)</p> <p>>=5,000 milliseconds</p> <p>>=3,000 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p> <p>CbFALSE (CbTRUE</p>	<p>LIN bus communication executes in 250ms loop.</p> <p>Dependent on bus loading.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	indicates enabled) ≥11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Brake System Control Module 1 on CAN Bus 2	U1610	This DTC monitors for a Lost Communication with Brake System Control Module on CAN Bus 2 error as determined by the BCM	<p>Message is not received from controller for</p> <p>Message \$211</p> <p>Message \$21B</p> <p>Message \$42A</p> <p>Message \$012</p> <p>Message \$415</p> <p>Message \$417</p> <p>Message \$4B5</p> <p>Message \$028</p>	<p>>10,625.00 milliseconds</p> <p>>10,625.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>10,025.00 milliseconds</p> <p>>10,250.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>10,025.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>Time since power-up reset, running reset, recovery from under/over voltage condition</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p>	<p>>=5,000 milliseconds</p> <p>>=3,000 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 10 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If power mode = Run/Propulsion/Start:</p> <p>Power Mode is run</p> <p>If power mode = Accessory:</p> <p>Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/ crank</p> <p>Battery voltage</p>	<p>CbFALSE (CbTRUE indicates enabled)</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Engine Control Module on CAN Bus 2	U1611	This DTC monitors for a Lost Communication with Engine Control Module on CAN Bus 2 error as determined by the BCM.	<p>Message is not received from controller for</p> <p>Message \$011</p> <p>Message \$01C</p> <p>Message \$01D</p> <p>Message \$213</p> <p>Message \$21D</p> <p>Message \$227</p> <p>Message \$229</p> <p>Message \$22A</p> <p>Message \$41D</p> <p>Message \$499</p> <p>Message \$4BB</p> <p>Message \$4BC</p> <p>Message \$4C1</p>	<p>>10,031.25 milliseconds</p> <p>>10,031.25 milliseconds</p> <p>>10,031.25 milliseconds</p> <p>>10,250.00 milliseconds</p> <p>>10,250.00 milliseconds</p> <p>>10,625.00 milliseconds</p> <p>>10,250.00 milliseconds</p> <p>>10,625.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>11,250.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>Time since power-up reset, running reset, recovery from under/over voltage condition</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p>	<p>>=5,000 milliseconds</p> <p>>=3,000 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 10 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Message \$214 Message \$4BD Message \$254 Message \$4E8 Message \$59A	>10,625.00 milliseconds >12,500.00 milliseconds >10,625.00 milliseconds >12,500.00 milliseconds >10,625.00 milliseconds	If power mode = Run/Propulsion/Start: Power Mode is run 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	CbFALSE (CbTRUE indicates enabled) >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Key Table Not Provisioned / Authoritative Counter At Maximum	U1960	This DTC indicates that the ECU security peripheral key slots are not provisioned OR ECU message authentication Authoritative Counters are at MAX value	<p>During controller initialization:</p> <p>IF (Any Security Peripheral Key Slot reports as Empty) -OR- (Any Authoritative Counter is at MAX value)</p> <p>During controller operation:</p> <p>IF (A Security Peripheral Key Slot reports as Empty) -OR- (An Authoritative Counter is at MAX value)</p>		Calibration enable	= CbTRUE		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Security Peripheral Performance	U1961	This DTC indicates that the ECU security peripheral has reported that it has failed.	The ECU security peripheral reports that the security peripheral hardware has failed.		Calibration enable	= CbTRUE		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Unable to Authenticate Serial Data Message	U1962	This DTC indicates that serial data message authentication on any key slot has failed a configurable number of times this key cycle.	Message authentication on a single key slot has failed a configurable number of times.	60	Calibration enable	= CbTRUE		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Input Power Circuit A/B Correlation	U3018	This diagnostic verifies that both (A and B) control module input power voltage sensors (when there are two) are neither inappropriately high nor low. It compares the sensed control module voltage A with sensed control module voltage B. If the absolute value of the difference between voltage A and B is greater than the failure threshold for sufficient time, the diagnostic will fail.	Difference between 12V Battery Power Circuit A and 12V Battery Power Circuit B	> 4.00V	Control Module Input Power Circuit A/B Correlation Diagnostic Enable calibration is CbTRUE 12V Starter Engaged	= CbTRUE = FALSE	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 Illum.
Front Faceplate Blower Discrete Knob Control Front (1) Circuit High	B2A4E	<p>This DTC will detect when the sensed voltage of HVAC FFP Blower Discrete Knob is Out of Range High (OORH).</p> <p>The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Blower Discrete Knob raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating.</p> <p>If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	Front Face Plate Request Blower Level Front Raw Voltage 1 is	>= 3.05V	<p>Diagnostics is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	4 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 Illum.
Front Faceplate Blower Discrete Knob Control Front (1) Circuit Low	B2A4F	<p>This DTC will detect when the sensed voltage of HVAC FFP Blower Discrete Knob is Out of Range Low (OORL).</p> <p>The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Blower Discrete Knob raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the OORL threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.</p>	Front Faceplate Request Blower Level Front Raw Voltage 1 is	<= 0.25 V	<p>Diagnosis is Enabled</p> <p>No Active Communication DTC</p>	U0164, U0424	4 seconds out of a 10 seconds window	Type B, 2 Trips

[illegible]

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Front Faceplate Temperature Discrete Knob Control Front (1) Circuit High	B2AA7	This DTC will detect when the sensed voltage of HVAC FFP Temperature Discrete Knob is Out of Range High (OORH). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Discrete Knob raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. If the voltage is greater than or equal to the OORH threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Face Plate Request Temp Level Front Raw Voltage 1 is	>= 3.05V	Front Face Plate (FFP) Temp Discrete Control Front Global Diagnostics Enable (Enable = TRUE) Front Face Plate (FFP) Temp Discrete Control Front 1 Circuit High Diagnostic Enable (Enable = TRUE) No Active Loss of Communication DTC No Active Alive Rolling Count DTC	= TRUE = TRUE U0164 U0424	4 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 Illum.
Front Faceplate Temperature Discrete Knob Control Front (1) Circuit Low	B2AA8	This DTC will detect when the sensed voltage of HVAC FFP Temperature Discrete Knob is Out of Range Low (OORL). The DTC is enabled when the enable criteria is met, and the FFP monitors and sends the HVAC FFP Temperature Discrete Knob raw voltage signal to the BCM for fault maturation. This DTC is a X out of Y diagnostic. The diagnostic will run continuously if serial data is operating. When the voltage is less than or equal to the OORL threshold then the BCM shall set the fault status to set to FAIL. That status value will cause the fail counter to increment. When the fail counter reaches its threshold prior to the sample counter reaching its threshold, then a FAIL is reported.	Front Faceplate Request Temp Level Front Raw Voltage 1 is	$\leq 0.25 \text{ V}$	Front Faceplate (FFP) Temp Discrete Control Front Global Diagnostis Enable (Enable = TRUE) Front Faceplate (FFP) Temp Discrete Control Front 1 Circuit Low Diagnostic (Enable = TRUE) No Active Loss of Communication DTC No Active Alive Rolling Count DTC	= TRUE = TRUE U0164 U0424	4 seconds out of a 10 seconds window	Type B, 2 Trips

[illegible]

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
CGM Battery Voltage Low Detected	B2B11	This monitoring checks the system voltage and sets a fault if it is below 7.0V with a calibratable X of Y debounce strategy.	Vehicle Supply Voltage with a debounce strategy of X of Y	< 7.0 +/- 0.5V = 320 = 400	Vehicle Power Mode FOR Any participating Partial Network Control module operational software	= Propulsion >= 5 sec = Active = Executing	4[sec] for pass min 3.2[sec] for fail	Type C- No MIL
Bus-Off detected on Communication CAN Bus 1	U1002	This fault is set if Communication CAN Bus 1 enters the Bus-Off state	Bus Off Event on CAN Bus 1 FOR	= TRUE >= 2.1 seconds	Vehicle Supply Voltage Any participating Partial Network FOR	> k_Battery Voltage Low Threshold = Active >= k_Control Module Communication Bus Off Power Mode Time	100[msec] for pass 2.1[sec] for fail	Type B 2 Trips
Bus-Off detected on Communication CAN Bus 2	U2413	This fault is set if Communication CAN Bus 2 enters the Bus-Off state	Bus Off Event on CAN Bus 2 FOR	= TRUE >= 2.1 seconds	Vehicle Supply Voltage Any participating Partial Network FOR	> k_Battery Voltage Low Threshold = Active >= k_Control Module Communication Bus Off Power Mode Time	100[msec] for pass 2.1[sec] for fail	Type B 2 Trips
Bus-Off detected on Communication CAN Bus 3	U1004	This fault is set if Communication CAN Bus 3 enters the Bus-Off state	Bus Off Event on CAN Bus 3 FOR	= TRUE >= 2.1 seconds	Vehicle Supply Voltage Any participating Partial Network FOR	> k_Battery Voltage Low Threshold = Active >= k_Control Module Communication Bus Off Power Mode Time	100[msec] for pass 2.1[sec] for fail	Type B 2 Trips
Bus-Off detected on Communication CAN Bus 5	U1006	This fault is set if Communication CAN Bus 5 enters the Bus-Off state	Bus Off Event on CAN Bus 5 FOR	= TRUE >= 2.1 seconds	Vehicle Supply Voltage Any participating Partial Network FOR	> k_Battery Voltage Low Threshold = Active >= k_Control Module Communication Bus Off Power Mode Time	100[msec] for pass 2.1[sec] for fail	Type B 2 Trips
Internal memory failure on the CGM Detected	B2B12	This monitoring checks whether a double bit ECCError has occurred in code flash or RAM. This fault is set if an ECCError has occurred.	ECCError Detected	= TRUE	N/A	N/A	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 the CPU by running an instruction test followed by a register test.	Instruction test failed OR Register test failed	= TRUE = TRUE	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		
Loss of Communication with the BCM Detected	U2203	This monitoring shall check a supervised message from the BCM for communication status. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	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 Illum.
Loss of Communication with the EBCM on CAN 1 Detected	U2418	This monitoring shall check a supervised message from the EBCM for communication status on CAN channel 1. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	6.5 [sec]	Type B 2 Trips
Loss of Communication with the EBCM on CAN 2 Detected	U2419	This monitoring shall check a supervised message from the EBCM for communication status on CAN channel 2. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	6.5 [sec]	Type B 2 Trips
Loss of Communication with the ECM Detected on CAN 2	U241C	This monitoring shall check a supervised message from the ECM for communication status on CAN channel 2. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	6.5 [sec]	Type B 2 Trips
Loss of Communication with the ECM Detected on CAN 3	U241D	This monitoring shall check a supervised message from the ECM for communication status on CAN channel 3. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	6.5 [sec]	Type B 2 Trips
Loss of Communication with the EPS Detected	U2205	This monitoring shall check a supervised message from the EPS for communication status. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	6.5 [sec]	Type B 2 Trips
Loss of Communication with the HVAC_FP_F Detected	U2209	This monitoring shall check a supervised message from the HVAC_FP_F for communication status. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	6.5 [sec]	Type B 2 Trips
Loss of Communication with the SDM Detected	U220C	This monitoring shall check a supervised message from the SDM for communication status. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	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 Illum.
Loss of Communication with the TCCM Detected	U220E	This monitoring shall check a supervised message from the TCCM for communication status. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	6.5 [sec]	Type B 2 Trips
Loss of Communication with the TCM Detected	U220F	This monitoring shall check a supervised message from the TCM for communication status. If the CGM has not received the message for 2.5x of its periodic rate plus an additional delay of 4 seconds, then this fault shall be set.	Supervised message not received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	Vehicle Supply Voltage AND Any participating Partial Network FOR	> k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Lost Communication Power Mode Time	6.5 [sec]	Type B 2 Trips
Central Gateway Module Received Invalid Data From Body Control Module	U137F	This diagnostic monitors invalid data received from the BCM. If X (default = 3) invalid data are received within Y (default = 1.5) seconds, the fault is set. If X+1 valid data are received with Y seconds, the fault is cleared.	Invalid BCM data instances WITHIN	>= X (default of 3) <= Y (default 1.5) seconds	k_OBD_APP_BCM_InvalidData_cal Vehicle Supply Voltage AND Any participating Partial Network FOR	= True > k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= kJ nvalid Data Received from BCM Power Mode Time	0.75 [sec] min 1.5 [sec] max	Type B 2 Trips
Central Gateway Module Key Table Not Provisioned	U1982	Upon start up, if the key table has not been provisioned, this fault is set. If the table is, or becomes, provisioned, it is cleared.	Key table is provisioned	= False	k_OBD_APP_KeyNotPovisioned_cal Vehicle Supply Voltage AND Any participating Partial Network FOR	= True > k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= k_Key Table Not Provisioned Diagnostic Time	150 [msec] min 5.0 [sec] max (startup)	Type B 2 Trips
Central Gateway Module Security Peripheral Performance	U1983	This diagnostic monitors the security peripheral and if the security peripheral indicates a fault or the key table is not provisioned, then this fault is set. Otherwise, it is cleared.	Security peripheral has a fault OR Key table is provisioned	= True = False	k_OBD_APP_SecurityPeripheralPerformance_cal Vehicle Supply Voltage AND Any participating Partial Network FOR	= True > k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= 5 seconds	150 [msec] min 5.0 [sec] max (startup)	Type B 2 Trips
Central Gateway Module Unable To Authenticate Serial Data Message	U1984	This diagnostic monitors for serial data message authentication failures. If X (default = 3) failures occur on a particular key slot, the fault is set. If X-1 messages on a failed key slot authenticate, the fault is cleared.	Serial data authentication failure instances on a key slot	>= X (default of 3)	k_OBD_APP_UnableToAuthenticateSerialData_cal Vehicle Supply Voltage AND Any participating Partial Network FOR	= True > k_Battery Voltage Low Threshold < k_Battery Voltage High Threshold = Active >= 2 seconds	30 [msec] min 0.72 [sec] max 2.0 [sec] on startup	Type B 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECUIdentification List NVM Corruption	U197C	ECUIdentification List NVM Corruption Diagnostic	When the checksum of the memory that stores the learned content no longer matches the stored checksum.	= TRUE	Vehicle Supply Voltage U197700 ECUIdentification Self Learn Not Completed DTC	> k_Battery Voltage Low Threshold = >=7V < k_Battery Voltage High Threshold = >=30V = Not Set	1.5 [sec] min 5 [sec] max on startup	Type B 2 Trips
Self-Learn Did Not Execute	U197B	Self Learn Did not Execute Diagnostic	Unlearn all ECU'sor do not self learn any of the ECU's	= TRUE	System Power mode Any participating Partial Network FOR	= OFF = Active >= 2 seconds	150 [msec] min 500 [msec] max on startup	Type B 2 Trips
Self-Learn Invalid Due to VIN Mismatch	U197D	Self Learn Invalid Due to VIN Mismatch Diagnostic	When all 17 characters of the DID \$F190 i.e. Vehicle Identification Number do not match all 17 characters of VIN being broadcasted. OR When last 8 characters of the DID \$F190 i.e. Vehicle Identification Number do not match the last 8 characters of VIN being broadcasted.	= TRUE = TRUE	When last 8 digits of Vehicle Identification Number (i.e. DID \$F190) are checked OR When all 17 digits of Vehicle Identification Number (i.e. DID \$F190) are checked AND U300251 Vehicle Identification Number - Not Programmed DTC	= True =True = Not Set	500 [msec] min 5 [sec] max on startup	Type B 2 Trips

24OBDG03D Part 1 EBCM Summary Tables

Component System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_OPEN_FRO_NT_LEFT	00502	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_FRO_NT_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	0050E	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	00514	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	00503	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	High side over current bit= True OR High side short to battery bit= True OR Low side over current bit= True OR Low side short to ground bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_SHORT_FRONT_RIGHT	00509	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	High side over current bit= True OR High side short to battery bit= True OR Low side over current bit= True OR Low side short to ground bit= True	• Wheel speed sensor supply is enabled	100 ms	Type A. MIL Illumination.
WSS_SHORT_REAR_LEFT	0050F	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	High side over current bit= True OR High side short to battery bit= True OR Low side over current bit= True OR Low side short to ground 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	High side over current bit= True OR High side short to battery bit= True OR Low side over current bit= True OR Low side short to ground 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 sp bit= TRUE	• Polaris ASIC sets XX LS SHORT TO GROUND sp 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 sp bit= TRUE	• Polaris ASIC sets XX LS SHORT TO GROUND sp 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_SH ORT_TO_ON D_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 sp bit= TRUE	• Polaris ASIC sets XX LS SHORT TO GROUND sp 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 sp bit= TRUE	• Polaris ASIC sets XX LS SHORT TO GROUND sp bit= TRUE	• Wheel speed sensor supply is enabled • Tested only during power up or after clear DTC.	100 ms	Type A. 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 dependent on the speed of the wheels showing a valid signal. If the average speed of moving wheel (km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 10 km/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 fault 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 10 km/h (to prevent setting Missing Wss faults on a roller bench). • the dynamic fault 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/h: 3 sec. If velocity is less than 50 km/h then fault maturation is: 10 sec. 2. If driven wheel is moving then: Fault maturation if velocity greater than 50 km/h: 10 sec. If velocity is less than 50 km/h 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 dependent on the speed of the wheels showing a valid signal. If the average speed of moving wheel (km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 10 km/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 = High • No excessive high or low voltage • Diagnostic Mode Inactive • Emissions Rote Test Inactive	3-120s depending on number of missing wss and situation	Type B. MIL Illumination.	

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_MISSING_FRONT_RIGHT	C00B	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 Front 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 dependent on the speed of the wheels showing a valid signal. If the average speed of moving wheel (km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6 km/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 fault 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 10 km/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 shows 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 driven wheel is moving then: Fault maturation if velocity greater than 50 km/h 3 sec. If velocity is less than 50 km/h then fault maturation is: 10 sec. 2. If driven wheel is moving then: Fault maturation if velocity greater than 50 km/h 10 sec. If velocity is less than 50 km/h then fault maturation is: 30 sec. Fault maturation time for three Wss missing: 120 sec	Front 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 dependent on the speed of the wheels showing a valid signal. If the average speed of moving wheel (km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6 km/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 wheels 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 > 80ph • No excessive high or low voltage • Diagnostic Mode Inactive • Emissions Rofe Test Inactive	3-120s depending on number of missing wss and situation	Type B, MIL Illumination.
WSS_MISSING_REAR_LEFT	00511	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 Front 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 dependent on the speed of the wheels showing a valid signal. If the average speed of moving wheel (km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6 km/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 fault 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 10 km/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 shows 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 driven wheel is moving then: Fault maturation if velocity greater than 50 km/h 3 sec. If velocity is less than 50 km/h then fault maturation is: 10 sec. 2. If driven wheel is moving then: Fault maturation if velocity greater than 50 km/h 10 sec. If velocity is less than 50 km/h then fault maturation is: 30 sec. Fault maturation time for three Wss missing: 120 sec	Front 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 dependent on the speed of the wheels showing a valid signal. If the average speed of moving wheel (km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6 km/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 wheels 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 > 80ph • No excessive high or low voltage • Diagnostic Mode Inactive • Emissions Rofe Test Inactive	3-120s depending on number of missing wss and situation	Type B, MIL Illumination.
WSS_MISSING_REAR_RIGHT	00517	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 Front 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 dependent on the speed of the wheels showing a valid signal. If the average speed of moving wheel (km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6 km/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 fault 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 10 km/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 shows 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 driven wheel is moving then: Fault maturation if velocity greater than 50 km/h 3 sec. If velocity is less than 50 km/h then fault maturation is: 10 sec. 2. If driven wheel is moving then: Fault maturation if velocity greater than 50 km/h 10 sec. If velocity is less than 50 km/h then fault maturation is: 30 sec. Fault maturation time for three Wss missing: 120 sec	Front 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 dependent on the speed of the wheels showing a valid signal. If the average speed of moving wheel (km/h) is greater than 50 km/h and/or any undriven wheel speed is greater than 6 km/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 wheels 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 > 80ph • No excessive high or low voltage • Diagnostic Mode Inactive • Emissions Rofe Test Inactive	3-120s depending on number of missing wss and situation	Type B, MIL Illumination.
WSS_ERRATIC_FRONT_LEFT	00504	This monitor checks if: • Wheel speed sensor not mounted correctly. • Missing tooth or teeth on the wheel speed sensor tone-ring • Electric magnetic interference (EMI).	Erratic Wheel Speed Sensor If the absolute value of the unfiltered wheel acceleration is greater than 491 m/s² 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 "FaultMaturation Weight". If the fault occurrence counter reaches "Fault Goat", 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 (Goat): 200ms	(Wheel_Accel) > 491 m/s²	• reference_vehicle_velocity > 3.58 m/s • Diagnostic Mode Inactive • Emissions Rofe Test Inactive	Goal: 40000 Continuous failure Time: 200ms	Type A, MIL Illumination.

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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	C00CA	This monitor checks if: • Wheel speed sensor not mounted correctly. • Missing both or teeth on the wheel speed sensor tone-ring. • Electro-magnetic interference (EM).	Erratic Wheel Speed Sensor • If the absolute value of the unfiltered wheel acceleration is greater than 491 m/s ² 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 "FaultMaturation 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 Rofe Test Inactive	Goal: 40000 Continuous failure Time: 200ms	Type A, MIL Illumination.
WSS_ERRATIC_REAR_LEFT	00510	This monitor checks if: • Wheel speed sensor not mounted correctly. • Missing both or teeth on the wheel speed sensor tone-ring. • Electro-magnetic interference (EM).	Erratic Wheel Speed Sensor • If the absolute value of the unfiltered wheel acceleration is greater than 491 m/s ² 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 "FaultMaturation 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 Rofe Test Inactive	Goal: 40000 Continuous failure Time: 200ms	Type A, MIL Illumination.
WSS_ERRATIC_REAR_RIGHT	00516	This monitor checks if: • Wheel speed sensor not mounted correctly. • Missing both or teeth on the wheel speed sensor tone-ring. • Electro-magnetic interference (EM).	Erratic Wheel Speed Sensor • If the absolute value of the unfiltered wheel acceleration is greater than 491 m/s ² 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 "FaultMaturation 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 Rofe Test Inactive	Goal: 40000 Continuous failure Time: 200ms	Type A, MIL Illumination.
WSS_DROPOUT_FRONT_LEFT	00505	This monitor checks if: • Defective wheel speed sensor. • Wheel speed sensor not mounted correctly. • Defective wheel speed sensor wiring harness. • Missing both 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 ² , 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 ² 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 failure. 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 ² , 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 ² 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 n/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 Rofe Test Inactive	40 ms	Type B, 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 both 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 ² , 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 ² 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 failure. 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 ² , 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 ² 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 n/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 Rofe Test Inactive	40 ms	Type B, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_DROPOUT_REAR_LEFT	00511	This monitor checks if: • Defective wheel speed sensor. • Wheel speed sensor not mounted correctly. • Defective wheel speed sensor wiring harness. • Missing both 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 ² , 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 ² 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 10km/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 ² , 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 ² 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 test 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 40msec, 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 so 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 Rote Test Inactive	40 ms	Type B: MIL Illumination.
WSS_DROPOUT_REAR_RIGHT	00517	This monitor checks if: • Defective wheel speed sensor. • Wheel speed sensor not mounted correctly. • Defective wheel speed sensor wiring harness. • Missing both 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 ² , 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 ² 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 10km/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 ² , 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 ² 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 test 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 40msec, 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 so 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 Rote Test Inactive	40 ms	Type B: MIL Illumination.
WSS_FAST_MISSING_FRONT_LEFT	00505	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 or 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 Rote Test Inactive SYSTEM_VOLTAGE_EXCESSIVE_LOW not latched	1 count	Type B: MIL Illumination.
WSS_FAST_MISSING_FRONT_RIGHT	C0508	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 or 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 Rote Test Inactive SYSTEM_VOLTAGE_EXCESSIVE_LOW not latched	1 count	Type B: MIL Illumination.
WSS_FAST_MISSING_REAR_LEFT	00511	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 or 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 Rote Test Inactive SYSTEM_VOLTAGE_EXCESSIVE_LOW not latched	1 count	Type B: MIL Illumination.

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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_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 or 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 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 Rolloff Test Inactive • SYSTEM_VOLTAGE_EXCESS IVE/ON 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. • Demagnetized tone-ring	If this wheel speed 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_DROPPOUT_XX faults are not latched.	• No electrical failure is currently present	40 msec	Type B. MIL Illumination.
WSS_TOO_FAST_SENSOR_FRONT_RIGHT	C0508	This monitor checks if: • Wheel speed sensor not mounted correctly. • Wheel speed sensor to tone-ring gap out of tolerance. • Demagnetized tone-ring	If this wheel speed 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_DROPPOUT_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. • Demagnetized tone-ring	If this wheel speed 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_DROPPOUT_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. • Demagnetized tone-ring	If this wheel speed 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_DROPPOUT_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 ASC	Polaris ASC Low Grey Zone Detect bit = True (The low grey zone is 7 to 14mA) or Polaris ASC 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 ASC	Polaris ASC Low Grey Zone Detect bit = True (The low grey zone is 7 to 14mA) or Polaris ASC 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	C0500	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 ASC	Polaris ASC Low Grey Zone Detect bit = True (The low grey zone is 7 to 14mA) or Polaris ASC 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 ASC	Polaris ASC Low Grey Zone Detect bit = True (The low grey zone is 7 to 14mA) or Polaris ASC 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 ASC	Polaris ASC sets any of these bits = TRUE	Polaris ASC 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.
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 ASC	Polaris ASC sets any of these bits = TRUE	Polaris ASC 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 ASC	Polaris ASC sets any of these bits = TRUE	Polaris ASC 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 ASC	Polaris ASC sets any of these bits = TRUE	Polaris ASC 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	P0562	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASC	• Detection is handled by the Polaris ASC	Polaris ASC sets WSS Under voltage 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 C. No MIL, "Emissions Neutral Diagnostic"
WSS_UNDER_VOLTAGE_FRONT_RIGHT	P0562	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASC	• Detection is handled by the Polaris ASC	Polaris ASC sets WSS Under voltage 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 C. No MIL, "Emissions Neutral Diagnostic"
WSS_UNDER_VOLTAGE_REAR_LEFT	P0562	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASC	• Detection is handled by the Polaris ASC	Polaris ASC sets WSS Under voltage 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 C. No MIL, "Emissions Neutral Diagnostic"
WSS_UNDER_VOLTAGE_REAR_RIGHT	P0562	This monitor checks if: • Defective wheel speed sensor • Defective wire harness to wheel speed sensor • Defective printed circuit board • Defective Polaris ASC	• Detection is handled by the Polaris ASC	Polaris ASC sets WSS Under voltage 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 C. No MIL, "Emissions Neutral Diagnostic"
ASC_DECODE_THREE_LEVEL_FAULT_FF	C0555	This monitor checks if: • wrong vehicle config file used • mislabeled using wrong WSS	Lockfor ASC decoding a three level sensor when a two level sensor is configured: Check for the number of VDABits received indicates that the ASC is decoding for a three level sensor or Check for the tp out of range bit received indicates that the	While a wheel speed 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 BA Counter SPI bits. If these bits are not zero, the MCU shall detect that the ASC is incorrectly decoding in mode 3.	• Polaris is initialized • WSS supply voltage is in normal range	15 msec	Type A. MIL Illumination.
ASC_THREE_LEVEL_DATA_READ_FAULT_FF	C0501	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.	counts up by 1 if the data package received rate from the sensor is > 300ms	• Polaris is initialized • WSS supply voltage is in normal range	3 count	Type A. MIL Illumination.
ASC_TWO_LEVEL_DATA_READ_FAULT_FF	P0506	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 • WSS supply voltage is in normal range	15 msec	Type A. MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
ASC_DECODE_THREE_LEVEL_FAULT_RF	C058	This monitor checks if: • wrong vehicle config file used • misbuilt 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 wheel speed channel is expected to be configured for a 3-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.	• Points is initialized • WSS supply voltage is in normal range	15 msec	Type A, ML Illumination.
ASC_THREE_LEVEL_DATA_READ_FAULT_RF	C0507	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.	counts up by 1 if the data package received rate from the sensor is > 3900ms	• Points is initialized • WSS supply voltage is in normal range	3 count	Type A, ML Illumination.
ASC_TWO_L_EVEL_DATA_RE_ADFAU_LT_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.	• Points is initialized • WSS supply voltage is in normal range	15 msec	Type A, ML Illumination.
ASC_DECODE_THREE_LEVEL_FAULT_LR	C0587	This monitor checks if: • wrong vehicle config file used • misbuilt 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	While a wheel speed channel is expected to be configured for a 3-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.	• Points is initialized • WSS supply voltage is in normal range	15 msec	Type A, ML Illumination.
ASC_THREE_LEVEL_DATA_READ_FAULT_LR	C050D	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.	counts up by 1 if the data package received rate from the sensor is > 3900ms	• Points is initialized • WSS supply voltage is in normal range	3 count	Type A, ML Illumination.
ASC_TWO_L_EVEL_DATA_RE_ADFAU_LTLR	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.	• Points is initialized • WSS supply voltage is in normal range	15 msec	Type A, ML Illumination.
ASC_DECODE_THREE_LEVEL_FAULT_RR	C0588	This monitor checks if: • wrong vehicle config file used • misbuilt 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	While a wheel speed channel is expected to be configured for a 3-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.	• Points is initialized • WSS supply voltage is in normal range	15 msec	Type A, ML Illumination.
ASC_THREE_LEVEL_DATA_READ_FAULT_RR	C0513	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.	counts up by 1 if the data package received rate from the sensor is > 3900ms	• Points is initialized • WSS supply voltage is in normal range	3 count	Type A, ML Illumination.
ASC_TWO_L_EVEL_DATA_RE_ADFAU_LTLR	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.	• Points is initialized • WSS supply voltage is in normal range	15 msec	Type A, ML 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 sensor doesn't send pulses (standstill or wheel speed pulses) for too long.	Monitors if an intelligent 3-level sensor 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.	• Points is initialized. • Wheel Speed Sensor supply is enabled • No WSS electrical fault is present • SYSTEM VOLTAGE EXCESSIVE LOW fault is not present	250 msec	Type A, ML 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 sensor doesn't send pulses (standstill or wheel speed pulses) for too long.	Monitors if an intelligent 3-level sensor 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.	• Points is initialized. • Wheel Speed Sensor supply is enabled • No WSS electrical fault is present • SYSTEM VOLTAGE EXCESSIVE LOW fault is not present	250 msec	Type A, ML 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 sensor doesn't send pulses (standstill or wheel speed pulses) for too long.	Monitors if an intelligent 3-level sensor 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.	• Points is initialized. • Wheel Speed Sensor supply is enabled • No WSS electrical fault is present • SYSTEM VOLTAGE EXCESSIVE LOW fault is not present	250 msec	Type A, ML 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 sensor doesn't send pulses (standstill or wheel speed pulses) for too long.	Monitors if an intelligent 3-level sensor 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.	• Points is initialized. • Wheel Speed Sensor supply is enabled • No WSS electrical fault is present • SYSTEM VOLTAGE EXCESSIVE LOW fault is not present	250 msec	Type A, ML Illumination.
WSS_PARITY_FRO_NT_LEFT_FT	C0555	This monitor checks if: VDA data bits are corrupted	Decodes the additional information of a Philips KM221 wheel speed sensor which is a 3-level VDA compliant sensor.	It's a VDA compliant Philips KM221 sensor so use the following mask for the data bits: 0 air gap (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.	• Points is initialized. • Wheel Speed Sensor supply is enabled	35 msec	Type A, ML Illumination.
WSS_PARITY_FRO_NT_RIGHT_T	C0556	This monitor checks if: VDA data bits are corrupted	Decodes the additional information of a Philips KM221 wheel speed sensor which is a 3-level VDA compliant sensor.	It's a VDA compliant Philips KM221 sensor so use the following mask for the data bits: 0 air gap (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.	• Points is initialized. • Wheel Speed Sensor supply is enabled	35 msec	Type A, ML Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
WSS_PAR (TY-R EAR_L, EFT)	C0507	This monitor checks if: • VDA data bits are completed	Decides the additional information of a Philips KM8221 vftedisped sensor which is a 3-level VDA compliant sensor.	It's a VDA compliant Philips KM8221 sensor so use the following mask for the data bits: 0 air/gap (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.	• Points is initialized. • Wheel Speed Sensor supply is enabled	35 msec	Type A, MIL Illumination.
WSS_PARITY_REAR_RIGHT	C0508	This monitor checks if: • VDA data bits are completed	Decides the additional information of a Philips KM8221 vftedisped sensor which is a 3-level VDA compliant sensor.	It's a VDA compliant Philips KM8221 sensor so use the following mask for the data bits: 0 air/gap (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.	• Points is initialized. • Wheel Speed Sensor supply is enabled	35 msec	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 ASC	• The ASC shall measure the width of each speed pulse or speed replacement pulse (p). If p is less than p minimum threshold or greater than p maximum threshold, the ASC shall set the tp Out of Range SPI flag.	POLARIS ASC sends diagnostic information indicating that the standstill pulse width is out of range (error bit equals 1) (3 level WSS only)	• Points is initialized • Wheel speed edge or stand still pulse received • WSS supply voltage is in normal range	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 ASC	• The ASC shall measure the width of each speed pulse or speed replacement pulse (p). If p is less than p minimum threshold or greater than p maximum threshold, the ASC shall set the tp Out of Range SPI flag.	POLARIS ASC sends diagnostic information indicating that the standstill pulse width is out of range (error bit equals 1) (3 level WSS only)	• Points is initialized • Wheel speed edge or stand still pulse received • WSS supply voltage is in normal range	15 msec - 375ms	Type A, MIL Illumination.
WSS_VDA_TP_OUT_OF_RANGE_EAR_LEFT_FT	C0500D	This monitor checks if: • standstill pulse width out of range • Defective system ASC	• The ASC shall measure the width of each speed pulse or speed replacement pulse (p). If p is less than p minimum threshold or greater than p maximum threshold, the ASC shall set the tp Out of Range SPI flag.	POLARIS ASC sends diagnostic information indicating that the standstill pulse width is out of range (error bit equals 1) (3 level WSS only)	• Points is initialized • Wheel speed edge or stand still pulse received • WSS supply voltage is in normal range	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 ASC	• The ASC shall measure the width of each speed pulse or speed replacement pulse (p). If p is less than p minimum threshold or greater than p maximum threshold, the ASC shall set the tp Out of Range SPI flag.	POLARIS ASC sends diagnostic information indicating that the standstill pulse width is out of range (error bit equals 1) (3 level WSS only)	• Points is initialized • Wheel speed edge or stand still pulse received • WSS supply voltage is in normal range	15 msec - 375ms	Type A, MIL Illumination.
WSS_STAN_DSTILL_FAST_FRONT_LEFT	C0501	This monitor checks if: • Defective system ASC • Standstill VDA transmission too short	• The MCU shall detect if standstill pulses occur faster than every 95ms, for 5 consecutive standstill pulses.	POLARIS ASC sends diagnostic information indicating that the standstill pulse transmission is too short- less than 105 msec (3 level WSS only)	• Points is initialized	Variable, See Fault Equation and Detection Rules. Range is from 25 - 475ms.	Type A, MIL Illumination.
WSS_STANDSTILL_FAST_FRONT_LEFT	C0501	This monitor checks if: • Defective system ASC • 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 ASC sends diagnostic information indicating that the standstill pulse transmission is too long - more than 195 msec (3 level WSS only)	• Points is initialized	Variable, See Fault Equation and Detection Rules. Range is from 1025 - 5100ms.	Type A, MIL Illumination.
WSS_STAN_DSTILL_FAST_FRONT_RIGHT	C0507	This monitor checks if: • Defective system ASC • Standstill VDA transmission too short	• The MCU shall detect if standstill pulses occur faster than every 95ms, for 5 consecutive standstill pulses.	POLARIS ASC sends diagnostic information indicating that the standstill pulse transmission is too short- less than 105 msec (3 level WSS only)	• Points is initialized	Variable, See Fault Equation and Detection Rules. Range is from 25 - 475ms.	Type A, MIL Illumination.
WSS_STANDSTILL_FAST_FRONT_RIGHT	C0507	This monitor checks if: • Defective system ASC • 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 ASC sends diagnostic information indicating that the standstill pulse transmission is too long - more than 195 msec (3 level WSS only)	• Points is initialized	Variable, See Fault Equation and Detection Rules. Range is from 1025 - 5100ms.	Type A, MIL Illumination.
WSS_STAN_DSTILL_FAST_REAR_LEFT	C0500D	This monitor checks if: • Defective system ASC • Standstill VDA transmission too short	• The MCU shall detect if standstill pulses occur faster than every 95ms, for 5 consecutive standstill pulses.	POLARIS ASC sends diagnostic information indicating that the standstill pulse transmission is too short- less than 105 msec (3 level WSS only)	• Points is initialized	Variable, See Fault Equation and Detection Rules. Range is from 25 - 475ms.	Type A, MIL Illumination.
WSS_STAN_DSTILL_SLOW_REAR_LEFT_FT	C0500D	This monitor checks if: • Defective system ASC • 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 ASC sends diagnostic information indicating that the standstill pulse transmission is too long - more than 195 msec (3 level WSS only)	• Points is initialized	Variable, See Fault Equation and Detection Rules. Range is from 1025 - 5100ms.	Type A, MIL Illumination.
WSS_STAN_DSTILL_FAST_REAR_RIGHT	C0513	This monitor checks if: • Defective system ASC • Standstill VDA transmission too short	• The MCU shall detect if standstill pulses occur faster than every 95ms, for 5 consecutive standstill pulses.	POLARIS ASC sends diagnostic information indicating that the standstill pulse transmission is too short- less than 105 msec (3 level WSS only)	• Points 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 ASC • 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 ASC sends diagnostic information indicating that the standstill pulse transmission is too long - more than 195 msec (3 level WSS only)	• Points is initialized	Variable, See Fault Equation and Detection Rules. Range is from 1025 - 5100ms.	Type A, MIL Illumination.
SYS_ASC_WSS_EDGE_MISMATCH_LF	P006	This monitor checks if: • Normal cause: Resistive short in the vftedisped sensor wiring other possible causes: Wheel Speed Sensor fault • ASC outputs shorted to neighboring pins • Open trace on circuit board • Defective system ASC	The Wheel Speed signal generated by the ASC 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 plausibility (less than a max number). 2) The micro will compare the edges detected by the internal timer with the SPI flags sent by the ASC to make sure they match.	• Points is initialized • No other ASC faults detected	25 msec	Type A, MIL Illumination.
SYS_ASC_WSS_EDGE_MISMATCH_RF	P006	This monitor checks if: • Normal cause: Resistive short in the vftedisped sensor wiring other possible causes: Wheel Speed Sensor fault • ASC outputs shorted to neighboring pins • Open trace on circuit board • Defective system ASC	The Wheel Speed signal generated by the ASC 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 plausibility (less than a max number). 2) The micro will compare the edges detected by the internal timer with the SPI flags sent by the ASC to make sure they match.	• Points is initialized • No other ASC faults detected	25 msec	Type A, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SYS_ASIC_WSS_EDGES_MISMATCH_LR	P0606	This monitor checks if: • Nominal cause: Resistive short in the wheel speed 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 plausibility (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.
SYSA ASIC_WSSD GE_MISMATCH_R_R	P0606	This monitor checks if: • Nominal cause: Resistive short in the wheel speed 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 plausibility (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	C0604	This monitor checks if: • Defective system ASIC • Defective wheel speed sensor	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	C0604	This monitor checks if: • Defective system ASIC • Defective wheel speed sensor	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	C0610	This monitor checks if: • Defective system ASIC • Defective wheel speed sensor	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_RIGHT	C0616	This monitor checks if: • Defective system ASIC • Defective wheel speed sensor	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	C0655	This monitor checks if: • Incorrect WSS installed (Non-Directional or Inflection 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. Normal calculations. Expecting 2 level non intelligent but have 3 level WSS (30*150 ms=4.5 sec). 2 level directional stand still pulses take 737 ms and for each pulse the probability 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	C0656	This monitor checks if: • Incorrect WSS installed (Non-Directional or Inflection 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. Normal calculations. Expecting 2 level non intelligent but have 3 level WSS (30*150 ms=4.5 sec). 2 level directional stand still pulses take 737 ms and for each pulse the probability 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	C0657	This monitor checks if: • Incorrect WSS installed (Non-Directional or Inflection 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. Normal calculations. Expecting 2 level non intelligent but have 3 level WSS (30*150 ms=4.5 sec). 2 level directional stand still pulses take 737 ms and for each pulse the probability 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	C0658	This monitor checks if: • Incorrect WSS installed (Non-Directional or Inflection 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. Normal calculations. Expecting 2 level non intelligent but have 3 level WSS (30*150 ms=4.5 sec). 2 level directional stand still pulses take 737 ms and for each pulse the probability 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.
SYSA ASIC_U_WS_OVER_VOLT	C06A3	This monitor checks if: • Defective system ASIC	If U _{WS} exceeds the rising U _{WS} over-voltage detection threshold for the detection debounce time, the ASIC sets the U _{WS} Overvoltage Warning SPI flag and disables the four high-side switches.	The MCU shall configure the wheel speed 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	P0662	This monitor checks if: • Defective system ASIC	• Within the ASIC, the U _{WS} and U ₁₂ 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 wheel speed operation. For ECUs with no U _{WS} voltage regulation: the MCU shall also read the ASIC's U ₁₂ Voltage Result SPI field and perform a plausibility check between U _{WS} and U ₁₂ . Note: sufficient voltage for wheel speed operation depends upon the type of wheel speed. MCU detects that the U _{WS} OverTemp Warning SPI flag received from the ASIC is TRUE.	• Polaris is initialized	100 msec	Type C, No MIL, "Emissions Neutral Diagnostic"
WSS_OVER_TEMP_W_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		• Polaris is initialized	15 msec	Type A. MIL Illumination.
SYSA ASIC_WSS_HS_STUC_K_ON	C06A3	This monitor checks if: • Defective system ASIC	• The ASIC's open circuit detection (BMA2) 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 wheel speed supplies but shall leave the high-side supplies off. The MCU shall detect if an open-circuit is not detected on any channel.	Anyone 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: • Significant difference size tires installed on the vehicle. • Missing larger tire (sensor picking up lag nuts) • Anything that generates consistent differences in apparent wheel rotational speed. • Different number of teeth on the exciter rings.	• Wheel Velocity Differences between one and the others > 15%. • The mismatch tire ratio adjustment is disabled if: • Vehicle Velocity < 8.9 mph. • Cornering is detected. • Spring 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 > 15%	• The mismatch tire ratio adjustment is disabled if: • Vehicle Velocity < 8.9 mph. • Cornering is detected. • Spring wheels are detected. • Braking is detected. • Wheel speed sensor faults exist. • Emissions Rule Test is active	1 Count	Type B. MIL Illumination.
WSS_DIRECTION_FAILURE_FRONT_LEFT	C2A01	This monitor checks if: • Wheel speed sensor not mounted correctly. • Electro-magnetic interference (EMI).	• Number of valid directional and non-directional WSS sensors must be greater than 0. • Number of valid directional WSS sensors must be greater than 0. • Valid directional and non-directional WSS sensors must: • Show unfiltered wheel speed velocity >= 15 km/h. • Show unfiltered wheel speed acceleration < 50 m/s ² . • All valid directional and non-directional WSS sensors must show velocities within 15% of the slowest valid wheel.	At least 1 sensor indicates Unknown, or at least 1 sensor indicates Forward and at least one sensor indicates Backwards For duration > 5 seconds While vehicle speed > 15 km/h.	• WSS must be valid (supply enabled and no electrical problems)	5 seconds	Type B. MIL Illumination.
WSS_DIRECTION_FAILURE_FRONT_RIGHT	C2A02	This monitor checks if: • Wheel speed sensor not mounted correctly. • Electro-magnetic interference (EMI).	• Number of valid directional and non-directional WSS sensors must be greater than 0. • Number of valid directional WSS sensors must be greater than 0. • Valid directional and non-directional WSS sensors must: • Show unfiltered wheel speed velocity >= 15 km/h. • Show unfiltered wheel speed acceleration < 50 m/s ² . • All valid directional and non-directional WSS sensors must show velocities within 15% of the slowest valid wheel.	At least 1 sensor indicates Unknown, or at least 1 sensor indicates Forward and at least one sensor indicates Backwards For duration > 5 seconds While vehicle speed > 15 km/h.	• WSS must be valid (supply enabled and no electrical problems)	5 seconds	Type B. MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SOL_FDBK_INEQUAL_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_INEQUAL_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/or 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	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/or 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/or 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_SIMTEST	C0005	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/or 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 7.43%	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 7.43%	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 7.43%	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 7.43%	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 7.43%	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_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 7.43%	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 7.43%	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 7.43%	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.

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Component/System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
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 A, MIL Illumination.
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	C00D5	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_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 allowed temperature. Microprocessor receives 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 allowed temperature. Microprocessor receives 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 allowed temperature. Microprocessor receives 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_OVE_RTEMP_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 allowed temperature. Microprocessor receives 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_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 allowed temperature. Microprocessor receives 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 allowed temperature. Microprocessor receives 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. Solenoid is commanded On 2. Power Switch is On 3. Battery voltage is within operating range.	45 counts	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. Solenoid is commanded On 2. Power Switch is On 3. Battery voltage is within operating range.	45 counts	Type A, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	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 ClampingResponse. 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. Solenoid is commanded ON 2. Power Switch is On 3. Battery voltage is within operating range.	45 counts	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 ClampingResponse. 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. Solenoid is commanded ON 2. Power Switch is On 3. Battery voltage is within operating range.	45 counts	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 ClampingResponse. 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 failures in 10 attempts)	Type A, MIL Illumination.
CLAMP_ACTIVATION_FAILURE_PEDAL_SIM_ISO	C0004	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 ClampingResponse. 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 failures in 10 attempts)	Type A, MIL Illumination.
LEAKY-DIVER-UNKNOWN_OWN_ABS_CIRCUITS	C0004	This monitor checks if: • Defective FET • Defective printed circuit board	• Slip-ControlPower Switch must be commanded ON then 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-DIVER-UNKNOWN_BOOST_CIRCUITS	C0004	This monitor checks if: • Defective FET • Defective printed circuit board	• Slip-ControlPower Switch must be commanded ON then 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	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. • Command is less than 720 mA. • Self-test complete. • Excessive Low Voltage fault not maturing	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	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	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. • Command is less than 720 mA. • Self-test complete. • Excessive Low Voltage fault not maturing	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	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	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. • Command is less than 720 mA. • Self-test complete. • Excessive Low Voltage fault not maturing	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	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_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	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. • Command is less than 720 mA. • Self-test complete. • Excessive Low Voltage fault not maturing	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	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	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. • Command is less than 720 mA. • Self-test complete. • Excessive Low Voltage fault not maturing	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	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	C0004	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	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. • Command is less than 720 mA. • Self-test complete. • Excessive Low Voltage fault not maturing	100 ms	Type A, MIL Illumination.
SOL_CC_DC_SATURATED_LOW_PEDAL_SIM_ISO	C0004	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	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 nonPWM'd.	Duty cycle is out of range	Polaris is initialized	100ms	Type A, MIL Illumination.
SOL_OVER_VOLTAGE_SIM_TEST	C0005	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 nonPWM'd.	Duty cycle is out of range	Polaris is initialized	15ms	Type A, MIL Illumination.
DC_SOL_REGULATION_FAILURE	P0006	This monitor checks if: • Defective system ASIC	• The ASIC shall monitor the state of each DRx output and report if it does not match the commanded state.	The MCU shall monitor ASIC's "DRx Gate Monitor Fault" SPI bits.	• Polaris is initialized	15 msec	Type A, MIL Illumination.
SOL_DUTY_CYCLE_FDBK_PLAU_S_FAULT	P0006	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	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% 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 verify 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 be in prior value, and the corresponding Data Read bit will be 0. SW shall suspend SM102 while Data Read is 0.	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% 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 verify 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 be in 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	15 msec	Type A, MIL Illumination.
COIL_CURRENT_FDBK_PLAU_S_FAULT	P0006	This monitor checks if: • Defective system ASIC	ASIC cannot control ad current properly			50msec	Type A, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
SPI_FAILURE_ASIC	P0605	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 [1-0] Polaris_Error_Flags_Observed [Polaris_Error_Flags]	• Power Switch is ON	5ms	Type A, MIL Illumination.
NVRAM_DEVICE_IN_OPERATIVE	P062F	This monitor checks if: • Problem in chip selected 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 successful message transfer, but the NVSRAM handler verifies a successful write event by reading back the information that is expected to be stored in NVSRAM and also verifying the checksum.	device operational flag = FALSE (error during read/write request occurred)	• Power Switch is ON	5ms	Type A, MIL Illumination.
NVRAM_WRITE_FAILURE	P062F	This monitor checks if: • Communication problem with NVSRAM chip • NVSRAM hardware problem	• This fault is detected by the NVSRAM handler. The NVSRAM handler verifies a successful write event by reading back the information that is expected to be stored in NVSRAM and also verifying the checksum.	If the NVSRAM handler detects an unsuccessful write event three times, the fault is set.	• Power Switch is ON	170 ms	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 (VDS), (2) the master's bridge pre-driver pins (PDG and PRG), (3) the ENQ digital output pin, and (4) the bi-side coil drivers (CC_DRx) and pre-drivers (DRCx).	• 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.	• 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.	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 5, then the AD_EVENT_LOCKUP fault will begin to mature. If greater than 5, 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.	Each solenoid in the system is expected to generate ON test pulses to indicate the end of a solenoid pulse duration. At the completion of the System Self Test, the number of ON test pulses issued during initial test and compare them with the number of ON tests performed from the faultless monitor. If the number of ON test pulses issued does not equal the expected number of pulses, a failure is indicated and this fault is set.	Solenoid[solenoid_id].Sol_On_Test_Cnt 1= Solenoid[solenoid_id].Expected_Sol_Test_Cnt	• 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.
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 consecutive 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-Re-set Monitor Rate: 10MS	periodic Net 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 (pass current delivered with internal FET)	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_PFN 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.
SYSASIC-EXCESS-STARTUPAT-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 MCU shall monitor the ASIC's Excessive Startup Time SPI flag.	• 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: Vrhg (ADREFH), Vlow (GND_Q1), and Vmid (ADREFH/2).	Each software loop, the MCU shall read the ADC conversion results for the Vrhg, 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.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	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: V _{high} (ADREFH1), V _{low} (SND_G1), and V _{mid} (ADREFH2).	Each software loop, the MCU shall read the ADC conversion results for the V _{high} , V _{low} and V _{mid} 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: V _{high} (ADREFH1), V _{low} (SND_G1), and V _{mid} (ADREFH2).	Each software loop, the MCU shall read the ADC conversion results for the V _{high} , V _{low} and V _{mid} 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_ATTEN_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.	Anyone 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_ATTEN_FACTOR	P060B	This monitor checks if: • Defective system ASIC	• Each background conversion loop, the ASIC shall perform the conversion of the internal V _{mid} voltage both with and without the selectable attenuation (switched in). The conversion results shall be stored respectively in the separate ADC V _{mid} with Attenuation Test Result and ADC V _{mid} Test Result SPI fields. • Each software loop, the MCU shall calculate the ASIC's ADC attenuation factor by reading the ADC V _{mid} with Attenuation Test Result and ADC V _{mid} 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 < 0.6178 OR Calculated ADC attenuation factor > 0.6320	• Polaris is initialized	15 msec	Type A, MIL Illumination.
SYS_ASIC_EXT_ADC_FAILU_RE	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 exiting 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	15ms	Type A, MIL Illumination.
SYS_ASIC_SYNC_PULSE_DETECT	P060B	This monitor checks if: • Defective system ASIC	• I/SIC 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.
SYS_ASIC_SPI_DETECT	P060B	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	P060B	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 checksum (DMA On/Off), walking 1s and walking 0s). 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_DUP1_SEED	P060B	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_STU CK	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	P060B	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	P060B	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 GPR 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 selected commanded on-time to the measured on-time. If the difference in the two times is >250 milliseconds for 10 consecutive checks then the fault is immediately matured	• Polaris is initialized	50 msec	Type A, MIL Illumination.
SYS_ASIC_UNEXPECTED_SYNC_PULSE	P060B	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.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	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.
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 faulting purposes.) For those registers not covered by other SML 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", WIDEN Status is high, and HST 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_TEMP_FDBK_A	P0606	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 MMAC ADC Channels are read. • If conversion results for VHigh and VLowware out of range, then Broken Wire fault is set.	• Power Switch is ON	5 msec	Type A MIL Illumination.
CANFD1_SPI_FAILURE	P0606	This monitor checks if: • Problem in chip select line • fault in SPI driver related code/circuit. • If SPI communication is not successful and if we are not able to communicate with the CAN transceiver	• 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 occurred)	• Power Switch is ON	1 count	Type A MIL Illumination.
CANFD2_SPI_FAILURE	P0606	This monitor checks if: • Problem in chip select line • fault in SPI driver related code/circuit. • If SPI communication is not successful and if we are not able to communicate with the CAN transceiver	• 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 occurred)	• Power Switch is ON	1 count	Type A MIL Illumination.
NVM_REQ_FAILED	P062F	This monitor checks if: • Esp Driver reports read/write error/timeout, indicating that the request failed, either after it was accepted or after it was rejected.	If a user request is either rejected and the number of configured retries expired or if it was accepted and then failed, while being processed by the underlying memory stack module.	NVM_CurrentBlockInfo_1.LastResult_1 == NVM_REQ_OK	Continuous falstafing	1 count	Type A MIL Illumination.
NVAINTEGRITY_FAILED	P062F	This monitor checks if: • If the read for a block detects that the data and/or CRC are corrupted based on the CRC check.	If the processing of a read request will detect, via the CRC checking, corruption of the data and/or CRC of the block that was subject to the read operation.	NVM_CurrentBlockInfo_1.LastResult_1 == NVM_REQ_INTEGRITY_FAILED	Continuous falstafing	1 count	Type A MIL Illumination.
NVM_LOSS_OF_REDUNDANCY	P062F	This monitor checks if: • If the contents are different, if the first instance becomes corrupted or if the first instance cannot be read.	If the reading performed over a REDUNDANT block indicates the block has lost its redundancy.	one block is OK, other isn't -> block isn't redundantly stored within NV RAM if (firstBlockDefect_1.secondBlockDefect) == TRUE	Continuous falstafing	1 count	Type A MIL Illumination.
NVM_QUEUE_OVERFLOW	P062F	This monitor checks if: • If the number of requests made to NVM exceeds the size of the queue and none of the ones in the queue has finished.	If a request is made that cannot be stored in the NVM queue (be it standard or immediate) as all configured queue positions of the related queue are already containing user requests.	queue was full, request to queue the next block leads to queue overflow	Continuous falstafing	1 count	Type A MIL Illumination.
EEP_FAILURE	P062F	This monitor checks if: • SPI transmission is faulty	The failure is set in case of a failed sequence due to a failure of the SPI transmission. A sequence can also fail if a transfer was rejected because of full transmission buffer.	EEP_E_CANCEL_FAILED - DEM event if a job cancellation failed EEP_E_READ_FAILED - DEM event if read job failed EEP_E_COMPARE_FAILED - DEM event if compare job failed EEP_E_TEST_CON_FAILED - DEM event if test communication job failed EEP_E_WRITE_FAILED - DEM event if write job failed EEP_E_ERASE_FAILED - DEM event if erase job failed	Continuous falstafing	3 counts	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, faults set.	• Polaris is initialized	15 msec	Type A MIL Illumination.
SYS_ASIC_SM_DI_SABLED	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, faults set.	• Polaris is initialized	15 msec	Type A MIL Illumination.
SYSA ASIC_SPI_TRANS_FER_ER_ROR	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 falstafing	15 msec	Type A MIL Illumination.
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. 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	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 4 different 8-bit values to sequential addresses in LMU SRAM. Data pattern: 0x12345678 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: 0x123456789ABCDEF 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: 0x123456789ABCDEF 6. Perform a 64-bit read and compare against expected values	Always runs during initialization	1 Count	Type A MIL Illumination.
OS_TASK_MONITOR_FAULT_CORE0	P0606	This monitor checks if: • Software Error • Partial Microcontroller Failure	Checks to be sure that all tasks on CPU0 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_CORE0	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.

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Component/System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	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_CORE0	P0606	This monitor checks if: Software Error	EB OS detects an error situation and calls ErrorHandler with a status code for which there is no other fault code.	None	Always Enabled	0'Number of errors in 10ms update Cycle	Type A, MIL Illumination.
RTOS_FAILURE_CORE1	P0606	This monitor checks if: Software Error	EB OS detects an error situation and calls ErrorHandler with a status code for which there is no other fault code.	None	Always Enabled	0'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 ErrorHandler with a status code for which there is no other fault code.	None	Always Enabled	0'Number of errors in 10ms update Cycle	Type A, MIL Illumination.
UNEXPECTED_EXCEPTION_CORE0	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 Elastobot 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 Elastobot 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 Elastobot 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 • Atleast one wheel velocity calculation between Main timer and Redundant timer does not agree	• Mismatched Wheel Velocity Failure • Both main timer and redundant timer are calculating the velocity for each wheel. At wheel speeds computed by the main timer are transmitted to the redundant timer every loop time. The redundant timer compares them to the appropriate velocities received from the main timer.	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_CORE0	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 Falsting	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 Falsting	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 Falsting	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 Auxin_Alarms_Update.xlsx 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 Auxix feedback does not match FSP command	• Power Switch in ON	Checked once at power up, sets for single 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 guarantee that SW is able to write to NVRAM depending on what has failed.	See Auxin_Alarms_Update.xlsx 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.
SYSBASIC_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.
SYSBASIC_TARGET_CURRENT_DETECT	P0606	This monitor checks if: When any ABS ISOs, NO DAP or PEDAL_SHIM solenoids are: • Shorted Solenoid OR • Open Solenoid Driver OR • Open Flyback diode OK • Power input to module is noisy	tests all pass on next ignition cycle	Periodically (e.g. once per ignition cycle), the MCU commands the maximum coil current with the solid state relay off for three, 5ms SW loops. SW checks the "CC_Drvx High Target Unreachable" SPI flag each 5ms SW loop from time of the first maximum current command to two loops after the third command loop (i.e. 3 loops total). At any point, if the "CC_Drvx High Target Unreachable" SPI flag is read back high, the High Target Current Unreachable diagnostic test passes, and the remainder of the High Target Current Unreachable test (command and flag readbacks) are aborted. If the "CC_Drvx High Target Unreachable" flag is never set during the 5 read loop, the diagnostic test fails. Periodically (e.g. once per ignition cycle), the MCU shall command the minimum no-load coil current with the solid state relay on for three, 5ms SW loops. SW shall check the "CC_Drvx Low Target Unreachable" SPI flag each 5ms SW loop from time of the first minimum current command to two loops after the third command loop (i.e. 3 loops total). At any point, if the "CC_Drvx Low Target Unreachable" SPI flag is read back high, the Low Target Current Unreachable diagnostic test passes, and the remainder of the Low Target Current Unreachable test (command and flag readbacks) are aborted. If the "CC_Drvx Low Target Unreachable" flag is never set during the 5 read loop, the diagnostic test fails.	• Polaris is initialized	15 msec	Type A, MIL Illumination.
SYBASIC_DRIVER_SHORT_DETECT	P0606	This monitor checks if: • Defective system ASIC	• The ASIC shall not automatically inhibit the Shorted Driver Detection (SDM37) when the SSR is off.	Periodically (e.g. once per ignition cycle), the MCU shall disable the SSR, enable the CC_Drvx and ORDrx drivers, command ORx 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.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
SYSA5 C_S_SR_5_ELF_TEST_FA_LED	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.	(1a) Set Command Watchdog Counter Value SPI field = 0, WDEN pin low, the Enable FailSafe SSR SPI bit = 0, and the SSR Shut Off Pin low (= on). (1b) 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 34s, 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 test two more times. If it is still failed then set the fault. 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 test two more times. If it is still failed then set the fault.	• Runs during initialization	15 msec	Type A, ML Illumination
SYSA5 IC_W_DOG_COUNT_TEST_FAILED	P0606	This monitor checks if: • Watchdog problem • Defective ASIC • PCB problem	• This fault tests the watchdog by purposely 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, ML Illumination
WDG_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, ML Illumination
SY5 ASIC_LOGIC_RST_STUCK_DETECT	P0606	This monitor checks if: • Defective source register problem • ASIC 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 falsifying	15 msec	Type A, ML 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, ML Illumination
SST_CORE2_FAILURE	P0606	This monitor checks if: Failure of the CPU core	Fault is set if SafeTbit test "CpuTst_CpuSstP1st[]" fails	Every 1 second the SafeTbit test "CpuTst_CpuSstP1st[]" is run. The fault is set if it reports a failure	Continuous - Always enabled	1 count	Type A, ML Illumination
UNIMPLEMENTED_INTERRUPT-CORE0	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 outer is zero then the fault will set if SRR bit of SRC register is set	Continuous Falsifying	300 counts	Type A, ML Illumination
ADC_FAILURE	P0606	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-up 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 read 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 (read value > initial value read * 1.05) OR If (read value < initial value read * 0.95) THEN, set ADC_FAILURE	performed at power up	1 count	Type A, ML Illumination
RESET-SSCHECK-FAILURE	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, ML 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 to 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, ML Illumination
BMU-CON_FIG_REGISTER_READ_BACK_FAILURE_RE	P0606	This monitor checks if: • Defective CPU	after the BMU has been initialized it will loop through a table of BMU registers and compare each register value to the value that the MCAL has previously written to it. If there is a difference, then the BMU will be unlocked, the register updated, and then the BMU will be put back to its previous state. The register will then be checked again. If it fails 3 times, then the BMU_CONFIG_REGISTER_READ_BACK_FAILURE will be set.	register value is not equal to test value written to it	performed at power up	1 count	Type A, ML Illumination
BCU_CONFIG_REGISTER_READBACK_FAILURE	P0606	This monitor checks if: • Defective CPU	after the BMU has been initialized it will loop through a table of BMU registers and compare each register value to the value that the MCAL has previously written to it. If there is a difference, then the BMU will be unlocked, the register updated, and then the BMU will be put back to its previous state. The register will then be checked again. If it fails 3 times, then the BMU_CONFIG_REGISTER_READ_BACK_FAILURE will be set.	register value is not equal to test value written to it	performed at power up	1 count	Type A, ML Illumination
WDY-CON_FIG_REGISTER_READBACK_FAILURE	P0606	This monitor checks if: • Defective CPU	On initialization One or more of these Safety Watchdog registers has an incorrect value: WDTSCON0.REL WDTSCON1.IRO WDTSCON1.IR1 WDTSCON1.DR WDTSCON1.LR WDTSCON1.TCTR	any register has an incorrect value for four consecutive checks	Enabled at power up	4 count	Type A, ML Illumination
CPU_BMU_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 BMU will be put back to its previous state. The register will then be checked again. If it fails 3 times, then the CPU_MPU_CONFIG_REGISTER_READ_BACK_FAILURE will be set.	register value is not equal to test value written to it	performed at power up	1 count	Type A, ML Illumination
BMU_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 BMU will be put back to its previous state. The register will then be checked again. If it fails 3 times, then the CPU_MPU_CONFIG_REGISTER_READ_BACK_FAILURE will be set.	register value is not equal to test value written to it	performed at power up	1 count	Type A, ML Illumination

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
RE_MICRO_REGISTER_READBACK_FAILURE	P000E	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_D_ DETECTED_FAULT RE	P0006	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 raised.	Anyone Safety Test flag is reported as FAILED in two consecutive tests	Enabled at power up	1 count	Type A, MIL Illumination.
STM_PLAUSIBILITY_FAILURE	P0008	This monitor checks if: • Defective CPU	STM and TRU times are read without interrupt between, then after 20 ms, STM and TRU elapsed times are read without interrupt between the readings, the 25% error is checked and Updown_tsbalsu monitor function is called. The fault is continuously checked every 20 ms.	The difference between the System Timer and Time Base Unit channel 1 >= 25%	Enabled at power up	105 msec	Type A, MIL Illumination.
EVR_C_FGMON_FAULT RE	P0006	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_START_UP_M_BIST_FAULT RE	P0004	This monitor checks if: • Defective CPU	The micro runs a RAM self test at power-up. If a failure is detected then 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.
MD_PU1_SENSE_COMMON_MODE_FAULT	C0596	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC	If (common mode sense offset - zero sense offset) is outside the normal range (<= SPUT_SENSE_MAX_CM_SHIFT), this fault is set.	If the current sampled at power-up with an injected common mode sense offset (positive negative together), is outside +/- maximum common mode offset range (from the zero offset reading), this fault is raised.	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrevs	1 count/1 ms	Type A, MIL Illumination.
MD_PU1_SENSE_NEGATIVE_FAULT LT	C0596	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC	If (zero sense offset - negative sense offset) is outside the normal range (SPUT_SENSE_MAX_NEG_SHIFT to SPUT_SENSE_MAX_NEG_SHIFT), this fault is set.	If the current sampled at power-up with an injected negative sense offset, is outside minimum to maximum negative offset range (from the zero offset reading), this fault is raised.	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrevs	1 count/1 ms	Type A, MIL Illumination.
MD_PU1_SENSE_POSITIVE_FAULT	C0596	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC	If (positive sense offset - zero sense offset) is outside the normal range (SPUT_SENSE_MAX_POS_SHIFT to SPUT_SENSE_MAX_POS_SHIFT), this fault is set.	If the current sampled at power-up with an injected positive sense offset, is outside minimum to maximum positive offset range (from the zero offset reading), this fault is raised.	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrevs	1 count/1 ms	Type A, MIL Illumination.
MD_IEM_OCCURRENCE_FAULT	C0582	This monitor checks if: • Bridge FET failure • Invalid execution reason of a motor interrupt	Compares the number of times each electric drive interrupt has occurred in a 4 ms 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 priority 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 "Preset" state (i.e. not in "off" or intermediate "Returning" or "Terminated" state)	1 count	Type A, MIL Illumination.
MD_MOTOR_PHASE_VOLTAGE_1_HIGH_FAULT	C0597	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 <= voltage < PHASE VOLTAGE THRESHOLD HIGH THEN fault 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 <= voltage > PHASE VOLTAGE THRESHOLD LOW THEN fault 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	C0597	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 <= voltage < PHASE VOLTAGE THRESHOLD HIGH THEN fault 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_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 <= voltage > PHASE VOLTAGE THRESHOLD LOW THEN fault 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_MOTOR_PHASE_VOLTAGE_3_HIGH_FAULT	C0597	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 <= voltage < PHASE VOLTAGE THRESHOLD HIGH THEN fault 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 <= voltage > PHASE VOLTAGE THRESHOLD LOW THEN fault 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_PHASE1_STUCK_HIGH_FAULT	C0597	This monitor checks if: • Top FET shorted • Top FET drive stuck on or • Phase sense stuck high	Prior to initiating 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	400 ms	Type A, MIL Illumination.
MD_PU_PHASE1_STUCK_LOW_FAULT	C0580	This monitor checks if: • Bottom FET shorted • Bottom FET drive stuck on or • Phase sense stuck low	Prior to initiating 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 0v, 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	400 ms	Type A, MIL Illumination.
MD_PU_PHASE2_STUCK_HIGH_FAULT	C0597	This monitor checks if: • Top FET shorted • Top FET drive stuck on or • Phase sense stuck high	Prior to initiating 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	400 ms	Type A, MIL Illumination.
MD_PU_PHASE2_STUCK_LOW_FAULT	C0580	This monitor checks if: • Bottom FET shorted • Bottom FET drive stuck on or • Phase sense stuck low	Prior to initiating 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 0v, 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	400 ms	Type A, MIL Illumination.
MD_PU_PHASE3_STUCK_HIGH_FAULT	C0597	This monitor checks if: • Top FET shorted • Top FET drive stuck on or • Phase sense stuck high	Prior to initiating 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	400 ms	Type A, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MLL Illumination
MD_PU_PHASE_3_STUCK_LOW_FAULT	C080	This monitor checks if: • Bottom FET shunted • Bottom FET drive stuck on or • Phase sense stuck low	Prior to initiating 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 0v, 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	400 ms	Type A, ML Illumination.
MD_PU_BRIDGE_BH_UV_FAULT	C080	This monitor checks if: • ECU hardware failure	Bridge driver bootstrap high side 1 capacitor under voltage fault reported during Bridge driver configuration.	With bridge enabled and SOFF off, the FET EL1 is driven for 200ms. After 200ms, "high side buffer capacitor 1 under voltage" error in internal error register is still set.	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1ms	Type A, ML Illumination.
MD_PU_BRIDGE_ERR_RR_STU_OK_N1_FAULT	C082	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 (IOHVB, BRIDGE_1_ERROR) is inactive, the HW input Pin (IOHVB, BRIDGE_1_ERROR) stays active.	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	32 ms	Type A, ML Illumination.
MD_PU_BRIDGE_ERR_STUCK_LO_FAULT	C082	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 (IOHVB, BRIDGE_1_ERROR) - inactive, the HW input Pin (IOHVB, BRIDGE_1_ERROR) stays active.	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	20 - 30ms	Type A, ML Illumination.
MD_PU_BRIDGE_INT_TIMEOUT_FAULT	C082	This monitor checks if: • Micro controller SPI failure. • Bridge Driver failure.	Verify Bridge Driver initialization completed within SPUT_DRV_INT_MAX_TIME.	If initialization of the bridge driver does not occur within 100ms @ 1ms/bit	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1ms	Type A, ML Illumination.
MD_PU_BRIDGE_MAX_POWER_D_OVIN_FAULT	C082	This monitor checks if: • Incorrect Bridge Driver operation	Allow only 80_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 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1ms	Type A, ML Illumination.
MD_PU_BRIDGE_OC_TIMEOUT_FAULT	C082	This monitor checks if: • Incorrect Bridge Driver operation	Verify immediate over current tests are completed within SPUT_DRV_OVER_CURRENT_MAX_TIME.	Immediate overcurrent tests are not completed within 10ms @ 0.1uA/bit	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	3 counts/2ms	Type A, ML Illumination.
MD_PU_BRIDGE_OCT_NOT_COMPLETED	C082	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 @ 0.1uA/bit	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	2 counts/2ms	Type A, ML Illumination.
MD_PU_BRIDGE_ERR_ACCEPTABLE_ERR	C082	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 (rgtm) - Overvoltage Internal Regulator & Error (err_ov_reg) - Charge Pump 1 Overload Error (err_cp1) - Charge Pump 2 Overload Error (err_cp2) - Overtemperature Shutdown (sd_ov) - Charge Pump Overvoltage Shutdown at Pin CB or Pin CH2-CL2 (sd_ov_cp) - V _s Path Charge Pump Input Overload (sd_cp1) - Overtemperature Detection (err_ov_e) - Laser Fault Warning (flw) - Error Correction of Control Register Failed (err_reg_invalid) err_ov_e, flw, in External Errors.	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	3 counts/3ms	Type A, ML Illumination.
MD_PU_SENSE_ZERO_OFFSET_FAULT	C086	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	Zero 1 sense outside valid range The microcontroller shall test that wdM1_1TP (positive) offset is inactive and M1_1TN (negative) offset is inactive. M1_SENSE_1 (zero-1 sense offset) is within SPUT_SENSE1_OFFSET_MAX_ERROR	Zero 1 sense offset (M1_SENSE_1) is outside the normal range	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	1 count/1ms	Type A, ML Illumination.
MD_PU_MCU_FET_OP_STUCK_ON_FAULT	C082	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 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	400 ms	Type A, ML Illumination.
MD_PU_BRIDGE_ERR_CFGSTATE_CHG_FAULT	C084	This monitor checks if: • Micro controller SPI failure. • Bridge Driver failure.	This fault/safe 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 configuration has been sent via SPI.	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	145 ms	Type A, ML Illumination.
MD_PU_BRIDGE_ERR_R_C_UVR_FAULT	C080	This monitor checks if: • Bad Motor Driver Circuit • Bad motor driver ASIC • Bad motor	This fault/safe tests that over current detection on the bridge driver is working as it should. This fault/safe 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 (IOHVB, BRIDGE_1_ERROR) was active, but over current fault bit was not set in sBridgeDriver.CurrentSenseAmplifierStatus. OR Self test was started and Current Sense Amplifier 1 &2 - Gain 2 was set to a valid value and bridge driver error output pin (IOHVB, BRIDGE_1_ERROR) was inactive, but over current fault bit was set in sBridgeDriver.CurrentSenseAmplifierStatus.	Battery voltage between 7.1 v and 18v AND Motor rotating below +/-8.3mrev/s	40 msec	Type A, ML Illumination.
MD_MOTOR_OPEN_PHASE1_FAULT	C081	This monitor checks if: • Open Phase	Phase and q-axis demand is compared with phase 1 measured current, if difference is less than threshold and if actual current is less than threshold, raise a fault.	Low Speed Detection (0rpm-400rpm) average 0-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 < 1 A (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 < 1 A (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	4 counts/4ms	Type A, ML Illumination.
MD_MOTOR_OPEN_PHASE2_FAULT	C081	This monitor checks if: • Open Phase	Phase and q-axis demand is compared with phase 2 measured current, if difference is less than threshold and if actual current is less than threshold, raise a fault.	Low Speed Detection (0rpm-400rpm) average 0-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 < 1 A (ZERO_PHASE_CURRENT_TH_THRESHOLD) High Speed Detection (400rpm-2400rpm) last 4 samples of Q-axis current demand > 10A (CURR DEM THRESHOLD) AND motor phase 1 current < 1 A (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	4 counts/4ms	Type A, ML Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MD_BRIDGE_SF_BRIDGE_SCC_FAULT	C05E	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).	Power 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_CP_RED1_OVER_VOLTAGE_FAULT	C05F	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 (ICHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register internal errors "overvoltage internal register 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	C05B	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 (ICHWAB_BRIDGE_1_REF_ VOLTAGE) is not between 2.25 V and 2.75 V.	• ECU provides assist AND • No safe state on bridge driver	18ms /128 counts	Type A, MIL Illumination.
MD_BRIDGE_V3_U NO ER_VOLTAGE_FAULT LT	C05B	This monitor checks if: • Bridge Driver incorrect operation.	Monitor Bridge Driver reporting under voltage error on its VCC (V3V) pin.	bridge driver error output pin is active (ICHWAB_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_V3I_OVER_VOLTAGE_FAULT	C05F	This monitor checks if: • Bridge Driver incorrect operation.	Bridge Driver is reporting over voltage on its VCC (V3V) pin.	bridge driver error output pin is active (ICHWAB_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	C05B	This monitor checks if: • Bridge Driver EBR line connectivity • Bridge driver incorrect operation.	Check M1_BD_ERR line state.	During self test, the bridge driver error output pin is active (ICHWAB_BRIDGE_1_ERROR), when Current Sense Amplifier 1&2 - Gain 2 (HBD_REG_OP_GAU2) was set to a valid value.	Battery voltage between 7.1 v and 18v AND Motor rotating below ω 8.3 rev/s	3 msec	Type A, MIL Illumination.
MD_BRIDGE_V5_OVER_VOLTAGE_FAULT	C05F	This monitor checks if: • Bridge Driver incorrect operation • Battery Voltage	During run time Bridge Driver reports V5 over voltage error (using ERR line and SPI error registers).	bridge driver error output pin is active (ICHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND (In register shutdown error "V5 Overvoltage Shutdown" is set OR In register external errors "V5 Overvoltage Detection Error" is set).	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A, MIL Illumination.
MD_BRIDGE_V5_U NO ER_VOLTAGE_A_FAULT	P05B2	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 (ICHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register external errors "V5 Undervoltage Detection Error" is set.	• ECU provides assist AND • No safe state on bridge driver	18ms /128 counts	Type C, No MIL Illumination. Neutral Diagnostic.
MD_BRIDGE_V5_U NO ER_VOLTAGE_B_FAULT	C05B	This monitor checks if: • Bridge Driver incorrect operation.	During run time Bridge Driver reports V5 under voltage error (using ERR line and SPI error registers), but battery voltage is greater than BD_V5/U_U V_2 DETECT_THRESHOLD.	bridge driver error output pin is active (ICHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register external errors "V5 Undervoltage Detection Error" is set AND battery voltage is \geq 6.5V.	• ECU provides assist AND • No safe state on bridge driver	1 count/1ms	Type A, MIL Illumination.
MD_BRIDGE_VOLTAGE_TOO_HI_EVENT	P05B3	This monitor checks if: High battery voltage	Bridge voltage state is checked to see if it is normal. Then it is checked for sustained abnormal battery voltage. If battery voltage is higher than high power threshold for high power holdoff period, and the transient over voltage threshold is not in use (bridge limit at 0%), then "too high" event is raised and bridge voltage state is changed to too high.	Voltage at bridge driver \geq 26.5V	• Motor power switch on AND • ENQ pin active	1 count/1ms	Type B, MIL Illumination.
MD_BRIDGE_VDHP_OVER_VOLTAGE_FAULT	C05F	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 (ICHWAB_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 errors "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	C05B	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 3.95V • Bridge driver error output pin is active (ICHWAB_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	18ms/128 counts	Type A, MIL Illumination.
MD_BRIDGE_VDHP_UV_B_FAULT	C05B	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_VDHP_UV_DETECT_THRESHOLD.	• The voltage on the VS pin of the bridge driver ASIC is below 3.95V • Bridge driver error output pin is active (ICHWAB_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 \geq 6.5V.	• ECU provides assist AND • No safe state on bridge driver	1 count/ 1ms	Type A, MIL Illumination.
MD_BRIDGE_U NO EFR_ED_ERROR_FAULT LT	C05B2	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 (ICHWAB_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.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	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: (BridgeDriverChMode == BRDG_NORMAL_OPERATION) (BridgeDriverState == BD_SHUTDOWN) (BridgeDriverChMode == BRDG_ERROR_MODE) && (ICHWAB_BRIDGE_1_ERROR == ACTIVE)	• ECU provides assist AND • No safe state on bridge driver	15 counts / 15ms	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 initialization.	Bridge driver mode is not at the expected state during configuration.	Battery voltage between 7.1 v and 18v AND Motor rotating below <18.3rev/s	3 counts / 3 ms	Type A, MIL Illumination.
MD_BRIDGE_SOFF_STUCK_IG_FAULT LT	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 (ICHWAB_BRIDGE_1_TEST) is driven active, bridge driver state (BridgeDriverState) did not change to BD_NORMAL.	Battery voltage between 7.1 v and 18v AND Motor rotating below <18.3rev/s	2 counts / 22ms	Type A, MIL Illumination.
MD_BRIDGE_SPI_MISO_FAILED_FAULT	C0585	This monitor checks if: • Bridge Driver incorrect operation • Microcontroller SPI failure.	Bridge Driver reports SPI errors (using SPI error registers) OR isolated 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	1 count/1ms	Type A, MIL Illumination.
MD_BRIDGE_SPI_RESP_TIMEOUT_FAULT	C0586	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	1 count/1 ms	Type A, MIL Illumination.
MD_BRIDGE_REG_UNDER_VOLTAGE_FAULT	C0588	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_RU_UV_DETECT_TH RESHOLD.	• Bridge Driver internal regulator voltage < 6.5V @ 1056 V/M • Bridge driver error output pin is active (ICHWAB_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_REG_OVER_VOLTAGE_FAULT	C0587	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 (ICHWAB_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_REG_OVER_VOLTAGE_FAULT	C0587	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 (ICHWAB_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_OVER_CURRENT_FAULT	C0590	This monitor checks if: • Bridge Driver incorrect operation.	Bridge Driver reporting amplifier over current errors.	ICHWAB_BRIDGE_1_ERROR is active OR In SPI status "error flag" is set AND In register current sense amplifier errors "err_oc_sp1 or err_oc_sp2 or err_oc_sp3" are set.	EcuCrosState_active == Ecu_MotorDriveOn AND DrvBgSafeStateRequired == FALSE AND Battery Voltage > 6V AND	1 count/1 ms	Type A, MIL Illumination.
MD_BRIDGE_OVER_TEMP_ERROR_FAULT	C0583	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 (ICHWAB_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 (ICHWAB_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/1 ms	Type A, MIL Illumination.
MD_BRIDGE_HS_OVER_VOLTAGE_FAULT	C0587	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 @ 1056V/M • Bridge driver error output pin is active (ICHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register internal error "Highside 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/1 ms	Type A, MIL Illumination.
MD_BRIDGE_HS_UNDER_VOLTAGE_FAULT	C0588	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_HCU_UV_DETECT_TH RESHOLD.	• Bridge Driver highside capacitor voltage < 6.5V @ 1056V/M • Bridge driver error output pin is active (ICHWAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set AND In register internal error "Highside 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/1 ms	Type A, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	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 (JCHVAB_BRIDGE_1_ENABLE) inactive and set all three bottom FETs ON. After 100us all bottom FETs were not disabled.	Battery voltage between 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	50 ms	Type A, MIL Illumination.
MD_BRIDGE_SOFT_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 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	40 ms	Type A, MIL Illumination.
MD_BRIDGE_SOFT_NOT_ENABLED_FAULT	C0582	This monitor checks if: • Bridge Driver SOFF signal connectivity.	The microprocessor shall test that when SOFF 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 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	30 msec	Type A, MIL Illumination.
MD_BRIDGE_LATENT_WARN ING_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 (JCHVAB_BRIDGE_1_ENABLE) active with all three bottom FETs already ON. After 100us even one bottom FET was not enabled.	Battery voltage between 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	29 msec	Type A, MIL Illumination.
MD_BRIDGE_CP_OVER_VOLTAGE_FAULT	C0587	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 (JCHVAB_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 error "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 error "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_DOP_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 (JCHVAB_BRIDGE_1_ERROR) OR the SPI status "error flag" is set. AND In register shutdown error "Digital Driving Path Stucked 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_CS_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 (JCHVAB_BRIDGE_1_ERROR)	Battery voltage between 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	85 ms	Type A, 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 (JCHVAB_BRIDGE_1_ERROR) OR trans reading was not within limits	Battery voltage between 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	100 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 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	170 ms	Type A, MIL Illumination.
MD_BRIDGE_D_RV_B IST_S HORT_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 (JCHVAB_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 values.	Battery voltage between 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	180 ms	Type A, MIL Illumination.
MD_BRIDGE_DRV_BIST_TIMEOUT_FAULT	C0582	This monitor checks if: • Bridge Driver BIST networking correctly.	Built-in self test times out.	Bridge Driver built in self test was not completed within 100msec.	Battery voltage between 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	1 count/1ms	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 (JCHVAB_BRIDGE_1_ERROR) OR VCC under voltage error bit was not set in external error register	Battery voltage between 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	2 counts/5ms	Type A, MIL Illumination.
MD_BRIDGE_DRV_INHBIT_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 (JCHVAB_BRIDGE_1_INHBIT) is active, the bridge driver operation mode register did not indicate that it is in the expected Sleep Mode.	Battery voltage between 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	2 counts/2ms	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 comma is started and Bridge Driver state changes to IDLE.	When HW inhibit Pin (JCHVAB_BRIDGE_1_INHBIT) is driven inactive, the bridge driver operation mode register did not transit from Sleep Mode to the expected Idle Mode.	Battery voltage between 7.1 v and 18 v AND Motor rotating below $\omega \pm 8.3$ rev/min	2 counts/2ms	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 (JCHVAB_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_DEMO_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, Faulting	5 msec	Type A, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MOTOR_SENDS_FAIL	C05C2	This monitor checks if: Motor magnet over temperature.	Motor magnet temperature is greater than threshold.	Sets when the estimated motor magnet temperature is > 160°C	Power ON, Continuous, Faulting	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, Faulting	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, Faulting	20 msec	Type A, MIL Illumination.
MD_PU_BRIDGE_PRR_CLOSE1_LSD_FAULT	C05B0	This monitor checks if: • Bridge driver disabled • Bridge driver is safe off mode • Protection and feedback • Protection and feedback	• 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 7.1 v and 18v AND Motor rotating below < 0.3 rev/s	2 msec	Type A, MIL Illumination.
MD_PU_BRIDGE_PRR_CLOSE1_OPEN_CCT_FAULT	C05B0	This monitor checks if: • Open motor phase • Drive current signals open • Drive current signals open	Non-driven phase voltages not pulled low while FETs are driven closed.	• phase voltage > 1.2V when < 1.2V expected	• MD_PU_BRIDGE_PRR_CLOSE1_LSD_FAULT detects, this fault will not detect.	2 msec	Type A, MIL Illumination.
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_OR > 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.
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_OR > 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 endorsed by the vehicle deceleration.	• Valid braking request (driver or autonomous) • BP_Model (MPG) > Boost pressure + 50 Bar • Vehicle deceleration is observed	• Signal valid; • No ABS; • vehicle at speed and is slowing down. • driver not on throttle and requested enough pressure	600 ms Goal: 18000	Type A, MIL Illumination.
BP_MODEL_TOO_LOW_ERROR	C053D	This monitor checks if: Common cause: Boost Pressure sensor 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 endorsed by the vehicle deceleration.	• Valid braking request (driver or autonomous) • BP_Model (MPG) < Boost pressure - 50 Bar • Vehicle deceleration is observed	• Signal valid; • No ABS; • DAP close to end and position; • vehicle at speed not slowing down much; • driver not on throttle and requested enough pressure	600 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_OR > 50 BAR	• Input signal valid; • driver request, DAP position, suggest there should be no pressure; • vehicle acceleration, vehicle at speed.	600 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_OR > 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_OR > 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.	Chronic Status Failed = Sensor open or shorted to sensor supply (conditions for MC_PRES_SEN_OPEN_OR_SHORT_HIGH) or Sensor shorted to ground (conditions for MC_PRES_SEN_SHORTED_LOW) Fault counts toward setting each time Chronic Failed status changes from Passed to Failed or from Failed 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 < 4.81 % 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_SHORT_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_P_RES_S_EN_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 < 4.81 % 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_SHORT_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_P_RES_S_EN_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.	Chronic Status Failed = Sensor open or shorted to sensor supply (conditions for SC_PRES_SEN_OPEN_OR_SHORT_HIGH) or Sensor shorted to ground (conditions for SC_PRES_SEN_SHORTED_LOW) Fault counts toward setting each time Chronic Failed status changes from Passed to Failed or from Failed 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	C05B0	This monitor checks if: • Missing Calibration • NVRAM error	This fault only checks if the ECU calibration is successful 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	600 ms Goal: 18000	Type A, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML 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 YawRate 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 YawRate 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	8 SWA gain error > 2 times hold Goal: 900 ms Goal: 1.8 s	Type C, No ML, "Emissions Neutral Diagnostic"
SWA_OFFSET_ERROR	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 ML, "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 (Yaw_Rate_Comp_Ts_Swa_s16) - ABS(Swa_Turn_Corrected_Delayed_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 ML, "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 ML, "Emissions Neutral Diagnostic"
SWA_NOT_ALIVE_ERROR	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] > 3s ⁻¹	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 > 7.5 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 ML, "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 ML, "Emissions Neutral Diagnostic"
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 ML, "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 ²	Lataccel is valid ABS is not active	100 msec	Type C, No ML, "Emissions Neutral Diagnostic"
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	Type C, No ML, "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	Type C, No ML, "Emissions Neutral Diagnostic"

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
LAT_SENSOR_GAIN_ERROR	C06E1	This monitor checks if: • electronic fault in sensor	• Lat Acceleration Sensor - Gain Error • This function computes the difference between the measured $\dot{\gamma}$ signal and an $\dot{\gamma}$ 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, YawRate, or steering angle. The model based on steering angle is considered to be the most robust one.	• No active Lat Acc fault • $\dot{\gamma}$ -signal is valid • Yaw Rate signal is valid • No active Wss fault • Vehicle speed > 4.2 m/sec, while driving forward	1. 1.5s 2. 75s	TypeC, No ML, "Emissions Neutral Diagnostic"
LONG_SENSOR_R_NOT_ALIVE_ERROR	C0651	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. $\text{brg acc signal} \geq \pm 25 \text{ m/s}^2$ OR 2. Long Acc is constant AND $\text{brg acc signal} < \pm 14 \text{ m/s}^2$ AND Vehicle Speed > 3 m/s ²	• Emissions Rofe Test Inactive AND • Long Acc is valid • Wheel speed is valid • vehicle speed > 3 m/sec	1. 1 s 2. 100 ms	TypeC, No ML, "Emissions Neutral Diagnostic"
LONG_SENSOR_STEP_ERROR	C0651	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 ²	• Long Acc is valid • ABS not active • Emissions Rofe Test Inactive	100 msec	TypeC, No ML, "Emissions Neutral Diagnostic"
LONG_SENSOR_RAW_OFFSET_ERROR	C0651	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 Rofe Test Inactive	200 ms	Type C, No ML, "Emissions Neutral Diagnostic"
LONG_SENSOR_OFFSET_ERROR	C0651	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, TC, and VSC • Emissions Rofe Test Inactive	1. 100 ms 2. 1.8s 3. 1.8s 4. 10 ms	TypeC, No ML, "Emissions Neutral Diagnostic"
LONG_SENSOR_GAIN_ERROR	C0651	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 Rofe Test Inactive	200 msec	TypeC, No ML, "Emissions Neutral Diagnostic"
YAW_SENSOR_R_NOT_ALIVE_ERROR	C06E3	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] < 857/s AND Vehicle Speed > 3 m/s ² 2. [Yaw rate] ? 1307/s	• Emissions Rofe Test Inactive AND 1. Yaw Rate is valid Wheel speed info is valid Vehicle speed > 3 m/s	1. 1 s 2. 100 ms	TypeC, No ML, "Emissions Neutral Diagnostic"
YAW_SENSOR_STEP_ERROR	C06E3	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 > 8007/s ²	• Yaw Rate is valid • Emissions Rofe Test Inactive	100 ms	Type C, No ML, "Emissions Neutral Diagnostic"
YAW_SENSOR_RAW_OFFSET_ERROR	C06E3	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] > 507/s	• Yaw Rate is valid • Wheel speed info is valid • Vehicle is standing still • Emissions Rofe Test Inactive	200 ms	Type C, No ML, "Emissions Neutral Diagnostic"
YAW_SENSOR_OFFSET_ERROR	C06E3	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 Continuously learned offset > 5 deg/sec while vehicle standing still. (Offset must remain present as vehicle driven away following standstill condition) Before Initialization while driving: 2 learned offset is > 87/s	• Yaw Rate is valid • Steering angle, Lat Acc and wheel speed information are valid • Vehicle speed > 4.2 m/s • Stable forward driving • Emissions Rofe Test Inactive	1. 100 ms 2. 1.8s 3. 100 ms	TypeC, No ML, "Emissions Neutral Diagnostic"
YAW_SENSOR_GAIN_ERROR	C06E3	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: 87/s + delta After Initialization: 37/s + delta Where delta is based on the driving situation, a function of vehicle speed, $\dot{\gamma}$, 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 Rofe Test Inactive	1. 1 s 2. 500 ms	TypeC, No ML, "Emissions Neutral Diagnostic"
PTS_TO_SCP_MODEL_TOO_HIGH_ERROR	C06D2	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 minimum 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 look-up table	500 ms Goal: 18000 Counts	Type A, ML Illumination.
PTS_TO_SCP_MODEL_TOO_LOW_ERROR	C06D3	This monitor checks if: • Pedal Simulator Valve is closed or blocked • Pedal Simulator susceptible to stone 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, ML Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
PTS1_OUT_OF_RANGE_ERROR	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.
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 SCP (i.e. PTS2 model and SCP signals agree on driver braking level, PTS1 model and SCP disagree)	• PTS1 signal gradient > 700 mm/s • PTS1 - PTS2 > Error_threshold • Mode(PTS1) <=> SCP and Mode(PTS2) == SCP	Signal is valid	50 ms 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 > Error_threshold • Mode(PTS2) <=> SCP and Mode(PTS1) == SCP	Signal is valid	50 ms Goal: 10 Counts	Type A, MIL Illumination.
PTS1_SENT_RECEIVE_ERROR	C2A13	This monitor checks if: PTS1 SENT data error	The PTS1SENT 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 PTS2 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 0xFFFF • 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 FTTO_PEDAL_MOTOR_POSITION_VALUE.	N/A	N/A	5 msec	Type A, MIL Illumination.
PTS2_MP92_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 FTTO_PEDAL_MOTOR_POSITION_VALUE.	N/A	N/A	5 msec	Type A, MIL Illumination.
PTS1_CORRELATION_ERROR	C05DD	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	C05DD	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.
PTS2_OFFSET_ERROR	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.
MP92_CORRELATION_ERROR	C05E6	This monitor checks if: • MP92 Failure • Note: MP91 failure results in BOOSTED BRAKE SYSTEM FAILURE for lack of motor rotation / pressure build	MP91 is SPI based with 50 us update rate. MP92 is SENT based with a 1 msec update rate. During motor rotation there is an expected difference in MP91 and MP92 based on the different time sampling rates (time lag on MP92). MP91 1 and 2 moving different direction; or MP91 1 and 2 stopped at different relative position than history	MP91 - MP92 > 2 Degrees + 3 Degrees (motor speed offset) MP91 1 and 2 moving different direction; or MP91 1 and 2 stopped at different relative position than history	Signal is valid	100 ms Goal: 18000	Type A, MIL Illumination.
MP92_SENT_RECEIVE_ERROR	C2A1A	This monitor checks if: MP92 Signal Failure	Monitor MP92 sent data received from the SentSensor.	The failsafe detects when MP92 sent data received from the SentSensor is out of the valid range.	MP92 signal data is received.	5 msec	Type A, MIL Illumination.
MP9_BIST_FAULT	C05BA	This monitor checks if: MP9 Built-in-Self-Test failure	Testing of this module should include running BIST at various MP9 angles. The ECU performs an independent calculation parallel to internal MP9 sensor BIST software. The fault will occur when the parallel calculations don't match.	The value calculated within the MP9 does not equal the ECU calculated value.	BIST inputs are not faulty.	30 msec	Type A, MIL Illumination.
SYS_ASIC_VDBAT_RANGE_FAILURE	P0562	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 < 6 V 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	Type C, No MIL, "Emissions Neutral Diagnostic"
SYS_ASIC_PDBAT_RANGE_FAILURE	P0562	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 < 6 V 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_SHORTED_TO_GND	U3066	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_Shorted_to_Gnd fault is set	• Ratio = (KL30_1_KL30_2)/(KL30_1+KL30_2) • P SW1 AND P SW2 are turned OFF OR at least one safety switch is turned ON • Fault is set if ratio is less than ~30% • P SW1 AND/OR P SW2 are turned ON and all safety switches are turned OFF. • Fault is set if ratio is less than ~10%	• Power ON, Continuous Failsafe	75ms	Type B, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
KL30_2_OPEN_OR_SHORTED_TO_GND	U3007	This monitor checks if: • Fuse blown (Open) • Short_to_Ground	Fault Detection Criteria 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_Shorted_to_Gnd fault is set. Note: Although the SW is 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 Falsifying	70ms	Type B. MIL Illumination.
SYSTEM_VOLTAGE_LOW	P0562	This monitor checks if: • Vehicle Battery Voltage Supply is providing low voltage levels. • Defective cables. • Defective printed circuit board.	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.	Filtered system voltage < 8.5V	• Engine is not being cranked • System is not re-initializing or shutting down • System is not shutting down	150 ms	Type C. No MIL. "Emissions Neutral Diagnostic"
SYSTEM_VOLTAGE_EXCESSIVE_LOW	P0562	This monitor checks if: • Vehicle Battery Voltage Supply is providing excessively low voltage level. • Defective cable. • Defective printed circuit board.	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.	Filtered system voltage < 7.5V	• Engine is not being cranked • System is not re-initializing or shutting down • System is not shutting down	150 ms	Type C. No MIL. "Emissions Neutral Diagnostic"
SYSTEM_VOLTAGE_H_IGH	P0563	This monitor checks if: • Voltage Supply is providing high voltage levels. • Defective printed circuit board.	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.	Filtered system voltage > 16.8 V	• Engine is not being cranked • System is not re-initializing or shutting down • System is not shutting down	100 ms	Type B. MIL Illumination.
SYSTEM_VOLTAGE_EXCESSIVE_H_IGH	P0563	This monitor checks if: • Voltage Supply is providing excessively high voltage levels. • Defective printed circuit board.	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.	Filtered system voltage > 18.8V	• Engine is not being cranked • System is not re-initializing or shutting down • System is not shutting down	15 ms	Type B. MIL Illumination.
SYSTEM_VOLTAGE_ECU_SELF_TEST_HOLD	P0562	This monitor checks if: • Voltage Supply is providing excessively lower high voltage levels. • Defective printed circuit board.	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.	Polaris.Ratynce_Sec_Error = TRUE or Unfiltered system voltage < 7.0V or Unfiltered system voltage > 18.8V	• Polaris is not initialized yet • System Voltage is outside the Excessive range (<7.0 V or >18.8V) Have not finished self-test	5 ms	Type C. No MIL. "Emissions Neutral Diagnostic"
SYSTEM_VOLTAGE_ERRATIC	P0562	This monitor checks if: • Voltage Supply is toggling between non-operational voltages and/or normal operating voltages • Defective cables. • Defective printed circuit board.	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.	If (Filtered System Voltage > 18.8) (Filtered System Voltage < 8.5) fail_counter += 15 else fail_counter -= 5 If fail_counter >= 500 set fault	• Engine is not being cranked • System is not re-initializing or shutting down • System is not shutting down	300ms minimum	Type C. No MIL. "Emissions Neutral Diagnostic"
PRIMARY_W_AKEUP_LINE_STUCK_LOW	P2534	This monitor checks if: • HW ignition line failure	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.	(State of Primary Wakeup line == Not Wake) && (CAN Signal == (CRANK RUN))	• Primary Wakeup COMMS Signal is Valid (Signal is Valid when MISSING_PPEI_ENGINE_GENERAL_STATUS_1 fault is not latched)	2s	Type B. MIL Illumination.
PRIMARY_W_AKEUP_LINE_STUCK_HIGH	P2535	This monitor checks if: • HW ignition line failure	The MCU compares the state of the Primary Wakeup Line with the Ignition 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.	(State of Primary Wakeup line == Wake) && (CAN Signal == (CRANK RUN))	• Primary Wakeup COMMS Signal is Valid (Signal is Valid when MISSING_PPEI_ENGINE_GENERAL_STATUS_1 fault is not latched) • AND • Primary Wakeup Line is ON	2s	Type B. MIL Illumination.
INTERNAL_5V_SUPPLY_VOLT_ERRATIC	P0606	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	If the filtered 5V supply toggles outside the allowed range but does not stay there long enough to mature the INTERNAL_5V_SUPPLY_VOLT_FAULT_RE then this fault is matured by an up/down counter on the condition	If the filtered System Voltage toggles as per the below range Filtered system voltage > 4.75V Filtered system voltage > 5.25 V	• 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	800 counts/80ms minimum	Type A. MIL Illumination.
ECU_SELF_TEST_TIMEOUT	P0562	This monitor checks if: • Faulted ECU	If the ECU self test does not complete in the allotted 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	None	Runs during startup	5 msec	Type C. No MIL. "Emissions Neutral Diagnostic"
PWR_PTS_MPS_SUP1_RAN_GE_LOW	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/or one circuit of the MPS). The MCU monitors the feedbacks on these two voltage supplies. If a supply feedback is continuously < 4.85V for 100ms then the respective supply fault is set.	If PWR<4.85 for 100ms	• MPS1 sensor is enabled • PTS 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	100ms	Type A. MIL Illumination.
PWR_PTS_MPS_SUP1_RAN_GE_HIGH	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/or one circuit of the MPS). The MCU monitors the feedbacks on these two voltage supplies. If a supply feedback is continuously > 5.15V for 100ms then the respective supply fault is set.	If PWR>5.15V for 100ms	• MPS1 is enabled • PTS 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_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/or 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 demerited 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 • PTS 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	Type A. MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
PWR_PTS_MPS_SUP2_RANGE_LOW	C05B2	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/faults is set.	If PWR<4.85 for 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_RAN_GE_HIGH	C05B8	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/faults is set.	If PWR>5.15V for 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	C05B8	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 the ignition is locked.	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	Type A. MIL Illumination.
PWR_SW_COIL_S_UP_OPEN	005 3B	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30/JNT 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 KL30_JNT for a continuous 50 msec then the fault is set.	If Feedback Voltage < 90% of KL30_x	• Power ON, Continuous Faulting	50ms	Type A. MIL Illumination.
PWR_SW_COIL_SUP_SHORT	005 3B	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30/JNT 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 KL30/JNT for a continuous 50 msec then the fault is set.	If Feedback Voltage > 80% of KL30_x	• Power ON, Continuous Faulting	50ms	Type A. MIL Illumination.
PWR_SW_BB_COIL_SUP_OPEN	005 3B	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30/JNT 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/JNT for a continuous 50 msec then the fault is set.	If Feedback Voltage < 90% of KL30_x	• Power ON, Continuous Faulting	50ms	Type A. MIL Illumination.
PWR_SW_BB_C_OIL_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 KL30/JNT 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 KL30/JNT for a continuous 50 msec then the fault is set.	If Feedback Voltage > 80% of KL30_x	• Power ON, Continuous Faulting	50ms	Type A. MIL Illumination.
PWR_SW_MOT_SUP_OPEN	005 95	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30/JNT 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/JNT for a continuous 50 msec then the fault is set.	If Feedback Voltage < 80% of KL30_x	• Power ON, Continuous Faulting	50ms	Type A. MIL Illumination.
PWR_SW_MOT_SUP_SHORT	005 95	This monitor checks if: • Disconnected Switch • PCB Problem	The KL30 supply inputs are switched on/off by the two Power Switches. The downstream KL30/JNT 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/JNT for a continuous 50 msec then the fault is set.	If Feedback Voltage > 90.75% of KL30_x	• Power ON, Continuous Faulting	50ms	Type A. MIL Illumination.
PWR_SW_PSW1_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 < 50% of KL30_x	• Power ON, Continuous Faulting	50 msec	Type B. MIL Illumination.
PWR_SW_PSW1_SUP_SH ORT	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 > 97% of KL30_x	• Power ON, Continuous Faulting	50ms	Type A. MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Elimination
PWR_SW_PBSW2_SUP_OPEN	U3007	This monitor checks if: • Disconnected Switch • PCB Problem	This fault is not enabled as 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 low. 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.	F Feedback Voltage < 50% of KL30_x	• Power ON, Continuous Fa Isolation	50ms	Type S, ML Illumination
PWR_SW_PBSW2_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.	F Feedback Voltage > 97% of KL30_x	• Power ON, Continuous Fa Isolation	50ms	Type A, ML 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 LSSR amplifier and to maintain regulation of the VASO regulators and the U3 and U1 linear regulators. If the VCP12 voltage is less than 7.25 V for 44 Tsec then the Polaris sets the VCP12 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.	VCP12 voltage is less than 7.25 V for 44 Tsec	• Polaris is initialized	100 msec	Type A, ML Illumination
SYBAS_IC_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, ML Illumination
SYS_AS_IC_VD_GL_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.	SSR ON: VDBat+3V <= VDG <= VDBat+ 2V SSR OFF: VDG <= 1.0V	• Polaris is initialized	100 msec	Type A, ML Illumination
SYBAS_IC_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 Tsec 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, ML Illumination
SYBAS_IC_VBAT_SW_CRR	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 U12 voltage from the Polaris. 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 • when the VBAT switch is commanded On	15 msec	Type A, ML 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, ML Illumination
SYBAS_ICU_5FALU_RE	P0606	This monitor checks if: • Defective system ASIC	The US power supply regulates battery voltage down to 5V to supply such circuits as network communication transceivers, internal sensors and ADC references. If US is outside the acceptable range (<4.75V or >5.1V) continuously for 105 Tsec then the ASIC shall continue to attempt to regulate US and set the US 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 US Out of Range Warning SPI bit (<4.75V or >5.1V)	• Polaris is initialized	5 msec	Type A, ML Illumination
SYBAS_IC_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, ML Illumination
US_AS_IC_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 US is not within the 4.75V and 5.25V	Polaris is initialized	200 msec	Type A, ML Illumination
BOOSTED_BRAKE_SYSTEM_FAILED	C0021	This monitor checks if: Internal ABS failure	Error Threshold (Y value) is a linear lookup table value which is a function of the Boost Pressure Target (X value). X0: 0 BAR, Y0: 0 BAR X1: 8 BAR, Y1: 0 BAR X2: 20 BAR, Y2: 4 BAR X3: 200 BAR, Y3: 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, ML Illumination

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
BOOSTED_BRAKE_SYSTEM_FAILED_C_RANK	P0662	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). X0: 0 BAR, Y0: 0 BAR X1: 6 BAR, Y1: 3 BAR X2: 20 BAR, Y2: 4 BAR X3: 200 BAR, Y0: 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 and CRANKING is present	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 C, No MIL, "Emissions Neutral Diagnostic"
BOOSTED_BRAKE_SYSTEM_DYNAMIC_LEAK	C0680	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 iteration of all of them in this document.	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_LEAK_SO_FAILED	C0680	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 isolated Circuit cannot be	BOOSTED_BRAKE_SYSTEM_DYNAMIC_LEAK already present.	230 msec	Type A, MIL, Illumination.
BOOST_POWER_MANAGEMENT_ENABLED_WARNING	P0662	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 11.2V	Type C, No MIL, "Emissions Neutral Diagnostic"
BOOST_POWER_MANAGEMENT_ACTIVE_FAILURE	P0662	This monitor checks if: Low input voltage to the module	Did not detect BOOST_POWER_MANAGEMENT_ENABLED_W ARNING Motor Voltage < 7 V (Need for quickly detecting to protect the DAP if for some reason the BOOST_POWER_MANAGEMENT_ENABLED_W ARNING 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"
BOOSTED_BRAKE_SYSTEM_FAILED_W ARNING	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). X0: 0 BAR, Y0: 0 BAR X1: 6 BAR, Y1: 3 BAR X2: 20 BAR, Y2: 11 BAR X3: 200 BAR, Y0: 155 BAR	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.	750 ms max (fault matures rate depends on the gradient of the boost error)	Type B, 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	Type B, MIL, Illumination.
ACU_NOT_CONFIGURED	P0602	This monitor checks if: Set if ECU sensor Learn or Comp Port Learn has not gone 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 ECU sensor, and comp port learn again and clear code	6 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 Actuator 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 is 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	Type B, MIL, Illumination.
BRAKE_BY_WIRE_HIGH_LEVEL_MONITOR_FAILURE_CRANK	P0662	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 Actuator 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 during CRANKING. 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 is INHIBITED OR • Electric Drive state is not active or not running OR • Actuator Control is not allowed OR • CRANKING is present	• Pedal travel sensor signal • SCP value • Boost Arb state • Electric drive status	200 msec	Type C, No MIL, "Emissions Neutral Diagnostic"
STATIC_CIRCUIT_LEAK_DETECTED	C0680	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	6 msec	Type A, MIL, Illumination.
STATIC_CIRCUIT_LEAK_DETECTED	C0680	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.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
BRAKE_BLEED_NOT_COMPLETED	C15C7	This monitor checks if: • DID NOT write DID B2	DIDB2 = 0	DID B2 = 0	Runs Continuous	5 msec	Type A. MIL Illumination.
BOOST_STARTUP_FAILURE	P0562	This monitor checks if: • LIN cable not connected to switch (Wiring), EPB fuse, EPB faulted	After mode manager completes system self test the boost system looks to initialize the boost controller. If during this phase the conditions are not correct we will set a fault.	When boostcontrol state is in initialize state a timer is incremented allowing a set time to initialize before a fault should be set.	Run during the power up initialization of boost arbitration	4 seconds	TypeC. No MIL, "Emissions Neutral Diagnostic "
EPB_SWT_NODE_FAILURE	U1122	This monitor checks if: • LIN cable not connected to switch (Wiring), EPB fuse, EPB faulted	This fault will be set when the connection to the EPB LIN Switch is disconnected. Increment a counter if the LIN cable is not connected to the switch, this fault will be set if no connection is detected.	No connection detected (Lost Communication)	• Fault will not be set during the following conditions: • within the first 12 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • System Power Mode is in crank mode. • EPB channel failure is not set. • PB_WAKE_UP_LINE_VOLTAGE_FAULT is not set.	Goal = 3	TypeC. No MIL, "Emissions Neutral Diagnostic "
EBCMEPB-SWTC_H_RSPMSG_FAULT	U1122	This monitor checks if: • Incoming message is not as expected	The incoming message on LIN is invalid then set this fault	Invalid message	• Fault will not be set during the following conditions: • within the first 12 seconds after System Power Mode has transitioned to RUN or OFF • Supply Voltage is less than 9V • System Power Mode is in crank mode. • EPB channel, node failure is not set. • PB_WAKE_UP_LINE_VOLTAGE_FAULT is not set.	Time = 15 msec Goal = 3	TypeC. No MIL, "Emissions Neutral Diagnostic "
CAN_0_BUS_OFF_COMM_FAULT	U0074	This monitor checks if: • C bus Shorted • CAN transceiver faulty	Can peripheral looks for the bit errors in transmitted messages and increments error counter if any error is detected	If error 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	220 msec	Type B. MIL Illumination.
CAN_1_BUS_OFF_COMM_FAULT	U0073	This monitor checks if: • C bus Shorted • CAN transceiver faulty	CAN peripheral looks 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	220 msec	Type B. MIL Illumination.
PB_WAKE_UP_LINE_VOLTAGE_FAULT	C0816	This monitor checks if: • Transceiver faulty • PCB problem	The SW monitors the A/D feedback received from the IN pin of LIN transceiver. If this voltage drops below the threshold voltage for 60 msec we set this fault indicating EPB wake up is not possible	If the transceiver feedback drops below voltage tv	• Power ON, Continuous Failsafe	30 msec	TypeC. No MIL, "Emissions Neutral Diagnostic "
KEY_TABLE_NOT_PROVISIONED	U1960	This monitor checks if: • Security peripheral general key is NOT provisioned.	1) The Authoritative Counter reaches its maximum value. 2) Any single Key Slot Provision State Flag for Key 2 through Key <n> is equal to a value of 0 while the MEC is equal to 0. 3) Upon receipt of ERC_KEY_EMPTY from the security peripheral (SECP). All messages authenticated using the missing key will be invalidated. Invalidated messages are discarded without any further processing.	1) The Authoritative Counter reaches its maximum value. 2) Any single Key Slot Provision State Flag for Key 2 through Key <n> is equal to a value of 0 while the MEC is equal to 0. 3) Upon receipt of ERC_KEY_EMPTY from the security peripheral (SECP).	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition • Vehicle is in logistic mode.	1 count	Type A. MIL Illumination.
SECURITY_PERIPHERAL_PERFORMANCE	U1961	This monitor checks if: • Security Peripheral Performance - Performance or incorrect Operation • Unable to generate a MAC • Unable to verify a MAC	1) If a request to the security peripheral to generate a Message Authentication Code (MAC) does not result in a response within a set amount of time", the security peripheral is considered to have failed due to an internal error. 2) If a request to the security peripheral to verify a Message Authentication Code (MAC) does not result in a response within a set amount of time", the security peripheral is considered to have failed due to an internal error. • The actual amount of time varies based upon security peripheral hardware used but will be less than a few seconds. • In the event the security peripheral cannot generate a MAC due to an internal error, the authenticated message shall be broadcast with a MAC equal to zero. • Failed verification means the message is discarded, no failsoft action is taken other than to set the DTC.	1) If a request to the security peripheral to generate a Message Authentication Code (MAC) does not result in a response within a set amount of time", the security peripheral is considered to have failed due to an internal error. 2) If a request to the security peripheral to verify a Message Authentication Code (MAC) does not result in a response within a set amount of time", the security peripheral is considered to have failed due to an internal error. • The actual amount of time varies based upon security peripheral hardware used but will be less than a few seconds.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition • Vehicle is in logistic mode.	1 count	Type A. MIL Illumination.
ECM_AVH_STATUS_FAULT	C15C8	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 validity bit will be checked immediately.	AVHWithStat = 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	1 count	TypeC. No MIL, "Emissions Neutral Diagnostic "
MISSINGMSG_BODY_GEN_INFO_3	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
ESP_ENG_SPO_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.	EngSpStat_O == 0x02	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	1 Count	Type B. MIL Illumination.

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MISSING_MSG_ACT_AXL_TORQUE	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2 s Counts	Type B, MIL Illumination.
ACT_AXL_TORQUE_SECURITY	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 20 consecutive count sequence errors. Sliding Window Fail Threshold is 20 of 31	Type B, MIL Illumination.
ACT_AXL_TORQUE_ARC	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 20 consecutive count sequence errors. Sliding Window Fail Threshold is 20 of 31	Type B, MIL Illumination.
MISSING_MSG_STRG_WHL_INFO	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 100 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	100ms	Type C, No MIL, "Emissions Neutral Diagnostic"
STRG_WHL_INFO_ARC	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No MIL, "Emissions Neutral Diagnostic"
SWP_STRG_W_HL_ANG_DUD	U0420	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module • Data mask is stuck off • Incorrect SAS installed	• When the incoming message is unpacked, the data mask bit will be checked immediately.	SAS Data Mask Failure indicated if data mask in message 0x1E5 is stuck off (equals to zero) for an extended period	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	5 seconds if vehicle has not yet reached 1.3 m/s, 50 msec otherwise	Type C, No MIL, "Emissions Neutral Diagnostic"
SWP_STRG_W_HL_ANG_CALIB_STS_FAULT	00051	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.	SrvWhtAngSenCalStat == Dn0	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 count	Type C, No MIL, "Emissions Neutral Diagnostic"
MISSING_GWCOM_DE_MSG	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V < VB < 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, MIL Illumination.

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Elimination
MISSING_OVCCM_34_MSS	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2 x Counts	Type B, ML Illumination
MISSING_MSG_PSTN_OFST_FRM_TRM_3	U0132	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type C, No ML, "Emissions Neutral Diagnostic"
PSTN_OFST_FRM_TRM_3_CHKSUM	U0421	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 \neq 0	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
PSTN_OFST_FRM_TRM_3_ARC	U0421	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 \neq 0	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
MISSING_VEH_LVL_CTL_GEN_INFO_1	U0132	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type C, No ML, "Emissions Neutral Diagnostic"
VEH_LVL_CTL_G_ENJN_FD_1_ARC	U0421	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 \neq 0	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
VEH_LVL_CTL_G_ENJN_FD_1_PROT_FAULT	U0421	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 \neq 0	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
MISSINGMSG_ELEC_PWR_STRG_OVRLY	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type C, No ML, "Emissions Neutral Diagnostic"

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
COMMS_TORQUE_OVERLAY_DELIVERED_STATU S_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 the CAN bus for this message and checks if the message was received in the detection time.	The Brake Control System shall set a code, if Torque Overlay Torque Delivered Status remains 80, Inactive for 250 ms after the brake control system made a steering torque request.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq V \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	250 ms	Type C, No ML, "Emissions Neutral Diagnostic"
MISSING_MSD_DAMPER_CTRL_INFO	U0139	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq V \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	TypeC, No ML, "Emissions Neutral Diagnostic"
DAMPER_CTRL_INFO_ARC	U043A	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 == 0	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq V \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fall Threshold is 8 of 16	TypeC, No ML, "Emissions Neutral Diagnostic"
DAMPER_CTRL_INFO_PROT_FAULT	U043A	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq V \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fall Threshold is 8 of 16	TypeC, No ML, "Emissions Neutral Diagnostic"
MISSING_MSD_ALTO_CLT_GEN_INFO	U1614	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9V \leq V \leq 16V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	TypeC, No ML, "Emissions Neutral Diagnostic"
MISSING/MSG_ALC_VEH_TOP_SPD_LM	U0132	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9V \leq V \leq 16V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	TypeC, No ML, "Emissions Neutral Diagnostic"
ALC_VEH_TOP_SPD_LM_ARC	U0421	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 == 0	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9V \leq V \leq 16V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 3 consecutive count sequence errors. Sliding Window Fall Threshold is 3 of 16	TypeC, No ML, "Emissions Neutral Diagnostic"
ALC_VEH_TOP_SPD_LM_PROT_FAULT	U0421	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9V \leq V \leq 16V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 3 consecutive count sequence errors. Sliding Window Fall Threshold is 3 of 16	TypeC, No ML, "Emissions Neutral Diagnostic"

240BDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
MISSING_MSG_BKUP_SYS_PWR_MD	U1607	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: $9V \leq V < 16V$ • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2 x Counts	Type C, No ML, "Emissions Neutral Diagnostic"
BKUP_SYS_PWR_MD_ARC	U0447	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 assessed according to GMW872.	New_ARC - Prev_ARC == 0	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: $9V \leq V < 16V$ • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 5 consecutive count sequence errors. Sliding Window Fail Threshold is 5 of 8	Type C, No ML, "Emissions Neutral Diagnostic"
MISSING_COM_CAN1_MSG04	U1607	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: $9V \leq V < 16V$ • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type C, No ML, "Emissions Neutral Diagnostic"
MISSING_COM_CAN1_MSG06	U1607	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: $9V \leq V < 16V$ • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2 x Counts	Type C, No ML, "Emissions Neutral Diagnostic"
MISSING_MSG_LAT_LONG_DATA	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 100 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: $9V \leq V < 16V$ • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	100ms	Type C, No ML, "Emissions Neutral Diagnostic"
LAT_LON_G_DATA_SECURITY	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: $9V \leq V < 16V$ • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
LAT_LON_G_DATA_ARC	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: $9V \leq V < 16V$ • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
LLDP_VE_H_ACCEL_DUD	U0452	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module • Data mask is stuck off • Incorrect IMU installed	• When the incoming message is unpacked, the data mask bit will be checked immediately.	IMU Data Mask Failure Indicated! If data mask in message 0x140 is stuck off (equal to zero) for an extended period	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: $8.0 V < V < 16.0 V$ • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	5 seconds if vehicle has not yet reached 1.3 m/s, 50 msec otherwise	Type C, No ML, "Emissions Neutral Diagnostic"

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
LLDP_LAT_ACCEL_SNSR_CORR_STS_FAULT	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 correlation status bit will be checked immediately.	Correlation Status = Unknown	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	1 count	TypeC, No ML, "Emissions Neutral Diagnostic"
LLDP_LONG_ACCEL_SNSR_CORR_STS_FAULT	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 correlation status bit will be checked immediately.	Correlation Status = Unknown	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	1 count	TypeC, No ML, "Emissions Neutral Diagnostic"
MISSING_MSG_OCCPFT_RSTRNT_INFO	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	TypeC, No ML, "Emissions Neutral Diagnostic"
MISSING_MSG_PST_CLSN_INFO	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	TypeC, No ML, "Emissions Neutral Diagnostic"
PST_CLSN_INFO_SECURITY	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 5 consecutive count sequence errors. Sliding Window Fail Threshold is 5 of 8	TypeC, No ML, "Emissions Neutral Diagnostic"
PST_CLSN_INFO_ARC	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 5 consecutive count sequence errors. Sliding Window Fail Threshold is 5 of 8	TypeC, No ML, "Emissions Neutral Diagnostic"
STRG_WHL_INFO_SECU RITY	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	TypeC, No ML, "Emissions Neutral Diagnostic"
MISSING_MSG_YAW_RATE	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 100 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	100ms	Type C, No ML, "Emissions Neutral Diagnostic"

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Elimination
YAW_RATE_SECURITY	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	TypeC, No ML, "Emissions Neutral Diagnostic"
YAW_RATE_ARC	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	TypeC, No ML, "Emissions Neutral Diagnostic"
YAW_RATE_DUD	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 data mask bit will be checked immediately.	Data Mask Failure indicated if data mask in message is stuck off (equal to zero) for an extended period	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	5 seconds if vehicle has not yet reached 1.3 m/s, 50 msec otherwise	TypeC, No ML, "Emissions Neutral Diagnostic"
YAW_RATE_CORR_FAULT	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 correlation status bit will be checked immediately.	Correlation Status = Unknown	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	1 count	TypeC, No ML, "Emissions Neutral Diagnostic"
MISSING_ACC_GNRL_INFO1_FCM	U0265	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	TypeC, No ML, "Emissions Neutral Diagnostic"
MISSING_ACC_GNRL_INFO1_EOCM	U1615	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	TypeC, No ML, "Emissions Neutral Diagnostic"
ACC_GNRL_INFO1_SECURITY	U053B	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	TypeC, No ML, "Emissions Neutral Diagnostic"
ACC_GNRL_INFO1_ARC	U053B	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	TypeC, No ML, "Emissions Neutral Diagnostic"
MISSING_MSD_APA_STS	U160C	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	TypeC, No ML, "Emissions Neutral Diagnostic"

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
APA_STS_SECURITY	UD6CA	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
APA_STS_ARC	UD6EA	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
MISSING_BCM_CAN2_MSG01	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.
MISSING_CGM_CAN2_MSG03	U1608	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.
MISSING_CGM_CAN2_MSG02	U1608	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.
MISSING_BCM_CAN2_MSG04	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.
MISSING_BCM_CAN2_MSG02	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.
MISSING_MSG_BODY_GEN_IN_FD_1	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MISSNG_MSG_BODY_VEH_SPD_CTL_RESP	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2 s Counts	Type B. MIL Illumination.
MISSNG_MSG_DRVRL_INTD_AXL_TQ_MN	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
MISSNG_MSG_DRVRL_INTD_AXL_TQ_MX	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
MISSNG_MSG_DRVRL_INTD_TQ	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
MISSNG_ECM_CAN2_MSG01	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
MISSNG_ECM_CAN2_MSG02	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2 s Counts	Type B. MIL Illumination.
MISSNG_ECM_CAN2_MSG03	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
ECM_CAN2_MSG02_ARC	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 == 0	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type B. MIL Illumination.
ECM_CAN2_MSG02_PRTCTN_VAL	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type B. MIL Illumination.

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Elimination
MISSING_OVCAN_R2_M55	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. ML Illumination.
MISSING_ECM_CAN2MSG04	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. ML Illumination.
CHS_SYS_TOTAL_AXLE_TRQ_REQ_STS_FAILED	U2 AC7	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 torque request status will be checked immediately.	Chassis System Total Axle Torque Request Status : Request Status = 2 OR 3 OR 4 OR 5 OR 6 Following are the ENUMs for Signal CSTATRS_ReqSts \$0-No_Request \$1-Request_Honored \$2-Limit_Adaptation \$3-Denial_Data_Failure_Temporary \$4-Denial_Data_Failure_Permanent \$5-Control_System_Failure_Temporary \$6-Control_System_Failure_Permanent	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	1 count	Type C. No ML, "Emissions Neutral Diagnostic"
MISSING_ECM_CAN2MSG12	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. ML Illumination.
MISSING_EOCCM_HCP1_CAN2MSG01	U1615	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type C. No ML, "Emissions Neutral Diagnostic"
MISSING_FCM_CAN2MSG01	U0265	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type C. No ML, "Emissions Neutral Diagnostic"
MISSING_EXT_LGT_VSH_WPR_INFO	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. ML Illumination.
MISSING_MSG_ENO_SPD	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. ML Illumination.
MISSING_EOCCM_GNRL_INFO1	U1615	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type C. No ML, "Emissions Neutral Diagnostic"

24OBDG03D Part 1 EBCM Summary Tables

Component/System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
ECM_GNRLIN_FDI_SECURITY	U052B	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V 1 VB 1 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
ECM_GNRLIN_FDI_ARC	U053B	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V 1 VB 1 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type C, No ML, "Emissions Neutral Diagnostic"
MISSING_FRT_TIRE_PRS	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V 1 VB 1 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.
MISSING_GVCGM_25_MSG	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V 1 VB 1 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.
MISSING_GVCGM_36_MSG	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V 1 VB 1 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.
MISSING_GVCGM_90_MSG	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V 1 VB 1 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, ML Illumination.
MISSING_LSCMB_AUTO_BRK	U0265	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V 1 VB 1 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type C, No ML, "Emissions Neutral Diagnostic"
LSCMB_AUTO_BRK_SECURITY	U0566	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V 1 VB 1 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 4 consecutive count sequence errors. Sliding Window Fail Threshold is 4 of 8	Type C, No ML, "Emissions Neutral Diagnostic"
LSCMB_AUTO_BRK_ARC	U0566	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V 1 VB 1 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 4 consecutive count sequence errors. Sliding Window Fail Threshold is 4 of 8	Type C, No ML, "Emissions Neutral Diagnostic"

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MISSING_OTS_AR_TUP	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2 x Counts	Type B. MIL Illumination.
MISSING_MSD_PRPL_STAT	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
MISSING_MSD_SYS_PWR_MD	U16140	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
SYS_PWR_MD_ARC	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 Error will be detected according to GMW8772.	New_ARC - Prev_ARC == 0	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 8 consecutive count sequence errors. Sliding Window Fail Threshold is 8 of 16	Type B. MIL Illumination.
MISSING_TEEN_DRVVR_ACTV	U16140	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
MISSING_MSD_TRNS_EST_GR	U1011	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.
TRNS_EST_G_R_SECURITY	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 12 consecutive count sequence errors. Sliding Window Fail Threshold is 12 of 16	Type B. MIL Illumination.
TRNS_EST_GR_ARC	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	Fastest maturation is 12 consecutive count sequence errors. Sliding Window Fail Threshold is 12 of 16	Type B. MIL Illumination.
MISSING_ECM_TCM_CAN2_MS001	U1011	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B. MIL Illumination.

24OBDG03D Part 1 EBCM Summary Tables

Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MISSING_ECM_TCM_CAN2_MISG02	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq VB \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2 s Counts	Type B: MIL Illumination.
TRNS_OIL_TMP_SIG_INVALID	U0402	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 validity bit will be checked immediately.	Transmission Oil Temperature Invalid = 1	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq VB \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition • Vehicle is in logistic mode.	1 count	Type B: MIL Illumination.
MISSING_MSG_VEH_MTN_INFO_1	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq VB \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B: MIL Illumination.
VEH_MTN_INFO_1_SECURITY	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq VB \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 10 consecutive count sequence errors Sliding Window Fail Threshold is 1 Out 16	Type B: MIL Illumination.
VEH_MTN_INFO_1_ARC	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq VB \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 10 consecutive count sequence errors Sliding Window Fail Threshold is 1 Out 16	Type B: MIL Illumination.
MISSING_VEH_ODO_DISP_VAL	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq VB \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B: MIL Illumination.
MISSING_MSG_WHLE_DIST	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq VB \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B: MIL Illumination.
MISSING_ECM_GNRL_INFO1	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \leq VB \leq 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B: MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
MISSNG_ECM_GNRL_INF01	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2 x Counts	Type B, MIL Illumination.
ECM_GNRL_INF01_ARC	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. • GM's SUM indicates a failed continuous operation.	• GM's SUM indicates a failed continuous operation.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 12 consecutive count sequence errors. Sliding Window Fail Threshold is 12 of 16	Type B, MIL Illumination.
ECM_GN_RL_INF01_SECU_RTY	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 Protection value with every new received frame. • GM's SUM indicates failed safety and failed security.	• GM's SUM indicates failed safety and failed security.	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	fastest maturation is 12 consecutive count sequence errors. Sliding Window Fail Threshold is 12 of 16	Type B, MIL Illumination.
MISSNG_ECM_GNRL_INF02	U1611	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, MIL Illumination.
MISSNG-EOC_MEOC_M_HCP1_FCM_MSG01	U1615	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type C, No MIL, "Emissions Neutral Diagnostic "
MISSNG_GVCGM_S1_MSG	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2.5 Counts	Type B, MIL Illumination.
MISSNG_BCM_CAN2_MSG07	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 250 msec OR Message length is less than defined by DBC	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2500 ms	Type B, MIL Illumination.
MISSNG_NODE_STATUS_CAN2_MSG01	U1607	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 is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V \pm VB \pm 16.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	2500 ms	Type C, No MIL, "Emissions Neutral Diagnostic "

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
NODE_STS_IPC_LCFA_FAULT	U0447	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	Node Status TCCMS Loss of Communication Fault Active	Node Status TCCMS Loss of Communication Fault Active	Fault is not set when: • While System Power Mode equals Start • Within the first 5 seconds after the Vehicle Power Mode has transitioned to Off, Run, or Propulsion • Supply voltage is not within the range: 9.0 V ± VB 1 ± 0.0 V • Within the first 5 seconds of a recovery from an under or over voltage condition • Within the first 5 seconds of power up/reset or a running reset • Bus off state is confirmed or ECU is recovering from a bus off condition	5500 ms	TypeC, No ML, "Emissions Neutral Diagnostic"
ECU_ID_NOT_PROGRAMMED	P0602	This monitor checks if: • ECU ID not programmed at ECU/HCU assembly plant	• This fault will be latched, if there is no valid value for Security Data in NVRAM.	NVRAM_SECURE_CODE_BLKID == 0xFF	• Power Switch is ON	1 count	Type A, ML Illumination.
VCFG_OPTION_S_NOT_PROG	P0602	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	• The CHASSIN VCFG component extends the former Function Enable logic. It now combines ECU programming with NVRAM and CALIBRATION, in order to activate/disable functions, features, and subsystems. This means that functionality is present in the code, that will be suppressed until activated by the new VCFG settings.	VCFG settings are not programmed/not available Vcfg_Options_Enable(VCFG_OPTION_S_ENABLE_BYTE_CAL) == (UB/VCFG_OPTIONS_CHECKS_SOME) OR Vcfg_Options_Enable(VCFG_OPTIONS_ENABLE_BYTE_CAL) > (UB/VCFG_OPTIONS_CHECKS_NONE)	• Power Switch is ON	1 count	Type A, ML Illumination.
VAF-C ALIBRATION/ NVAL ID	P0602	This monitor checks if: • Problem at signal source • Problem at message source module • Problem with bus wiring • Problem at message receiving module	VAF file not configured properly	None	• Power Switch is ON	1 count	Type A, ML Illumination.
PB_MICRO_IPC_FAULT	U3000	This monitor checks if: S12 micro or Champion micro arithmetic failure, S12 micro or Champion micro SPI failure, EMC	• This fault sets when the Champion micro detects an IPC failure with the S12 micro	EPB Micro IPC Counter Fault = TRUE OR EPB Micro IPC CRC Fault = TRUE OR EPB Micro not initializing (not alive)	Continuous	50 msec	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MICRO_RAM_FAULT	P0604	This monitor checks if: S12 micro RAM failure	Each RAM cell is consecutively written with test patterns, read back and compared with the expected value. In case of a disagreement, the fault is set At startup, the complete RAM is checked this way, during cyclic operation the RAM is checked cell by cell in the idle loop (complete check • 1s in normal operation, 17 s in sleep mode)	Freescape Micro SW does an initial RAM check and a cyclical RAM check To perform a RAM test, a RAM area is written with a special pattern and read back to check its correctness	Continuous	10 msec	Type A, ML Illumination.
PB_MICRO_ROM_FAULT	00616	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 written added to the current checksum for a section. If the byte being checked is the last byte of a section, then the section is verified for a correct checksum stored at the end of the section.	Continuous	10 msec	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MICRO_STACK_FAULT	U3000	This monitor checks if: S12 micro wrong program execution, instruction execution faults, addressing faults.	Below and above the RSTACK and CSTACK areas of memory, 16 bit RAM cells are written with a pattern. In case of a stack fault, this pattern will be overwritten and very likely changed by that. All patterns are periodically checked that they are not changed	To detect underflow/overflow of the system stacks, a word of RAM is reserved at the end of each of the system stacks. A word of RAM is also reserved at the upper most address of the stack section. To detect cases where the application exception could be pushing a value onto the stack that matches the test value, the test value that is stored at these reserved addresses will be changed each update. Stacks checked are the: UNDEFINED/ADCODE STACK, SUPERVISOR/VIDEOSTACK, FIQ_MODE_STACK, IRQ_MODE_STACK If the reserved stack which contains a pattern is overwritten, a fault will be set	Continuous	10 msec	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MOTOR_SUPPLY_OC	00616	This monitor checks if: • open supply	Precondition: no FC_ADD_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	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MOTOR_SUPPLY_OC_RR	00616	This monitor checks if: • open supply	Precondition: no FC_ADD_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	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MICRO_ADC_REFERENCE_FAULT	00616	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	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MICRO_ADC_CAL_DATA_IMPLAUSIBLE	00616	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	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MICRO_ADC_CAL_FAULT	00616	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	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MICRO_ECC_FAILURE	U3000	This monitor checks if: S12 micro memory controller defect	The S12 micro's memory controller has a test mode in which a memory error can be injected when writing to memory. When reading from that faultily written memory cell and the ECC logic does not detect the fault as expected, the monitor fails	ECC failure detected at time ROM is read for use or when a background ROM check fails	• Periodic	10 msec	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MICRO_S12_IPC_FAULT	U3000	This monitor checks if: • Communication error • Crosstalk or arbitration problem	• This fault sets when the S12 micro detects an IPC failure with the Champion micro	• Set when the S12 detects an IPC failure: • ID • Rolling count • Checksum • Length	• EPB micro initialized	10 msec	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MICRO_SWITCH_DISCONNECTED_LIN	U1122	This monitor checks if: • Switch disconnected • Defective LIN transceiver • LIN communication error	The EPB switch pattern has to be stable in the state "DISCONNECTED" (LIN bus communication is disturbed). The stability check takes between 80ms and 150ms. Afterwards the fault qualification is started. The total fault detection-time is increased by the delay of the stability check.	Switch disconnected pattern observed	• continuous	1200 msec	TypeC, No ML, "Emissions Neutral Diagnostic"
PB_MOTOR_MISSING_INITIALIZATION_ERROR	00616	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	TypeC, No ML, "Emissions Neutral Diagnostic"
PBC_LOG_ICAL_SEQ_MONITOR	00616	This monitor checks if: Defective ECU	• Fault is detected by Mando PBC	Program Sequence Fault detected	Vehicle Power Mode: OFF, ACCESSORY, RUN Vehicle Operating Conditions: Dynamic or Static state Exceptions: none	See Detection Rules (fault is detected by Mando PBC)	TypeC, No ML, "Emissions Neutral Diagnostic"

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	MIL Illumination
PBC_RUN_IN_NCT_DONE	C0616	This monitor checks if: Assembly check has not been performed yet	* Fault is detected by Mando PBC	Assembly Test Not Done	Vehicle Power Mode: OFF, ACCESSORY, RUN, Cranking Vehicle Operating Conditions: Dynamic and Static state Exceptions: none	See Detection Rules (fault is detected by Mando PBC)	Type C, No MIL, "Emissions Neutral Diagnostic"
PBC_POWERDOWN_EEPROM_FAILED	C0616	This monitor checks if: Unexpected Powerdown, Invalid EE + brake state data Activation interrupted and not resumed in time or structure	* Fault is detected by Mando PBC	Actuator status is UNKNOWN due to unexpected power down or EEPROM failure	Vehicle Power Mode: OFF, ACCESSORY, RUN Vehicle Operating Conditions: Dynamic, static state Exceptions: Disabled by calibration, Assembly check is not done	See Detection Rules (fault is detected by Mando PBC)	Type C, No MIL, "Emissions Neutral Diagnostic"
PBC_HOST_U NAVAILABLE	C0616	This monitor checks if: Host SW shutdown/EPB actuation	* Fault is detected by Mando PBC	Host is not available	Vehicle Power Mode: OFF, ACCESSORY, RUN Vehicle Operating Conditions: Dynamic, static state Exceptions: Disabled by calibration, Non-operational mode	See Detection Rules (fault is detected by Mando PBC)	Type C, No MIL, "Emissions Neutral Diagnostic"
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 falsifying	40 s	Type C, No MIL, "Emissions Neutral Diagnostic"
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 falsifying	10 ms	Type C, No MIL, "Emissions Neutral Diagnostic"
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 falsifying	40 s	Type C, No MIL, "Emissions Neutral Diagnostic"
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 falsifying	10 ms	Type C, No MIL, "Emissions Neutral Diagnostic"
EPB_COMMAND_RANGE_ERROR	C0616	This monitor checks if: • EPB decel request out of range	* This falsify 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 falsifying	250 msec	Type C, No MIL, "Emissions Neutral Diagnostic"
PBC_C_RANKING_TIMEOUT	C0616	This monitor checks if: Power mode is Cranking	* When power mode is cranking, suspend actuation as long as it is cranking until timeout after 5 seconds	When Power Mode = Cranking, Then Suspend actuation as long as it is cranking and also provide the following options to Mando: 1. Timeout after 5 seconds and set the fault 2. Continue actuation	Power mode is Cranking	5 sec	Type C, No MIL, "Emissions Neutral Diagnostic"
PB-HSB_NIT_FAULT	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 C, No MIL, "Emissions Neutral Diagnostic"
EPB_ASSIST_CURRENT_FEEDBACK_EXCEEDED	C0616	This monitor checks if: Excessive clamp force request. E.x.	Feedback current > 13.5 amps for 300 msec or Feedback current > 16.6 amps for 20 msec while the motor is being requested to apply clamp force.	Feedback current > 13.5 amps for 300 msec or Feedback current > 16.6 amps for 20 msec	Runs continuously during EPB Assist	1 count	Type C, No MIL, "Emissions Neutral Diagnostic"
EPB_ASSIST_CURRENT_FEEDBACK_MPLAUSIBLE	C0616	This monitor checks if: Request for clamp force with no feedback	If during EPB assist active control the current feedback doesn't exceeded min current for x number of requests for activation	Feedback Current < Min Current for > 150 msec. The results in 1 count	Runs continuously during EPB Assist	>= 4 counts	Type C, No MIL, "Emissions Neutral Diagnostic"
PBC_HOST_IGNORED_COMMAND	C0616	This monitor checks if: Defective ECU, or wrong conditions when EPB actuation was requested	PBC detects this fault if "Motor Driver State" does not change to current value of "Motor Command" for over 100ms, PBC sets FaultStatus(33) as "Failed" and cancel the current actuation request (MotorCommand = STOP and then NONE) (Refer VDA 4R3.177)	"Motor Driver State" does not change to current value of "Motor Command" for over 100ms	Vehicle Power Mode: OFF, ACCESSORY, RUN Vehicle Operating Conditions: static state Exceptions: Disabled by calibration, Non-operational mode	100ms	Type C, No MIL, "Emissions Neutral Diagnostic"
PB_UNDERVOLTAGE	P0562	This monitor checks if: • Vehicle Battery Voltage Supply is providing low voltage levels. • Defective cables. • Defective printed circuit board.	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 8.0V for more than 100 msec then the fault is cleared.	Filtered system voltage < 8.5V	* Engine is not being cranked * System is not re-initializing or shutting down * System is not shutting down	150 ms	Type C, No MIL, "Emissions Neutral Diagnostic"
PB_OVERVOLTAGE	P0563	This monitor checks if: • Voltage Supply is providing high voltage levels. • Defective printed circuit board.	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.	Filtered system voltage > 16.8 V	* Engine is not being cranked * System is not re-initializing or shutting down * System is not shutting down	100 ms	Type B, MIL Illumination.
TASK_OVER_RUN_CORE0	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 occurrence 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 occurrence of 2 overruns in a row due to latching of the fault bit.	Type A, MIL Illumination.
TASK_OVER_RUN_CORE2	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 occurrence of 2 overruns in a row due to latching of the fault bit.	Type A, MIL Illumination.

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Component/ System	Fault Code	Monitoring Strategy Description	Fault Detection Criteria	Threshold Value	Secondary Parameter and Enable Condition	Maturation Time	ML Illumination
RUNNING_RESET_FAILURE	P0562	This monitor checks if: • Keep Alive Voltage Regulator not functional. • Processor loses complete power (system voltage). • Processor is incorrectly reset.	• Two tasks in NVSRAM 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 flash NVSRAM updates on the last module shutdown (i.e. Disconnect battery) from module before shutdown)	• No Short: Status = Disabled • A controlled shutdown is detected • System power mode != Diagnostic mode • PENDING Position != PARK • Vehicle is moving as defined by WSS != IDLE or Invalid	5ms	Type C, No ML. Emissions Neutral Diagnostic *
MPU_FAULT_TRW_SCS_CORE0	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, ML 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, ML 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, ML 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, ML Illumination.
ICC_FAILURE_CORE0	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, ML 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, ML 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, ML Illumination.
MISSING_FLYBACK_DIODE_FAULT	U3000	This monitor checks if: • Fly Back Diode is Missing	• This fault only runs if SW is compiled with DEVEL on	SW detects that a fly back diode is missing	• Power Switch is ON	1 count	Type4C, No ML. Emissions Neutral Diagnostic *

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Performance	C0552	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.	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	> 0.1500 g	battery voltage run crank voltage diagnostic monitor enabled region 1 specific enable update raw lateral longitudinal acceleration signal stability 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 Enabled Disabled > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE = 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, 1 Trip No MIL Emission Neutral "Emission Neutral Diagnostics - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	> 0.1500 g	battery voltage run crank voltage diagnostic monitor enabled region 2 specific enable update raw lateral longitudinal acceleration signal stability 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	> 11.00 volts > 11.00 volts Enabled Disabled > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE = 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 Illum.
					acceleration signal) 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	> 0.1500 g	battery voltage run crank voltage diagnostic monitor enabled region 3 specific enable update raw lateral longitudinal acceleration signal stability 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 diagnostic fault sequence gear active P0716 fault active P0716 test fail this key on P0717 fault active P0717 test fail this key on	> 11.00 volts > 11.00 volts Enabled Disabled > 15.0 KPH < 0.5300 g = TRUE = TRUE = TRUE = 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	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 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 = 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	update rate	
			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	> 0.1500 g	battery voltage run crank voltage diagnostic monitor enabled region 4 specific enable update raw lateral longitudinal acceleration signal stability time: TOSS vehicle speed TOSS vehicle speed acceleration automatic transmission is clutch to clutch OR dual	> 11.00 volts > 11.00 volts Enabled Disabled > 15.0 KPH < 0.5300 g = 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,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 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 LI0073 fault active LI0073 test fail this key on DTCs not fault active	= 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 > 0.0 KPH < 0.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	50 millisecond update rate 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 Illum.
Longitudinal Acceleration Sensor Circuit Low	C0553	<p>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.</p> <p>Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.</p>	<p>raw longitudinal acceleration signal when sensor type is directly proportional OR raw longitudinal acceleration signal when sensor type is inversely proportional</p> <p>update raw longitudinal acceleration signal stability time, fail and sample time, 50 millisecond update rate</p>	<p>< -3.8500 g</p> <p>> -3.8500 g</p> <p>(< 0.5 Q impedance between signal and controller ground)</p>	<p>battery voltage run crank voltage diagnostic monitor enable</p> <p>sensor type is either directly proportional or inversely proportional</p> <p>U0073 fault active U0073 test fail this key on</p>	<p>> 11.00 volts > 11.00 volts = 1 Boolean</p> <p>= CeLATR_e_VoltageDirectProp</p> <p>= FALSE = FALSE</p>	<p>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</p>	<p>Type C, 1 Trip No MIL Emissions Neutral "Emissions Neutral Diagnostic - Type C"</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Circuit High	C0554	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_VoltageDirec tProp = 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, 1 Trip No MIL Emissio ns Neutral "Emissio ns Neutral Diagnost ic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit Low	C0697	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_VoltageDirec tProp = 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, 1 Trip No MIL Emissio ns Neutral "Emissio ns Neutral Diagnost ic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit High	C0698	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_VoltageDirec tProp = 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, 1 Trip No MIL Emissio ns Neutral "Emissio ns Neutral Diagnost ic - Type C"

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Performance	C0699	<p>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.</p> <p>Emission neutral default state sets lateral acceleration signal = 0.0 g.</p>	<p>ABS(raw lateral acceleration signal) AND ABS(raw lateral acceleration signal)</p> <p>update raw lateral acceleration signal fail, 50 millisecond update rate</p>	<p>> 0.5300 g</p> <p>< 3.8500 g</p>	<p>battery voltage run crank voltage diagnostic monitor enable</p> <p>update raw lateral acceleration signal stability time: TOSS vehicle speed automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnostic 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</p> <p>ABS(raw lateral acceleration signal) update sample time</p> <p>U0073 fault active U0073 test fail this key on DTCs not fault active</p>	<p>> 11.00 volts > 11.00 volts = 1 Boolean</p> <p>> 15.0 KPH = TRUE</p> <p>= TRUE = TRUE = FALSE</p> <p>= FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th</p> <p>< 0.5300 g</p> <p>= FALSE = FALSE VehicleSpeedSensor_FA</p>	<p>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</p>	<p>Type C, 1 Trip No MIL Emissions Neutral "Emissions Neutral Diagnostic - Type C"</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Actuator Solenoid Circuit Open - Bank 1	P0010	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K Q impedance between signal and controller ground.	P0010is 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 Illum.
Intake Camshaft System Performance - Bank 1	P0011	Detects a VVT system error by comparing the desired and actual cam positions when WT 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 System Voltage Engine Running Power Take Off (PTO) active Desired cam position Desired AND Measured cam position Desired cam position variation No Active DTCs	= TRUE > 11.00 Volts = TRUE = FALSE > 0 deg > (P0011_CamPosErrorLimId)deg AND < (CalculatedPerfMaxId) deg < 3.00 deg for (P0011_P05CC_StablePositionTimeId) seconds P0010 P2088 P2089	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 Illum.
Exhaust Camshaft Actuator Solenoid Circuit Open - Bank 1	P0013	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	> 200 K Q impedance between signal and controller ground.	<p>P0013is Enabled</p> <p>System supply voltage</p> <p>Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	> 11.00 Volts	<p>20 failures out of 25 samples</p> <p>250 ms /sample, continuous</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft System Performance - Bank 1	P0014	Detects a VVT system error by comparing the desired and actual cam positions when WT 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_CamPosErrorLimEc1)deg AND < (CalculatedPerfMaxEd)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 Illum.
Crankshaft Position (CKP)- Camshaft Position (CMP) Correlation Bank 1 SensorA	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 expected nominal cam position	 >= 4 cam edges < -9.1 Crank Degrees > 11.7 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser control indicates the phaser is 'parked' No Active DTCs: Time since last execution of a test IntCamECC_OilPresLow	Test is Enabled CrankSensor_FA P0340, P0341 > 1.0 sec = FALSE	4 cam edge measurements and 1 test sample per engine cycle Test failure is 4 fails in 5 samples Diagnostic failure is 2 failed tests out of 3 If the first test fails, the next test is delayed to confirm the phaser 'parked' This delay time is defined by P0016, P0017, P0018, P0019: Cam Correlation Oil Temperature Threshold For mid-park phasers, an additional delay P0016-0019 Mid-Park Phaser Delay is applied	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 expected nominal cam position	 >= 4 cam edges < -8.1 Crank Degrees > 12.8 Crank Degrees	Crankshaft and camshaft position signals are synchronized Engine is Spinning Cam phaser control indicates 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 Illum.
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 Illum.
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 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 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnosis is Enabled</p> <p>System supply Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	> 200 K Q impedance between signal and controller ground.	<p>Diagnostic is Enabled</p> <p>System supply voltage</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
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 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 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 Illum.
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 Q 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 Illum.
O2S Heater Control Circuit Bank 1 Sensor 1	P0030	Controller specific output driver circuit diagnoses the heater output low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	> 200 K Q impedance between output and controller ground.	<p>Diagnostic is Enabled</p> <p>Ignition Voltage Engine Speed</p>	= Crank or Run > 11.0 volts > 400 RPM	<p>20 failures out of 25 samples</p> <p>250 ms / sample</p> <p>Continuous</p>	Type B, 2 Trips Note: In certain controllers P0031 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensors	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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.</p>	< 0.5 Q impedance between output and controller ground.	<p>Diagnostic is Enabled</p> <p>Ignition Voltage Engine Speed</p>	= Crank or Run > 11.0 volts > 400 RPM	<p>20 failures out of 25 samples</p> <p>250 ms / sample</p> <p>Continuous</p>	Type B, 2 Trips Note: In certain controllers P0030 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensors	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.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between output and controller power.	<p>Diagnostic is Enabled</p> <p>Ignition Voltage Engine Speed</p>	<p>= Crank or Run > 11.0 volts > 400 RPM</p>	<p>20 failures out of 25 samples</p> <p>250 ms / sample</p> <p>Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbo/Super Charger Bypass Valve A Control Circuit	P0033	<p>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.</p> <p>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.</p>	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	> 200 K Q impedance between output and controller ground	<p>Diagnostic enabled *****</p> <p>Powertrain relay voltage *****</p> <p>Engine does not crank</p> <p>Diagnostic system not disabled</p>	<p>True *****</p> <p>≥ 11.0 Volts *****</p>	<p>10 failures out of 12 samples</p> <p>PWM CRV: 100ms /sample eCRV: 12.5ms /sample</p>	<p>Type A, 1 Trips</p> <p>Note: In certain controllers P0034 may also set turbo/super charger bypass valve control circuit low</p>

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbo/Super Charger Bypass Valve A Control Circuit High	P0035	<p>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.</p> <p>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.</p>	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p> <p>In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.</p>	< 0.5 Q impedance between output and controller power.	<p>Diagnostic enabled *****</p> <p>Powertrain relay voltage *****</p> <p>Engine does not crank Diagnostic system not disabled</p>	<p>True *****</p> <p>≥ 11.0 Volts *****</p>	<p>10 failures out of 12 samples</p> <p>PWM CRV: 100ms /sample eCRV: 12.5ms /sample</p>	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor2	P0037	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.</p>	< 0.5 Q impedance between output and controller ground.	<p>Diagnostic is Enabled</p> <p>Ignition</p> <p>Voltage</p> <p>Engine Speed</p>	= Crank or Run >11.0 volts > 400 RPM	<p>20 failures out of 25 samples</p> <p>250 ms / sample</p> <p>Continuous</p>	Type B, 2 Trips Note: In certain controllers P0036 may also set

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Control Circuit Bank1 Sensor2	P0038	Controller specific output driver circuit diagnoses the heater output low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between output and controller power.	<p>Diagnostic is Enabled</p> <p>Ignition Voltage Engine Speed</p>	<p>= Crank or Run > 11.0 volts > 400 RPM</p>	<p>20 failures out of 25 samples</p> <p>250 ms / sample</p> <p>Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Camshaft Profile Actuator 1 Performance	P003C	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 1	Detected an Unintended pin firing without 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 Illum.
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 Illum.
HO2S Heater Resistance Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0054	<p>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.</p> <p>This fault is set if the heater resistance is outside the expected range.</p>	Heater Resistance outside of the expected range of	3.7 < ohms <8.8	<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>Coolant - IAT Engine Soak Time Coolant Temp Ignition Voltage Engine Run time</p>	<p>ECT_Sensor_FA P262B IAT_SensorFA < 8.0 °C >28,800 seconds > -30.0 °C < 32.0 volts < 0.15 seconds</p>	Once per valid cold start	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Profile Actuator 1 Performance	P005A	An unintended pin firing without controller command. Exhaust Camshaft Profile Actuator 1	Detected an Unintended pin firing without 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	Diagnosis 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 Illum.
MAP / MAF / Throttle Position Correlation	P0068	Detect when MAP and MAF do not match estimated engine airflow as established by the TPS	<p>Difference between MAP and estimated MAP exceeds threshold (kPa), or P0651 (5 Volt Ref), or P0107 (MAP circuit low), or P0108 (MAP circuit high) have failed this key cycle, then MAP portion of diagnostic fails</p> <p>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</p>	<p>Table, f(TPS). See supporting tables: P0068_Delta MAP Threshold f(TPS)</p> <p>Table, f(TPS). See supporting tables: P0068_Delta MAF Threshold f(TPS)</p> <p>Table, f(RPM). See supporting tables: P0068_Maximum MAF f(RPM)</p> <p>Table, f(Volts). See supporting tables: P0068_Maximum MAF f(Volts)</p>	<p>Engine Speed</p> <p>Run/Crank voltage</p>	<p>> 800 RPM</p> <p>> 6.41 Volts</p>	<p>Continuously fail MAP and MAF portions of diagnostic for 0.1875 s</p> <p>Continuous in MAIN processor</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Outside Air Temperature (OAT) Sensor Circuit Performance	P0071	<p>Detects an Outside Air Temperature (OAT) sensor that is stuck in range. There are two components to the test: an engine off component, and an engine running component.</p> <p>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.</p> <p>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.</p> <p>For applications that have ability to move without engaging the internal combustion</p>	<p>Engine Off:</p> <p>If IAT >= OAT: IAT - OAT</p> <p>If IAT < OAT: OAT - IAT</p> <p>If either of the following conditions are met, this diagnostic will pass:</p> <p>If IAT >= OAT: IAT - OAT</p> <p>If IAT < OAT: OAT - IAT</p>	<p>> 20.0 deg C</p> <p>> 20.0 deg C</p> <p><= 20.0 deg C</p> <p><= 20.0 deg C</p>	<p>Diagnostic is Enabled</p> <p>Time between current ignition cycle and the last time the engine was running</p> <p>Engine is not running</p> <p>Vehicle Speed</p> <p>Coolant Temperature - IAT</p> <p>IAT - Coolant Temperature</p> <p>OAT-to-IAT engine off equilibrium counter</p> <p>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</p> <p>No Active DTCs:</p>	<p>>= 28,800.0 seconds</p> <p>>= 15.5 MPH</p> <p>< 20.0 deg C</p> <p>< 20.0 deg C</p> <p>>= 300.0 counts</p> <p>VehicleSpeedSensor_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA</p>	Executed every 100 msec until a pass or fail decision is made	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		engine, the engine off test will continue. If the vehicle has been moving quickly enough for a long enough period of time, the IAT and OAT values should have reached an equilibrium. This period of time is defined by the "OAT-to-IAT engine off equilibrium counter". The "OAT-to-IAT engine off equilibrium counter" is a counter that is incremented or decremented based on vehicle speed when the engine is off. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared.				EngineModeNotRunTimer Error		
		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.	Engine Running: If IAT >= OAT: IAT - OAT If IAT < OAT: OAT - IAT If either of the following conditions are met, this diagnostic will pass: If IAT >= OAT: IAT - OAT If IAT < OAT: OAT - IAT	> 20.0 deg C > 20.0 deg C <= 20.0 deg C <= 20.0 deg C	Diagnostic is Enabled Time between current ignition cycle and the last time the engine was running Engine is running Vehicle Speed Engine airflow OAT-to-IAT engine running equilibrium counter The "OAT-to-IAT engine running equilibrium counter" is a counter that is incremented or decremented based on vehicle speed and engine air flow when the engine is running. When this counter is high enough, the vehicle has reached an equilibrium where IAT and OAT can be compared. The value that is added or subtracted to the counter every 100 msec is contained in table P0071: OAT Performance Drive Equilibrium Engine Running No Active DTCs:	>= 28,800.0 seconds >= 15.5 MPH >= 10.0 grams/second >= 300.0 counts	Executed every 100 msec until a pass or fail decision is made	
						VehicleSpeedSensor_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>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.</p> <p>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.</p> <p>While the "OAT-to-IAT engine running equilibrium counter" is counting, IAT and OAT are monitored for</p>				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 Illum.
		similarity. If they are similar, the OAT Performance Diagnostic passes. If the counter reaches an equilibrium and the IAT and OAT values are not similar, the OAT Performance Diagnostic will fail.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Outside Air Temperature (OAT) Sensor Circuit Low	P0072	Detects a continuous short to ground in the Outside Air Temperature (OAT) signal circuit by monitoring the OAT sensor output resistance and failing the diagnostic when the OAT resistance is too low. The OAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A lower resistance is equivalent to a higher temperature.	Raw OAT Input	≤ 46 Ohms (-150 deg C)	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 Illum.
Outside Air Temperature (OAT) Sensor Circuit High	P0073	Detects a continuous open circuit in the Outside Air Temperature (OAT) signal circuit by monitoring the OAT sensor output resistance and failing the diagnostic when the OAT resistance is too high. The OAT sensor is a thermistor in which the resistance across the sensor can be equated to a temperature. A higher resistance is equivalent to a lower temperature.	Raw OAT Input	$\geq 427,757$ 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 Illum.
Outside Air Temperature (OAT) Sensor Intermittent In-Range	P0074	<p>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.</p> <p>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".</p> <p>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.</p>	<p>String Length</p> <p>Where:</p> <p>"String Length" = sum of "Diff" calculated over</p> <p>And where:</p> <p>"Diff" = ABS(current OAT reading - OAT reading from 100 milliseconds previous)</p>	<p>> 100 deg C</p> <p>10 consecutive OAT readings</p>	Diagnostic is Enabled		<p>4 failures out of 5 samples</p> <p>Each sample takes 1.0 seconds</p>	Type B, 2 Trips

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module SIDI High Pressure Pump min/max authority	P0089	This DTC determines when the high pressure pump control has reached to its max or min authority	High Pressure Fuel Pump Delivery Angle OR High Pressure Fuel Pump Delivery Angle	>= 92° ≤ 0°	High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Barometric Pressure Inlet Air Temp Fuel Temp Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP orTFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) andCam or Crank Sensor Not FA and IAT,IAT2,ECTNot FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In	True ≥11 Volts > 0.275 MPa Enabled when a code clear is not active or not exiting device control Engine is not cranking ≥ 70.0 KPA ≥ -40.0 degC -20 ≤ Temp degC ≤ 126	Windup High/Low 10.00 seconds failures out of 12.50 Seconds samples	Type B, 2 Trips

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

24OBDG03D Part 1 ECM Summary Tables

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

24OBDG03D Part 1 ECM Summary Tables

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

24OBDG03D Part 1 ECM Summary Tables

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor 2 Circuit Performance (applications with humidity sensor and manifold temperature sensor)	P0096	<p>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.</p> <p>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.</p> <p>This diagnostic is executed once per</p>	<p><u>Good Correlation Between IAT and IAT3:</u></p> <p>ABS(Power Up IAT - Power Up IAT2)</p> <p>AND</p> <p>ABS(Power Up IAT - Power Up IAT3)</p> <p>AND</p> <p>ABS(Power Up IAT2 - Power Up IAT3)</p>	<p>> 30 deg C</p> <p><= 25 deg C</p> <p>> 25 deg C</p>	<p>Diagnostic is Enabled</p> <p>Time between current ignition cycle and the last time the engine was running</p> <p>Powertrain Relay Voltage for a time</p> <p>No Active DTCs:</p> <p>LIN communications established with MAF</p>	<p>> 28,800 seconds</p> <p>>= 11.0 Volts >= 0.9 seconds</p> <p>PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error</p>	Executes once at the beginning of each ignition cycle if enable conditions are met	Type B, 2 Trips
			<p><u>Not Good Correlation, IAT in middle:</u></p> <p>Power Up IAT is between Power Up IAT2 and Power Up IAT3</p> <p>AND</p> <p>ABS(Power Up IAT2 - Power Up IAT3)</p> <p>AND</p> <p>ABS(Power Up IAT - Power Up IAT2) > ABS(Power Up IAT - Power Up IAT3)</p>	<p>> 25 deg C</p>	<p>Diagnostic is Enabled</p> <p>Time between current ignition cycle and the last time the engine was running</p> <p>Powertrain Relay Voltage for a time</p> <p>No Active DTCs:</p> <p>LIN communications established with MAF</p>	<p>> 28,800 seconds</p> <p>>= 11.0 Volts >= 0.9 seconds</p> <p>PowertrainRelayFault ECT_Sensor_Ckt_FA IAT_SensorCircuitFA MnfdTempSensorCktFA HumTempSnsrCktFA EngineModeNotRunTimer Error</p>		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 2 Low (applications with LIN MAF)	P0097	<p>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.</p> <p>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.</p>	IAT 2 Temperature	< -60 degrees C	<p>Diagnostic is Enabled</p> <p>Powertrain Relay Voltage for a time</p> <p>LIN communications established with MAF</p> <p>No Active DTCs:</p>	<p>>= 11.0 Volts >= 0.9 seconds</p> <p>PowertrainRelayFault</p>	<p>40 failures out of 50 samples</p> <p>1 sample every 100 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit 2 High (applications with LIN MAF)	P0098	<p>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.</p> <p>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.</p>	IAT 2 Temperature	> 150 degrees C	<p>Diagnostic is Enabled</p> <p>Powertrain Relay Voltage for a time</p> <p>LIN communications established with MAF</p> <p>No Active DTCs:</p>	<p>>= 11.0 Volts >= 0.9 seconds</p> <p>PowertrainRelayFault</p>	<p>40 failures out of 50 samples</p> <p>1 sample every 100 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor 2 Intermittent In-Range (applications with humidity)	P0099	<p>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.</p> <p>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.</p>	<p>String Length</p> <p>Where: "String Length" = sum of "Diff" calculated over</p> <p>And where: "Diff" = ABS(current IAT2 reading - IAT 2 reading from 100 milliseconds previous)</p>	<p>> 100.00 deg C</p> <p>10 consecutive IAT 2 readings</p>	<p>Diagnostic is Enabled</p> <p>Powertrain Relay Voltage for a time</p> <p>No Active DTCs:</p> <p>LIN communications established with MAF</p>	<p>>= 11.0 Volts >= 0.9 seconds</p> <p>PowertrainRelayFault</p>	<p>4 failures out of 5 samples</p> <p>Each sample takes 1.0 seconds</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temperature Sensor Performance (ATM)	P00B2	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.	<p>This sensor is compared to two other sensors for this diagnostic to function.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: RadiatorCoolantTempSnsr</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5</p> <p>Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6</p>		<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>Propulsion system Inactive timer error</p> <p>Sensor under diagnosis is not faulted</p> <p>Used comparison sensors are not currently faulted:</p> <ul style="list-style-type: none"> - BiasChkCylHdCIntSnsr - BiasChkBlockCIntSnsr - BiasChkEngInCIntSnsr - BiasChkEngOutCIntSnsr - BiasChkHtrCrInCIntSnsr - BiasChkHtrCrOutCInSnsr - BiasChkRadOutCIntSnsr - BiasChkByplnCIntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - 	<p>OAT_PtEstFiltFA</p> <p>PSAR_PropSysInactiveCr s_FA</p> <p>= FALSE</p> <p>EECR_RadiatorOutlet_CktFA</p> <p>EECR_CylHeadCoolant_CktFA</p> <p>EECR_BlockCoolant_CktFA</p> <p>EECR_EngineInlet_CktFA</p> <p>EECR_EngineOutlet_CktFA</p> <p>EECR_HeaterCoreInlet_CktFA</p> <p>EECR_HeaterCoreOutlet_CktFA</p> <p>EECR_RadiatorOutlet_CktFA</p> <p>EECR_BypassInlet_CktFA</p> <p>EECR_CylHeadMetal1_CktFA</p> <p>IAT_SensorFA</p> <p>HumTempSnsrFA</p> <p>MnfdTempSensorFA</p> <p>OAT_AmbientSensorFA</p> <p>EngOilTempFA</p> <p>EGRTempSensorUPSS_FA</p>	<p>1 failure to set DTC</p> <p>1 sec/ sample</p> <p>Once per valid cold start</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the physical (Temperature) sensor number.</p> <p>Bypass Inlet: CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkCylHdCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkBloCkCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B:</p> <p>Engine Block: CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkCylHdCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkBypInCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A:</p>	<p>20.73 °C 8.69 °C</p> <p>34.19 °C</p>	<p>BiasChk_EGR_DwnStmSnsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr</p> <p>Comparison sensors</p> <p>=====</p> <p>The following thresholds are based on the sensor under diagnosis</p> <p>Bypass Inlet: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Engine Block: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Engine Inlet: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Head Coolant: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Heater Inlet: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Heater Outlet: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Radiator Outlet: Propulsion Off Soak Time Ambient Air Temperature</p>	<p>EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl</p> <p>= Available</p> <p>> 21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p>		

[illegible]

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Comparison sensor 2: CeEECR_e_BiasChkBlo ckCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B:	17.82 °C 7.74 °C	application: 2x2 signature Absolute Drop IAT Drop Temperature Derivative 2x2 Signature Criteria: The warm sensors Sensor 1: Sensor 2: The cool sensors Sensor 1: Sensor 2:	Enabled Enabled Disabled Disabled CeAEHR_e_BlKHtrCylHd CIntSnsr CeAEHR_e_BlKHtrFueIS nsr CeAEHR_e_BlKHtrRadO utCIntSnsr CeAEHR_e_BlKHtrOutsid eAirSnsr		
			Comparison sensor 1: CeEECR_e_BiasChkHtr CrInCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkByp InCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater: CeEECR_e_AuxHeaterBi asLow Threshold A: Threshold B:	18.83 °C 9.84 °C	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	10.0 °C 5.0 °C >12.0 °C CeAEHR_e_BlKHtrBlock CIntSnsr >87.00 L/min		
			Radiator Outlet: CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEng InCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkMa nfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater:					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_AuxHeaterBiasLow 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	19.49°C 17.85°C >A°C >A°C >B°C >B°C	Flow time is between AND either Engine runtime is OR Insufficient 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 Additional 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	0.1 -20.0 seconds < 80.0 seconds >300.0 seconds >2.0 °C CeAEHR_e_BlkHtrIntake AirSnsr >5.0 °C >400.0 seconds >24.0kph 0.5 times the seconds with vehicle speed below the threshold above > 180.0 seconds > 1,800 seconds CeAEHR_e_BlkHtrBlock ClntSnsr		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficient 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 Illum.
Radiator Coolant Temp Sensor Circuit Low Voltage	P00B3	Circuit Continuity This DTC detects a short to ground in the RCT (Radiator Coolant temperature) signal circuit or the RCT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	<p>RCT Resistance (@ 150°C)</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NoUseAssgnmnt</p> <p>Temperature Sensor 5: CeEECR_e_NoUseAssgnmnt</p> <p>Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5</p> <p>Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6</p>	<p>< X Ohms</p> <p>X is equal to: Temp Sensor 1: 55 Ohms</p> <p>Temp Sensor 2: 47.5 Ohms</p> <p>Temp Sensor 3: 41.1 Ohms</p> <p>Temp Sensor 4: 47.5 Ohms</p> <p>Temp Sensor 5: 41.1 Ohms</p> <p>Temp Sensor 6: 47.5 Ohms</p> <p>Temp Sensor 7: 47.5 Ohms</p>	Diagnostic is Enabled		<p>5 seconds out of a 6 seconds window</p> <p>Continuously sampled</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Radiator Coolant Temp Sensor Circuit High Voltage	P00B4	Circuit Continuity This DTC detects a short to high or open in the RCT (Radiator Coolant temperature) signal circuit or the RCT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C) This program uses a highly configurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_NollseAssg nmnt Temperature Sensor 5: CeEECR_e_NollseAssg nmnt 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: 298,262 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 298,262 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 298,262 Ohms Temp Sensor 7: 298,262 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 Illum.
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.	<p>Temperature step change:</p> <p>1) positive step change is greater than calculated high limit</p> <p>OR</p> <p>2) negative step change is lower than calculated low limit.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p>		<p>Diagnostic is Enabled</p> <p>No Active DTC's</p>	<p>EECR_RCT_Erratic_TFT KO</p> <p>EECR_RCT_CktHiLo_FA</p>	<p>5 seconds out of a 6 seconds window</p> <p>Continuously sampled</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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	 3.1 seconds -60.0 °C 150.0 °C 7.4 seconds -60.0 °C 150.0 °C 4.4 seconds -60.0 °C 150.0 °C 5.7 seconds -60.0 °C 150.0 °C 4.5 seconds -60.0 °C 150.0 °C 2.8 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 Illum.
			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. *****	2.5 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 Illum.
High Pressure Start Diagnostic	P00C6	The DTC Diagnoses the high side fuel pressure during engine cranking.	<p>The ECM detects that the fuel pressure is not rising or has fallen beyond acceptable limits during engine cranking</p> <p>Pressure Rise Test: Sensed High Pressure Fuel Rail Pressure value</p> <p>Pressure Fall Test: Sensed High Pressure Fuel Rail Pressure value</p>	<p>< P00C6 - Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery (see Supporting Table)</p> <p><= P00C6 - Minimum acceptable value of fuel rail pressure after High Pressure Start (see Supporting Table)</p>	<p>High Pressure Rise Diagnostic During Start</p> <p>High Pressure Fall Diagnostic During Start</p> <p>Low side feed fuel pressure</p> <p>Engine Run Time Run/Crank Voltage Engine Coolant</p> <p>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.</p>	<p>Enabled</p> <p>Disabled</p> <p>>= 0 KPA</p> <p>< = 0 sec > 8 Volts -100 <= °C <= 126</p> <p>All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT, IAT2 and ECT Not FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control</p>	<p>Pressure Rise Test: Crank Time >= P00C6 - High Pressure Pump Control Mode timeout (see Supporting Table) 6.25 ms per sample</p> <p>Pressure Fall Test: Injected cylinder events >= P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThresh after High Pressure Start (see Supporting Table)</p> <p>4 samples per engine rotation</p>	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Pressure Measurement System - Multiple Sensor Correlation (single turbo)	P00C7	<p>Detects an inconsistency between pressure sensors in the induction system in which a particular sensor cannot be identified as the failed sensor.</p> <p>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.</p> <p>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</p>	<p>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)</p>	<p>> 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</p>	<p>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</p>	<p>> 10.0 seconds ≥ 50.0 kPa ≤ 115.0 kPa ≥ 50.0 kPa ≤ 115.0 kPa ≥ 50.0 kPa ≤ 115.0 kPa EngineModeNotRunTimer Error MAP_SnsrFA AAP_SnsrFA AAP2_SnsrFA AAP_LIN1_SnsrCktFA MAP_SensorCircuitFP AAP_SnsrCktFP AAP2_SnsrCktFP AAP_LIN1_SnsrCktFP</p>	<p>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</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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	> 10.0 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)	< 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:	> 10.0 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	
			AWS					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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	> 10.0 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	

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Press Regulator Solenoid Supply Voltage Control High Side Circuit Short to ground	P00C9	Controller specific output driver circuit diagnoses High Pressure pump Control Solenoid high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	 ≤ 1.1 or 15 Amps selectable threshold 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

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Press Regulator Solenoid Supply Voltage Control High Side Circuit Short to power	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 Illum.
Intake Air Temperature Sensor 3 Circuit Performance (applications with humidity sensor and manifold temperature sensor)	P00E9	Detects an Intake Air Temperature 3 (IAT3) sensor value that is stuck in range by comparing the IAT3 sensor value against the IAT and IAT2 sensor values and failing the diagnostic if the IAT3 value is more different than the IAT and IAT2 values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled.	<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 <= 25.0 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 Illum.
		enable conditions are met.			LIN communications established with MAF			
			<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 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 Illum.
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 Illum.
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 Illum.
Intake Air Temperature Sensor 3 Intermittent In-Range	POOEC	<p>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.</p> <p>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".</p> <p>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.</p>	<p>String Length</p> <p>Where: "String Length" = sum of "Dir" calculated over</p> <p>And where: "Dir" = ABS(current IAT3 reading - IAT 3 reading from 100 milliseconds previous)</p>	<p>> 80.00 deg C</p> <p>10 consecutive IAT 3 readings</p>	Diagnostic is Enabled		<p>4 failures out of 5 samples</p> <p>Each sample takes 1.0 seconds</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Humidity Sensor Circuit Low (applications with LIN MAF)	P00F4	<p>Detects an erroneously 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.</p> <p>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.</p>	Relative Humidity	<= -6.25 %	<p>Diagnostic is Enabled</p> <p>Powertrain Relay Voltage for a time</p> <p>LIN communications established with MAF</p> <p>No Active DTCs:</p>	<p>>= 11.0 Volts >= 0.9 seconds</p> <p>PowertrainRelayFault</p>	<p>40 failures out of 50 samples</p> <p>1 sample every 100 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Humidity Sensor Circuit High (applications with LIN MAF)	P00F5	<p>Detects an erroneously 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.</p> <p>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.</p>	Relative Humidity	>= 106.25 %	<p>Diagnostic is Enabled</p> <p>Powertrain Relay Voltage for a time</p> <p>LIN communications established with MAF</p> <p>No Active DTCs:</p>	<p>>= 11.0 Volts >= 0.9 seconds</p> <p>PowertrainRelayFault</p>	<p>40 failures out of 50 samples</p> <p>1 sample every 100 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Humidity Sensor Circuit Intermittent	P00F6	<p>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.</p> <p>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".</p> <p>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.</p>	<p>String Length</p> <p>Where: "String Length" = sum of "Diff" calculated over</p> <p>And where: "Diff" = ABS(current Humidity reading - Humidity reading from 100 milliseconds previous)</p>	<p>> 80 %</p> <p>10 consecutive Humidity readings</p>	<p>Diagnostic is Enabled</p> <p>Powertrain Relay Voltage for a time</p> <p>No Active DTCs:</p> <p>LIN communications established with MAF</p>	<p>>= 11.0 Volts >= 0.9 seconds</p> <p>PowertrainRelayFault</p>	<p>4 failures out of 5 samples</p> <p>Each sample takes 1.0 seconds</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow System Performance (single turbo)	P0101	<p>Detects a performance failure in the Mass Air Flow (MAF) sensor, such as when a MAF value is stuck in range.</p> <p>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).</p> <p>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</p>	<p>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.</p> <p>MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered</p> <p>MAPI model fails when ABS(Measured MAP - MAP Model 1) Filtered</p> <p>MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered</p> <p>MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered</p> <p>TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered</p> <p>TPS model fails when Filtered Throttle Model Error</p> <p>TIAP Correlation model fails when High Engine Air Flow is TRUE AND</p>	<p>> 25.0 grams/sec</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 350 kPa*(g/s)</p>	<p>Engine Speed Engine Speed</p> <p>(Coolant Temp OR OBD Coolant Enable Criteria</p> <p>(Coolant Temp OR OBD Max Coolant Achieved</p> <p>Intake Air Temp Intake Air Temp</p> <p>Powertrain Relay Voltage for a period of time</p> <p>Minimum total weight factor (all factors multiplied together)</p> <p>See Residual Weight Factor tables.</p>	<p>>= 400 RPM <= 5,700 RPM</p> <p>>= -9 Deg C</p> <p>= TRUE)</p> <p><= 130 Deg C</p> <p>= FALSE)</p> <p>-20 Deg C <= 125 Deg C</p> <p>>= 9.1 Volts >= 0.2 Seconds</p> <p>>= 0.50</p> <p>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</p> <p>MAP Model 1 Error multiplied by</p>	<p>Continuous</p> <p>Calculation are performed every 12.5 msec</p>	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>AND Manifold Pressure</p> <p>AND Filtered Mass Air Flow - Mass Air Flow</p> <p>Low Engine Air Flow is TRUE when Mass Air Flow</p> <p>AND Manifold Pressure</p> <p>AND Mass Air Flow - Filtered Mass Air Flow</p>	<p>P0101, P0106, P0121, P0236, P1101: TIAP- MAP Correlation Min Air Flow</p> <p>> a threshold in kPa as a function of engine speed. See table</p> <p>P0101, P0106, P0121, P0236, P1101: TIAP- MAP Correlation Min MAP</p> <p>< 3.0 gm/sec</p> <p>< a threshold in gm/sec as a function of engine speed. See table</p> <p>P0101, P0106, P0121, P0236, P1101: TIAP- Baro Correlation Max Air Flow</p> <p>< a threshold in kPa as a function of engine speed. See table</p> <p>P0101, P0106, P0121, P0236, P1101: TIAP- Baro Correlation Max MAP</p> <p>< 2.0 gm/sec</p>	<p>No Pending DTCs:</p> <p>Diagnostic is Enabled</p>	<p>AmbientAirDefault</p> <p>EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor Circuit Low Frequency (Continental MAF)	P0102	<p>Detects a continuous short to ground in the MAF sensor circuit or a MAF sensor that is outputting a frequency that is too low. The diagnostic monitors the MAF sensor frequency output and fails the diagnostic when the MAF frequency is too low. A low MAF frequency is associated with a high engine air flow.</p> <p>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 air flow value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a mass air flow value in grams/second through a transfer function.</p>	MAF Output	<= 820 Hertz (>= 351.8 gm/sec)	<p>Engine Run Time Engine Speed Powertrain Relay Voltage Above criteria present for a period of time</p> <p>Diagnostic is Enabled</p>	<p>> 0.0 seconds ≥ 300 RPM ≥ 9.1 Volts</p> <p>≥ 0.5 seconds</p>	<p>200 failures out of 250 samples</p> <p>1 sample every cylinder firing event</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Mass Air Flow Sensor Circuit High Frequency (Continental MAF)	P0103	<p>Detects a MAF sensor that is outputting a frequency signal that is too high. The diagnostic monitors the MAF sensor frequency output and fails the diagnostic when the MAF frequency is too high. A high MAF frequency is associated with a low engine air flow.</p> <p>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 air flow value is converted by the sensor to a frequency value in Hertz. A digital square wave signal is transmitted by the sensor to the ECM. The ECM calculates the frequency of the square wave signal and converts that frequency to a mass air flow value in grams/second through a transfer function.</p>	MAF Output	>= 13,350 Hertz (<= 0.00 gm/sec)	<p>Engine Run Time Engine Speed Powertrain Relay Voltage Above criteria present for a period of time</p> <p>Diagnostic is Enabled</p>	<p>> 0.0 seconds >= 300 RPM >= 9.1 Volts</p> <p>>= 0.5 seconds</p>	<p>200 failures out of 250 samples</p> <p>1 sample every cylinder firing event</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Performance (single turbo)	P0106	<p>Detects a performance failure in the Manifold Pressure (MAP) sensor, such as when a MAP value is stuck in range.</p> <p>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).</p> <p>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</p>	<p>Engine Running:</p> <p>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.</p> <p>MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered</p> <p>MAP1 model fails when ABS(Measured MAP - MAP Model 1) Filtered</p> <p>MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered</p> <p>MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered</p> <p>TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered</p> <p>TPS model fails when Filtered Throttle Model Error</p> <p>TIAP Correlation model fails when</p> <p>High Engine Air Flow is</p>	<p>> 25.0 grams/sec</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 350 kPa*(g/s)</p>	<p>Engine Speed Engine Speed</p> <p>(Coolant Temp OR OBD Coolant Enable Criteria</p> <p>(Coolant Temp OR OBD Max Coolant Achieved</p> <p>Intake Air Temp Intake Air Temp</p> <p>Powertrain Relay Voltage for a period of time</p> <p>Minimum total weight factor (all factors multiplied together)</p> <p>See Residual Weight Factor tables.</p>	<p>>= 400 RPM <= 5,700 RPM</p> <p>>= -9 Deg C</p> <p>= TRUE)</p> <p><= 130 Deg C</p> <p>= FALSE)</p> <p>-20 Deg C <= 125 Deg C</p> <p>>= 9.1 Volts >= 0.2 Seconds</p> <p>>= 0.50</p> <p>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</p> <p>MAP Model 1 Error multiplied by</p>	<p>Continuous</p> <p>Calculation are performed every 12.5 msec</p>	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>-</p> <p>AND Manifold Pressure</p> <p>AND Filtered Mass Air Flow - Mass Air Flow</p> <p>Low Engine Air Flow is TRUE when Mass Air Flow</p> <p>AND Manifold Pressure</p> <p>AND Mass Air Flow - Filtered Mass Air Flow</p>	<p>P0101, P0106, P0121, P0236, P1101: TIAP- MAP Correlation Min Air Flow</p> <p>> a threshold in kPa as a function of engine speed See table</p> <p>P0101, P0106, P0121, P0236, P1101: TIAP- MAP Correlation Min MAP</p> <p>< 3.0 gm/sec</p> <p>< a threshold in gm/sec as a function of engine speed See table</p> <p>P0101, P0106, P0121, P0236, P1101: TIAP- Baro Correlation Max Air Flow</p> <p>< a threshold in kPa as a function of engine speed See table</p> <p>P0101, P0106, P0121, P0236, P1101: TIAP- Baro Correlation Max MAP</p> <p>< 2.0 gm/sec</p>	<p>No Pending DTCs:</p> <p>Diagnostic is Enabled</p>	<p>TC_BoostPresSnsrCktFA AmbientAirDefault</p> <p>EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Manifold Absolute Pressure Sensor Circuit Low	P0107	Detects a continuous short to ground in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too low. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	< 3.3 % 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 Illum.
Manifold Absolute Pressure Sensor Circuit High	P0108	Detects a continuous short to power or open circuit in the Manifold Absolute Pressure (MAP) signal circuit by monitoring the MAP sensor output voltage and failing the diagnostic when the MAP voltage is too high. The MAP sensor is a pressure transducer which outputs a voltage proportional to the absolute pressure.	MAP Voltage	> 78.0% of 5 Volt Range (This is equal to 336.0 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 Illum.
Intake Air Temperature Sensor Circuit Performance (applications with humidity sensor and manifold temperature sensor)	P0111	Detects an Intake Air Temperature (IAT) sensor value that is stuck in range by comparing the IAT sensor value against the IAT2 and IAT3 sensor values and failing the diagnostic if the IAT value is more different than the IAT2 and IAT3 values than is expected. If the engine has been off for a long enough period of time, the air temperature values in the engine compartment of the vehicle are considered to have equalized, and the diagnostic can be enabled.	<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
		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>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 Illum.
		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 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_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 Illum.
Intake Air Temperature Sensor Circuit Low (applications with LIN MAF)	P0112	<p>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.</p> <p>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.</p>	IAT Temperature	< -60 degrees C	<p>Diagnostic is Enabled</p> <p>LIN Communications established with MAF</p>		<p>40 failures out of 50 samples</p> <p>1 sample every 100 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Circuit High (applications with LIN MAF)	P0113	<p>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.</p> <p>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.</p>	IAT Temperature	> 150 degrees C	<p>Diagnostic is Enabled</p> <p>LIN Communications established with MAF</p>		<p>40 failures out of 50 samples</p> <p>1 sample every 100 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intake Air Temperature Sensor Intermittent In-Range	P0114	<p>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.</p> <p>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".</p> <p>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.</p>	<p>String Length</p> <p>Where: "String Length" = sum of "Diff" calculated over</p> <p>And where: "Diff" = ABS(current IAT reading - IAT reading from 100 milliseconds previous)</p>	<p>> 80.00 deg C</p> <p>10 consecutive IAT readings</p>	<p>Diagnostic is Enabled</p> <p>LIN communications established with MAF</p>		<p>4 failures out of 5 samples</p> <p>Each sample takes 1.0 seconds</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Sensor Performance (ATM)	P0116	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.	<p>This sensor is compared to two other sensors for this diagnostic to function.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5</p> <p>Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6</p>		<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>Propulsion system Inactive timer error</p> <p>Sensor under diagnosis is not faulted</p> <p>Used comparison sensors are not currently faulted:</p> <ul style="list-style-type: none"> - BiasChkCylHdCIntSnsr - BiasChkBlockCIntSnsr - BiasChkEngInCIntSnsr - BiasChkEngOutCIntSnsr - BiasChkHtrCrInCIntSnsr - BiasChkHtrCrOutCInSnsr - BiasChkRadOutCIntSnsr - BiasChkByplnCIntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSn 	<p>OAT_PtEstFiltFA</p> <p>PSAR_PropSysInactiveCr s_FA</p> <p>= FALSE</p> <p>EECR_EngineOutlet_CktFA</p> <p>EECR_CylHeadCoolant_CktFA</p> <p>EECR_BlockCoolant_CktFA</p> <p>EECR_EngineInlet_CktFA</p> <p>EECR_EngineOutlet_CktFA</p> <p>EECR_HeaterCoreInlet_CktFA</p> <p>EECR_HeaterCoreOutlet_CktFA</p> <p>EECR_RadiatorOutlet_CktFA</p> <p>EECR_BypassInlet_CktFA</p> <p>EECR_CylHeadMetal1_CktFA</p> <p>IAT_SensorFA</p> <p>HumTempSnsrFA</p> <p>MnfdTempSensorFA</p> <p>OAT_AmbientSensorFA</p> <p>EngOilTempFA</p>	<p>1 failure to set DTC</p> <p>1 sec/ sample</p> <p>Once per valid cold start</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the physical (Temperature) sensor number.</p> <p>Bypass Inlet: CeEECR_e_PhysSnsr1 Comparison sensor 1: CeEECR_e_BiasChkCylHdCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkBloCkCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B:</p> <p>Engine Block: CeEECR_e_PhysSnsr7 Comparison sensor 1: CeEECR_e_BiasChkCylHdCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkBypInCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasHigh Threshold A: Threshold B:</p>	<p>20.73 °C 8.69 °C</p>	<p>sr - BiasChk_EGR_DwnStmSnsr - BiasChk_EGR_LowPrsSnsr - BiasChkFuelSnsr</p> <p>Comparison sensors =====</p> <p>The following thresholds are based on the sensor under diagnosis</p> <p>Bypass Inlet: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Engine Block: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Engine Inlet: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Head Coolant: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Heater Inlet: Propulsion Off Soak Time Ambient Air Temperature</p> <p>Heater Outlet: Propulsion Off Soak Time Ambient Air Temperature</p>	<p>EGRTempSensorUPSS_FA EGRTempSensorDNSS_FA LPE_TempSnsrFA HRTR_b_FuelSensor_FA_Bndl</p> <p>= Available</p> <p>> 21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p> <p>>21,600 seconds >-20.0 °C</p>		

[illegible]

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_BiasChkBlo ckCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN oEffect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B:		There are 4 different types of aux heater detection for this application: 2x2 signature Absolute Drop IAT Drop Temperature Derivative	Enabled Enabled Disabled Disabled		
			Heater Outlet: CeEECR_e_NoPhysAssg nmnt Comparison sensor 1: CeEECR_e_BiasChkHtrCrInCintSnsr Comparison sensor 2: CeEECR_e_BiasChkBypInCintSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B:	17.82 °C 7.74 °C	The warm sensors Sensor 1: Sensor 2: The cool sensors Sensor 1: Sensor 2:	CeAEHR_e_BlkhTrCylHdCintSnsr CeAEHR_e_BlkhTrFueISnsr CeAEHR_e_BlkhTrRadOutCintSnsr CeAEHR_e_BlkhTrOutsideAirSnsr		
			Radiator Outlet: CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInCintSnsr Comparison sensor 2: CeEECR_e_BiasChkManifestedAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterNoEffect Block Heater:	18.83 °C 9.84 °C	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)	10.0 °C 5.0 °C >12.0 °C		
					Absolute Drop Criteria: The is monitored for a drop. The drop will be monitored for once coolant flow is	CeAEHR_e_BlkhTrBlockCintSnsr > 87.00 L/min		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>CeEECR_e_AuxHeaterBiasLow</p> <p>Threshold A:</p> <p>Threshold B:</p> <p>A failure will be reported if any of the following conditions are met. Evaluated in order:</p> <p>1) This sensor is above both comparison sensors</p> <p>2) This sensor is below both comparison sensors</p> <p>3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew</p> <p>4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew</p>	<p>19.49 °C</p> <p>17.85 °C</p> <p>>A °C</p> <p>>A °C</p> <p>>B °C</p> <p>>B °C</p>	<p>AND</p> <p>Flow time is between</p> <p>AND either</p> <p>Engine runtime is</p> <p>OR</p> <p>Insufficient coolant flow is present for</p> <p>A block heater is detected if a drop is</p> <p>IAT Drop Criteria:</p> <p>The sensor will be used as IAT for this method</p> <p>A block heater will be detected if:</p> <p>IAT has a drop of during a drive defined by:</p> <p>Drive time</p> <p>Vehicle speed</p> <p>Additional drive time is provided when vehicle speed drops below above threshold as follows</p> <p>This detection method will abort if the engine is off</p> <p>OR</p> <p>Engine runtime</p> <p>Temperature Derivative Criteria:</p> <p>Derivative will be monitored using</p>	<p>0.1 -20.0 seconds</p> <p>< 80.0 seconds</p> <p>>300.0 seconds</p> <p>>2.0 °C</p> <p>CeAEHR_e_BlkHtrIntake AirSnsr</p> <p>>5.0 °C</p> <p>>400.0 seconds</p> <p>>24.0kph</p> <p>0.5 times the seconds with vehicle speed below the threshold above</p> <p>> 180.0 seconds</p> <p>> 1,800 seconds</p> <p>CeAEHR_e_BlkHtrBlock CIntSnsr</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Derivative will be monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficient 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 Illum.
Engine Coolant Temp Sensor Circuit Low	P0117	Circuit Continuity This DTC detects a short to ground in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ 150°C) This program uses a highly configurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1 Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_NoUseAssgnmnt Temperature Sensor 5: CeEECR_e_NoUseAssgnmnt Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 47.5 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 47.5 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 47.5 Ohms Temp Sensor 7: 47.5 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 Illum.
Engine Coolant Temp Sensor Circuit High	P0118	Circuit Continuity This DTC detects a short to high or open in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. This is accomplished by monitoring the resistance of the circuit. If the resistance goes out of the expected range the DTC is set.	ECT Resistance (@ -60°C) This program uses a highly configurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1 Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_NollseAssg nmnt Temperature Sensor 5: CeEECR_e_NollseAssg nmnt 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: 298,262 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 298,262 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 298,262 Ohms Temp Sensor 7: 298,262 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 Illum.
Engine Coolant Temperature (ECT) Sensor Circuit Intermittent	P0119	Circuit Erratic This DTC detects large step changes in the ECT (Engine Coolant temperature) signal circuit or the ECT sensor. Allowable high and low limits are calculated for the next sample based on the previous sample and sensor time constant. If the sensor responds faster than should be possible the DTC is set.	<p>Temperature step change:</p> <p>1) positive step change is greater than calculated high limit</p> <p>OR</p> <p>2) negative step change is lower than calculated low limit.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr1</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5</p> <p>Temperature Sensor 7:</p>		<p>Diagnostic is Enabled</p> <p>No Active DTC's</p>	ECT_Sensor_Ckt_FA EECR_EngineOut_Erratic_TFTKO	<p>5 seconds out of a 6 seconds window</p> <p>Continuously sampled</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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	 3.1 seconds -60.0 °C 150.0 °C 7.4 seconds -60.0 °C 150.0 °C 4.4 seconds -60.0 °C 150.0 °C 5.7 seconds -60.0 °C 150.0 °C 4.5 seconds -60.0 °C 150.0 °C 2.8 seconds				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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 2.5 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 Illum.
Throttle Position Sensor Performance (single turbo)	P0121	<p>Detects a performance failure in the Throttle Position sensor (TPS) sensor, such as when a TPS value is stuck in range.</p> <p>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.</p> <p>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</p>	<p>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.</p> <p>MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered</p> <p>MAP1 model fails when ABS(Measured MAP - MAP Model 1) Filtered</p> <p>MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered</p> <p>MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered</p> <p>TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered</p> <p>TPS model fails when Filtered Throttle Model Error</p> <p>TIAP Correlation model fails when</p> <p>High Engine Air Flow is TRUE AND Measured TIAP -</p>	<p>> 25.0 grams/sec</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 350 kPa*(g/s)</p>	<p>Engine Speed Engine Speed</p> <p>(Coolant Temp OR OBD Coolant Enable Criteria</p> <p>(Coolant Temp OR OBD Max Coolant Achieved</p> <p>Intake Air Temp Intake Air Temp</p> <p>Powertrain Relay Voltage for a period of time</p> <p>Minimum total weight factor (all factors multiplied together)</p> <p>See Residual Weight Factor tables.</p>	<p>>= 400 RPM <= 5,700 RPM</p> <p>>= -9 Deg C</p> <p>= TRUE)</p> <p><= 130 Deg C</p> <p>= FALSE)</p> <p>-20 Deg C <= 125 Deg C</p> <p>>= 9.1 Volts >= 0.2 Seconds</p> <p>>= 0.50</p> <p>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</p> <p>MAP Model 1 Error multiplied by</p>	<p>Continuous</p> <p>Calculation are performed every 12.5 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Performance diagnostic will fail.	<p>measured MAP - offset as a function of engine speed See table P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset</p> <p>OR</p> <p>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</p> <p>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</p> <p>High Engine Air Flow is TRUE when Mass Air Flow</p> <p>AND</p>	<p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 1.0 seconds</p> <p>> 1.0 seconds</p> <p>> a threshold in gm sec as a function of engine speed See table P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow</p>	No Active DTCs:	<p>P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM</p> <p>MAP Model 2 Error multiplied by P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM</p> <p>MAP Model 3 Error multiplied by P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM</p> <p>TIAP Model 1 Error multiplied by P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM</p> <p>Filtered Throttle Model Error multiplied by P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM</p> <p>MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA</p>		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 < (100% corresponds to 5.0 Volt)	6.50 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS1 Circuit High	P0123	Detects a continuous or intermittent short high in TPS1 circuit by monitoring the TPS 1 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too high. This diagnostic only runs when battery voltage is high enough.	TPS1 % Vref > (100% corresponds to 5.0 Volt)	95.00 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Temperature Below Stat Regulating Temperature	P0128	This DTC detects if the ECT (EngineCoolant temperature) does not achieve the required target temperature after an allowed energy accumulation by the engine. This can be caused by an ECT sensor biased low or a cooling system that is not warming up correctly because of a stuck open thermostat or other fault.	<p>Energy is accumulated after the first combustion event using Range 1, 2 or 3:</p> <p>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.</p> <p>Range 1 (Primary): Ambient air temperature is between 10.0 and 52.0 °C</p> <p>Engine Outlet Coolant reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 21.1 °C. The target temperature for this range will not drop below 66.9 °C</p> <p>Range 2 (Secondary): Ambient air temperature is between -9.0 and 10.0 °C</p> <p>Engine Outlet Coolant reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 33.0 °C. The target temperature for this range will not drop below 33.0 °C</p>	<p>P0128 Maximum Acculated Energy - Primary</p> <p>P0128 Maximum Acculated Energy - Secondary</p>	<p>Diagnostic is Enabled</p> <p>No DTCs</p> <p>Engine soak time Engine run time Engine Outlet Coolant Temperature - Range 1: - Range 2: - Range 3:</p> <p>Devices in main cooling circuit are not in in device control</p> <p>If Engine RPM is continuously greater than for this time period</p> <p>Distance traveled</p>	<p>THMR_AWP_AuxPumpFA THMR_AHV_FA THMR_SWP_Control_FA THMR_SWP_Flow8tuckOn_FA THMR_SWP_NoFlow_FA OAT_PtEstFiltFA VehicleSpeedSensor_FA EngineTorqueEstInaccuracy MAF_SensorFA ETHR_CoolantEnergyModel ETHR_RemedialActionLevel1 ETHR_RemedialActionLevel2 ETHR_RemedialActionLevel3 EECR_EngineOutlet_FA</p> <p>> 1,800.0 seconds 10.0- 1,800.0 seconds</p> <p><47.5 °C <35.6 °C <35.6 °C</p> <p>9,999 rpm 5.0 seconds</p> <p>>0.2 km</p>	<p>1 failure to set DTC</p> <p>1 sec/ sample</p> <p>Once per ignition key cycle</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>C</p> <p>Range 3 (Tertiary): Ambient air temperature is between -9.0 and -9.0 °C</p> <p>Engine Outlet Coolant reaches the start to open temperature of the flow control device to the radiator (ie: thermostat) minus 33.0 °C. The target temperature for this range will not drop below 33.0 °C</p>	<p>P0128 Maximum Accumulated Energy - Tertiary</p> <p>This diagnostic models the net energy into and out of the cooling system during the warm-up process.</p> <p>The ten energy terms are: heat from combustion (with AFM correction), heat from after-run, heat loss to transmission oil, heat loss to environment, heat loss to cabin, heat loss to DFCO, heat loss to engine oil, heat loss to exhaust, and eat loss to autostop.</p>	<p>The diagnostic will abort if the temperature has dropped by after the customer has commanded the engine off</p>	>5.0 °C		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 1 (WRAF& Gen4 ECM	P0131	<p>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).</p> <p>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.</p>	<p>B1S1 WRAF ASIC indicates a ground short to any of the following WRAF signals:</p> <p>A) Pump Current - short to ground fail counts are accumulated to determine fault status.</p> <p>B) Reference Cell Voltage - short to ground fail counts are accumulated to determine fault status.</p> <p>C) Reference Ground - short to ground fail counts are accumulated to determine fault status.</p> <p>D) Trim circuit - short to ground fail counts are accumulated to determine fault status.</p> <p><u>Note:</u> This ASIC is referred to as ATIC142 (Continental).</p> <p><u>Note:</u> A ground short on the Pump Current or Reference Voltage signal may also set a P223C DTC.</p>	<p>The ASIC provides a fault indication when the pump current, reference cell or reference ground pin is < 150mV.</p> <p>Note: the faults must exist for previous 100 milli - seconds to qualify for a fail flag.</p> <p>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.</p>	<p>Diagnostic is Enabled</p> <p>B1S1 DTC's Not active this key cycle</p> <p>Measure Valid status (ASIC)</p> <p>Controller status (ASIC)</p> <p>Engine Run or Auto stop *****</p> <p>Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) *****</p>	<p>P0135, P0030, P0031 or P0032</p> <p>= Valid</p> <p>= Ready</p> <p>= True</p> <p>= Complete</p> <p>> 20.0 seconds</p>	<p>Signal A: 20 failures out of 24 samples</p> <p>OR</p> <p>Signal B: 20 failures out of 24 samples</p> <p>OR</p> <p>Signal C: 20 failures out of 24 samples</p> <p>OR</p> <p>Signal D: 20 failures out of 24 samples</p> <p>Continuous in 25 milli - second loop</p>	Type B, 2 Trips
			<p>B1S1 WRAF ASIC indicates a ground short to any of the following WRAF signals:</p>	<p>The ASIC provides a fault indication when the pump current, reference cell, reference ground or</p>	<p>Diagnostic is Enabled</p> <p>B1S1 DTC's Not active this key cycle</p>	<p>P0135, P0030, P0031 or P0032</p>	<p>Signal A: 20 failures out of 24 samples</p> <p>OR</p>	

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 1 (WRAF& Gen4 ECM	P0132	<p>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).</p> <p>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.</p>	<p>B1S1 WRAF ASIC indicates a short to power on any of the following WRAF signals:</p> <p>A) Pump Current - short to power fail counts are accumulated to determine fault status.</p> <p>B) Reference Cell Voltage - short to power fail counts are accumulated to determine fault status.</p> <p>C) Reference Ground - short to power fail counts are accumulated to determine fault status.</p> <p>D) Trim Circuit - short to power fail counts are accumulated to determine fault status</p> <p><u>Note:</u> This ASIC is referred to as ATIC142 (Continental)..</p>	<p>The ASIC provides a fault indication when the pump current, reference cell, reference ground or trim circuit pin is > 5.2V.</p> <p>Note: the faults must exist for more than 100 msec to qualify for a fail flag.</p> <p>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.</p>	<p>Diagnostic is Enabled</p> <p>B1S1 DTC's Not active this key cycle</p> <p>Measure Valid Status (ASIC)</p> <p>Controller status (ASIC)</p> <p>Engine Run or Auto stop *****</p> <p>Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) *****</p>	<p>P0135, P0030, P0031 or P0032</p> <p>= Valid</p> <p>= Ready</p> <p>= True</p> <p>= Complete</p> <p>> 20.0 seconds</p>	<p>Signal A: 20 failures out of 24 samples</p> <p>OR</p> <p>Signal B: 20 failures out of 24 samples</p> <p>OR</p> <p>Signal C: 20 failures out of 24 samples</p> <p>OR</p> <p>Signal D: 20 failures out of 24 samples</p> <p>Frequency: Continuous in 25 milli - second loop</p>	Type B, 2 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 1	P0135	<p>This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit. This test compares the measured heater current (monitored thru the low side driver) and compares it to the expected values (over the voltage range provided) for the released sensor.</p> <p>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.</p>	Heater Current outside of the expected range of	$0.3 < \text{Amps} < 4.0$	<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>System Voltage Heater Warm-up delay O2S Heater device control</p> <p>B1S1 O2S Heater Duty Cycle</p> <p>All of the above met for</p>	<p>ECT_Sensor_FA</p> <p>>10.5 Volts = Complete</p> <p>= Not active</p> <p>> zero</p> <p>>120 seconds</p>	<p>/failures out of 9 samples</p> <p>Frequency: 2 tests per trip 10 seconds delay between tests and 1 second execution rate</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit Low Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0137	<p>This DTC determines if the O2 sensor signal circuit is shorted low. When enabled, the diagnostic monitors the O2S signal and compares it to the threshold.</p> <p>The diagnostic failure counter is incremented if the O2S signal is below the threshold value. This DTC is set based on the fail and sample counters.</p>	Oxygen Sensor Signal	< 40mvolts	<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>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</p> <p>Low Fuel Condition Only when FuelLevelDataFault</p> <p>Commanded Equivalence Ratio Air Per Cylinder Fuel Control State Closed Loop Active</p>	<p>TPS_ThrottleAuthorityDefaulted MAP_SensorFA AIR_System FA Ethanol Composition Sensor FA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnrCkt_FA FuelInjectorCircuit_FA</p> <p>= Not active = Not active = Not active = Not active 10.5 < Volts = Not active = Not active = Not active = Not active</p> <p>= False = False</p> <p>0.991 < ratio <1.040 150< mgrams <800 = Closed Loop = TRUE (Please see "Closed Loop Enable")</p>	<p>320 failures out of 400 samples</p> <p>Frequency: Continuous in 100 milli-second loop</p>	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Circuit High Voltage Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0138	<p>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.</p> <p>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.</p>	Oxygen Sensor Signal	> 1,050 mvolts	<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>System Voltage</p> <p>AFM Status</p> <p>Heater Warm-up delay</p> <p>Engine Run Time</p> <p>Engine Run Accum</p> <p>Low Fuel Condition</p> <p>Only when</p> <p>FuelLevelDataFault</p> <p>*****</p> <p>Secondary delay after above conditions are complete (cold start condition)</p> <p>Secondary delay after above conditions are complete (not cold start condition)</p> <p>Commanded Equivalence Ratio</p> <p>*****</p> <p>All of the above met for</p>	<p>TPS_ThrottleAuthorityDefaulted</p> <p>MAF_SensorFA</p> <p>MAP_SensorFA</p> <p>EvapExcessPurgePsbl_FA</p> <p>FuelInjectorCircuit_FA</p> <p>Ethanol Composition Sensor FA</p> <p>AIR System FA</p> <p>10.5 < Volts</p> <p>= All Cylinders active</p> <p>= Complete</p> <p>> 5.0 seconds</p> <p>> 30.0 seconds</p> <p>= False</p> <p>= False</p> <p>*****</p> <p>> 150.0 seconds when engine soak time > 28,800 seconds</p> <p>> 150.0 seconds when engine soak time < 28,800 seconds</p> <p><1.040 EQR</p> <p>*****</p> <p>> 3.0 seconds</p>	<p>100 failures out of 125 samples</p> <p>Frequency: Continuous in 100 milli-second loop</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	P013A	<p>The P013A diagnostic is the third in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, &P013B. ThisDTC 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.</p> <p>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.</p> <p>Primary method: The P013A diagnostic measures the secondary 02 sensor voltage response rate</p>	<p>Primary Method: The EWMA of the Post 02 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.20 coefficient.</p> <p>OR</p> <p>Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)</p>	<p>> 8.0 units < 7.2 units</p> <p>> 70.0 grams (upper voltage threshold is 450 mvolts and lower voltage threshold is 150 mvolts)</p>	<p>Diagnostic is Enabled</p> <p>No Active DTCs</p> <p>B1S2 DTCs Not Active this key cycle</p> <p>System Voltage Learned heater resistance</p> <p>Green O2S Condition</p>	<p>TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemBI TFTK0 FuelTrimSystemB2 TFTK0 EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_1_TFTKO O2S_Bank_2_TFTKO</p> <p>P013B, P013E, P013F, P2270 or P2271</p> <p>>10.5 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)</p>	<p>Frequency: Once per trip Note: if NaPOPD_b_Res etFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.</p>	<p>Type A, 1 Trips EWMA</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>between an upper and lower voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized integral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTCP013A 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.</p> <p>Secondary method:</p>			<p>Low Fuel Condition Only when FuelLevelDataFault</p> <p>Post fuel cell</p> <p>Crankshaft Torque DTC's Passed</p> <p>=====</p> <p>After above conditions are met: DFCO mode is continued (wo driver initiated pedal input).</p>	<p>in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.</p> <p>= False</p> <p>= False</p> <p>= Enabled, refer to Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests for additional info. < 125.0 Nm</p> <p>P2270 (and P2272 if applicable) P013E (and P014A if applicable)</p> <p>=====</p>		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Slow Response Lean to Rich Bank 1 Sensor 2	P013B	<p>The P013B diagnostic is the sixth in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, &P013B. ThisDTC 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.</p> <p>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.</p> <p>Primary method: The P013B diagnostic measures the secondary 02 sensor voltage response rate</p>	<p>Primary Method: The EWMA of the Post 02 sensor normalized integral value. The EWMA repass limit is The EWMA calculation uses a 0.20 coefficient.</p> <p>OR</p> <p>Secondary Method: The Accumulated mass air flow monitored during the Slow Response Test (between the upper and lower voltage thresholds)</p>	<p>> 8.0 units < 7.2 units</p> <p>> 200 grams (lower voltage threshold is 350 mvolts and upper voltage threshold is 600 mvolts)</p>	<p>Diagnostic is Enabled</p> <p>No Active DTCs</p> <p>B1S2 DTCs Not Active this key cycle</p> <p>System Voltage Learned heater resistance</p> <p>Green O2S Condition</p>	<p>TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR System FA FuelInjectorCircuit_FA FuelTrimSystemBI TFTK0 FuelTrimSystemB2 TFTK0 EngineMisfireDetected_FA Ethanol Composition Sensor FA O2S_Bank_1_TFTKO O2S_Bank_2_TFTKO</p> <p>P013A, P013E, P013F, P2270 or P2271</p> <p>>10.5 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs")</p> <p>= 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:</p>	<p>Frequency: Once per trip Note: if NaPOPD_b_Res etFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_Rap idResponseActiv e = TRUE, multiple tests per trip are allowed.</p>	<p>Type A, 1 Trips EWMA</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>between an lower and upper voltage threshold. The response rate is then normalized to mass air flow rate and scaled resulting in a normalized integral value. The normalized integral is fed into a 1st order lag filter to update the final EWMA result. DTCP013B is set when the EWMA value exceeds the EWMA threshold.</p> <p>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.</p> <p>Secondary method:</p>			<p>Green Cat System Condition</p> <p>Low Fuel Condition Only when FuelLevelDataFault</p> <p>Post fuel cell</p> <p>DTC's Passed</p> <p>=====</p> <p>After above conditions are met: Fuel Enrich mode continued.</p>	<p>B1S2, B2S2 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.</p> <p>= 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.</p> <p>(Note: This feature is only enabled when the vehicle is new and cannot be enabled in service).</p> <p>= False</p> <p>= False</p> <p>= Enabled, refer to Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests for additional info.</p> <p>P2270 P013E P013A P2271 P013F</p> <p>=====</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		This fault is set if the secondary O2 sensor does not achieve the required upper voltage threshold before the accumulated mass air flow threshold is reached.			<p>=====</p> <p>During this test the following must stay TRUE or the test will abort: 0.951 < Base Commanded EQR < 1.100</p> <p>=====</p> <p>During this test: Engine Airflow must stay below:</p> <p>=====</p> <p>and the delta Engine Airflow over 12.5msec must be :</p>	<p>=====</p> <p>100 gps</p> <p>< 100.0 gps</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Delayed Response Rich to Lean Bank 1 Sensor 2	P013E	<p>The P013E diagnostic is the second in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, &P013B. ThisDTC 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.</p> <p>This fault is set if the secondary 02 sensor does not achieve the required voltage before the accumulated mass airflow threshold is reached.</p>	<p>Post 02 sensor voltage</p> <p>AND</p> <p>The Accumulated mass airflow monitored during the Delayed Response Test under DFCO</p> <p>DFCO begins after: 1) Catalyst has been rich for a minimum of AND 2) Catalyst Rich Accumulation Air Flow is</p>	<p>> 450 mvolts</p> <p>> 70 grams</p> <p>> 1 secs</p> <p>>8.0 grams</p>	<p>Diagnostic is Enabled</p> <p>No Active DTCs</p> <p>B1S2 DTCs Not Active this key cycle</p> <p>System Voltage Learned heater resistance</p> <p>Green 02S Condition</p>	<p>TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR_System FA FuelInjectorCircuit_FA FuelTrimSystemBI TFTK0 FuelTrimSystemB2 TFTK0 EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTKO 02S_Bank_ 2_TFTKO</p> <p>P013A, P013B, P013F, P2270 or P2271</p> <p>>10.5 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs")</p> <p>= 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:</p>	<p>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.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>Low Fuel Condition Only when FuelLevelDataFault</p> <p>Post fuel cell</p> <p>Crankshaft Torque</p> <p>DTC's Passed</p> <p>Number of fueled cylinders =====</p> <p>After above conditions are met: DFCO mode entered (wo driver initiated pedal input).</p>	<p>B1S2, B282 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.</p> <p>= False</p> <p>= False</p> <p>= Enabled, refer to Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests for additional info. < 125.0 Nm</p> <p>P2270</p> <p>< 3 cylinders =====</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Delayed Response Lean to Rich Bank 1 Sensor 2	P013F	<p>The P013F diagnostic is the fifth in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, &P013B. ThisDTC 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.</p> <p>This fault is set if the secondary 02 sensor does not achieve the required voltage before the accumulated mass airflow threshold is reached.</p>	<p>Post 02 sensor voltage</p> <p>AND</p> <p>The Accumulated mass airflow monitored during the Delayed Response Test</p>	<p>< 350 mvolts</p> <p>>200 grams</p>	<p>Diagnostic is Enabled</p> <p>No Active DTCs</p> <p>B1S2 DTCs Not Active this key cycle</p> <p>System Voltage</p> <p>Learned heater resistance</p> <p>Green 02S Condition</p>	<p>TPS_ThrottleAuthorityDefaulted</p> <p>ECT_Sensor_FA</p> <p>IAT_SensorFA</p> <p>MAF_SensorFA</p> <p>MAP_SensorFA</p> <p>AIR_System FA</p> <p>FuelInjectorCircuit_FA</p> <p>FuelTrimSystemBI TFTK0</p> <p>FuelTrimSystemB2 TFTK0</p> <p>EngineMisfireDetected_FA</p> <p>Ethanol Composition Sensor FA</p> <p>02S_Bank_ 1_TFTK0</p> <p>02S_Bank_ 2_TFTK0</p> <p>P013A, P013B, P013E, P2270 or P2271</p> <p>>10.5 Volts</p> <p>= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs")</p> <p>= Not Valid, Green O2S condition is considered valid until the accumulated air flow is greater than</p> <p>Multiple DTC Use_Green Sensor Delay Criteria - Limit</p> <p>for the following locations:</p>	<p>Frequency: Once per trip</p> <p>Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>Green Cat System Condition</p> <p>Low Fuel Condition Only when FuelLevelDataFault</p> <p>Post fuel cell</p> <p>DTC's Passed</p> <p>Number of fueled cylinders</p> <p>=====</p> <p>After above conditions are met: Fuel Enrich mode</p>	<p>B1S2, B282 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.</p> <p>= 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).</p> <p>= False</p> <p>= False</p> <p>= Enabled, refer to Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests for additional info.</p> <p>P2270 P013E P013A P2271</p> <p>> 1 cylinders</p> <p>=====</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<div>entered.</div> <div>=====</div> <div>During this test the following must stay TRUE or the test will abort: 0.951 < Base Commanded EQR < 1.100</div> <div>=====</div> <div>During this test: Engine Airflow must stay below:</div> <div>=====</div> <div>and the delta Engine Airflow over 12.5msec must be :</div>	<div>=====</div> <div>100 gps</div> <div>< 100.0 gps</div>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
O2S Heater Performance Bank 1 Sensor 2) (For Single Bank Exhaust Only	P0141	<p>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.</p> <p>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.</p>	Heater Current outside of the expected range of	0.3 > amps > 2.5	<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>System Voltage</p> <p>Heater Warm-up delay</p> <p>02S Heater device control</p> <p>B1S1 02S Heater Duty Cycle</p> <p>All of the above met for</p>	<p>ECT_Sensor_FA</p> <p>>10.5 Volts</p> <p>= Complete</p> <p>= Not active</p> <p>> zero</p> <p>> 120 seconds</p>	<p>/failures out of 9 samples</p> <p>Frequency: 2 tests per trip 10 seconds delay between tests and 1 second execution rate.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Delayed Response Rich to Lean Bank 1 Sensor 1) (WRAF	P015A	<p>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.</p> <p>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.</p> <p>Primary method: 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 air flow rate, engine speed, Baro,</p>	<p>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</p> <p>OR</p> <p>Secondary Method: The Accumulated time monitored during the R2L Delayed Response Test.</p> <p>AND</p> <p>Pre WRAF 02 sensor measured EQR is</p>	<p>> 0.60 EWMA (sec) < 0.58 EWMA (sec)</p> <p>< 0.800 EQR</p> <p>> 3.5 Seconds</p> <p>> 0.300 EQR</p>	<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control</p> <p>Low Fuel Condition Only when FuelLevelDataFault</p>	<p>TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemBI _TFTK0 FuelTrimSystemB2 TFTK0 EthanolCompositionSensor_FA EngineMisfireDetected_FA WRAF_Bank_1_FA P0131, P0132, P013A, P013B, P013E, P013F, P2270, P2271</p> <p>>10.5 Volts = Not active = Not active = Not active = Not active = False</p>	<p>Frequency: Once per trip Note: if NaESPD_b_Fast InitResplsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponsesActive = TRUE, multiple tests per trip are allowed</p>	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>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.</p> <p><u>Secondary method:</u> This fault is set if the primary WRAF 02 sensor does not achieve the required lower measured EQR</p>			<p>Green 02S Condition</p> <p>02 Heater (pre sensor) on for</p> <p>Engine Coolant (Or OBD Coolant Enable Criteria</p> <p>IAT</p> <p>Engine run Accum</p> <p>Engine Speed to initially enable test</p> <p>Engine Speed range to keep test enabled (after initially enabled)</p> <p>Engine Airflow</p> <p>Vehicle Speed to initially enable test</p> <p>Vehicle Speed range to keep test enabled (after initially enabled)</p> <p>Closed loop integral</p> <p>Closed Loop Active</p>	<p>= False</p> <p>= Not Valid, Green 02S condition is considered valid until the accumulated air flow is greater than Multiple DTC Use_Green Sensor Delay Criteria - Limit for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.</p> <p>> 30 seconds</p> <p>> 60 °C</p> <p>= TRUE)</p> <p>> -40 °C</p> <p>> 30 seconds</p> <p>950 < RPM < 2,950</p> <p>900 < RPM < 3,050</p> <p>2.0 < gps < 12.5</p> <p>40.4 < MPH < 77.7</p> <p>35.4 < MPH < 82.0</p> <p>0.75 < C/L Int < 1.08</p> <p>= TRUE</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		threshold before a delay time threshold is reached.			Evap Ethanol Estimation in Progress Baro Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time Predicted Catalyst temp Fuel State ===== All of the above met for at least 2.5 seconds, and then the Force Cat Rich intrusive stage is requested. ===== Pre O2S EQRB1S1 at end of Cat Rich stage Fuel State Number of fueled cylinders ===== After above conditions are met: DFCO Mode is entered (wo driver initiated pedal input).	(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 < 900 = DFCO possible ===== ===== > 1.112EQR = DFCO active < 3 cylinders =====		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Delayed Response Lean to Rich Bank 1 Sensor 1) (WRAF	P015B	<p>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.</p> <p>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.</p> <p>Primary method: 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 air flow rate, engine speed, Baro, and intake air temperature resulting in</p>	<p>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.</p> <p>OR</p> <p>Secondary method: The Accumulated time monitored during the L2R Delayed Response Test.</p> <p>AND</p> <p>Pre WRAF 02 sensor measured EQR is</p> <p>OR</p> <p>At end of Cat Rich stage the Pre WRAF 02 sensor measured EQR is</p>	<p>> 0.60 EWMA (sec) < 0.58 EWMA (sec)</p> <p>> 4.0 Seconds</p> <p>< 0.996 EQR</p> <p>< 1.112EQR</p>	<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>P015Atest is complete and</p> <p>System Voltage EGR Device Control Idle Device Control Fuel Device Control AIR Device Control</p> <p>Low Fuel Condition</p>	<p>TPS_ThrottleAuthorityDefaulted MAP_SensorFA IAT_SensorFA ECT_Sensor_FA AmbientAirDefault MAF_SensorFA EvapPurgeSolenoidCircuit_FA EvapFlowDuringNonPurge_FA EvapVentSolenoidCircuit_FA EvapSmallLeak_FA EvapEmissionSystem_FA FuelTankPressureSnrCkt_FA FuelInjectorCircuit_FA AIR System FA FuelTrimSystemBI_TFTK0 FuelTrimSystemB2 TFTK0 EthanolCompositionSensor_FA EngineMisfireDetected_FA WRAF_Bank_1_FA P0131, P0132, P013A, P013B, P013E, P013F, P015A, P2270, P2271</p> <p>= Passed</p> <p>>10.5 Volts = Not active = Not active = Not active = Not active</p>	<p>Frequency: Once per trip Note: if NaESPD_b_Fast InitResplsActive = TRUE for the given Fuel Bank OR NaESPD_b_RapidResponsesActive = TRUE, multiple tests per trip are allowed</p>	Type A, 1 Trips EWMA

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>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.</p> <p><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 delavtime threshold is</p>			<p>Only when FuelLevelDataFault</p> <p>Green 02S Condition</p> <p>02 Heater (pre sensor) on for</p> <p>Engine Coolant (Or OBD Coolant Enable Criteria</p> <p>IAT Engine run Accum</p> <p>Engine Speed to initially enable test Engine Speed range to keep test enabled (after initially enabled)</p> <p>Engine Airflow Vehicle Speed to initially enable test Vehicle Speed range to keep test enabled (after initially enabled)</p>	<p>= False</p> <p>= False</p> <p>= Not Valid, Green 02S condition is considered valid until the accumulated air flow is greater than Multiple DTC Use_Green Sensor Delay Criteria - Limit for the following locations: B1S1, B2S1 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.</p> <p>> 30 seconds > 60 °C</p> <p>=TRUE)</p> <p>> -40 °C > 30 seconds</p> <p>950 < RPM < 2,950</p> <p>900 < RPM < 3,050</p> <p>2.0 < gps < 12.5</p> <p>40.4 < MPH < 77.7</p> <p>35.4 < MPH < 82.0</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		reached.			<p>Closed loop integral Closed Loop Active</p> <p>Evap</p> <p>Ethanol Estimation in Progress</p> <p>Baro Post fuel cell EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on time</p> <p>Predicted Catalyst temp Fuel State Number of fueled cylinders</p> <p>=====</p> <p>When above conditions are met: Fuel Enrich mode is entered.</p> <p>=====</p> <p>During this test: Engine Airflow must stay between: and the delta Engine Airflow over 12.5msec must be :</p>	<p>0.75 < C/L Int < 1.08 = TRUE (Please see “Closed Loop Enable Clarification” in Supporting Tables).</p> <p>not in control of purge = Not Active (Please see “Ethanol Estimation in Progress” in Supporting Tables).</p> <p>> 70kpa = enabled = not active</p> <p>= not active</p> <p>> 60.0 sec</p> <p>500 < °C < 900 = DFCO inhibit</p> <p>> 1 cylinders</p> <p>=====</p> <p>=====</p> <p>0 < gps < 30</p> <p>< 30.0 CIDS</p>		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel System Too Lean Bank 1	P0171	<p>Determines if the primary fuel control system for Bank 1 is in a lean condition, based on the filtered long-term purge-on, long term purge-off 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 therefore values > 1.0 indicates a Lean condition.</p> <p>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.</p>	<p>The filtered, adjusted for purge flow, long-term fuel trim metric, OR the filtered, non-adjusted purge-on long-term fuel trim metric</p> <p>AND</p> <p>The filtered short-term fuel trim metric (Note: any value below 0.95 effectively nullifies the short-term fuel trim criteria)</p> <p>If a fault has been detected the filtered, adjusted for purge flow, long-term fuel trim metric, AND the filtered, non-adjusted purge on long-term fuel trim metric</p> <p>AND</p> <p>The filtered short-term fuel trim metric to repass the diagnostic.</p>	<p>>= 1.320</p> <p>>= 1.320</p> <p>>= 0.100</p> <p>< 1.280</p> <p>< 1.280</p> <p>< 2.000</p>	<p>The primary fuel trim diagnostic is enabled</p> <p>Engine speed BARO Coolant Temp</p> <p>Coolant Temp MAP Inlet Air Temp MAF Fuel Level</p> <p>Long Term Fuel Trim data accumulation:</p> <p>Sometimes, certain Long-Term Fuel Trim Cells are not utilized for control and/or diagnosis</p>	<p>525 <rpm< 5,700 > 70 kPa > -20 °C (or OBD Coolant Enable Criteria = TRUE) < 160 °C 10 <kPa< 255 -20 <°C< 160 1 <g/s< 1,000 > 10% or if fuel sender is faulty the diagnostic will bypass the fuel level criteria.</p> <p>> 20.00 seconds of data must accumulate on each trip, with at least 10.00 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 adjustment to Minimum accumulation time.</p> <p>(Please see P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage in Supporting Tables for a list of cells utilized for diagnosis)</p>	Frequency: 100 ms Continuous Loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>Closed Loop Long Term FT</p> <p>EGR Diag. Catalyst Diag. Post 02 Diag. Device Control EVAP Diag.</p> <p>-----</p> <p>Delay during GPF Regeneration</p> <p>Standard startup delays are re-initialized following completion of GPF Regen to allow system stabilization. (See "Long Term Fuel Trim data accumulation" above.)</p> <p>-----</p> <p>No active DTC:</p> <p>-----</p>	<p>Enabled Enabled (Please see "Closed Loop Enable Clarification" and "Long Term FT Enable CriteriaPrimary Long Term Fuel Trim Enable Criteria" in Supporting Tables.)</p> <p>Intrusive Test Not Active Intrusive Test Not Active Intrusive Test Not Active Not Active Large Leak Diagnostic (P0455) Not Active</p> <p>-----</p> <p>No Delay</p> <p>-----</p> <p>1AC_SystemRPM_FA MAP_SensorFA MAF_SensorFA MAF_SensorTFTKO AIR System FA EvapExcessPurgePsbl_F A</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Ethanol Composition Sensor FA FuelInjectorCircuit_FA EngineMisfireDetected_FA EGRValvePerformance_FA EGRValveCircuit_FA MAP_EngineVacuumStat us AmbPresDfItStatus TC_BoostPresSnsrFA O2S_Bank_1_Sensor_1_ FA		

[illegible]

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>term fuel trim metric is only monitored on programs that have acceptable emissions when the long-term fuel metric reaches its full authority.</p> <p>Once purge is enabled if the filtered Purge Long Term Fuel Trim metric > 0.730 , 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 <= 0.730 , 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 <= 0.725 the fault will set.</p> <p>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</p>		<p>term fuel trim metric must be > 0.000 to repass the diagnostic. The intrusive test will be enabled at long-term fuel metric values < 0.78 until the diagnostic repasses after a failure.</p>		<p>If the accumulated purge volume is > 1,200.0 grams, the intrusive test will not be inhibited even if Purge Vapor Fuel is > 25.1 %.</p>	<p>time to purge excess vapors from the canister. During this period, fuel trim will pass if the filtered Purge Long Term Fuel Trim metric > 0.730 for at least 120.00 seconds, indicating that the canister has been purged.</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		segments allowing Purge to renable between segments. Likewise, for these reasons, if after the 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 Illum.
SENT Fuel Rail Temperature Sensor 1 Circuit Low Fault	P0182	<p>This DTC diagnose SENT fuel rail temperature sensor 1 that is too low out of range.</p> <p>If the sensor digital value (repressing the reference 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.</p>	Fuel Temperature Sensor 1 SENT digital read value	< 145	<p>Fuel Temperature Out of Range Diagnostic Enabled</p> <p>No Fault Active on</p> <p>No Fault Pending on</p>	<p>True</p> <p>Enabled when a code clear is not active or not exiting device control</p> <p>SENT Communication Fault Active (U0625, U101B, U0670, U0671)</p> <p>SENT Internal Error Fault Active (P126E)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Active (P128C)</p> <p>SENT Internal Error Fault Pending (P126E)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)</p>	<p>50.00 failures out of 62.00 samples 100 ms per Sample Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 1 Circuit High Fault	P0183	<p>This DTC diagnose SENT fuel rail temperature sensor 1 that is too high out of range.</p> <p>If the sensor digital value (repressing the reference 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.</p>	Fuel Temperature Sensor 1 SENT digital read value	> 1,865	<p>Fuel Temperature Out of Range Diagnostic Enabled</p> <p>No Fault Active on</p> <p>No Fault Pending</p>	<p>True</p> <p>Enabled when a code clear is not active or not exiting device control</p> <p>SENT Communication Fault Active (U0625, U101B, U0670, U0671)</p> <p>SENT Internal Error Fault Active (P126E)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Active (P128C)</p> <p>SENT Internal Error Fault Pending (P126E)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)</p>	<p>50.00 failures out of 62.00 samples 100 ms per Sample Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 2 Circuit Low Fault	P0187	<p>This DTC diagnose SENT fuel rail temperature sensor 2 that is too low out of range.</p> <p>If the sensor digital value (repressing the reference 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.</p>	Fuel Temperature Sensor 1 SENT digital read value	< 145.00	<p>Fuel Temperature Out of Range Diagnostic Enabled</p> <p>No Fault Active on</p> <p>No Fault Pending</p>	<p>True</p> <p>Enabled when a code clear is not active or not exiting device control</p> <p>SENT Communication Fault Active (U0625, U101B, U0670, U0671)</p> <p>SENT Internal Error Fault Active (P126F)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Active (P128D)</p> <p>SENT Internal Error Fault Pending (P126F)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)</p>	<p>50.00 failures out of 62.00 samples</p> <p>100 ms per Sample</p> <p>Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 2 Circuit High Fault	P0188	<p>This DTC diagnose SENT fuel rail temperature sensor 2 that is too high out of range.</p> <p>If the sensor digital value (repressing the reference 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.</p>	Fuel Temperature Sensor 1 SENT digital read value	> 1,865.00	<p>Fuel Temperature Out of Range Diagnostic Enabled</p> <p>No Fault Active on</p> <p>No Fault Pending</p>	<p>True</p> <p>Enabled when a code clear is not active or not exiting device control</p> <p>SENT Communication Fault Active (U0625, U101B, U0670, U0671) SENT Internal Error Fault Active (P126F)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Active (P128D)</p> <p>SENT Internal Error Fault Pending (P126F)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)</p>	<p>50.00 failures out of 62.00 samples 100 ms per Sample Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit Range/ Performance	P018B	<p>This DTC detects a fuel pressure sensor response stuck within the normal operating range using an intrusive test (as follows)</p> <p>a] Intrusive Test Trigger: 1] Fuel Pump Duty Cycle Clamped Time (min or max duty cycle) >= 5 sec</p> <p>Or 2] Fuel Pres Err Variance <= calibration value KeFDBR_cmp_FPSS_MinPres</p> <p>Variance ; Otherwise, Report status as Pass</p> <p>b] Intrusive test freq limit: 60 sec between intrusive tests that pass,</p> <p>c] Intrusive test Fuel Flow limit: Fuel Flow Actual < Max allowed Fuel Flow rate</p>	<p>Sensed fuel pressure change</p> <p>[absolute value, during intrusive test]</p>	>= 30.00 kPa	<p>a) Diagnostic is ..</p> <p>b) Timer Engine Running</p> <p>c1) Fuel Flow Rate Valid c2) Fault bundle FDB_FuelPresSnrCktFA c3) Reference Voltage Fault Status [DTC P0641] c4) Fault bundle FAB_FuelPmpCktFA c5) Fuel Control Enable Fault Active [DTC P12A6] c6) Fuel Pump Driver Module OverTemp Fault Active [DTC P1255] c7) Fuel Pump Speed Fault Active [DTCP129F] c8) CAN Sensor Bus message \$0C3 Comm Fault [DTCP165C] c9) CAN Sensor Bus Fuel Pmp Speed Command ARC and Checksum Comm Fault Code [DTC U18A7] c10) Fuel Pump Duty Cycle Fault Active c11) Sensor Configuration [Wired to FTZM?] c12) Sensor Bus Relay On d) Emissions Fuel Level Low [Message \$3FB] e) Fuel Control Enable f) Fuel Pump Control State g) Instantaneous Fuel</p>	<p>a) ENABLED</p> <p>b) >= 5.00 seconds</p> <p>c1) == TRUE c2) == False</p> <p>c3) == False</p> <p>c4) == False</p> <p>c5) == False</p> <p>c6) == False</p> <p>c7) == False</p> <p>c8) == False</p> <p>c9) == False</p> <p>c10) == False</p> <p>c11) == CeFDBR_e_WiredTo_FT ZM c12) == TRUE</p> <p>d) == False</p> <p>e) == TRUE f) == Normal Control OR == Fuel Pres Sensor Stuck Control g) >= 0.05 gm/sec</p>	<p>1 sample/ 12.5 millisec</p> <p>Intrusive Test Duration:</p> <p>Fuel Flow - related (5 to 12 sec)</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Flow h) Diagnostic System Disabled j1) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B \$0CE] [DTCU18A7] j2) CAN Sensor Bus message \$0C3_Available j3) Fuel Pres Sensor Ref Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B \$0C3][DTC U18A7]	h) == False j1) == False j2) == TRUE j3) == False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pressure Sensor "B" Circuit Low	P018C	This DTC detects if the fuel pressure sensor circuit is shorted low Values are analyzed as percent of sensor reference voltage $[(\text{Abs } 5.0\text{V} - \text{SensorVoltsActual}) / 5.0\text{V}] * 100\%$	Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	< 4.00 % or [0 kPa gauge]	a) Diagnostic is .. b) Run_Crank Active c) Diagnostic System Disabled d) Pressure Sensor Configuration	a) ENABLED b) == TRUE c) == False d) If calibration value CeFDBR_e_WiredTo_FT ZM == WiredTo ECM Else 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 is .. b) Run_Crank Active c) Diagnostic System Disabled d1) Pressure Sensor Configuration d2) Sensor Bus Relay On d3) CAN Sensor Bus message \$0C3 Available d4) Fuel Pres Sensor Ref Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B \$0C3] [Info]	a) ENABLED b) == TRUE c) == False d1) If calibration value CeFDBR_e_WiredTo_FT ZM == WiredTo FTZM Else see Case1 d2) == TRUE d3) == TRUE d4) == False	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 Illum.
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 $[(\text{Abs } 5.0\text{V} - \text{SensorVoltsActual}) / 5.0\text{V}] * 100\%$	Fuel Pressure Sensor output % [re. full range as percent of 5.0V reference]	> 96.00 % or [743 kPa ga]	a) Diagnostic is .. b) Run_Crank Active c) Diagnostic System Disabled d) Pressure Sensor Configuration	a) ENABLED b) == TRUE c) == False d) If calibration value CeFDBR_e_WiredTo_FT ZM == WiredTo ECM Else 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 is .. b) Run_Crank Active c) Diagnostic System Disabled d1) Pressure Sensor Configuration d2) Sensor Bus Relay On d3) CAN Sensor Bus message \$0C3 Available d4) Fuel Pres Sensor Ref Voltage Status Message Counter Incorrect Alive Rolling Count and Checksum Error [CAN Bus B \$0C3][Info1]	a) ENABLED b) == TRUE c) == False d1) If calibration value CeFDBR_e_WiredTo_FT ZM == WiredTo FTZM Else See Case 1 d2) == TRUE d3) == TRUE d4) == False	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 Illum.
SENT SIDI High Pressure Sensor Performance	P0191	The DTC determines if there is a skewed control fuel rail sensor (Sensor1) via a comparison to diagnostic sensor (sensor2) continuously when the engine is running and the commanded pressure is steady.	<p>Primary sensor (P1) vs. Secondary sensor (P2) performance rationality</p> <p>((Low Limit fail Filtered Fuel Control Error)</p> <p>OR</p> <p>(High Limit Fail: Filtered Fuel Control Error))</p> <p>AND</p> <p>(Filtered Absolute delta between sensor1 and sensor2</p>	<p><=</p> <p>P0191 - Low fail limit of fuel control due to pressure sensor skewed low (See supporting table)</p> <p>>=</p> <p>P0191 - High fail limit of fuel control due to high pressure sensor skewed High (see Supporting table)</p> <p>>= 1.00 mpa</p> <p>Note: fuel control error is calculated based on the square root of sensor1 divided by sensor2, this value is filter to ensure proper failure detection.</p> <p>Absolute delta between sensor1 and sensor2 value is filter to ensure proper failure detection.</p>	<p>Commanded Pressure rate of change (increasing or decreasing)</p> <p>for a period of time</p>	<p><3.00 mpa</p> <p>>= 1.25 seconds</p> <p>Enabled when a code clear is not active or not exiting device control</p>	<p>Filter Fuel Control Error term and Absolute delta between sensor1 and sensor2 exceed Low or High Fail limit for a duration >= 1.50 seconds</p> <p>This is diagnostic runs Continuous</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Pressure Sensor 1 Out of Range	P0192	<p>This DTC diagnose SENT high pressure sensor 1 that is too low out of range.</p> <p>If the sensor digital value (repressing 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.</p>	High Pressure Rail Sensor 1 SENT digital read value	=< 66			<p>Time Based: 400 Failuerout of 500 Samples 6.25 ms per Sample Continuous</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Temperature (EOT) Circuit Low	P0197	Controller specific output driver circuit diagnoses the Engine Oil Temperature (EOT) Sensor low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor (EOT) Circuit Resistance	< 25 ohms	Diagnostic Status	Enabled	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 Illum.
Engine Oil Temperature (EOT) Circuit High	P0198	Controller specific output driver circuit diagnoses the Engine Oil Temperature (EOT) Sensor low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Engine Oil Temperature Sensor (EOT) Circuit Resistance	> 450,000 ohms	Diagnostic Status Engine Run Time OR ECT	Enabled > 20.0 seconds ≥ -20 Deg C	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 Illum.
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 <u>Pass/Fail Condition:</u> 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 Illum.
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 Illum.
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 Illum.
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 <u>Pass/Fail Condition:</u> 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 Illum.
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	<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>Engine Runtime Distance traveled this key cycle</p> <p>Ambient air pressure</p> <p>Ambient air temperature</p> <p>*****</p> <p>Engine coolant temperature</p> <p>At least once during the key cycle</p> <p>Type 0 (non-heated t-stat)</p> <p>*****</p> <p>Heat to coolant</p> <p>DFCO time</p> <p>RPM</p> <p>Active Fuel Management is not in</p>	<p>ECT_Sensor_Ckt_FA</p> <p>VehicleSpeedSensor_FA</p> <p>OAT_PtEstFiltFA</p> <p>THMR_AWP_AuxPumpFA</p> <p>THMR_AHV_FA</p> <p>THMR_SWP_Control_FA</p> <p>EngineTorqueEstInaccuracy</p> <p>ECT_Sensor_Perf_FA</p> <p>THMR_SWP_NoFlow_FA</p> <p>THMR_SWP_Flow8tuckOn_FA</p> <p>>30.0 seconds</p> <p>>1.2 km</p> <p>> 55.0 kPa</p> <p>>-9.0 °C</p> <p>> 66.9 °C</p> <p>></p> <p>P01F0 - Heat To Coolant Min 2D</p> <p>< 15.0 seconds</p> <p>< 9,999</p> <p>Half Cylinder Mode</p>	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 Illum.
Injector 1 Open Circuit - (SIDI)	P0201	<p>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.</p> <p>Or</p> <p>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.</p>	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p> <p>Or</p> <p>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	<p>≥ 200 KOhms impedance between signal and controller ground</p> <p>≥ 200 KOhms impedance between signal and controller ground</p>	Battery Voltage Engine Run Time	<p>≥ 11 Volts</p> <p>≥ 0 Seconds</p> <p>P062B notFAorTFTK</p>	<p>10.00 failures out of 20.00 samples</p> <p>100 ms /sample Continuous</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Open Circuit - (SIDI)	P0202	<p>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.</p> <p>Or</p> <p>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.</p>	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p> <p>Or</p> <p>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	<p>≥ 200 KOhms impedance between signal and controller ground</p> <p>≥ 200 KOhms impedance between signal and controller ground</p>	Battery Voltage Engine Run Time	<p>≥ 11 Volts ≥ 0 Seconds</p> <p>P062B notFAorTFTK</p>	<p>10.00 failures out of 20.00 samples</p> <p>100 ms /sample Continuous</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector3 Open Circuit - (SIDI)	P0203	<p>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.</p> <p>Or</p> <p>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.</p>	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p> <p>Or</p> <p>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	<p>≥ 200 KOhms impedance between signal and controller ground</p> <p>≥ 200 KOhms impedance between signal and controller ground</p>	Battery Voltage Engine Run Time	<p>≥ 11 Volts</p> <p>≥ 0 Seconds</p> <p>P062B notFAorTFTK</p>	<p>10.00 failures out of 20.00 samples</p> <p>100 ms /sample Continuous</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Open Circuit - (SIDI)	P0204	<p>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.</p> <p>Or</p> <p>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.</p>	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p> <p>Or</p> <p>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	<p>≥ 200 KOhms impedance between signal and controller ground</p> <p>≥ 200 KOhms impedance between signal and controller ground</p>	Battery Voltage Engine Run Time	<p>≥ 11 Volts ≥ 0 Seconds</p> <p>P062B notFAorTFTK</p>	<p>10.00 failures out of 20.00 samples</p> <p>100 ms /sample Continuous</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS2 Circuit Low	P0222	Detects a continuous or intermittent short low or open in TPS2 circuit by monitoring the TPS 2 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too low. This diagnostic only runs when battery voltage is high enough.	TPS2 % Vref < (100% corresponds to 5.0 Volt)	5.00 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
TPS2 Circuit High	P0223	Detects a continuous or intermittent short high in TPS2 circuit by monitoring the TPS 2 sensor percent Vref and failing the diagnostic when the TPS percent Vref is too high. This diagnostic only runs when battery voltage is high enough.	TPS2 % Vref > (100% corresponds to 5.0 Volt)	91.80 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	79/159 counts; 57 counts continuous; 3.125 ms /count in the ECM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharger Boost Pressure (TIAP) Sensor Performance (single turbo)	P0236	<p>Detects a performance failure in the Turbocharger Boost Pressure sensor, such as when a Turbocharger Boost Pressure value is stuck in range.</p> <p>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).</p> <p>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</p>	<p>Engine Running:</p> <p>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.</p> <p>MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered</p> <p>MAP1 model fails when ABS(Measured MAP - MAP Model 1) Filtered</p> <p>MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered</p> <p>MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered</p> <p>TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered</p> <p>TPS model fails when Filtered Throttle Model Error</p> <p>TIAP Correlation model fails when High Engine Air Flow is TRUE AND</p>	<p>> 25.0 grams/sec</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 350 kPa*(g/s)</p>	<p>Engine Speed Engine Speed</p> <p>(Coolant Temp OR OBD Coolant Enable Criteria</p> <p>(Coolant Temp OR OBD Max Coolant Achieved</p> <p>Intake Air Temp Intake Air Temp</p> <p>Powertrain Relay Voltage for a period of time</p> <p>Minimum total weight factor (all factors multiplied together)</p> <p>See Residual Weight Factor tables.</p>	<p>>= 400 RPM <= 5,700 RPM</p> <p>>= -9 Deg C</p> <p>= TRUE)</p> <p><= 130 Deg C</p> <p>= FALSE)</p> <p>-20 Deg C <= 125 Deg C</p> <p>>= 9.1 Volts >= 0.2 Seconds</p> <p>>= 0.50</p> <p>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</p> <p>MAP Model 1 Error multiplied by</p>	<p>Continuous</p> <p>Calculation are performed every 12.5 msec</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		Pressure sensor. In this case, the Turbocharger Boost Pressure Performance diagnostic will fail.	<p>Measured TIAP - measured MAP - offset as a function of engine speed See table P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset</p> <p>OR</p> <p>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</p> <p>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</p> <p>High Engine Air Flow is TRUE when Mass Air Flow</p>	<p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 1.0 seconds</p> <p>> 1.0 seconds</p> <p>> a threshold in gm/sec as a function of engine speed See table</p>	No Active DTCs:	<p>P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM</p> <p>MAP Model 2 Error multiplied by P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM</p> <p>MAP Model 3 Error multiplied by P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM</p> <p>TIAP Model 1 Error multiplied by P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM</p> <p>Filtered Throttle Model Error multiplied by P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM</p> <p>MAP_SensorCircuitFA EGRValvePerformance_FA MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>AND Manifold Pressure</p> <p>AND Filtered Mass Air Flow - Mass Air Flow</p> <p>Low Engine Air Flow is TRUE when Mass Air Flow</p> <p>AND Manifold Pressure</p> <p>AND Mass Air Flow - Filtered Mass Air Flow</p>	<p>P0101, P0106, P0121, P0236, P1101: TIAP- MAP Correlation Min Air Flow</p> <p>> a threshold in kPa as a function of engine speed See table</p> <p>P0101, P0106, P0121, P0236, P1101: TIAP- MAP Correlation Min MAP</p> <p>< 3.0 gm/sec</p> <p>< a threshold in gm/ sec as a function of engine speed See table</p> <p>P0101, P0106, P0121, P0236, P1101: TIAP- Baro Correlation Max Air Flow</p> <p>< a threshold in kPa as a function of engine speed See table</p> <p>P0101, P0106, P0121, P0236, P1101: TIAP- Baro Correlation Max MAP</p> <p>< 2.0 gm/sec</p>	<p>No Pending DTCs:</p> <p>Diagnostic is Enabled</p>	<p>AmbientAirDefault</p> <p>EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharge r 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 Illum.
Turbocharge r 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	> 78.0% of 5 Volt Range (This is equal to 336.0 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 Illum.
Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit Low	P0245	<p>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.</p> <p>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.</p>	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.</p> <p>In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.</p>	< 0.5 Q impedance between output and controller ground	<p>Diagnostic enabled *****</p> <p>Powertrain relay voltage</p> <p>Ignition run crank voltage *****</p> <p>Engine does not crank</p> <p>Diagnostic system not disabled</p>	<p>True *****</p> <p>>=11.0 Volts</p> <p>>5.00 Volts *****</p>	<p>10 failures out of 14 samples</p> <p>100ms /sample</p>	<p>Type A, 1 Trips</p> <p>Note: In certain controllers P0243 may also set turbocharger wastegate / supercharger boost solenoid A control circuit</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbocharge r Wastegate / Supercharge r Boost Solenoid A Control Circuit High	P0246	<p>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.</p> <p>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.</p>	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p> <p>In certain controllers this diagnosis runs only when the HWIO-output is driven by the application S/W.</p>	< 0.5 Q impedance between output and controller power	<p>Diagnostic enabled *****</p> <p>Powertrain relay voltage</p> <p>Ignition run crank voltage *****</p> <p>Engine does not crank</p> <p>Diagnostic system not disabled</p>	<p>True *****</p> <p>>=11.0 Volts</p> <p>>5.00 Volts *****</p>	<p>10 failures out of 14 samples</p> <p>100ms /sample</p>	Type A, 1 Trips

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Low side circuit shorted to ground (SIDI)	P0261	Controller specific output driver circuit diagnoses Injector 1 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 Low side circuit shorted to power (SIDI)	P0262	Controller specific output driver circuit diagnoses Injector 1 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Low side circuit shorted to ground (SIDI)	P0264	Controller specific output driver circuit diagnoses Injector 2 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 Low side circuit shorted to power (SIDI)	P0265	Controller specific output driver circuit diagnoses Injector 2 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector3 Low side circuit shorted to ground (SIDI)	P0267	Controller specific output driver circuit diagnoses Injector 3 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector3 Low side circuit shorted to power (SIDI)	P0268	Controller specific output driver circuit diagnoses Injector 3 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Low side circuit shorted to ground (SIDI)	P0270	Controller specific output driver circuit diagnoses Injector 4 low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	<= 1 volt between signal and controller ground	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 Low side circuit shorted to power (SIDI)	P0271	Controller specific output driver circuit diagnoses Injector 4 low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbo/Super Charger Engine Underboost Wastegate Position Deviation; Turbocharge r 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 ***** Coolant temperature or OBD Coolant Enable Criteria and Coolant temperature and not OBD Max Coolant Achieved ***** Engine speed ***** Desired Torque ***** Desired Torque derivative in range Actual wastegate position in range Actual wastegate position derivative in range ***** All conditions have to be fulfilled for:	True ***** > -40.0 °C < 150.0 °C ***** > refer to P0234 P0299: Engine speed minimum limit over Ambient pressure to enable the WG deviation diagnosis, in Supporting tables. ***** > refer to P0234 P0299: Desired torque minimum limit over Ambient pressure to enable the WG deviation diagnosis, in Supporting tables. ***** > -30.00 Nm/sec < 30.00 Nm/sec > 20.00 % < 100.00 % > -20.00 %/sec < 20.00 %/sec ***** > refer to	36 failures out of 45 samples 100ms /sample	Type A, 1 Trips

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

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

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

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

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

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Random Misfire Detected	P0300	These DTC's will determine if a random or a cylinder specific misfire is occurring by monitoring various terms derived from crankshaft velocity.	Crankshaft Deceleration Value(s) vs. Engine Speed and Engine load		Engine Run Time	> 2 crankshaft revolution	Emission Exceedence = any (5) failed 200 rev blocks out of (16) 200 rev block tests	Type B, 2 Trips (Mil Flashes with Catalyst damage level of Misfire)
Cylinder 1 Misfire Detected	P0301	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.	The equation used to calculate deceleration value is tailored to specific vehicle operating conditions.		Engine Coolant Temp	"ECT" If OBD Max Coolant Achieved = FALSE -12°C < ECT Or if OBD Max Coolant Achieved = TRUE -12°C < ECT < 128°C		
Cylinder 2 Misfire Detected	P0302		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.		Or If ECT at startup Then	< -12°C If OBD Max Coolant Achieved = FALSE 21°C < ECT If OBD Max Coolant Achieved = TRUE 21°C < ECT < 128°C	Failure reported for (1) Exceedence in 1st (16) 200 rev block tests, or (4) Exceedences thereafter.	
Cylinder 3 Misfire Detected	P0303							
Cylinder 4 Misfire Detected	P0304							
		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		- see details of thresholds on Supporting Tables Tab	System Voltage + Throttle delta - Throttle delta	9.00 < volts < 32.00 < 95.00 % per 25 ms < 95.00 % per 25 ms		
			SINGLE CYLINDER CONTINUOUS MISFIRE((Medres_Decel Medres_Jerk	> RufSCD_Decel AND > RufSCD_Jerk)	Early Termination option: (used on plug ins that may not have enough engine run time at end of trip for normal interval to complete.)	Not Enabled	OR when Early Termination Reporting = Enabled and engine rev > 1,000 revs and < 3,200 revs at end of trip	
			OR (Medres_Decel Medres_Jerk	> SCD_Decel AND > SCD_Jerk)				
			OR (Lores_Decel Lores_Jerk	> RufCyl_Decel AND > RufCyl_Jerk)				
			OR (Lores_Decel Lores_Jerk	> CylModeDecel AND > CylModeJerk)				
		Default Action: If Misfire P030x sets on some hybrid applications, the isolation damper	OR RevBalanceTime	>RevMode_Decel				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		between engine and transmission can go into extreme resonance. Default action is to move rpm out of the resonance zone. If default action not activated, significant hardware damage could occur rendering vehicle inoperable.	<p>*****</p> <p>**This Feature not used on Gasoline engines**</p> <p>Combustion Modes that force selection of Idle Tables</p> <p>*****</p> <p>Other patterns of misfire use adjustments to the single cylinder continuous misfire threshold tables:</p> <p>RANDOM MISFIRE Use random misfire thresholds If no misfire for</p> <p>(Medres_Decel</p> <p>AND</p> <p>Medres_Jerk)</p> <p>OR (Medres_Decel</p> <p>AND</p> <p>Medres_Jerk)</p> <p>OR (Lores_Decel</p> <p>AND</p> <p>Lores_Jerk)</p>	<p>*****</p> <p>**This Feature not used on Gasoline engines**</p> <p>CombustModelIdleTbl in Supporting Tables</p> <p>*****</p> <p>> 6 Engine Cycles</p> <p>> RufSCD_Decel * Random_SCD_Decel</p> <p>> RufSCD_Jerk * Random_SCD_Jerk</p> <p>>SCD_Decel * Random_SCD_Decel</p> <p>> SCD_Jerk * Random_SCD_Jerk</p> <p>> RufCyl_Decel * RandomCylModDecel</p> <p>> RufCyl_Jerk * RandomCylModJerk</p>			<p>any Catalyst Exceedence = (1) 200 rev block as data supports for catalyst damage.</p> <p>Catalyst Failure reported with (1 or 3) Exceedences in FTP, or (1) Exceedence outside FTP.</p> <p>Continuous</p>	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			OR (Revmode Active AND (within one engine cycle: 2nd largest Lores_Decel)	$> \text{CylModeDecel} * \text{PairCylModeDecel}$				
			BANK MISFIRE Cylinders above Bank Thresholds (Medres_Decel AND Medres_Jerk)	$\geq 3 \text{ cylinders}$ $> \text{RufSCD_Decel} * \text{Bank_SCD_Decel}$ $> \text{RufSCD_Jerk} * \text{Bank_SCD_Jerk}$				
			OR (Medres_Decel AND Medres_Jerk)	$> \text{SCD_Decel} * \text{Bank_SCD_Decel}$ $> \text{SCD_Jerk} * \text{Bank_SCD_Jerk}$				
			OR (Lores_Decel AND Lores_Jerk)	$> \text{RufCyl_Decel} * \text{BankCylModeDecel}$ $> \text{RufCyl_Jerk} * \text{BankCylModeJerk}$				
			OR (Lores_Decel AND Lores_Jerk)	$> \text{CylModeDecel} * \text{BankCylModeDecel}$ $> \text{CylModeJerk} * \text{BankCylModeJerk}$				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CONSECUTIVE CYLINDER MISFIRE 1st cylinder uses single cyl continuous misfire thresholds; 2nd Cylinder uses: (Medres_Decel AND Medres_Jerk) OR (Medres_Decel AND Medres_Jerk) OR (Lores_Decel AND Lores_Jerk) OR (Lores_Decel AND Lores_Jerk)	> 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 Illum.
			CYLINDER DEACTIVATIONMODE (Active Fuel Managment) AFM: SINGLE CYLINDER CONTINUOUS MISFIRE (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) OR (CylBeforeDeacCylDecel AND CylBeforeDeacCyl_Jerk) AFM: RANDOM MISFIRE Use random misfire thresholds If no misfire for (CylAfterDeacCyl_Decel AND CylAfterDeacCyl_Jerk) (CylBeforeDeacCylDecel AND	$> \text{CylModeDecel} * \text{ClyAfterAFM_Decel}$ $> \text{CylModeJerk} * \text{CylAfterAFM_Jerk}$ $> \text{CylModeDecel} * \text{CylBeforeAFM_Decel}$ $> \text{CylModeJerk} * \text{ClyBeforeAFM_Jerk}$ $> 6 \text{ Engine Cycles}$ $> \text{CylModeDecel} * \text{ClyAfterAFM_Decel} * \text{RandomAFM_Decel}$ $> \text{CylModeJerk} * \text{CylAfterAFM_Jerk} * \text{RandomAFM_Jerk}$ $> \text{CylModeDecel} * \text{CylBeforeAFM_Decel} * \text{RandomAFM_Decel}$				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CylBeforeDeacCyl_Jerk)	<p>> CylModeJerk * ClyBeforeAFM_Jerk * RandomAFM_Jerk</p> <p>OR IF option Crank based IMEP estimate is Enabled and CrankBasedJMEP is</p> <p>Not Enabled</p> <p>< 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</p> <p>- see details on Supporting Tables Tab</p>				
			Misfire Percent Emission Failure Threshold	> 2.33%P0300				
			Misfire Percent Catalyst	>				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>Damage</p> <p>When engine speed and load are less than the FTP calcs (3) catalyst damage exceedences are allowed.</p>	<p>Catalyst_Damage_Misfire_Percentage in Supporting Tables whenever secondary conditions are met.</p> <p>< 0 FTP rpm AND < 0 FTP % load</p>	<p>(at low speed/loads, one cylinder may not cause cat damage)</p> <p>Engine Speed Engine Load Misfire counts</p> <p>Engine Speed</p> <p>No active DTCs:</p>	<p>> 0 rpm AND > 0 % load AND < 180 counts on one cylinder</p> <p>500 < rpm < ((Engine Over Speed Limit) - 400) OR 8,191)</p> <p>Engine speed limit is a function of inputs like Gear and temperature</p> <p>see EngineOverSpeedLimit in supporting tables</p> <p>TPS_FA EnginePowerLimited MAF_SensorTFTKO MAP_SensorTFTKO IAT_SensorTFTKO ECT_Sensor_Ckt_TFTKO 5VoltReferenceB_FA CrankSensor_TFTKO CrankSensor_FA CamLctnIntFA</p>	<p>4 cycle delay</p> <p>4 cycle delay</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						CamLctnExhFA CamSensorAnyLctnTFTK 0 AnyCamPhaser_FA AnyCamPhaser_TFTKO AmbPresDfItStatus		
					P0315 & engine speed	> 1,000 rpm	4 cycle delay	
					Fuel Level Low	LowFuelConditionDiagnostic	500 cycle delay	
					Cam and Crank Sensors	in sync with each other	4 cycle delay	
					Misfire requests TCC unlock	Not honored because Transmission in hot mode or POPD intrusive diagnostic running	4 cycle delay	
					Fuel System Status	# Fuel Cut	4 cycle delay	
					Active FuelManagement	Transition in progress	4 cycle delay	
					Undetectable engine speed and engine load region	Undetectable region from Malfunction Criteria	4 cycle delay	
					Abusive Engine Over Speed	> 8,192 rpm	0 cycle delay	
					Below zero torque (except CARB approved 3000 rpm to redline triangle.)	< ZeroTorqueEngLoad or < ZeroTorqueAFM if AFM is active in Supporting Tables	4 cycle delay	
					Below zero torque: TPS Vehicle Speed	< 1.3% (< 1.3% in AFM) > 30 mph (> 30 mph AFM)	4 cycle delay	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					NEGATIVE TORQAFM If deactivated cylinders appear to make power, torque is negative: DeactivatedCyl_Decel AND DeactivatedCyl_Jerk AND # of Deact Cyls Inverted	<DeacCylInversionDecel <DeacCylInversionJerk > 2 cylinders	5 cycle delay	
					Manual Trans	Clutch shift	0 cycle delay	
					Accel Pedal Position AND Automatic transmission shift	> 98.00 %	7 cycle delay	
					After Fuel resumes on Automatic shift containing Fuel Cut		2 Cylinder delay	
					Delay if PTC 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 Illum.
					<p>Driver cranks before Wait to Start lamp extinguishes</p> <p>Brake Torque *****</p> <p>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:</p> <p>Stop filter early:</p> <p>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).)</p> <p>Used Off Idle, and while not shifting, TPS Engine Speed Veh Speed Auto Transmission</p> <p>individual candidate deemed abnormal if number of</p>	<p>IF TRUE</p> <p>> 199.99% Max Torque *****</p> <p>> "Ring Filter" # of engine cycles after misfire in Supporting Tables</p> <p>> "Number of Normals" # of engine cycles after misfire in Supporting Tables tab</p> <p>> 3 % > 1,000 rpm > 3 mph not shifting</p>	<p>WaitToStart cycle delay</p> <p>0 cycle delay *****</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>consecutive decelerating cylinders after "misfire": (Number of decels can vary with misfire detection equation) Consecutive decels while in SCD Mode Cyl Mode Rev Mode</p> <p>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,</p> <p>abnormal candidates/ total candidates</p> <p>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</p>	<p>> Abnormal SCD Mode > Abnormal Cyl Mode > Abnormal Rev Mode in Supporting Tables</p> <p>>0.50 ratio</p>	discard 100 engine cycle test	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>the 100 engine cycles. Typically used for checking a single misfire per engine cycle but can support some other patterns on some packages</p> <p>Pattern Recog Enabled:</p> <p>Pattern Recog Enabled during Cylinder Deac</p> <p>Pattern Recog Enabled consecutive cyl patrn</p> <p>Engine Speed Veh Speed</p> <p>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.</p> <p>(CylAfter_Accel AND CylAfter_Jerk)</p> <p>Additionally, the crankshaft</p>	<p>Enabled</p> <p>Enabled</p> <p>Enabled</p> <p>900 < rpm < 6,500 > 3.1 mph</p> <p>> Misfire_decel * 1st_FireAftrMisfr_Acel</p> <p>> Misfire_Jerk * 1st_FireAftrMisfr_Jerk</p> <p>Or if AFM mode is active: > Misfire_decel * 1stFireAftrMisAcelAFM > Misfire_Jerk * 1stFireAfterMisJerkAFM</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>is checked again a small calibratable number of cylinders later to see if the disturbance 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.</p> <p>Num of Cylinders after misfire to start check of crankshaft snap</p> <p>"misfire" recognized if: Crankshaft snap after: isolated "misfire"</p> <p>repetative "misfire"</p> <p>At the end of 100 engine cycle test, the ratio of unrecog/recognized is checked to confirm if real misfire is present.</p> <p>Ratio of Unrecog/Recog</p>	<p>2 Cylinders</p> <p>< Misfire_Jerk * SnapDecayAfterMisfire</p> <p>< Misfire_Jerk * SnapDecayAfterMisfire * RepetSnapDecayAdjst in Supporting Tables</p> <p>>0.80</p>	<p>discard 100 engine cycle test</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>*****</p> <p>NON-CRANKSHAFT BASED ROUGH ROAD:</p> <p>Rough Road Source</p> <p>*****</p> <p>IF Rough Road Source = WheelSpeedInECM</p> <p>(Wheel speed noise OR ABS = OR Traction = OR Vehicle Stability) =</p> <p>AND No Emission Neutral Default Action DTCs</p> <p>*****</p> <p>IF Rough Road Source = "FromABS"</p> <p>(RoughRoad = OR ABS = OR Traction = OR Vehicle Stability) =</p> <p>AND No Emission Neutral Default Action DTCs</p> <p>*****</p> <p>IF Rough Road Source = "TOSS"</p> <p>TOSS dispersion</p>	<p>*****</p> <p>Disabled</p> <p>CeRRDR_e None</p> <p>*****</p> <p>> WSSRoughRoadThres</p> <p>active active active</p> <p>ABS Failed Vehicle Dynamics Control System Status Driven Wheel Rotation Status Non Driven Wheel Rotation Status</p> <p>*****</p> <p>detected</p> <p>active active active</p> <p>ABS Failed Vehicle Dynamics Control System Status</p> <p>*****</p> <p>>TOSSRoughRoadThres</p> <p>in supporting tables</p>	<p>*****</p> <p>discard 100 engine cycle test</p> <p>*****</p> <p>discard 100 engine cycle test</p> <p>*****</p> <p>discard 100 engine cycle test</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>AND No Active DTCs</p> <p>Transmission Output Shaft Angular Velocity Validity TransmissionEngagedStat e_FA (Auto Trans only) ClutchPstnSnsr FA (Manual Trans only)</p> <p>*****</p> <p>Default Action</p> <p>Isolator Resonance Default Action Option *****</p> <p>If Isolator Resonance Option Enabled AND Misfire P030xTFTKO</p>	<p>Transmission Output Shaft Angular Velocity Validity TransmissionEngagedStat e_FA (Auto Trans only) ClutchPstnSnsr FA (Manual Trans only)</p> <p>*****</p> <p>Not Enabled *****</p> <p>Set engine speed limits: 0 < Eng RPM < 8,000</p>	<p>4 cycle delay</p> <p>*****</p> <p>*****</p>	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Per Cylinder	P0324	This diagnostic checks for knock sensor performance out of the normal expected range on a per cylinder basis due to Excessive Knock (either real or false knock). In the knock detection algorithm, the term "Knock Intensity" (KI) is used to define the relative size of a knock event, and is calculated as (KI = current knock event - knock threshold). This results in a KI amplitude that is proportional to the size of the knock event (as seen by the knock sensor). In addition, Knock Intensity cannot be less than zero as it is forced/limited to be = 0 with no knock detected (i.e. whenever the current knock event < knock threshold, KI = 0). This diagnostic calculates a first-order lag filter version of the Knock Intensity and sets a fault when: (Filtered KI) > (Excessive Knock Diagnostic Threshold)	Filtered Knock Intensity (where 'Knock Intensity' = 0 with no knock; and > 0 & proportional to knock magnitude with knock)	> P0324_PerCyl_ExcessiveKnock_Threshold (no units)	Diagnostic Enabled? Engine Run Time Engine Speed Engine Air Flow Engine Coolant Temperature or OBD Coolant Enable Criteria Inlet Air Temperature Cumulative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes > 0.0 seconds > 400 RPM AND < 8,500 RPM >0 mg/cylinder AND < 2,200 mg/cylinder > -40 deg's C = TRUE > -40 deg's C > 400 revs	First Order Lag Filters with Weight Coefficient = 0.0400 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Bank 1	P0325	<p>This diagnostic checks for an open in the knock sensor circuit Sensor 1/Bank 1. There are two possible methods used:</p> <p>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 propagate 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</p>	<p>Open Circuit Method chosen (2 possible methods: 20 kHz or Normal Noise):</p> <p>Filtered FFT Output</p> <p>Filtered FFT Output</p>	<p>= P0325_P0330_OpenMethod_2</p> <p>Case 1 (20 kHz Method): > P0325_P0330_OpenCktThrshMin (20 kHz) AND < P0325_P0330_OpenCktThrshMax (20 kHz)</p> <p>Case 2 (Normal Noise Method): > P0325_P0330_OpenCktThrshMin (Normal Noise) AND < P0325_P0330_OpenCktThrshMax (Normal Noise)</p>	<p>Diagnostic Enabled?</p> <p>Engine Run Time</p> <p>Engine Speed</p> <p>Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)</p> <p>Engine Air Flow</p> <p>Engine Coolant Temperature</p> <p>or</p> <p>OBD Coolant Enable Criteria</p> <p>Inlet Air Temperature</p>	<p>Yes</p> <p>> 0.0 seconds</p> <p>> 550 RPM and < 5,000 RPM</p> <p>> 400 revs</p> <p>> 75 mg/cylinder and < 2,200 mg/cylinder</p> <p>> -40 deg's C</p> <p>= TRUE</p> <p>> -40 deg's C</p>	<p>First Order Lag Filter with Weight Coefficient</p> <p>Weight Coefficient = 0.0047</p> <p>Updated each engine event</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>the 20 kHz injected signal is detected only on one of the sensor inputs).</p> <p>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.</p> <p>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.</p> <p>See Supporting Tables for method definition: P0325 P0330 OoenM</p>						

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Bank 1	P0326	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis. This diagnostic is specifically designed to identify the fault condition where the knock sensor is properly attached electrically, but produces an abnormally low output due to being unattached (or loosely attached) with the mounting bolt (and thus unable to properly transfer the engine vibration energy from the engine block to the knock sensor). The term "Abnormal (engine) Noise" is used to define this diagnostic method. A fault condition is identified when a first-order lag filtered version of the Abnormal Noise signal falls below the diagnostic threshold.	<p>Filtered FFT Intensity</p> <p>(where 'FFT Intensity' = Non-knocking, background engine noise for a selected frequency)</p> <p>Filtered FFT Intensity</p>	<p>Case 1: Engine <u>not</u> in AFM mode</p> <p>< P0326_P0331_Abnor malNoise_Threshold (Supporting Table)</p> <p>OR</p> <p>Case 2: Engine <u>is</u> in AFM mode</p> <p>< P0326_P0331_Abnor malNoise_Thresh_AF M (Supporting Table; Engine is in AFM mode)</p>	<p>Diagnostic Enabled?</p> <p>Engine Run Time</p> <p>Engine Speed</p> <p>Engine Air Flow</p> <p>Engine Coolant Temperature</p> <p>or</p> <p>OBD Coolant Enable Criteria</p> <p>Inlet Air Temperature</p> <p>Individual Cylinders enabled for Abnormal Noise</p> <p>Cumulative Number of Engine Revs Above Min Eng Speed (per key cycle)</p>	<p>Yes</p> <p>> 0.0 seconds</p> <p>>2,100 RPM (not in AFM mode) OR > 3,000 (in AFM mode)</p> <p>AND < 8,500 RPM</p> <p>> 200 mg/cylinder AND < 2,200 mg/cylinder</p> <p>> -40 deg's C</p> <p>= TRUE</p> <p>> -40 deg's C</p> <p>P0326_P0331-Abnormal NoiseCylsEnabled (Supporting Table)</p> <p>> 334 Revs</p>	<p>First Order Lag Filters with Weight Coefficient =</p> <p>0.0043</p> <p>Updated each engine event</p>	Type A, 1 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Bank 2	P0330	<p>This diagnostic checks for an open in the knock sensor circuit Sensor 2/Bank 2. There are two possible methods used:</p> <p>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 propagate 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:</p> <p>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</p>	<p>Individual Sensor Thresholds Enabled?</p> <p>Open Circuit Method chosen (2 possible methods: 20 kHz or Normal Noise):</p> <p>Filtered FFT Output</p> <p>Filtered FFT Output</p>	<p>= 1, Use Case 3 and 4</p> <p>= P0325_P0330_OpenMethod_2 (supporting table)</p> <p>Case 1 (20 kHz Method):</p> <p>> P0325_P0330_OpenCktThrshMin (20 kHz) AND < P0325_P0330_OpenCktThrshMax (20 kHz)</p> <p>Case 2 (Normal Noise Method):</p> <p>> P0325_P0330_OpenCktThrshMin (Normal Noise) AND < P0325_P0330_OpenCktThrshMax (Normal Noise)</p> <p>Case 3 (20 kHz Method):</p>	<p>Diagnostic Enabled?</p> <p>Engine Run Time</p> <p>Engine Speed</p> <p>Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above)</p> <p>Engine Air Flow</p> <p>Engine Coolant Temperature</p> <p>or</p> <p>OBD Coolant Enable Criteria</p> <p>Inlet Air Temperature</p>	<p>Yes</p> <p>> 0.0 seconds</p> <p>> 550 RPM and < 5,000 RPM</p> <p>≥400 revs</p> <p>> 75 mg/cylinder and < 2,200 mg/cylinder</p> <p>> -40 deg's C</p> <p>= TRUE</p> <p>> -40 deg's C</p>	<p>First Order Lag Filter with Weight Coefficient</p> <p>Case 1 & 2: Weight Coefficient = 0.0047</p> <p>Updated each engine event</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>Open Circuit (because the 20 kHz injected signal is detected only on one of the sensor inputs).</p> <p>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.</p> <p>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.</p> <p>See Suooorting Tables</p>	<p>Filtered FFT Output</p> <p>Filtered FFT Output</p>	<p>> P0330_OpenCktThrs hMin2 (20 kHz)</p> <p>AND</p> <p>< P0330_OpenCktThrs hMax2 (20kHz)</p> <p>Case 4 (Normal Noise Method):</p> <p>> P0330_OpenCktThrs hMin2 (NN)</p> <p>AND</p> <p>< P0330_OpenCktThrs hMax2 (NN)</p>			<p>Case 3 & 4 Weight Coefficient = 0.01</p> <p>Updated each engine event</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>for method definition: P0325_P0330_OpenM ethod defines which of the two diagnostic methods is used as a function of engine speed (RPM). Typical implementations: A. Use 20 kHz method at all engine 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</p> <p>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.</p>						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Performance Bank 2	P0331	This diagnostic checks for knock sensor performance out of the normal expected range, on a per sensor basis. This diagnostic is specifically designed to identify the fault condition where the knock sensor is properly attached electrically, but produces an Abnormally low output due to being unattached (or loosely attached) with the the mounting bolt (and thus unable to properly transfer the engine vibration energy from the engine block to the knock sensor). The term "Abnormal (engine) Noise" is used to define this diagnostic method. A fault condition is identified when a first-order lag filtered version of the Abnormal Noise signal falls below the diagnostic threshold. 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_AbnormalLo2 (Supporting Table) OR Case 4: Engine is in AFM mode < P0331_AbnormalLoA FM_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 Cumulative Number of Engine Revs Above Min Eng Speed (per key cycle)	Yes > 0.0 seconds >2,100 RPM (not in AFM mode) OR > 3,000 (in AFM mode) AND < 8,500 RPM > 200 mg/cylinder AND < 2,200 mg/cylinder > -40 deg's C = TRUE > -40 deg's C P0326_P0331-Abnormal NoiseCylsEnabled (Supporting Table) > 334 Revs	First Order Lag Filter with Weight Coefficient Case 1 & 2: Weight Coefficient = 0.0047 Updated each engine event Case 3 & 4: Weight Coefficient = 0.01 Updated each engine eventFirst	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit Low Bank 2	P0332	This diagnostic checks for an out of range low knock sensor signal. A 3-resistor bias network at each sensor input to the ECM provides a DC diagnostic voltage that will remain within a normal range when the external knock sensor circuit is free of short circuit faults. The diagnostic output is reported as a percentage (0 to 100%) when compared to the 5.0 volt reference voltage.	Sensor Input or Return Signal Line	< 8.0 Percent (of 5 Volt Reference)	Diagnostic Enabled? Engine Speed	Yes > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Knock Sensor (KS) Circuit High Bank 2	P0333	This diagnostic checks for an out of range high knock sensor signal. A 3-resistor bias network at each sensor input to the ECM provides a DC diagnostic voltage that will remain within a normal range when the external knock sensor circuit is free of short circuit faults. The diagnostic output is reported as a percentage (0 to 100%) when compared to the 5.0 volt reference voltage.	Sensor Input or Return Signal Line	> 39.00 Percent (of 5 Volt Reference)	Diagnostic Enabled? Engine Speed	Yes > 0 RPM and < 8,500 RPM	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankshaft Position (CKP) SensorA Circuit	P0335	Diagnostic will fail if a crank sensor pulse was not received during a period of time; if crank sensor pulses are received the diagnostic will pass.	Time since last crankshaft position sensor pulse received	≥ 4.0 seconds	Starter engaged AND (cam pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type A, 1 Trips
			No crankshaft pulses received	≥ 1.0 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 Illum.
Crankshaft Position (CKP) SensorA Performance	P0336	1. Fail counts will occur if the engine goes out of synchronization repeatedly over a period of time and will pass if the engine stays in synchronization. 2. Diagnostic will fail if synchronization gap is not found in a specified period of time and will pass if the synchronization gap is found. 3. Diagnostic will fail if the incorrect number of crank sensor teeth are detected in-between detecting the synchronization gap and will pass if the correct number of teeth are seen.	Time in which 10 or more crank re-synchronizations occur	< 10.0 seconds	Engine Air Flow Cam-based engine speed No DTC Active:	Test is Enabled >= 3.0 grams/second > 450 RPM P0335	Continuous every 250 msec	Type 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 > 3.0 grams/second))	Continuous every 100 msec	
			Crank pulses received in one engine revolution OR Crank pulses received in one engine revolution	< 1 pulses > 65,535 pulses	Engine is Running OR Starter is engaged No DTC Active:	Test is Enabled P0365 P0366	8 failures out of 10 samples One sample per engine revolution	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A	P0340	Diagnostic will fail if a cam sensor pulse was not received during a period of time; if cam sensor pulses are received the diagnostic will pass.	Time since last camshaft position sensor pulse received	>= 5.5 seconds	Starter engaged AND (crank pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type A, 1 Trips
			OR Time that starter has been engaged without a camshaft sensor pulse	>= 4.0 seconds				
			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 until 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 Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 SensorA	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 > 10 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 until 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 Illum.
Crankshaft Position Sensor - Crankshaft Start Position Incorrect	P034A	Monitors the position of the crankshaft during auto-start's to verify that the crankshaft is in the expected position-diagnostic will fail if the crankshaft is not in the expected range otherwise the diagnostic will pass	Crankshaft position is in error by a number of crankshaft wheel teeth	> 1 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 Illum.
Crankshaft Position Sensor - Crankshaft Direction Incorrect	P034B	Detects if the crankshaft is not rotating in the correct direction- will fail if the engine is reported to be spinning backwards while the engine is running otherwise the diagnostic will pass.	Number of crankshaft sensor reversals within a period of time	>= 3 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 >= 3.0 grams/second CrankSensor_FA	Continuous Every 250 msec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT	P0351	Diagnoses Cylinder #1 Ignition Control (E8T) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT	P0352	Diagnoses Cylinder #2 Ignition Control (E8T) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT	P0353	Diagnoses Cylinder #3 Ignition Control (E8T) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	>11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT	P0354	Diagnoses Cylinder #4 Ignition Control (E8T) output driver circuit for an Open Circuit fault. Controller specific output driver circuit diagnoses the low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 30 kQ impedance between signal and controller ground	Engine running Ignition Voltage	>11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor B	P0365	Diagnostic will fail if a cam sensor pulse was not received during a period of time; if cam sensor pulses are received the diagnostic will pass.	Time since last camshaft position sensor pulse received	>= 5.5 seconds	Starter engaged AND (crank pulses being received OR (MAF_SensorFA AND Engine Air Flow	Test is Enabled = FALSE > 3.0 grams/second))	Continuous every 100 msec	Type A, 1 Trips
			OR Time that starter has been engaged without a camshaft sensor pulse	>= 4.0 seconds				
			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 until 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 Illum.
Camshaft Position (CMP) Sensor Performance Bank 1 Sensor B	P0366	Diagnostic will fail if an incorrect number of cam sensor pulses are detected over a number of engine cycles and will pass if the number of cam pulses is correct.	The number of camshaft pulses received during 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 > 10 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 until 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	> 200 K Q impedance between signal and controller ground.	<p>Diagnostic is Enabled</p> <p>System supply voltage</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
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 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 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 Illum.
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 Q impedance between signal and controller power	Diagnosis 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 Illum.
Intake Camshaft Profile Actuator 3 Performance	P03EF	An unintended pin firing without controller command. Intake Camshaft Profile 3	Detected an Unintended pin firing without 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 Illum.
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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	> 200 K Q impedance between signal and controller ground.	<p>Diagnostic is Enabled</p> <p>System supply voltage</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
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 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 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnostic is Enabled</p> <p>System supply Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
Exhaust Camshaft Profile Actuator 3 Performance	P03F4	An unintended pin firing without controller command. Exhaust Camshaft Profile Actuator 3	Detected an Unintended pin firing without 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 Illum.
Catalyst System Low Efficiency Bank 1 - Intrusive (legacy)	P0420	INTRUSIVE CATALYST MONITOR ALGORITHM (a deceleration fuel cutoff condition triggers the diagnostic at least once per trip) Oxygen Storage concept: The catalyst washcoat contains Cerium Oxide which reacts with NO and O ₂ during lean A/F excursions to store the excess oxygen (Le. Cerium Oxidation). During rich A/F excursions, Cerium Oxide reacts with CO and H ₂ to release this stored oxygen (I.e. Cerium Reduction). This condition is defined as Oxygen Storage Capacity (OSC). The CatMon strategy involves a “measure” of OSC by intrusive Rich A/F followed by Lean A/F excursions (due to decel fuel cutoff). A Normalized Ratio of 1 indicates a good part and a ratio of 0 indicates a very bad part. Normalized Ratio Calculation = (C1-C2) / (C3-C2)	Normalized Ratio OSC Value (See P0420 Normalized OSC Ratio calc tab) (the EWMA calculation uses a 0.11 coefficient)	< 0.35	A1) Core catalyst diagnostic is A2) TWC Passive Observer diagnostic Disabled ? B) Enable criteria : See Trouble Code P2270 - (O ₂ Sensor Signal Stuck Lean Bank 1 Sensor 2) ----- - C) Rapid Step Response (RSR) feature will initiate multiple tests: C1) If the difference between current EWMA value and the current OSC Normalized Ratio value is C2) and the current OSC Normalized Ratio value is C3) while the number of RSR tests is (maximum number of tests allowed to detect failure after RSR is triggered) ----- D1) Mass Air Flow is D2) and Mass Air Flow is E) Predicted catalyst temperature F) Pre-catalyst O ₂ Sensor or Pre-cat WRAF Sensor	A1) Enabled A2) Check : Disabled C1)>0.61 sec C2) <0.10 sec C3) < 10 counts ----- D1)> 2.00 g/s D2)< 20.00 g/s E) < 900 deg C F) > 825.00 mV or > 1.08 EQR	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 Illum.
		<p>where</p> <p>C1: Raw OSC Calculation = (post-cat 02 Response time) - (pre-cat 02 Response time)</p> <p>C2: BestFailing OSC value:: calibration table (based on temp and exhaust gas flow)</p> <p>C3: WorstPassing OSC value : calibration table (based on temp and exhaust gas flow)</p> <p>The Intrusive Catalyst Monitoring test is completed during a decel fuel cutoff event following a rich intrusive fueling event which is initiated by the 02 Sensor Signal Stuck Lean Bank 1 Sensor 2 test (See P2270 conditions for details)</p>			<p>G) Post-catalyst 02 Sensor</p> <p>-----</p> <p>General Enable Criteria: In addition to Code P2272 conditions, the following Code Bundles shall not be true :</p> <p>H1) For Switching 02 Sensors:</p> <p>H2) ForWRAF Sensors:</p>	<p>G) > 825.00 mV</p> <p>-----</p> <p>H1) O2S_Bank_1_Sensor_1_ FA O2S_Bank_1_Sensor_2_ FA O2S_Bank_2_Sensor_1_ FA O2S_Bank_2_Sensor_2_ FA</p> <p>H2) WRAF_Bank_1_FA, WRAF_Bank_2_FA</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) System Small Leak Detected (No ELCP - Conventional EVAP Diagnostic - with EAT using 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. EONV is an evaporative system leak detection diagnostic that runs when the vehicle is shut off when enable conditions are met. Prior to sealing the system and performing the diagnostic, the fuel volatility is analyzed. In an open system (Canister Vent Solenoid [CVS] open) high volatility fuel creates enough flow to generate a measurable pressure differential relative to atmospheric. After the volatility check, the vent solenoid will close. After the vent is closed, typically a build up of pressure from the hot soak begins (phase-1). The pressure typically will peak and then begin to decrease as the fuel cools. When	The total delta from peak pressure to peak vacuum during the test is normalized against a calibration pressure threshold table that is based upon fuel level and ambient temperature. (Please see P0442 EONV Pressure Threshold (Pascals) in Supporting Tables). The normalized value is calculated by the following equation: 1 - (peak pressure - peak vacuum) / pressure threshold. The normalized value is entered into EWMA (with 0= perfect pass and 1= perfect fail). When EWMA is the DTC light is illuminated. The EWMA calculation uses a 0.13 weighting coefficient. The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 3 additional consecutive trips.	< 0.35 (EWMA Re-Pass Threshold) > 0.59 (EWMA Fail 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 condition s Run length is 3 to 6 trips after code clear or non-volatile reset

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		the pressure drops (-62) Pa from peak pressure, the vent is then opened for 60 seconds to normalize the system pressure. The vent is again closed to begin the vacuum portion of the test (phase-2). As the fuel temperature continues to fall, a vacuum will begin forming. The vacuum will continue until it reaches a vacuum peak. When the pressure rises 62 Pa from vacuum peak, the test then completes. If the key is turned on while the diagnostic test is in progress, the test will abort.			Ambient Temperature Using OAT Sensor to be Valid ***** 1. Startup OAT is less than previous trip EAT OR 2. Startup ECT - previous trip EAT OR 3. Engine off time OR 4. At startup, time since previous EAT valid and able to learn OR 5. EAT - current OAT OR 6. EAT < current OAT and speed timer and current OAT - EAT Speed timer increments at 100 msec rate and increments vary based on vehicle speed as follows: vehicle speed < 10mph -0.2 seconds 10 mph<speed< 35 mph 0.10 seconds 35mph<speed<124 0.33 seconds 124mph<speed< 124 0.33 seconds Speed timer can never be less than 0 seconds ***** 1. High Fuel Volatility	***** <0 °C > 3,600 seconds < 3,600 seconds 0 °C < difference < 2 °C > 240 seconds < 2 °C -0.2 seconds 0.10 seconds 0.33 seconds 0.33 seconds *****		

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) Canister Purge Solenoid Valve Circuit (ODM) (No ELCP - Conventional EVAP Diagnostic)	P0443	Controller specific output driver circuit diagnoses the canister purge solenoid low sided driver for an open circuit failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	> 200 K 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 controlle rs P0458 may also set (Caniste r Purge Solenoid Short to Ground)

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) 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 impedance 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 controlle rs P0498 may also set (Vent Solenoid Short to Ground)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Performance (No ELCP - Conventional EVAP Diagnostic)	P0451	<p>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.</p> <p>During the EONV test, the fuel tank vacuum sensor is re-zeroed. A re-zero occurs:</p> <ol style="list-style-type: none"> 1) At the transition from the volatility phase to the pressure phase. 2) At the transition from the pressure phase to the vacuum phase. <p>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.</p> <p>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</p>	<p>The tank vacuum sensor voltage is compared to a window about the nominal sensor voltage offset (~1.5 volts)</p> <p>Upper voltage threshold (voltage addition above the nominal voltage)</p> <p>Lower voltage threshold (voltage subtraction below the nominal voltage)</p> <p>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).</p> <p>When EWMA is the DTC light is illuminated.</p> <p>The EWMA calculation uses a 0.20 weighting coefficient.</p> <p>The DTC light can be turned off if the EWMA is and stays below the</p>	<p>0.2 volts</p> <p>0.2 volts</p> <p>> 0.73 (EWMA Fail Threshold),</p> <p><0.40 (EWMA Re-Pass Threshold)</p>	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes		<p>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.</p>	<p>Type A, 1 Trips</p> <p>EWMA</p> <p>Average run length: 6</p> <p>Run length is 2 trips after code clear or non-volatile reset</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>detected, then the results of the re-zero test are used to determine if there is a re-zero problem.</p> <p>1) An individual re-zero test generates a re-zero ratio. The ratio goes from 0.0 to 1.0.</p> <p>2) A 0.0 means that the re-zero pressure signal achieved exactly atmospheric pressure.</p> <p>3) A ratio of 1.0 means that the re-zero pressure did not get within the window.</p> <p>4) Re-zero pressure within the window generates values between 0.0 and 1.0.</p> <p>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.</p>	EWMA fail threshold for 3 additional consecutive trips.					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0452	<p>This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too low out of range.</p> <p>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.</p> <p>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.</p>	<p>FTP sensor signal</p> <p>The normal operating range of the FTP sensor is 0.5 volts (-1245 Pa) to 4.5 volts (-3736 Pa).</p>	< 0.15 volts (3.0 % of Vref or -1,495 Pa)	No active DTC's:	P1001 P1005 U18A2	<p>640 failures out of 800 samples</p> <p>12.5 ms /sample</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0453	<p>This DTC will detect a Fuel Tank Pressure (FTP) sensor signal that is too high out of range.</p> <p>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.</p> <p>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.</p>	<p>FTP sensor signal</p> <p>The normal operating range of the FTP sensor is 0.5 volts (-1245 Pa) to 4.5 volts (~ -3736 Pa).</p>	> 4.85 volts (97.0 % of Vref or -3,985 Pa)	No active DTCs:	P1001 P1005 U18A2	<p>640 failures out of 800 samples</p> <p>12.5 ms /sample</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Pressure (FTP) Sensor Circuit Intermittent (No ELCP - Conventional EVAP Diagnostic)	P0454	<p>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.</p> <p>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.</p> <p>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."</p> <p>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</p>	<p>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.</p>	<p>> 112 Pa < 249 Pa >10 %</p>	<p>This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes and the canister vent solenoid is closed</p>		<p>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.</p> <p>12.5 ms /sample</p>	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission (EVAP) System Large Leak Detected (No ELCP - Conventional EVAP Diagnostic - with Purge Pump - with Fuel Tank Zone Module (FTZM))	P0455	<p>This DTC will detect a weak vacuum condition (large leak or purge blockage) in the EVAP system.</p> <p>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.</p> <p>The algorithm accumulates purge flow during the test to determine a displaced purge volume as the test proceeds.</p> <p>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.</p> <p>On fuel systems with fuel caps</p> <p>If the first failure of</p>	<p>Purge volume</p> <p>while Tank vacuum</p> <p>After setting the DTC for the first time, 0 liters of fuel must be consumed before setting the DTC for the second time.</p>	<p>> 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)</p> <p>< 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)</p>	<p>Diagnostic is Enabled</p> <p>Fuel Level System Voltage Barometric Pressure Purge Flow</p> <p>No active DTCs:</p> <p>No Active DTCs TFTKO</p> <p>If ECT > IAT, Startup</p>	<p>10 % < Percent < 90 % > 10.0 volts > 70 kPa > 2.00%</p> <p>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</p> <p>P0443 P0449 P0452 P0453 P0454 P0458 P0459 P0498 P0499 P1001 P1005 P11FF P130F U18A2</p>	<p>Once per cold start</p> <p>Time is dependent on driving conditions</p> <p>Maximum time before test abort is 1,400 seconds</p> <p>Weak Vacuum Follow-up Test</p> <p>With large leak detected, the follow-up test is limited to 0 seconds. Once the MIL is on, the follow-up test runs indefinitely.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>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.</p> <p>On fuel systems without fuel caps</p> <p>The P0455 MIL will be commanded off on the ignition cycle after the third consecutive pass of P0455 is reported.</p>	<p>Weak Vacuum Follow-up Test (fuel cap replacement test) Weak Vacuum Test failed.</p> <p>Passes if tank vacuum</p> <p>Note: Weak Vacuum Follow-up Test can only report a pass.</p>	> 2,740 Pa	<p>temperature delta (ECT-IAT): Startup IAT Startup ECT</p> <p>Weak Vacuum Follow-up Test This test can run following a weak vacuum failure or on a hot restart.</p>	<p><8 °C 4 °C<Temperature<35 °C <35 °C</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Purge Control Valve Circuit Low (No ELCP - Conventional EVAP Diagnostic)	P0458	Controller specific output driver circuit diagnoses the canister purge solenoid low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 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 P0443 may also set (Canister Purge Solenoid Open Circuit)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Evaporative Emission System Purge Control Valve Circuit High (No ELCP - Conventional EVAP Diagnostic)	P0459	Controller specific output driver circuit diagnoses the canister purge solenoid low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 Q impedance 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 Illum.
Fuel Level Sensor 1 Performance (For use on vehicles with a single fuel tank)	P0461	This DTC will detect a primary fuel tank level sensor stuck in-range.	a) Sensed fuel volume change is b) while engine fuel consumption is	a) < 3 liters b) > 27.81 liters	1. Diagnostic is Enabled 2. Engine Operational State	2. == Running	250 ms / sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level Sensor 1 Circuit Low Voltage (For use on vehicles with a fuel float connected to an FTZM)	P0462	This DTC will detect a primary fuel tank sensor out-of-range low.	Fuel level Sender % of 5V range	< 10 %	a) Diagnostic is Enabled b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	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 Illum.
Fuel Level Sensor 1 Circuit High Voltage (For use on vehicles with a fuel float connected to an FTZM)	P0463	This DTC will detect a primary fuel tank level sensor out-of-range high.	Fuel level Sender % of 5V range	> 60 %	a) Diagnostic is Enabled b) Fuel Level Sensor Initialized status c) Fuel Level Sensor Data Available Status d) Communication faults status	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 Illum.
Fuel Level Sensor 1 Circuit Intermittent (No ELCP - Conventional EVAP Diagnostic)	P0464	<p>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.</p> <p>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.</p> <p>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."</p> <p>The fuel level change rationality diagnostic is an "X out of Y" test.</p> <p>1) Each time the EONV test completes, the (Y) sample counter is incremented.</p> <p>2) Each time the rationality test has an</p>	<p>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.</p> <p>An intermittent fuel level signal problem is defined as:</p> <p>The fuel level changes by</p>	<p>> 10 %</p> <p>> 10 %</p>	<p>This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes</p>		<p>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.</p> <p>100 ms /sample</p>	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 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 Illum.
Evaporative Emission (EVAP) System Flow During Non- Purge (No ELCP - Conventional EVAP Diagnostic - with purge pump - with Fuel Tank Zone Module (FTZM))	P0496	<p>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.</p> <p>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.</p> <p>Additional Information</p> <p>The purge valve leak diagnostic exists to help service replace leaking purge valves that could otherwise be detected with the EONV small leak diagnostic (P0442).</p>	<p>Tank Vacuum</p> <p>for</p> <p>Test time</p>	<p>> 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</p> <p>< refer to P0496 purge valve leak test time as a function of fuel level and barometric pressure in Supporting Tables.</p> <p>Test time only increments when engine vacuum > 10.0 kPa.</p>	<p>Diagnostic is Enabled</p> <p>Fuel Level System Voltage Barometric pressure Startup IAT</p> <p>Startup ECT Engine Off Time</p> <p>Initial purge pump pressure</p> <p>P146C EVAP Purge Pump System Misassembled diagnostic is not running</p> <p>Purge pump over tempertaure status is False</p> <p>No active DTCs:</p> <p>No pending DTCs:</p>	<p>10 % < Percent < 90 % > 10.0 volts > 70 kPa 4 °C < Temperature < 35 °C</p> <p>< 35 °C > 28,800.0 seconds</p> <p>> 3.1 kPa</p> <p>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</p>	<p>Once per cold start</p> <p>Cold start: max time is 1,400 seconds</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No Active 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 Illum.
Evaporative Emission System Vent Solenoid Control Circuit Low (No ELCP - Conventional EVAP Diagnostic - with Fuel Tank Zone Module (FTZM))	P0498	Controller specific output driver circuit diagnoses the vent solenoid low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 0.5 Q impedance 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 Illum.
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 impedance 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 Illum.
Crankcase Ventilation System Disconnecte d	P04DB	<p>The Crankcase Ventilation System Disconnected Diagnostic monitors the performance of the Positive Crankcase Ventilation (PCV) System.</p> <p>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.</p> <p>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.</p> <p>The product of the</p>	<p>ScaledSignalLo * ScaledNoiseLo or ScaledSignalHi * ScaledNoiseHi</p> <p>Where ScaledSignalLo =</p> <p>Where ScaledNoiseLo =</p> <p>Where ScaledSignalHi =</p>	<p>< 1.00 kPa * kPa</p> <p>> 9,999.00 kPa * kPa</p> <p>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</p> <p>0.00 kPa is subtracted from the normalized value. The absolute value of the result is taken to get the final ScaledSignalLo.</p> <p>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</p> <p>Average Crankcase Ventilation Pressure</p>	<p>Diagnostic is Enabled</p> <p>Outside Air Temperature Engine Coolant Temperature Barometric Pressure</p> <p><u>Stability conditions:</u> Engine Air Flow Engine Air Flow Engine Vacuum Engine Vacuum Engine Speed Engine Speed</p> <p>Maximum Engine Air Flow - Minimum Engine Air Flow over the sample period</p> <p>Engine Manifold Pressure (MAP) Transient Active</p> <p>MAP Transient Delay</p> <p><u>MAP Transient Active</u> = TRUE when: Engine Speed Engine Speed MAP Delta over 100 msec</p> <p><u>MAP Transient Delay</u> = TRUE for a period of time after MAP Transient Active becomes FALSE. This time is determined</p>	<p>>= -9.0 Degrees C</p> <p>>= 60.0 Degrees C</p> <p>>= 70.0 kPa</p> <p>>= 75.0 Grams/Second</p> <p><= 140.0 Grams/Second</p> <p>>= -100.0 kPa</p> <p><= -30.0 kPa</p> <p>>= 2,000 RPM</p> <p><= 4,000 RPM</p> <p><= 20.0 Grams/Second</p> <p>= FALSE</p> <p>= FALSE</p> <p>> 500 RPM</p> <p>< 2,300 RPM</p> <p>> MAP Transient Delta Threshold which is a function of engine speed based on table P04DB: MAP Transient Delta Threshold</p>	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 Illum.
		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.	Where ScaledNoiseHi = 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.	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. 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	as a function of the maximum MAP Delta measured while MAP Transient Active = TRUE, and is based on table P04DB: MAP Transient Delay Active Time ----- Time that stability conditions must be met prior to sampling data Data is sampled over a period of time Stability conditions must continue to be met as the data sample is collected. A data sample may accumulate data from multiple sample windows. <u>DTCs Active:</u> <u>DTCs Pending:</u>	----- = 0.5 Seconds = 0.5 Seconds MAF_SensorFA MAP_SensorFA OAT_PtEstFiltFA AmbPresDfltStatus ECT_Sensor_FA PCV_Sensor_FA PCV_Sensor_Circuit_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankcase Ventilation Hose Connection Sensor Circuit Low	P04E2	<p>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.</p> <p>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.</p>	Crankcase Ventilation Pressure Sensor Voltage	<= 3.0% of 5 Volt Range (This is equal to -5.88 kPa)	Diagnostic is Enabled		<p>1,280 failures out of 1,600 samples</p> <p>1 sample every 3.125 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankcase Ventilation Hose Connection Sensor Circuit High	P04E3	<p>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.</p> <p>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.</p>	Crankcase Ventilation Pressure Sensor Voltage	>= 97.0 % of 5 Volt Range (This is equal to 5.88 kPa)	Diagnostic is Enabled		<p>1,280 failures out of 1,600 samples</p> <p>1 sample every 3.125 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Crankcase Ventilation Hose Connection Sensor Range/Performance	P04FB	<p>Detects a performance failure in the Crankcase Ventilation Pressure sensor, such as when the sensor value is stuck in range.</p> <p>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.</p> <p>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.</p>	<p>Crankcase Ventilation Pressure</p> <p>OR</p> <p>Crankcase Ventilation Pressure</p>	<p>≥ 0.63 kPa</p> <p>≤ -0.63 kPa</p>	<p>Diagnostic is Enabled</p> <p>Engine is not rotating</p> <p>(Time since engine has stopped rotating</p> <p>OR</p> <p>Outside Ambient Temperature)</p> <p>Engine Coolant Temperature</p> <p><u>DTCs Active:</u></p>	<p>\geq KtPCVD_t_PCV_PresSn srEquilibtable seconds</p> <p>≥ -9.00 deg C</p> <p>≥ 60.0 deg C</p> <p>PCV_Sensor_Circuit_FA ECT_Sensor_FA EngineModeNotRunTimer Error</p>	<p>128 failures out of 160 samples</p> <p>1 sample every 3.125 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Low Engine Speed Idle System	P0506	This DTC indicates that actual engine speed is lower than desired engine speed at idle so that it is out of speed control capability. Testing is performed when basic conditions are met. If filtered engine speed error exceeds a calibrated threshold for a calibrated duration, code is set. This testing is performed continuously per trip if basic conditions are met	Filtered Engine Speed Error. It is calculated with a calibrated filter coefficient Filter coefficient	> 91.00 rpm 0.00300	Baro Coolant Temp Engine run time Ignition voltage Time since gear change Time since a TCC mode change IAT Vehicle speed Commanded RPM delta Idle time For manual transmissions: Clutch Pedal Position or Clutch Pedal Position	> 70 kPa > 60 °C > 30 sec 32 > volts > 11 > 3 sec > 3 sec > -20 °C < 1.24 mph, 2kph < 25 rpm > 5 sec > 88.00 pct or < 16.00 pct PTC not active Transfer Case not in 4WD LowState	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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No active DTCs	Off-vehicle device control (service bay control) must not be active. following conditions not TRUE: (VeTESR_e_EngSpdReqI ntvType = CeTESR_e_EngSpdMinLi mitAND VeTESR_e_EngSpdReqR espType = CeTESR_e_NoSuggestio n) Clutch is not depressed TC_BoostPresSnsrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_F A IAT_SensorCircuitFA EvapFlowDuringNonPurg e_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_F A IgnitionOutputDriver_FA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFault LowFuelConditionDiagnos tic Clutch Sensor FA AmbPresDfItldStatus		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					All of the above met for Idle time	P2771 > 5 sec The diagnostic does not run during autostop as engine is shutdown during that time (occurs in a hybrid or 12v start stop vehicle)		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
High Engine Speed Idle System	P0507	This DTC indicates that actual engine speed is higher than desired engine speed at idle so that it is out of speed control capability. Testing is performed when basic conditions are met. If filtered engine speed error exceeds a calibrated threshold for a calibrated duration, code is set. This testing is performed continuously per trip if basic conditions are met	Filtered Engine Speed Error. It is calculated with a calibrated filter coefficient Filter coefficient	< -182.00 rpm 0.00300	Baro Coolant Temp Engine run time Ignition voltage Time since gear change Time since a TCC mode change IAT Vehicle speed Commanded RPM delta For manual transmissions: Clutch Pedal Position or Clutch Pedal Position	> 70 kPa > 60 °C > 30 sec 32 > volts > 11 > 3 sec > 3 sec > -20 °C < 1.24 mph, 2kph < 25 rpm > 88.00 pct < 16.00 pct PTC not active Transfer Case not in 4WD LowState Off-vehicle device control (service bay control) must not be active.	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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No active DTCs	<p>following conditions not TRUE: (VeTESR_e_EngSpdReqIntvType = CeTESR_e_EngSpdMinLimitAND VeTESR_e_EngSpdReqRespType = CeTESR_e_NoSuggestion)</p> <p>Clutch is not depressed</p> <p>TC_BoostPresSnsrFA ECT_Sensor_FA EnginePowerLimited EGRValveCircuit_FA EGRValvePerformance_FA IAT_SensorCircuitFA EvapFlowDuringNonPurge_FA FuelTrimSystemB1_FA FuelTrimSystemB2_FA FuelInjectorCircuit_FA MAF_SensorFA EngineMisfireDetected_FA IgnitionOutputDriver_FA TPS_FA TPS_Performance_FA VehicleSpeedSensor_FA FuelLevelDataFaultLow FuelConditionDiagnostic Clutch SensorFA AmbPresDfltStatus P2771</p>		
					All of the above met	> 5 sec		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cold Start Rough Idle	P050D	Monitors the combustion performance when the cold start emission reduction strategy is active by accumulating and determining the percentage of engine cycles that have less than complete combustion relative to the total number of engine cycles in which Dual Pulse is active.	<p>Deceleration index vs. Engine Speed Vs Engine load</p> <p>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.</p> <p>Incomplete combustion identified by P0300 threshold tables:</p>	<p>(>Idle SCD AND >Idle SCD ddt Tables) OR (>Idle Cyl Mode AND > Idle Cyl Mode ddt Tables)</p>	<p>Misfire Algorithm Enabled (Refer to P0300 for Enablement Requirements)</p> <p>OBD Manufacturer Enable Counter</p> <p>To enable the diagnostic, the Cold Start Emission Reduction Strategy Must Be Active per the following:</p> <p>Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure AND NumCLOEvents</p> <p>In addition, Dual Pulse Strategy Is Enabled and Active Per the following:</p> <p>Engine Speed</p> <p>Accel Position</p> <p>Engine Run Time</p> <p>For the engine speeds and loads in which Dual</p>	<p>= 0</p> <p>< 500.00 degC > -12.00degC ≤ 66.00 degC ≥ 72.00 KPa < 1.00</p> <p>≥ 300.00 RPM ≤ 2,600.00 RPM</p> <p>≤ 25.00 Pct</p> <p>< 30 seconds</p>	<p>Runs once per trip when the cold start emission reduction strategy is active and Dual Pulse is enabled and active.</p> <p>Frequency: 100ms</p> <p>Test completes after Dual Pulse is no longer active OR The first 500 engine cycles have been reached</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Pulse is active: Dual Pulse Error induced misfires percentage Dual Pulse Error induced misfires percentage Engine Cycles 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	>= catalyst damaging misfire < 90% of the maximum achievable catalyst damaging misfire. >= 75.00 <501 >= 800.00 degC >= 22.00 seconds > 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. < 72.00 KPa		

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Dual Pulse Strategy will exit per the following: Engine Speed OR Accel Position Engine Run Time 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 Misfire Converter Protection strategy Engine Metal Overtemp strategy Fuel control state Output State Control DOD Or DFCO Power Enrichment Dynamic Power Enrichment Piston Protection Hot Coolant Enrichment	> 2,800.00 RPM > 35.00 Pct >= 30 seconds Not Enabled Not being requested Not being requested Open Loop Not being requested for fuel Not Active Not Active Not Active Not Active Not Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Injector Flow Test General Enable DTC's Not Set:	Not Active 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 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 Illum.
Engine Oil Pressure (EOP) Sensor Performance - Continuously Variable Displacement Oil Pump	P0521	<p>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.</p> <p>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.</p>	<p>Two Stage Oil Pump EOP Sensor Test with Engine Running, High Pressure State</p> <p><u>To Fail when previously passing with the engine running:</u></p> <p>Filtered Engine Oil Pressure below threshold</p> <p>OR</p> <p>Filtered Engine Oil Pressure above threshold</p> <p><u>To pass when previously failing:</u></p> <p>Filtered Engine Oil Pressure above low threshold plus an offset</p> <p>OR</p> <p>Filtered Engine Oil Pressure below high threshold minus an offset</p>	<p>Filtered Oil Pressure < (P0521_CVDOP_MinOilPresFail kPa)</p> <p>OR</p> <p>Filtered Oil Pressure > (P0521_CVDOP_MaxOilPressure kPa)</p> <p>Filtered Oil Pressure > (P0521_CVDOP_MinOilPresFail + 10.0 kPa)</p> <p>OR</p> <p>Filtered Oil Pressure < (P0521_CVDOP_MaxOilPressure - 10.0 kPa)</p>	<p>Variable Displacement Oil Pump is Present = TRUE</p> <p>Engine Running Diagnostic Status</p> <p>Engine Off Rationality Test Diagnostic Reporting Status</p> <p>Oil Pressure Sensor In Use</p> <p>Engine Running</p> <p>Ambient Air Pressure</p> <p>Oil Aeration (= TRUE if engine speed > 4,500 RPM for longer than TimeForOilAeration seconds)</p> <p>Filtered Engine Speed within range</p> <p>Sensed Oil Temperature within range</p> <p>Engine Speed stable</p> <p>No active DTC's</p>	<p>Enabled</p> <p>Enabled</p> <p>Test not report a fail state</p> <p>Yes</p> <p>>10.0 seconds</p> <p>>70.0 kPa</p> <p>FALSE</p> <p>1,000 RPM < Filtered Engine Speed < 4,500 RPM</p> <p>40.0 deg C < Sensed Oil Temperature <120.0 degC</p> <p>(RPM - Previous RPM) < 35</p> <p>Fault bundles: MAF_SensorFA ECT_Sensor_FA IAT_SensorFA EngOilPressureSensorCkt FA AmbientAirDefault EngOilTempFA CrankSensor_FA</p>	<p>> 40 errors out of 50 samples.</p> <p>Performed every 100 msec</p> <p>> 10passes out of 50 samples.</p> <p>Performed every 100 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Two Stage Oil Pump EOP Sensor Test with Engine Off If enabled: <u>To Fail when previously passing with the engine off:</u> Difference between oil pressure and Barometric pressure is Greater than a threshold OR Less than a threshold	 (Oil Pressure - Barometric Pressure) >-30.0 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 > 0.0 deg C > 10.0 seconds EngineModeNotRunTimer _FA EngOilTempFA EngOilPressureSensorCkt FA CrankSensor_FA	> 20 errors out of 40 samples. Run once per trip	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Circuit Low Voltage	P0522	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too low. This diagnostic compares the EOP circuit voltage to the reference voltage.	(Engine Oil Pressure Sensor Circuit Voltage) - 5 Volts) *100	<p>< 10.00 percent</p> <p>Deadband: < 5 percent or > 95 percent</p>	<p>Engine Speed Enable Engine Speed Disable</p> <p>Oil Pressure Sensor In Use</p> <p>Diagnostic Status</p>	<p>> 400 rpm < 350 rpm</p> <p>Yes</p> <p>Enabled</p>	<p>1,280 failures out of 1,600 samples</p> <p>Performed every 3.125 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure (EOP) Sensor Circuit High Voltage	P0523	Determines if the Engine Oil Pressure (EOP) Sensor circuit voltage is too high. This diagnostic compares the EOP circuit voltage to the reference voltage.	(Engine Oil Pressure Sensor Circuit Voltage) - 5 Volts) *100	> 90.00 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 Illum.
System Voltage Low	P0562	Detects a low 12V battery system. This diagnostic reports the DTC when battery voltage is low. Monitoring occurs when the engine speed is above a calibrated value.	System voltage low	Battery voltage <= 9.00	System voltage low diag enable = TRUE Run Crank voltage Engine speed >=	1.00 Voltage >5.00 volts 400.00	400 failures out of 500 samples 12.5 ms /sample	Type C, 1 Trip No MIL Emissions Neutral

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
System Voltage High	P0563	Detects a high 12V battery system. This diagnostic reports the DTC when battery voltage is high.	System voltage high	Battery voltage >= 18.00	System voltage high diag enable = TRUE Run Crank voltage	1.00 Voltage >5.00 volts	400 failures out of 500 samples 12.5 ms /sample	Type C, 1 Trip No MIL Emissions Neutral

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Mutil- Function Switch Circuit Legacy	P0564	<p>Detect when cruise control multi-function switch circuit (analog) voltage is in an invalid range.</p> <p>"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."</p>	Cruise Control analog circuit voltage must be "between ranges" for greater than a calibratable period of time over a sample period.	<p>The cruise control analog voltage A/D count ratio is considered to be "between ranges" when the ratio is measured in the following ranges:</p> <p>0.28 -0.31, 0.415-0.445, 0.585-0.615 0.78-0.81, 1.005- 1.035</p>	<p>Diagnostic is enabled.</p> <p>CAN cruise switch diagnostic enable in ECM</p>	1.00	indicate failure for 0.50 seconds over the sample period / 25.00 seconds.	Type C, 1 Trip No MIL Emissio ns Neutral , "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 Illum.
Cruise Control On Switch Circuit Legacy	P0565	<p>Detects a failure of the cruise on/off switch in a continuously applied state</p> <p>"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.</p>	Cruise Control On switch remains applied for greater than a calibratable period of time over a sample period.	fail in the applied state for greater than 20.00 seconds over the sample period of 25.00 seconds	<p>Diagnostic is enabled.</p> <p>CAN cruise switch diagnostic enable in ECM</p>	1.00	fail for greater than 20.00 seconds / 25.00 seconds	<p>Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Resume Circuit Legacy	P0567	<p>Detects a failure of the cruise resume switch in a continuously applied state</p> <p>"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."</p>	Cruise Control Resume switch remains applied for greater than a calibratable period of time over a sample period.	fail in the applied state for greater than 89.00 seconds over the sample period of 99.00 seconds	<p>Diagnostic is enabled.</p> <p>CAN cruise switch diagnostic enable in ECM</p>	1.00	fail for greater than 89.00 seconds/99.00 seconds	<p>Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Set Circuit Legacy	P0568	<p>Detects a failure of the cruise set switch in a continuously applied state</p> <p>"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."</p>	Cruise Control Set switch remains applied for greater than a calibratable period of time over a sample period	fail in the applied state for greater than 89.00 seconds over the sample period of 99.00 seconds	<p>Diagnostic is enabled.</p> <p>CAN cruise switch diagnostic enable in ECM</p>	1.00	fail for greater than 89.00 seconds/99.00 seconds	<p>Type C, 1 Trip No MIL Emissions Neutral</p> <p>'Emissions Neutral Diagnostics - special type C"</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Cancel Switch Circuit Legacy	P056C	<p>Detects a failure of the cruise cancel switch in a continuously applied state</p> <p>"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." Only applicable for vehicles with a momentary on/off cruise switch architecture.</p>	Cruise Control Cancel switch remains applied for greater than a calibratable period of time over a sample period	fail in the applied state for greater than 20.00 seconds over the sample period of 25.00 seconds	<p>Diagnostic is enabled.</p> <p>CAN cruise switch diagnostic enable in ECM</p>	1.00	fail for greater than 20.00 seconds/ 25.00 seconds	Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit Range/ Performance	P057B	This diagnostic monitors the Brake Pedal Position Sensor for a stuck in range failure	Brake pedal position sensor movement diagnostic cal is enabled 1.00	True	Diagnostic is enabled. 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 threshold after calibratable number of tests have completed to report a "test passed" for P057B	EWMA value looked up in supporting table P057B KtBRKI_K_FastTestP ointWeight 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 > 4.72 OR (for slow test) shift lever has been in park once this key cycle vehicle speed >= 6.00 accelerator pedal position < 5.00	total number of EWMA tests > 20.00	
			Calculated EWMA Value must be less than calibratable threshold after calibratable number of tests have completed to report a "test failed" for P057B. This test runs once per key cycle	EWMA value looked up in supporting table P057B KtBRKI_K_CmpltTest Pointweight P057B as a function of calculated brake pedal position delta EWMA value is less than 0.40	no DTC's active (P057C, P057D)	shift lever has been in park once this key cycle vehicle speed >= 6.00 accelerator pedal position < 5.00	total number of EWMA tests > 2.00	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit Low	P057C	detects short to ground for brake pedal position sensor	If x of y samples are observed below failure threshold, default brake pedal position to zero percent and set DTC.	5.00	Diagnostic is enabled. Brake Pedal Position Sensor Low Voltage Diagnostic Enable	1.00	20.00 / 32.00 counts	MIL: Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Brake Pedal Position Sensor Circuit 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 Illum.
Brake Pedal Position Sensor Circuit Intermittent/ Erratic	P057E	detects noisy / erratic output 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	29.26	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 Illum.
Cruise Control Multi- function Circuit Low Voltage Legacy	P0580	<p>detects short to ground failure for cruise control multi-function switch circuit (analog) voltage</p> <p>"Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input 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.</p> <p>For certain vehicles (GM Global A), this also accounts for Open Circuit failure on cruise multi-function switch circuit.</p>	Cruise Control analog circuit voltage must be in an "Short To Ground" range for greater than a calibratable period of time over a sample period.	The cruise control analog voltage A/D count ratio is considered to be "open short to ground when the ratio is measured in the following ranges: 0-0.185	<p>Diagnostic is enabled.</p> <p>CAN cruise switch diagnostic enable in ECM</p>	1.00	indicate failure for 2.00 seconds/ 25.00 seconds.	<p>Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi- function Circuit High Voltage Legacy	P0581	detects short to power failure for cruise control multi-function switch circuit (analog) voltage "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input 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 an "Open Short To Ground" range for greater than a calibratable period of time over a sample period.	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	indicate failure for 2.00 seconds/ 25.00 seconds.	Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi- Function Input B Circuit Legacy	P0589	<p>Detect when cruise control multi-function switch circuit B (analog) voltage is in an invalid range.</p> <p>"Emissions Neutral Default Action : When the BCM tells the ECM that the cruise switch for the cruise control analog input voltage 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.</p>	Cruise Control analog circuit B voltage must be "between ranges" for greater than a calibratable period of time over a sample period..	The cruise control analog voltage A/D count ratio is considered 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	<p>Diagnostic is enabled.</p> <p>CAN cruise switch diagnostic enable in ECM</p>	1.00	indicate failure for 0.50 seconds / 25.00 seconds.	<p>Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi- Function Input B Circuit Low Legacy	P0592	detects short to ground failure for cruise control multi-function switch circuit B (analog) voltage. "Emissions Neutral Default Action : When the BCM tells the ECM that the 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 over a sample period.	The cruise control Circuit B analog voltage A/D count ratio is considered to be "open short to ground" when the ratio is measured in the following ranges: 0-0.185	Diagnostic is enabled. CAN cruise switch diagnostic enable in ECM	1.00	indicate failure for 2.00 seconds / 25.00 seconds	Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Multi- Function Input B Circuit High Legacy	P0593	detects short to power failure for cruise control multi-function switch circuit B (analog) voltage. "Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input voltage 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 over a sample period.	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	indicate failure for 2.00 seconds / 25.00 seconds.	Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Condition] 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 position [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.	<p>[Smart Shutter Actuator 1 Position Response</p> <p>OR</p> <p>Shutters Not Initialized</p> <p>OR</p> <p>The absolute difference between Smart Shutter Actuator 1 Position Response and Shutter response and Commanded Position percent]</p> <p>AND</p> <p>Shutter 1 Diagnostic Delay Threshold count</p>	<p>[Indeterminate</p> <p>OR</p> <p>= TRUE</p> <p>OR</p> <p>> 5.00]</p> <p>AND</p> <p>Counter > 109.00 counts</p>	<p>a. Command Shutter/ Enable.</p> <p>b. Shutter/ Performance Diagnostic Enabled</p> <p>c. Off Vehicle Communication Service Request Diagnostic Enabled</p> <p>Any of the following conditions are met:</p> <p>d. Run Crank Active</p> <p>All of the following conditions are met:</p> <p>e. Run Crank Active</p> <p>f. Command On and Key Off</p> <p>g. ECU Awake</p> <p>h. Run Crank Voltage in Range</p> <p>i. Ignition Powertrain Relay Voltage in Range</p> <p>j. Actuator Initialization Complete</p> <p>Any of the following conditions are met</p> <p>k. If Enabled, performance diagnostics will be enabled even in the</p>	<p>a. = TRUE</p> <p>b. = Enabled</p> <p>c. = TRUE</p> <p>d. =TRUE</p> <p>e. = FALSE</p> <p>f. =TRUE</p> <p>g. =TRUE</p> <p>h. >=11.00 AND <= 32.00</p> <p>i. >= 11.00 AND <= 32.00</p> <p>j. =TRUE</p> <p>k. = Disabled</p>	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 Illum.
					<p>presence of a communication fault.</p> <p>All of the following conditions are met:</p> <p>l. LIN communication NOT faulted.(DTC: U028400, U058500)</p> <p>m. No LIN communication Fault Pending</p> <p>n. LIN communication Data is Ready</p>	<p>l. = TRUE</p> <p>m. =TRUE</p> <p>n. =TRUE</p>		
			Shutter 1 Performance Test count	= 5.00 counts	<p>a. Command Shutter1 Enable.</p> <p>b. Shutter1 Performance Diagnostic Enabled</p> <p>c. Off Vehicle Communication Service Request Diagnostic Enabled</p> <p>Any of the following conditions are met:</p> <p>d. Run Crank Active</p> <p>All of the following conditions are met:</p> <p>e. Run Crank Active</p> <p>f. Command On and Key Off</p>	<p>a. = TRUE</p> <p>b. = Enabled</p> <p>c. = TRUE</p> <p>d. =TRUE</p> <p>e. = FALSE</p> <p>f. =TRUE</p>	1-5 actuator cycles [1 cycle typically requires 10-25 seconds]	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Active Grill Air Shutter B Performance /Stuck OFF	P05AE	A2-part diagnostic. Part 1 continuously monitors for failure to achieve a commanded shutter actuator position [Suspect Stuck Condition] 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 position [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. Retry attempts will continue until the commanded position is achieved or the trip ends.	<p>[Smart Shutter Actuator 2 Position Response</p> <p>OR</p> <p>Shutters Not Initialized</p> <p>OR</p> <p>The absolute difference between Smart Shutter Actuator 2 Position Response and Shutter response and Commanded Position percent]</p> <p>AND</p> <p>Shutter 2 Diagnostic Delay Threshold count</p>	<p>[Indeterminate</p> <p>OR</p> <p>= TRUE</p> <p>OR</p> <p>>5.00]</p> <p>AND</p> <p>Counter > 109.00 counts</p>	<p>a. Command Shutter2 Enable.</p> <p>b. Shutter2 Performance Diagnostic Enabled</p> <p>c. Off Vehicle Communication Service Request Diagnostic Enabled</p> <p>Any of the following conditions are met:</p> <p>d. Run Crank Active</p> <p>All of the following conditions are met:</p> <p>e. Run Crank Active</p> <p>f. Command On and Key Off</p> <p>g. ECU Awake</p> <p>h. Run Crank Voltage in Range</p> <p>i. Ignition Powertrain Relay Voltage in Range</p> <p>j. Actuator Initialization Complete</p> <p>Any of the following conditions are met</p> <p>k. If Enabled, performance diagnostics will be</p>	<p>a. = TRUE</p> <p>b. = Enabled</p> <p>c. = TRUE</p> <p>d. = TRUE</p> <p>e. = FALSE</p> <p>f. = TRUE</p> <p>g. = TRUE</p> <p>h. >=11.00 AND <= 32.00</p> <p>i. >= 11.00 AND <=32.00</p> <p>j. =TRUE</p> <p>k. = Disabled</p>	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 Illum.
					<p>enabled even in the presence of a communication fault.</p> <p>All of the following conditions are met:</p> <p>l. LIN communication NOT faulted.(DTC: U028500, U058600)</p> <p>m. No LIN communication Fault Pending</p> <p>n. LIN communication Data is Ready</p>	<p>l. = TRUE</p> <p>m. =TRUE</p> <p>n. =TRUE</p>		
			Shutter 2 Performance Test count	= 5.00 counts	<p>a. Command Shutter2 Enable.</p> <p>b. Shutter2 Performance Diagnostic Enabled</p> <p>c. Off Vehicle Communication Service Request Diagnostic Enabled</p> <p>Any of the following conditions are met:</p> <p>d. Run Crank Active</p> <p>All of the following conditions are met:</p> <p>e. Run Crank Active</p> <p>f. Command On and Key Off</p>	<p>a. = TRUE</p> <p>b. = Enabled</p> <p>c. = TRUE</p> <p>d. =TRUE</p> <p>e. = FALSE</p> <p>f. =TRUE</p>	<p>1-5 actuator cycles</p> <p>[1 cycle typically requires 10-25 seconds]</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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: U028500, U058600) 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 Illum.
Exhaust Camshaft System Cold Start Performance - Bank 1	P05CE	<p>Detects a VVT system error during Cold Starts by comparing the desired and actual cam positions when WT is activated.</p> <p>This is the same type diagnostic as P0014 except this detects excessive deviations of position while the cold start phaser positions are being commanded.</p>	Camshaft position error [absolute value of (desired position - actual position)] is compared to thresholds to determine if excessive	Cam Position Error > 6.00 deg.	<p>Diagnostic is Enabled</p> <p>Exhaust Cam Phsr Enable</p> <p>System Voltage</p> <p>Engine Running</p> <p>Power Take Off (PTO) active</p> <p>Catalyst Warmup Enabled</p> <p>Desired cam position</p> <p>Desired AND Measured cam position</p> <p>Desired cam position variation</p> <p>No Active DTCs</p>	<p>= TRUE</p> <p>> 11.00 volts</p> <p>= TRUE</p> <p>= FALSE</p> <p>= TRUE</p> <p>> 0 deg</p> <p>> 6.00 deg AND < 30.00 deg</p> <p><3.00 deg for (P0014_P05CE_StablePo sitionTimeEd) sec</p> <p>P0013 P2090 P2091</p>	<p>65 failures out of 75 samples</p> <p>100 ms /sample</p>	Type B, 2 Trips

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECM RAM Failure	P0604	Indicates that the ECM has detected a RAM fault. This includes Primary Processor System RAM Fault, Primary Processor Cache RAM Fault, Primary Processor TPU RAM Fault, Primary Processor Update Dual Store RAM Fault, Primary Processor Write Protected RAM Fault, and Secondary Processor RAM Fault. This diagnostic runs continuously.	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	Type A, 1 Trips
			Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written >=	254 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written >=	5 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	
			Indicates that the primary processor detects an illegal write attempt to protected RAM. Number of illegal writes are >	65,534 counts			Diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal ECM Processor Integrity Fault	P0606	Indicates that the ECM has detected an internal processor integrity fault. These include diagnostics done on the SPI Communication as well as a host of diagnostics for both the primary and secondary processors.	Time new seed not received exceeded			always running	450 milliseconds	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 150 milliseconds 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 occurred since last controller initialization.	3 (results in MIL), 5 (results in MIL and remedial action)		Test is Enabled: 1 (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted memory	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Counter >=					
			Checks for ECC (error correcting code) circuit test errors reported by the hardware for RAM memory circuit. Increments counter during controller initialization if ECC error occurred 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: P0606 PFM_Enable f (Loop Time) (If 0, this test is disabled)	Fail Table, f(Loop Time). See supporting tables: P0606 PFM Sequence Fail f (Loop Time) / Sample Table, f (Loop Time)See supporting tables: P0606 PFM Sequence Sample f(Loop Time) counts 50 ms/count in the ECM main processor	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 occurred 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 occurred 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 RAM variable, depends on length of time to write flash to RAM	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 percent >	6.00 %	Run/Crank Voltage >	7.00 V	2/ 14 counts or 1.75 seconds continuous; 250 ms/count in the ECM main processor	
			Resistance deviation	6.00 %	Run/Crank Voltage >	7.00 V	2/ 14 counts or	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Main Processor Performance (Gasoline applications ONLY)	P060C	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	-111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	Type A, 1 Trips
			Absolute difference between Equivance Ratio torque compensation and its dual store out of bounds given by threshold	111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Absolute difference of Accessory torque and its redundant calculation is out of bounds given by threshold range	111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of Filtered Air-per-cylinder and its redundant calculation is out of bounds given by threshold range	165.45 mg	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			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	18.08 degrees		Engine speed >0rpm	Up/down timer 425 ms continuous, 0.5 down time multiplier	
			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 multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Nm				
			One step ahead calculation of air-per-cylinder and two step ahead is greater than threshold	80.00 mg		Engine speed > 650 rpm	Up/down timer 441 ms continuous, 0.5 down time multiplier	
			Difference between Unmanaged Spark and PACS Spark is greater than threshold	18.08 degrees	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			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 multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Zero pedal axle torque is out of bounds given by threshold range	High Threshold 1,737.36 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Creep Coast Axle Torque is out of bounds given by threshold range	High Threshold 1,737.36 Nm Low Threshold -65,535.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			Absolute difference of Friction torque and its redundant calculation is out of bounds given by threshold range	111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Arbitrated Air-Per-Cylinder filter coefficient is out of bounds given by threshold range	High Threshold 1.000 Low Threshold 0.074	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Launch spark is active but the launch spark redundant path indicates it should not be active	N/A		Engine speed < 7,000.00 or 7,200.00 rpm (hysteresis pair)	Up/down timer 141 ms continuous, 0.5 down time multiplier	
			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	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Cylinders active greater than commanded	2 cylinders		Engine run flag = TRUE > 2.00 s Number of cylinder events since engine run > 24 No fuel injector faults active	Up/down timer 441 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			Predicted torque for uncorrected zero pedal determination is greater than calculated limit.	Table, f(Engine, Oil Temp). P060C_Speed Control External Load f(Oil Temp, RPM) + 111.40	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				Nm				
			Engine Predicted Request Without Motor is greater than its redundant calculation plus threshold	110.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Engine Immediate Request Without Motor is greater than its redundant calculation plus threshold	110.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Positive Torque Offset is greater than its redundant calculation plus threshold	111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			OR					
			Positive Torque Offset is less than its redundant calculation minus threshold					
			Commanded Predicted Engine Request is greater than its redundant calculation plus threshold	111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, down time multiplier 0.5	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Cylinder Spark Delta Correction exceeds the absolute difference as compared to Unadjusted Cylinder Spark Delta	18.08 degrees	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			1. Cylinder Torque Offset exceeds step size threshold OR 2. Sum of Cylinder Torque Offset exceeds sum threshold	1. 111.40 Nm 2. 111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Engine Capacity Minimum Immediate Without Motor is greater than its dual store plus threshold	111.40 Nm			Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Engine Capacity Minimum Engine Off is greater than threshold	0 Nm			Up/down timer 475 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine Capacity Minimum Engine Immediate Without Motor is greater than threshold	0 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			Commanded Immediate Engine Request is greater than its redundant calculation plus threshold	111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine Speed Lores Intake Firing (event based) calculation does not equal its redundant calculation	N/A		Engine speed greater than Orpm	Up/down timer 141 ms continuous, 0.5 down time multiplier	
			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 141 ms continuous, 0.5 down time multiplier	
			Idle speed control calculated predicted minimum torque request exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: P060C_Speed Control External Load f(Oil Temp, RPM) + 111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Idle speed control calculated predicted minimum torque without reserves exceeds calculated torque limit	Table, f(Oil Temp, RPM). See supporting tables: P060C_Speed Control External Load f(Oil Temp, RPM) + 111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			Difference between Driver Requested Immediate Torque primary path and its secondary exceeds threshold	1,737.36 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			Driver Immediate Request is less than its redundant calculation minus threshold	1,737.36 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded Immediate Request is greater than its redundant calculation plus threshold OR Commanded Immediate Request is less than its redundant calculation minus threshold	1,737.36 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			Difference between Cruise Axle Torque Arbitrated Request and	40.63 Nm		Cruise has been engaged for more than 4.00	Up/down timer 2,048 ms continuous.	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Cruise Axle Torque Request exceeds threshold			seconds	0.5 down time multiplier	
			Desired engine torque request greater than redundant calculation plus threshold	110.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Engine min capacity above threshold	111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 126 ms continuous, 0.5 down time multiplier	
			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 multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of adjustment factor based on temperature and its dual store above threshold	2.76 m/s	Ignition State	Accessory, run or crank	Up/down timer 172 ms continuous, 0.5 down time multiplier	
			1. Absolute difference of redundant calculated engine speed above threshold	500 RPM		Engine speed greater than 0 RPM	Up/down timer 141 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			Speed Control's Predicted Torque Request and its dual store	N/A	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			do not match				0.5 down time multiplier	
			Engine oil temperature and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 403 ms continuous, 0.5 down time multiplier	
			Desired throttle position greater than redundant calculation plus threshold	7.23 percent	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			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 multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Throttle desired torque above desired torque plus threshold	111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Difference of Final Torque feedback proportional plus integral term and its redundant calculation is out of bounds given by threshold range	High Threshold 111.40 Nm Low Threshold -111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Difference of torque model coefficients and its redundant calculation is out of bounds given by threshold range	High Threshold 0.0001741 Low Threshold -0.0001741	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Difference of base friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 111.40 Nm Low Threshold -111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Accessory drive friction torque is out of bounds given by threshold range	High Threshold 111.40 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			AC friction torque is	High Threshold	Ignition State	Accessory, run or crank	Up/down timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			greater than commanded by AC control software or less than threshold limit	40.00 Nm Low Threshold 0.00 Nm			475 ms continuous, 0.5 down time multiplier	
			Difference of Oil temperature delta friction torque and its redundant calculation is out of bounds given by threshold range	High Threshold 111.40 Nm Low Threshold -111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Generator friction torque is out of bounds given by threshold range	High Threshold 111.40 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Absolute difference between the Supercharger friction torque and its redundant calculation greater than threshold	111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			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 111.40 Nm Low Threshold -111.40 Nm Rate of change threshold		Engine speed >0rpm MAF, MAP and Baro DTCs are false	Up/down timer 475 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				6.96 Nm/loop				
			Torque error compensation is out of bounds given by threshold range	High Threshold 111.40 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Delta Torque Baro compensation is out of bounds given by threshold range	High Threshold 7.03 Nm Low Threshold 0.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			1. Difference of reserve torque value and its redundant calculation exceed threshold OR 2. Reserve request does not agree with operating conditions or Difference of final predicted torque and its redundant calculation exceed threshold OR 3. Rate of change of reserve torque exceeds threshold, increasing direction only OR 4. Reserve engine torque above allowable capacity threshold	1.110.40 Nm 2. N/A 3.110.40 Nm 4.110.40 Nm	3. &4.: Ignition State	1. &2.: Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 111.40 Nm 3. &4.: Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			Absolute difference of the	Table. ffDesired		Enoine soeed >0rom	Uo/down timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			calculated Intake Manifold Pressure during engine event versus during time event is greater than threshold	Engine Torque). See supporting tables: P060C_Delta MAP Threshold f(Desired Engine Torque)			141 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			Driver Predicted Request is greater than its redundant calculation plus threshold OR Driver Predicted Request is less than its redundant calculation minus threshold	1,737.36 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Cold Delta Friction Torque and its dual store do not match	N/A	Ignition State	Accessory, run or crank	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Predicted torque for zero pedal determination is greater than calculated limit.	Table, f(Oil Temp, RPM). See supporting tables: Speed Control External Load f(Oil Temp, RPM) + 111.40 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			Steady State Estimated	N/A		AFM not changing from	Up/down timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine Torque and its dual store are not equal			Active to Inactive and preload torque not changing and one loop after React command Engine speed >0rpm	2,048 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			Difference of minimum spark advance limit and its redundant calculation is out of bounds given by threshold range	18.08 degrees	Ignition State	Accessory, run or crank	Up/down timer 141 ms continuous, 0.5 down time multiplier	
			Difference of commanded spark advance and adjusted delivered is out of bounds aiven bv	18.08 degrees		Engine speed >0rpm	Up/down timer 425 ms continuous, 0.5	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			threshold range				down time multiplier	
			Absolute difference between Estimated Engine Torque and its dual store are above a threshold	111.40 Nm		Engine speed >0rpm	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Absolute difference between Estimated Engine Torque without reductions due to torque control and its dual store are above a threshold	111.40 Nm		Engine speed >0rpm	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Difference of desired spark advance for managed torque and its redundant calculation is out of bounds given by threshold range	18.08 degrees		Torque reserve (condition when spark control greater than optimum to allow fast transitions for torque disturbances) > 111.40 Nm	Up/down timer 441 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of Engine Capacity Minimum Running Immediate Brake Torque Excluding Cylinder Sensitivity and its redundant calculation is out of bounds given by threshold range	111 Nm		Engine speed >0rpm	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			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 > 650 rpm	Up/down timer 441 ms continuous, 0.5 down time multiplier	
			Rate limited cruise axle torque request and its dual store do not match within a threshold	40.63 Nm	Ignition State	Accessory, run or crank	Up/down timer 163 ms continuous, 0.5 down time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							multiplier	
			<p>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</p> <p>OR</p> <p>2. Absolute difference of Calculated accelerator pedal position compensated for carpet learn and error conditions and its dual store do not equal</p> <p>OR</p> <p>3. Absolute difference of Calculated accelerator pedal position and its dual store do not equal</p>	<p>1. 3.50 %</p> <p>2. N/A</p> <p>3. N/A</p>	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Commanded axle torque is greater than its redundant calculation by threshold	1,737.36 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Commanded axle torque is less than its redundant calculation by threshold	2,606.04 Nm	Ignition State	Accessory, run or crank	Up/down timer 475 ms continuous, 0.5 down time multiplier	
			Preload timer and its redundant calculation do not equal	N/A	Ignition State	Accessory, run or crank AFM apps only	Up/down timer 141 ms continuous, 0.5 down time multiplier	
			AC friction torque is greater than commanded by AC control software	40.00 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,048 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Engine Speed Lores Intake Firing (time based) calculation does not equal its redundant calculation	N/A		Engine speed >0rpm	Up/down timer 175 ms continuous, 0.5 down time multiplier	
			Absolute difference of the calculated spark offset for equivalence ratio and its redundant calculation is greater than a threshold	18.08 degrees		Engine speed >0rpm	Up/down timer 141 ms continuous, 0.5 down time multiplier	
			Transmission Torque Request calculations 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 calculation is greater than a threshold	0.01 Nm			Up/down timer 2,048 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Absolute difference of maximum throttle area and its redundant calculation is greater than a threshold	15 mm2			Up/down timer 172 ms continuous, 0.5 down time multiplier	
			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 multiplier	
			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 multiplier	
			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 multiplier	
			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	111.40 Nm Greater than 111.40 Nm or Lower than 111.40 Nm	Engine State	Running	Up/down timer 200.00 ms continuous, 0.5 down time multiplier	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			-OR- Immediate Feedback Control is active beyond allowed	2.00 seconds				
			-OR- Torque Control MPC Failure is active					
			Calculated or Commanded Engine to Axle ratio is lower than a threshold	0.9	Ignition State	Accessory, run or crank	Up/down timer 175.00 ms continuous, 0.5 down time multiplier	
			-OR- Engine to Axle Offset is greater than a threshold	111.40 Nm				
			Difference between Cruise Arbitration Request and its redundant calculation exceeds a threshold	65.15Nm	Ignition State	Accessory, run or crank	Up/down timer 500.00 ms continuous, 0.5 down time multiplier	
			-OR- Difference between Cruise Acceleration Request and its redundant calculation exceeds a threshold	0.05 KPH/Second				
			Difference between commanded Axle Torque and its redundant calculation is greater than a threshold	1,737.36 Nm	Ignition State	Accessory, run or crank	Up/down timer 2,047.97 ms continuous, 0.5 down time multiplier	
			-OR-					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Difference between commanded Axle Torque and its redundant calculation is less than a threshold	2,606.04 Nm				

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	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 Illum.
					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 CamSensorAnyLocationF A == 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 Illum.
Fuel Pump Relay Control Circuit Open	P0627	Controller specific output driver circuit diagnoses the Feed Fuel Pump Relay high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.	≥ 200 KOhms impedance between signal and controller ground.	Run/Crank Voltage	Voltage 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type A, 1 Trips Note: In certain controllers P0629 may also set (Fuel Pump Relay Control Short to Power)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit Low Voltage	P0628	Controller specific output driver circuit diagnoses the Feed Fuel Pump Relay high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.</p>	<= 0.5 Ohms impedance between signal and controller ground	Run/Crank Voltage	Voltage 11.00 volts	<p>8 failures out of 10 samples</p> <p>250 ms / sample</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Relay Control Circuit High Voltage	P0629	Controller specific output driver circuit diagnoses the Feed Fuel Pump Relay high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	≤ 0.5 Ohms impedance between signal and controller power	Run/Crank Voltage	Voltage 11.00 volts	8 failures out of 10 samples 250 ms / sample	Type A, 1 Trips Note: In certain controllers P0627 may also set (Fuel Pump Relay Control Open Circuit)

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

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

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

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #1 Circuit	P0641	Detects a continuous or intermittent short on the 5 volt reference circuit #1 by monitoring the reference percent 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 > (100% corresponds to 5.5 Volt)	88.64 % Vrefl 93.18% Vrefl 0.90 % 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 Illum.
Internal Control Module 02 Sensor Processor Performance Bank 1) (For use with WRAF	P064D	<p>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.</p> <p>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.</p>	B1S1 WRAF ASIC indicates control module faults	Controller Status fail counts and Measure Valid fail counts are accumulated to determine fault status	<p>Diagnostic is Enabled</p> <p>Engine Run or Auto stop</p> <p>Heater Warm-up delay</p> <p>WRAF circuit diagnostic delay since power up</p>	<p>= True</p> <p>= Complete</p> <p>> 20.0 sec</p>	<p>128 controller status fail counts out of 160 samples</p> <p>OR</p> <p>128 measure valid fail counts out of 160 samples</p> <p>25 ms /sample</p> <p>Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Unauthorized Software Calibration Detected	P064F	This DTC indicates that the ECU software has an invalid MACT (Message Authentication Code Table)	The MACT embedded in the ECU software is invalid	Invalid MACT	Calibration enable	= 1 Boolean	N/A	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #2 Circuit	P0651	Detects a continuous or intermittent short on the 5 volt reference circuit #2 by monitoring the reference percent Vref2 and failing the diagnostic when the percent Vref2 is too low or too high or if the delta between the filtered percent Vref2 and non-filtered percent Vref2 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref2 < or ECM percent Vref2 > or the difference between ECM filtered percent Vref2 and percent Vref2 > (100% corresponds to 5.5 Volt)	88.64 % Vref2 93.18% Vref2 0.90 % 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 Illum.
Control Module Power Relay Control Circuit	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 0 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 controlle rs P0686 may also set (Powertr ain Relay Control Short to Ground).

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Power Relay Control Circuit Low Voltage	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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to ground failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.</p>	Short to ground: < 0.5 Q impedance between output and controller ground	<p>Powertrain relay Low Side driver short to ground diagnostic diagnostic enable = TRUE</p> <p>Run/Crank Voltage</p>	<p>1.00</p> <p>Voltage > 11.00volts</p>	<p>8 failures out of 10 samples</p> <p>250 ms / sample</p>	<p>Type B, 2 Trips</p> <p>Note: In certain controllers P0685 may also set (Powertrain Relay Control Open Circuit).</p>

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Illum.
Control Module Power Relay Feedback Circuit High Voltage	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 Illum.
5 Volt Reference #3 Circuit	P0697	Detects a continuous or intermittent short on the 5 volt reference circuit #3 by monitoring the reference percent Vref3 and failing the diagnostic when the percent Vref3 is too low or too high or if the delta between the filtered percent Vref3 and non-filtered percent Vref3 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref3 < or ECM percent Vref3 > or the difference between ECM filtered percent Vref3 and percent Vref3 > (100% corresponds to 5.5 Volt)	88.64 % Vref3 93.18% Vref3 0.90 % 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 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
5 Volt Reference #4 Circuit	P06A3	Detects a continuous or intermittent short on the 5 volt reference circuit #4 by monitoring the reference percent Vref4 and failing the diagnostic when the percent Vref4 is too low or too high or if the delta between the filtered percent Vref4 and non-filtered percent Vref4 is too large. This diagnostic only runs when battery voltage is high enough.	ECM percent Vref4 < or ECM percent Vref4 > or the difference between ECM filtered percent Vref4 and percent Vref4 > (100% corresponds to 5.5 Volt)	88.64 % Vref4 93.18% Vref4 0.90 % 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 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Knock Sensor Processor 1 Performance	P06B6	This diagnostic checks for a fault with the internal test circuit (sensor #1) used only for the '20 kHz' method of the Open Circuit Diagnostic. A fault is present when the signal level from the 20 kHz range of the FFT output falls between the Open Test Circuit thresholds.	FFT Diagnostic Output	> P06B6_P06B7_OpenT estCktThrshMin AND < P06B6_P06B7_OpenT estCktThrshMax See Supporting Tables	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	Yes > 0.0 seconds > 550 RPM and < 8,500 RPM > 200 Revs > 10 mg/cylinder and < 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Weight Coefficient = 0.0100 Updated each engine event	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Cumulative Number of Engine Revs (per key cycle) within min/max Engine Speed enable (above) Engine Air Flow	Yes > 0.0 seconds > 550 RPM and < 8,500 RPM > 200 Revs > 10 mg/cylinder and < 2,000 mg/cylinder	First Order Lag Filter with Weight Coefficient Case 1 Weight Coefficient = 0.0100 Updated each engine event Case 2 Weight Coefficient = 0.0100 Updated each engine event	Type A, 1 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure Control Circuit High	P06DC	Controller specific output driver circuit diagnoses the oil pump low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	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 Illum.
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.	<p>Absolute Oil Pressure Error =</p> <p>ABS [Desired Oil Pressure - Measured Oil Pressure]</p> <p>A first-order lag filter is applied to the error value, every 100ms:</p> <p>Filtered Pressure Error = Previous Error + 0.00400 *(New Error - Previous Error)</p> <p><u>Fail from passing state:</u></p> <p>Filtered Oil Pressure Error is greater than a threshold AND the cyclor algorithm is unable to clear the fault.</p> <p><u>Pass from failing state:</u></p>	<p>Filtered Pressure Error > 40.00 kPa</p> <p>AND</p> <p>Cyclor Algorithm has cycled the pump solenoid for 1.80 seconds</p> <p>AND</p> <p>Filtered Pressure Error > P06DD_CVDOP_MaxPressErr after the cyclor is complete</p>	<p><u>Common Criteria:</u></p> <p>Closed Loop Pump Control Active</p> <p>Engine Running</p> <p>Powertrain Relay Voltage</p> <p>Desired Oil Pressure in Range</p> <p>Oil Temperature in Range</p> <p>Engine Speed in Range</p>	<p>> 11.00</p> <p>P06DD_CVDOP_MinDesPres < Desired Oil Pressure < P06DD_CVDOP_MaxDesPres</p> <p>40.00 °C < Oil Temp < 120.00 °C</p> <p>1,500 RPM <= Engine Speed <= 4,500</p>	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 Illum.
			Filtered Oil Pressure Error is less than a threshold	Filtered Pressure Error < P06DD_CVDOP_Max PressErr				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.	
DC/DC Converter Voltage SensorA Range/ Performance	P0E32	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	> 2 Volt	Diagnostic enabled	1	320 failed samples out of 400 samples in 12.50 ms loop	Type B, 2 Trips	
				If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active)	1	TRUE			
					TRUE				
					FALSE				
				Engine running OR Engine stopped	for > 160 loops in 12.50 ms loop for > 160 loops in 12.50 ms loop				
				Battery Voltage	>= 6.60 Volts				
			Stabilize Mode- Auto- Cranking: Absolute value of voltage difference between DC/ DC Converter Actuator Voltage Raw Value 1 and ECM Run/Crank	> 2 Volt	Diagnostic enabled	1			8 failed samples out of 16 samples in 12.50 ms loop
				If Global B electrical architecture Then (Run/Crank or Accessory) Else (Sensor Bus Relay On AND Sensor Bus Relay Fault Active)	1	TRUE			
					TRUE				
		FALSE							
		Engine auto-cranking	for>0 loops in 12.50 ms loop						
	Battery Voltage	>= 6.60 Volts							
Stablize Mode-Auto- Cranking Events: Number of failed auto- cranking events exceeds threshold	> 2 failed auto- cranking events	Diagnostic enabled	1	2 failed auto- crank events out of 3 consecutive auto-crank events					
		If Global B electrical architecture Then (Run/Crank or Accessory)	1		TRUE				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
DC/DC Converter Voltage SensorA Low	P0E33	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 1 TRUE TRUE FALSE >= 6.60 Volts	320 failed samples out of 400 samples in 12.50 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Voltage SensorA High	P0E34	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 1 TRUE TRUE FALSE >= 6.60 Volts	320 failed samples out of 400 samples in 12.50 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Voltage Sensor B Range/ Performance	P0E37	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	> 2 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 1 TRUE TRUE FALSE for > 160 loops in 12.50 ms loop for > 160 loops in 12.50 ms loop >= 6.60 Volts	320 failed samples out of 400 samples in 12.50 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	> 2 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 1 TRUE TRUE FALSE for > 0 loops in 12.50 ms loop >= 6.60 Volts	8 failed samples out of 16 samples in 12.50 ms loop	
			Stabilize 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 1 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 Illum.
					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 Illum.
DC/DC Converter Voltage Sensor B Low	P0E38	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 1 TRUE TRUE FALSE >= 6.60 Volts	320 failed samples out of 400 samples in 12.50 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Voltage Sensor B High	P0E39	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 1 TRUE TRUE FALSE >= 6.60 Volts	320 failed samples out of 400 samples in 12.50 ms loop	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Reset Error	P1005	This 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.	<p>If the diagnostic has detected that an unexpected reset has occurred:</p> <p>The time since last module reset event data value received from the FPDCM/FTZM is less than the previous value and also</p> <p>And</p> <p>The rollover occurred value received from the FPDCM/FTZM is false</p> <p>for</p> <p>out of total samples</p>	<p><=0.50 seconds</p> <p>>=2.00 counts</p> <p>>=400.00 counts</p>	<p>DTC is enabled</p> <p>Sensor bus relay is on</p> <p>Battery voltage</p> <p>No FTZM reconfiguration is requested for</p> <p>A new message that contains the FPDCM/FTZM reset data is received</p> <p>The following DTCs that diagnose the message that contains the FPDCM/FTZM reset data are not active:</p> <p>P1000</p> <p>U18A2</p>	<p>Enabled</p> <p>> 11.00 Volts</p> <p>1.00 second(s)</p>	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 Illum.
Fuel Pump Phase U-V- W Circuit Open	P1029	<p>This DTC detects if any of the 3phase fuel pump control circuits is Open [system configuration "Brushless"]</p> <p>The diagnostic can detect open circuit faults when the fuel pump is not rotating. In the "stopped" state, small currents are injected into each motor phase circuit pair by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. This process is completed in less than 1 millisecond. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are</p>	Phased-pair circuit voltage	3V <= V [back-EMF] <= 6V	<p>a) Sensed fuel pump speed</p> <p>b) Device configuration Chassis Fuel Pres System type</p> <p>c) Diagnostic is ..</p> <p>d) CAN Sensor Bus message \$3EC Available</p> <p>e) Sensor Bus Relay On</p> <p>f) Sensor Bus B Message \$3EC Temp Signal Message Counter Incorrect [Info7]</p>	<p>a) == 0 RPM</p> <p>b) == Brushless motor</p> <p>c) ENABLED</p> <p>d) == TRUE</p> <p>e) == TRUE</p> <p>f) == False</p>	<p>40.00 failures / 80.00 samples</p> <p>1 sample / 12.5 ms</p>	Type A, 1 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Phase U-V- W Circuit Low	P102A	<p>This DTC detects if the fuel pump control circuit is shorted to low [Short to Ground]</p> <p>The diagnostic detects short-to-ground faults using 2 methods depending on whether the fuel pump is rotating. 1) In the "rotating" state, voltage drop across each phase-pair high-side drive is monitored, or 2) in the "stopped" state, small currents are injected into each motor phase circuit pair by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-</p>	Phased-pair circuit voltage Difference	Vdelta > 0.145 V	a) Chassis Fuel Pres System type Device configuration b) Diagnostic is .. c) CAN Sensor Bus message \$3EC_Avail d) Sensor Bus Relay On e) Sensor Bus Message \$3EC Temp Signal Message Counter Incorrect [Info7]	a) == Brushless motor b) Enabled c) == TRUE d) == TRUE e) == False	40.00 failures / 80.00 samples 1 sample / 12.5 ms	Type A, 1 Trips
			Phased-pair circuit voltage	V [back-EMF] >= 6 V	a) Sensed fuel pump speed b) Chassis Fuel Pres System type Device configuration c) Diagnostic is .. d) CAN Sensor Bus message \$3EC Available e) Sensor Bus Relay On f) Sensor Bus Message \$3EC Temp Signal Message Counter Incorrect [Info7]	a) == 0 RPM b) == Brushless motor c) Enabled d) == TRUE e) == TRUE f) == False	40.00 failures / 80.00 samples 1 sample / 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		phase signal wherein only 2 phases are active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds. This open circuit diagnostic follows "smart device" Component Technical Specifications.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Phase U-V- W Circuit High	P102B	<p>This DTC detects if the fuel pump control circuit is shorted to high voltage [Short to Battery]</p> <p>The diagnostic detects short-to-battery faults using 2 methods depending on whether the fuel pump is rotating. 1) In the "rotating" state, voltage drop across each phase-pair low-side current shunt is monitored, or 2) in the "stopped" state, small currents are injected into each motor phase circuit pair by an internal fixed source and corresponding back-EMF voltage is monitored. A fault is reported when the monitored voltage falls into a specific range [adjusted for source voltage]. The FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the</p>	Phased-pair circuit voltage Difference	Vdelta > 0.4 V	a) Diagnostic is .. b) Device configuration Chassis Fuel Pressure SysType == FTZM Electronically Commutated c) CAN Sensor Bus message \$3EC_Avail d) Sensor Bus Relay On e) Sensor Bus Message \$3EC Temp Signal Message Counter Incorrect	a) Enabled b) == TRUE c) == TRUE d) == TRUE e) == False	40.00 failures/ 80.00 samples 1 sample / 12.5 ms	Type A, 1 Trips
			Phased-pair circuit voltage	V[backEMF] > 6 V	a) Diagnostic is .. b) Sensed fuel pump speed b) Device configuration Fuel Pressure System Type == FTZM Electronically Commutated c) CAN Sensor Bus message \$3EC_Avail d) Sensor Bus Relay On e) Sensor Bus Message \$3EC Temp Signal Message Counter Incorrect	a) Enabled b) == 0 RPM b) == TRUE c) == TRUE d) == TRUE e) == False	40.00 failures/ 80.00 samples 1 sample / 12.5 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless fuel pump speed is inferred using the rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 milliseconds. This open circuit diagnostic follows "smart device" Component Technical Specifications.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Q 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 Illum.
02 Sensor Heater Supply Voltage Sense Circuit Range/ Performance	P103B	<p>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.</p> <p>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.</p> <p>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.</p>	The absolute value of Heater Supply Voltage delta from Run Crank voltage	> 2.00 volts	<p>Diagnostic is Enabled</p> <p>Powertrain relay in range (Relay in range is defined as relay voltage</p> <p>Run Crank signal active</p>	<p>= True</p> <p>> 11.00 volts)</p> <p>= True</p> <p>(Please see “Run/Crank Active conditions” in Supporting Tables)</p>	<p>8 failures out of 10 samples</p> <p>250 ms / sample</p> <p>Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Heater Supply Voltage Sense Circuit Low	P103C	<p>The P103C diagnostic determines if the heater supply circuit is low by comparing the heater supply voltage to the threshold.</p> <p>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.</p> <p>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.</p>	Heater Supply Voltage	< 6.00 volts	<p>Diagnostic is Enabled</p> <p>Powertrain relay in range (Relay in range is defined as relay voltage</p> <p>Run Crank signal active</p>	<p>= True</p> <p>> 11.00 volts)</p> <p>= True</p> <p>(Please see “Run/Crank Active conditions” in Supporting Tables)</p>	<p>8 failures out of 10 samples</p> <p>250 ms / sample</p> <p>Continuous</p>	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 >315.00 degrees <305.00 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	ECCR_EngineOutlet_FA VECR_MRV_LoC_FA VECR_MRV_PstnSnsrCkt_FA VECR_MRV_PstnSnsrCkt_TFTKO VECR_MRV_PstnPerf_FA = Enabled = Successful or Inprogress ->-40.0 °C = TRUE <9,999.0 °C = Inactive	Within 60.0 seconds after engine shutdown.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant 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 Illum.
Cylinder 1 Injection Pulse Performance	P10A3	Diagnostic to determine if injection pulse total compensation for cylinder 1 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag _TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	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 Illum.
Cylinder 1 Injection Pulse Performance	P10A4	Diagnostic to determine if injection pulse total compensation for cylinder 1 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> P10A4 P10A6 P10A8 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 Illum.
Cylinder 2 Injection Pulse Performance	P10A5	Diagnostic to determine if injection pulse total compensation for cylinder 2 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag _TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	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 Illum.
Cylinder 2 Injection Pulse Performance	P10A6	Diagnostic to determine if injection pulse total compensation for cylinder 2 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> P10A4 P10A6 P10A8 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 Illum.
Cylinder 3 Injection Pulse Performance	P10A7	Diagnostic to determine if injection pulse total compensation for cylinder 3 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag_TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	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 Illum.
Cylinder 3 Injection Pulse Performance	P10A8	Diagnostic to determine if injection pulse total compensation for cylinder 3 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> P10A4 P10A6 P10A8 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 Illum.
Cylinder 4 Injection Pulse Performance	P10A9	Diagnostic to determine if injection pulse total compensation for cylinder 4 is less than the minimum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	< P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) FULR_b_FPV_MeasDiag _TFTKO Uncompensated Injection Pulse Width (Injection is commanded)	= True = True > 0	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 Illum.
Cylinder 4 Injection Pulse Performance	P10AA	Diagnostic to determine if injection pulse total compensation for cylinder 4 is greater than the maximum fail limit. The injection pulse total compensation is the sum of the opening magnitude and closing time compensation. Opening Magnitude and closing time compensation are determined using the voltage feedback across the injector enable and command wires.	Total Injection Small Pulse compensation	> P10A4 P10A6 P10A8 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 Illum.
Barometric Pressure Sensor AZ C Correlation	P10BC	<p>Detects a performance failure in the Barometric Pressure (BARO) sensor, such as when a BARO value is stuck in range.</p> <p>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.</p>	Difference between BARO A Sensor reading and BARO C Sensor reading	> 15.0 kPa	<p>Diagnostic is Enabled</p> <p>LIN communications established with MAF</p>		<p>160 failures out of 200 samples</p> <p>1 sample every 25 msec</p>	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 threshold based on High pressure Pump.	Engine Speed Battery Voltage	≥ 50 RPM ≥ 11 Volts Not in pump device control Enabled when a code clear is not active or not exiting device control	20 failures out of 40 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Inlet Airflow System Performance (single turbo)	P1101	<p>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.</p> <p>This diagnostic is performed using the Intake Flow Rationality Diagnostic (IFRD). IFRD calculates modeled values of sensors from these four sensors.</p> <p>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</p>	<p>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.</p> <p>MAF model fails when ABS(Measured Flow - Modeled Air Flow) Filtered</p> <p>MAPI model fails when ABS(Measured MAP - MAP Model 1) Filtered</p> <p>MAP2 model fails when ABS(Measured MAP - MAP Model 2) Filtered</p> <p>MAP3 model fails when ABS(Measured MAP - MAP Model 3) Filtered</p> <p>TIAP1 model fails when ABS(Measured TIAP - TIAP Model 1) Filtered</p> <p>TPS model fails when Filtered Throttle Model Error</p> <p>TIAP Correlation model fails when High Engine Air Flow is TRUE AND Measured TIAP -</p>	<p>> 25.0 grams/sec</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 350 kPa*(g/s)</p>	<p>Engine Speed Engine Speed</p> <p>(Coolant Temp OR OBD Coolant Enable Criteria</p> <p>(Coolant Temp OR OBD Max Coolant Achieved</p> <p>Intake Air Temp Intake Air Temp</p> <p>Powertrain Relay Voltage for a period of time</p> <p>Minimum total weight factor (all factors multiplied together)</p> <p>See Residual Weight Factor tables.</p>	<p>>= 400 RPM <= 5,700 RPM</p> <p>>= -9 Deg C</p> <p>= TRUE)</p> <p><= 130 Deg C</p> <p>= FALSE)</p> <p>-20 Deg C <= 125 Deg C</p> <p>>= 9.1 Volts >= 0.2 Seconds</p> <p>>= 0.50</p> <p>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</p> <p>MAP Model 1 Error multiplied by</p>	<p>Continuous</p> <p>Calculation are performed every 12.5 msec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		the system, but no single failed sensor can uniquely be identified. In this case, the Inlet Airflow System Performance diagnostic will fail.	<p>measured MAP - offset as a function of engine speed See table P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset</p> <p>OR</p> <p>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</p> <p>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</p> <p>High Engine Air Flow is TRUE when Mass Air Flow</p>	<p>> 30.0 kPa</p> <p>> 30.0 kPa</p> <p>> 1.0 seconds</p> <p>> 1.0 seconds</p> <p>> a threshold in gm sec as a function of engine speed See table P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow</p>	No Active DTCs:	<p>P0101, P0106, P0121, P012B, P0236, P1101: MAP1 Residual Weight Factor based on RPM</p> <p>MAP Model 2 Error multiplied by P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM</p> <p>MAP Model 3 Error multiplied by P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM</p> <p>TIAP Model 1 Error multiplied by P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM</p> <p>Filtered Throttle Model Error multiplied by P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM</p> <p>MAP_SensorCircuitFA EGRValvePerformance_F A MAF_SensorCircuitFA CrankSensor_FA ECT_Sensor_FA IAT_SensorFA MnfdTempSensorFA TC_BoostPresSnsrCktFA</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>AND Manifold Pressure</p> <p>AND Filtered Mass Air Flow - Mass Air Flow</p> <p>Low Engine Air Flow is TRUE when Mass Air Flow</p> <p>AND Manifold Pressure</p> <p>AND Mass Air Flow - Filtered Mass Air Flow</p>	<p>> a threshold in kPa as a function of engine speed See table P0101, P0106, P0121, P0236, P1101: TIAP- MAP Correlation Min MAP</p> <p>< 3.0 gm/sec</p> <p>< a threshold in gm sec as a function of engine speed See table P0101, P0106, P0121, P0236, P1101: TIAP- Baro Correlation Max Air Flow</p> <p>< a threshold in kPa as a function of engine speed See table P0101, P0106, P0121, P0236, P1101: TIAP- Baro Correlation Max MAP</p> <p>< 2.0 gm/sec</p>	<p>No Pending DTCs:</p> <p>Diagnostic is Enabled</p>	<p>AmbientAirDefault</p> <p>EGRValve_FP ECT_Sensor_Ckt_FP IAT_SensorCircuitFP MnfdTempSensorCktFP</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT SIDI High Pressure Rail Temperature Sensor Performance	P111F	This DTC Diagnoses Fuel Temperature sensors rationality by comparing Primary sensor (T1) vs. Secondary sensor (T2)	Fuel Temperature Error (Absolute delta between sensor1 and sensor2)	> 15.00 degC	<p>Fuel Temperature Rationality Diagnostic Enabled</p> <p>No Fault Active on</p> <p>No Fault Pending on</p>	<p>True</p> <p>Enabled when a code clear is not active or not exiting device control</p> <p>Temperature sensors 1 out of range Low or High Fault Active (P0182, P0182)</p> <p>Temperature sensors 2 out of range Low or High (P0187, P0188)</p> <p>SENT Communication Fault Active (U0625, U101B, U0670, U0671)</p> <p>SENT Intenal Error Fault Active (P126E, P126F)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Active (P128C, P128D)</p> <p>SENT Communication Fault Pending (U0625, U101B, U0670, U0671)</p> <p>Fuel Temperature Sensor SENT Message Error Fault Pending (P128C, P128D)</p>	<p>100.00 failures out of 125.00 samples</p> <p>100 ms per Sample Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module 5V Reference 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 6.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module 5V Reference 2 Circuit	P1177	This DTC monitors for an error in the Fuel Pump Driver Control Module 5V Reference 2 Circuit.	Raw Fuel Pump Driver Control Module 5V Reference 2 is 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 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 6.00 milliseconds.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit	P1178	This DTC monitors for an error in the Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit	Raw Fuel Pump Driver Control Module Fuel Level Sensor 1 Internal Supply Circuit is 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 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 Illum.
Injector 1 low side circuit shorted to high side circuit	P1248	Controller specific output driver circuit diagnoses injector 1 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 low side circuit shorted to high side circuit	P1249	Controller specific output driver circuit diagnoses injector 2 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector3 low side circuit shorted to high side circuit	P124A	Controller specific output driver circuit diagnoses injector 3 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 low side circuit shorted to high side circuit	P124B	Controller specific output driver circuit diagnoses injector 4 high sided driver for a short to low sided driver failure when the output is powered on by comparing a voltage measurement to controller specific voltage threshold	Voltage measurement outside of controller specific acceptable range during driver on state indicates high sided driver for a short to low sided driver failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for high sided driver for a short to low sided driver failure.	25 amp >= through low side driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Over Temperature	P1255	<p>To detect if an internal fuel pump driver over-temperature condition exists under normal operating conditions.</p> <p>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.</p>	Fuel Pump Driver Temperature	T > 160 degC	<p>a) Diagnostic is ..</p> <p>b) Sensor Bus Relay On</p> <p>c) CAN Sensor Bus message \$3EC_Available</p> <p>d) Sensor Bus Message \$3EC Temp Signal Message Counter Incorrect [CFMR_b_FTZM_Info7_A RC_ChkErr]</p>	<p>a) Enabled</p> <p>b) == TRUE</p> <p>c) == TRUE</p> <p>d) <> TRUE</p>	<p>5.00 failures/ 10.00 samples</p> <p>1 sample / 100 millisec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail Temperature Sensor 1 Internal Fault - Error Code	P126E	This DTC Diagnoses the SENT Fuel Temperature Sensor 1 internal failure	Fuel Temperature Sensor 1 SENT digital read value	$\geq 4,089.00$	No Fault Active on No Fault Pending 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) Fuel Temperature Sensor SENT Message Error Fault Pending (P128C)	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail 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	$\geq 4,089.00$	No Fault Active on No Fault Pending 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) Fuel Temperature Sensor SENT Message Error Fault Pending (P128D)	50.00 failures out of 62.00 samples 100 ms per Sample Continuous	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SENT Fuel Rail High Pressure Sensor 2 Out of Range	P127C	<p>This DTC diagnose SENT high pressure sensor 2 that is too low out of range.</p> <p>If the sensor digital value (repressing 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.</p>	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 Illum.
SENT Fuel Rail Pressure Sensor 1 Internal Performance	P128A	This DTC determines if there is internal error within the SENT pressure sensor 1 (i.e. Broken wire bond internal to the SENT Sensor). Once the internal error is detected a fixed faulted digital values is communicated to the ECU.	Digital pressure sesnor 1 value	>= 4,089	SENT Fuel Rail Pressure Sensor Internal Performance Enable 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 Illum.
SENT Fuel Rail Pressure Sensor 2 Internal Performance	P128B	This DTC determines if there is internal error within the SENT pressure sensor 2 (i.e. Broken wire bond internal to the SENT Sensor). Once the internal error is detected a fixed faulted digital values is communicated to the ECU.	Digital pressure sesnor 2 value	>= 4,089	SENT Fuel Rail Pressure Sensor Internal Performance Enable 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 Illum.
SENT Fuel Rail Pressure &Temperature Sensor Temperature 1 Message Incorrect	P128C	This DTC diagnoses the the communication errors on the temperature 1 serial data channel	Serial Message 1 Age	>= 0.03 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 Illum.
SENT Fuel Rail Pressure & Temperature Sensor Temperature 2 Message Incorrect	P128D	This DTC diagnoses the the communication errors on the temperature 2 serial data channel	Serial Message 2 Age	>= 0.03 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 Illum.
SENT Fuel Rail Pressure & Temperature Sensor Pressure Message Incorrect	P128F	This DTC determines if there is any SENT signal waveform for discrepancies (i.e. too many pulse, too few pulse, clock shift). The SENT HWIO Determines message waveform fault (i.e.too many pulse, too few pulse, clock shift) and if the message age is too long.	SENT HWIO Determines message fault (i.e.too many pulse, too few pulse, clock shift) Message Age	= true > 1.69 ms	SENT signal Serial waveform diagnostics enable SENT power up delay No Fault Active on	True >= 0.00 seconds Enabled when a code clear is not active or not exiting device control U0625 P16E5	400 failures out of 500 samples 6.25 ms per sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Fuel Pump Speed Signal Incorrect	P129F	FTZM ERFS control samples back-Electromotive Force [EMF] for zero voltage-level crossings as a detection method to enable closed loop control brushless commutation. Back EMF is an electrical characteristic of the inactive phase of the 3-phase signal wherein only 2 phases are active at any moment. Brushless pump speed is inferred using rate of zero-crossings detection and number of motor pole-pairs. Speed is reported to the ECM as serial data every 10 millisecs. Diagnostic software [FABR ring] calculates the error between the commanded, arbitrated fuel pump speed [FCBR ring] and the FTZM sensed fuel pump speed. The error is filtered and evaluated against calibratable threshold limits to determine pass/fail status. Any failure that exists on the fuel pump output circuit (3 phases) will be manifested in a Fuel Pump Speed	Sensed Filtered Fuel Pump Speed Error	<p>> Speed Error Low Threshold [Supporting Table] P129F Threshold Low</p> <p>OR</p> <p>< Speed Error High Threshold [Supporting Table] P129F Threshold High</p>	<p>a) Diagnostic is ..</p> <p>b) CAN Sensor Bus message \$0CB_Available</p> <p>c) FABR Fuel Control Enable Fault Active</p> <p>d) Fuel Pmp Speed Command Alive Rolling Count and Checksum Error [CAN Bus B \$0CE] [CFMR_b_FTZM_Cmd1_ARC_ChkErr]</p> <p>e) FABR Fuel Pump Ckt FA</p> <p>f) FABR Driver OverTemp FA</p> <p>g) Run_Crank input Voltage</p> <p>h) Sensor Bus Relay On</p> <p>j) CAN Sensor Bus message \$0CB Data Fault [CFMR_b_FTZM_Info8_ARC_ChkErr]</p> <p>k) CAN Sensor Bus message \$0CB Comm Fault [CFMR_b_FTZM_Info8_UcodeCmFA]</p> <p>l) Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [CFMR_b_FTZM_Cmd1_UcodeCmFA]</p> <p>m) Timer - FABR Rising Edge Diagnostic Delay</p> <p>n) Timer - FABR Falling Edge Diagn Delay</p>	<p>a) Enabled</p> <p>b) == TRUE</p> <p>c) <> TRUE</p> <p>d) <> TRUE</p> <p>e) <> TRUE</p> <p>f) <> TRUE</p> <p>g) > 9.00 volts</p> <p>h) == TRUE</p> <p>j) <> TRUE</p> <p>k) <> TRUE</p> <p>l) <> TRUE</p> <p>m) > 2.20 seconds</p> <p>n) > 1.00 seconds</p>	1 sample / 12.5 msec	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Driver Control Module Enable Circuit Performance	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 done by comparing the fuel control enable circuit state [high or low] sensed by the Fuel Tank Zone Module device to the commanded state of the fuel control enable signal from the ECM [in serial data]. When the sensed state does not match the commanded state, the fail counter increments.	Sensed Fuel Control Enable circuit state [Fuel Tank Zone Module device]	<> Fuel Control Enable Active command [serial data]	a) Diagnostic is .. b) Sensor Bus message \$0CC Fuel Pump Command Message Signal Counter Incorrect [CFMR_b_FTZM_Info2_ARC_ChkErr] c) CAN Sensor Bus message \$OCC_Available d) Sensor Bus Relay On e) Timer [FABR t RunCrankActive]	a) Enabled b) <> TRUE c) == TRUE d) == TRUE e) >= 0.51 seconds	40.00 failures / 80.00 samples 1 sample / 12.5 millisec	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	<p>Reported iteration number exceeds threshold.</p> <p>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.</p> <p>Two cases are considered as failure:</p> <p>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.</p> <p>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.</p>	> 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			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 Illum.
			<p>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.</p> <p>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.</p>	Solution plus upper bound > 10.00.				
			<p>Reported iteration number is negative.</p> <p>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:</p> <p>1) the torque solver</p>	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 Illum.
			<p>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.</p> <p>2) the torque solver returns a solution and is not in Case1, 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.</p>					

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	<= -12.09° >= 122.00°	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 (hysteresis disable < 10.00 V) VECR_BRV_PstnFdbk_A v VECR_BRV_PstnFdbk_F ol PowertrainRelayStateOn_ FA Powertrain Relay Feedback Circuit DTCs P0689, P0690 = True >= -34.00 °C (hysteresis disable <= -35.00 °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 B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Oil Pressure 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 Illum.
Cold Start Emissions Reduction System Fault	P1400	Model based test computes power from exhaust flow and thermal energy resulting from elevated idle speed and retarded spark advance. Detects if the cold start emission reduction system has failed resulting in the delivered power being out of range.	<p>Average desired accumulated exhaust power - Average actual accumulated exhaust power (too much energy delivered to catalyst)</p> <p>Average desired accumulated exhaust power - Average actual accumulated exhaust power (too little energy delivered to catalyst)</p> <p>(EWMA filtered)</p> <p>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 accumulated power would use the final commanded spark and actual engine speed. Refer to the Supporting Tables for details</p>	<p>< -32.00 KJ/s (high RPM failure mode)</p> <p>> 20.00 KJ/s (low RPM failure mode)</p>	<p>To enable the diagnostic, the Cold Start Emission Reduction Strategy must be Active per the following:</p> <p>Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure</p> <p>The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:</p> <p>Catalyst Temperature AND Engine Run Time</p> <p>OR</p> <p>Engine Run Time</p> <p>OR</p> <p>Barometric Pressure</p>	<p>< 500.00 degC AND > -12.00 degC AND <= 66.00 degC AND >= 72.00 KPa</p> <p>>= 800.00 degC AND >= 22.00 seconds</p> <p>> P1400_CatalystLightOffExtendedEngineRunTimeExit</p> <p>This Extended Engine run time exit is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details.</p> <p>< 72.00 KPa</p>	<p>Runs once per trip when the cold start emission reduction strategy is active</p> <p>Frequency: 100ms Loop</p> <p>Test completes after 8 seconds of accumulated qualified data.</p>	EWMA Based - Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>Other Enable Criteria:</p> <p>OBD Manufacturer Enable Counter</p> <p>Vehicle Speed</p> <p>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</p> <p>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:</p> <p>Pedal Close Delay Timer</p> <p>the diagnostic will continue the calculation.</p> <p>A change in gear will initiate a delay in the calculation of the average qualified residual value to</p>	<p>0</p> <p><1.24MPH</p> <p>0</p> <p>(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)</p> <p>> 5.00 seconds</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>allow time for the actual engine speed and actual final commanded spark to achieve their desired values. Therefore, when the:</p> <p>Gear Shift Delay Timer</p> <p>the diagnostic will continue the calculation</p> <p>For Manual Transmission vehicles:</p> <p>Clutch Pedal Position</p> <p>Clutch Pedal Position</p> <p>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.</p> <p>The time weighting factor must be :</p>	<p>> 1.50 seconds</p> <p>> 88.00 %</p> <p><16.00%</p> <p>>0 These are scalar values that are a function of engine run time. Refer to</p>		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Level SensorA 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 Ref V Period]	> 25.00 millise	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 millise	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 Illum.
					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 Illum.
EVAP Purge Pump On Speed Performance	P1467	Purge pump speed does not match requested pump speed when pump is commanded on	<p>Purge pump speed</p> <p>Purge pump speed</p>	<p>> 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</p> <p>< 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</p>	<p>Diagnostic is Enabled</p> <p>Propulsion system on</p> <p>Purge pump commanded on</p> <p>LIN data available for</p> <p>Outside Air Temp</p> <p>Powertrain relay voltage</p> <p>Barometric pressure</p> <p>Time delay</p> <p>Purge Pump Over Temperature Status</p> <p>No active DTCs</p>	<p>> 2 counts</p> <p>>-20 °C</p> <p>>11.0 volts</p> <p>>70 kPa</p> <p>> 14 seconds for purge pump speed to spool up (pump off to on)</p> <p>= False</p> <p>P1469 - Purge Pump Speed OOR Low</p> <p>P146A- Purge Pump Speed OOR High</p> <p>P148E - Purge Pump Voltage OOR Low</p> <p>P148F - Purge Pump Voltage OOR High</p> <p>P1490 - Purge Pump Voltage Performance</p> <p>P14A4-EVAP Purge Pump Temperature Too High</p>	<p>100 failures out of 125 samples</p> <p>100 msec / sample</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					No pending DTC's	Purge Pump LIN Communication Fault Active AmbientAirDefault OAT_AmbientSensorFA P1469 - Purge Pump Speed OOR Low P146A- Purge Pump Speed 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 Illum.
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 Propulsion system on Purge pump commanded off LIN data available for Powertrain relay voltage Time delay No active DTCs No pending DTCs	>2 counts >11.0 volts >21 seconds for purge pump speed to spool up (pump on to off) 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 P1469 - Purge Pump Speed OOR Low P146A- Purge Pump Speed OOR High	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 Illum.
						Purge Pump LIN Communication Fault Pending		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP Purge Pump Speed Too Low	P1469	Purge pump speed signal is out of range low	Purge pump speed	< -100RPM	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 Illum.
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 Illum.
EVAP Purge Pump System Performance (Continuous Flow Version)	P146B	<p>Purge pump system flow performance, based on pressure sensor feedback, is too low or too high.</p> <p>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.</p>	<p>Purge pump flow ratio low</p> <p>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</p> <p>Purge pump flow ratio high</p> <p>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</p>	<p>< 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 pressure</p> <p>> 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</p>	<p>Diagnostic is Enabled</p> <p>Propulsion system on</p> <p>Conditions for Estimated Ambient Temperature Using OAT Sensor to be Valid (read description for details)</p> <p>Outside Air Temperature</p> <p>Outside Air Temperature</p> <p>Barometric Pressure</p> <p>Pump speed on timer</p> <p>No device control</p> <p>Averaging of pump pressure sensor reading is valid</p> <p>Purge is enabled</p> <p>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</p> <p>LIN data available for</p> <p>LIN IAT data available</p> <p>Powertrain relay voltage</p>	<p>= TRUE</p> <p>>0 °C</p> <p><50 °C</p> <p>>70 kPa</p> <p>> 14 seconds</p> <p>= TRUE</p> <p>= TRUE</p> <p>> 5.0 Seconds</p> <p>>2 counts</p> <p>>11.0 volts</p>	<p>80 failures out of 100 samples</p> <p>100 msec / sample</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>*****</p> <p>When entering or re-entering the enable criteria in this section a delay timer needs to expire</p> <p>Engine RPM to enable Engine RPM to remain enabled</p> <p>Engine airflow to enable Engine airflow to remain enabled</p> <p>Purge solenoid DC to enable Purge solenoid DC to remain enabled</p> <p>Purge gas flow ratio to enable</p> <p>Purge gas flow ratio to remain enabled</p> <p>Purge flow to enable Purge flow to remain enabled</p> <p>Induction vacuum to</p>	<p>*****</p> <p>> 1.0 Seconds</p> <p>400 RPM <X<6,800 RPM 350 RPM <X<6,850 RPM</p> <p>0 g/s <X<90 g/s -5 g/s <X<95 g/s</p> <p>5<X<101 % 2<X<104%</p> <p>Purge System Low Purge Flow Enable <X< Purge System High Purge Flow Enable in Supporting Tables.</p> <p>Purge System Low Purge Flow Remain Enabled <X< Purge System High Purge Flow Remain Enabled in Supporting Tables.</p> <p>0.0 <X<1.5 g/s -0.1 <X<1.6 g/s</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enable Induction vacuum to remain enabled Vehicle Speed to enable Vehicle Speed to remain enabled IAT to enable IAT to remain enabled Purge DC change per 100 ms loop to enable Purge DC change per 100 ms loop to remain enable ***** No active DTCs	<0.3 kPa <0.5 kPa >3.1 mph >1.9mph 0.0 <X< 100.00 deg C -5.0 <X< 105.00 deg C X< 5.0 % X< 6.0 % ***** 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 - Purue Pumo		

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

24OBDG03D Part 1 ECM Summary Tables

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Purge pump speed No active DTCs	>35,000 RPM 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 Illum.
					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 Illum.
EVAP Purge Pump Pressure Sensor Circuit Low Voltage	P146D	<p>This DTC will detect a Purge Pump Pressure sensor signal that is too low out of range.</p> <p>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.</p> <p>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.</p>	<p>Purge pump pressure sensor signal</p> <p>The normal operating range of the purge pump pressure sensor is 0.5 volts (~ -6000 Pa) to 4.5 volts (~ 26000 Pa).</p>	<3.0% of 5Vref(0.1 V or -8,800 Pa)	Diagnostic is 1.00		<p>1,280 failures out of 1,600 samples</p> <p>6.25 ms /sample</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP Purge Pump Pressure Sensor Circuit High Voltage	P146E	<p>This DTC will detect a Purge Pump Pressure sensor signal that is too high out of range.</p> <p>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.</p> <p>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.</p>	<p>Purge pump pressure sensor signal</p> <p>The normal operating range of the purge pump pressure sensor is 0.5 volts (~ -6000 Pa) to 4.5 volts (~ 26000 Pa).</p>	>97.0% of 5 Vref (4.9 V or 28,800 Pa)	Diagnostic is 1.00		<p>1,280 failures out of 1,600 samples</p> <p>6.25 ms /sample</p>	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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.	<p>illuminated.</p> <p>The EWMA calculation uses a 0.20 weighting coefficient.</p> <p>The DTC light can be turned off if the EWMA is and stays below the EWMA fail threshold for 3 additional consecutive trips.</p>	<0.40 (EWMA Re-Pass Threshold)				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP Purge Pump Voltage Sensor Circuit Low	P148E	<p>This DTC will detect a purge pump voltage sensor signal that is out of range low (short to ground or open circuit).</p> <p>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.</p>	Purge pump voltage sensor reading	<3.5 volts	<p>Diagnostic is Enabled</p> <p>LIN data available for</p> <p>Powertrain relay voltage</p> <p>No active DTCs</p> <p>Np pending DTCs</p>	<p>> 2 counts</p> <p>>11.0 volts</p> <p>Purge Pump LIN Communication Fault Active</p> <p>Purge Pump LIN Communication Fault Pending</p>	<p>50 failures out of 63 samples</p> <p>100 ms /sample</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
EVAP Purge Pump Voltage Sensor Circuit High	P148F	<p>This DTC will detect a purge pump voltage sensor signal that is out of range high (short to power).</p> <p>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.</p> <p>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.</p>	Purge pump voltage sensor reading	>28.0 volts	<p>Diagnostic is Enabled</p> <p>LIN data available for</p> <p>Powertrain relay voltage</p> <p>No active DTCs</p> <p>Np pending DTCs</p>	<p>> 2 counts</p> <p>>11.0 volts</p> <p>Purge Pump LIN Communication Fault Active</p> <p>Purge Pump LIN Communication Fault Pending</p>	<p>50 failures out of 63 samples</p> <p>100 ms /sample</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Propulsion system on Powertrain relay voltage Engine not cranking Voltage stabilization delay time after engine crank (> 2 seconds) LIN data available for No Active DTC's No Pending DTC's	>11.0 volts P148E - Purge Pump Voltage OOR Low P148F - Purge Pump Voltage OOR High Purge Pump LIN Communication Fault Active P148E - Purge Pump Voltage OOR Low P148F - Purge Pump Voltage OOR High 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 Illum.
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.	<p>This sensor is compared to two other sensors for this diagnostic to function.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr2</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5</p> <p>Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6</p> <p>The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the</p>		<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>Propulsion system Inactive timer error</p> <p>Sensor under diagnosis is not faulted</p> <p>Used comparison sensors are not currently faulted:</p> <ul style="list-style-type: none"> - BiasChkCylHdCIntSnsr - BiasChkBlockCIntSnsr - BiasChkEngInCIntSnsr - BiasChkEngOutCIntSnsr - BiasChkHtrCrInCIntSnsr - BiasChkHtrCrOutCIntSnsr - BiasChkRadOutCIntSnsr - BiasChkByplnCIntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmS 	<p>OAT_PtEstFiltFA PSAR_PropSysInactiveCr s_FA = FALSE</p> <p>EECR_TS2_CktFA</p> <p>EECR_CylHeadCoolant_CktFA EECR_BlockCoolant_CktFA EECR_EngineInlet_CktFA</p> <p>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 EGRTempSensorUPSS_FA</p>	<p>1 failure to set DTC 1 sec/ sample Once per valid cold start</p>	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Comparison sensor 2: CeEECR_e_BiasChkByp InCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater: CeEECR_e_AuxHeaterN ©Effect Threshold A: Threshold B: Head Coolant: CeEECR_e_PhysSnsr6 Comparison sensor 1: CeEECR_e_BiasChkBlo ckCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkByp InCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B: Heater Inlet: CeEECR_e_NoPhysAss gnmnt Comparison sensor 1: CeEECR_e_BiasChkByp InCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlo ckCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater:	12.44 °C 12.44 °C 20.03 °C 8.69 °C	===== Comparison sensor 1 & 2 are not ===== 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 There are 4 different types of aux heater detection for this application: 2x2 signature	= CeEECR_e_BiasChkNoS election Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA CeAEHR_e_BlkHtrBlock CIntSnsr CeAEHR_e_BlkHtrRadO utCIntSnsr >7.67 °C >21,600 seconds >21,600 seconds >-20.00 °C Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B:	17.82 °C 7.74 °C	Absolute Drop IAT Drop Temperature Derivative	Enabled Disabled Disabled		
			Heater Outlet: CeEECR_e_NoPhysAssgnmnt Comparison sensor 1: CeEECR_e_BiasChkHtrCrlnClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBypInClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B:	18.83 °C 9.84 °C	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)	CeAEHR_e_BlkhtrCylHdClntSnsr CeAEHR_e_BlkhtrFuelsnsr CeAEHR_e_BlkhtrRadOutClntSnsr CeAEHR_e_BlkhtrOutsideAirSnsr 10.0 °C 5.0 °C >12.0 °C		
			Radiator Outlet: CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B:	19.49 °C 17.85 °C	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 Insufficient coolant flow is present for	CeAEHR_e_BlkhtrBlockClntSnsr >87.00 L/min 0.1 -20.0 seconds < 80.0 seconds >300.0 seconds		
			A failure will be reported if anv of the followinga		A block heater is detected			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>conditions are met. Evaluated in order:</p> <p>1) This sensor is above both comparison sensors</p> <p>2) This sensor is below both comparison sensors</p> <p>3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew</p> <p>4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew</p>	<p>>A °C</p> <p>>A °C</p> <p>>B °C</p> <p>>B °C</p>	<p>if a drop is</p> <p>IAT Drop Criteria: The sensor will be used as IAT for this method</p> <p>A block heater will be detected if:</p> <p>IAT has a drop of during a drive defined by: Drive time Vehicle speed</p> <p>Additional drive time is provided when vehicle speed drops below above threshold as follows</p> <p>This detection method will abort if the engine is off OR Engine runtime</p> <p>Temperature Derivative Criteria: Derivative will be monitored using</p> <p>Derivative will be monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficient coolant flow is present for</p>	<p>>2.0 °C</p> <p>CeAEHR_e_BlkHtrIntake AirSnsr</p> <p>>5.0 °C</p> <p>>400.0 seconds >24.0kph</p> <p>0.5 times the seconds with vehicle speed below the threshold above</p> <p>> 180.0 seconds > 1,800 seconds</p> <p>CeAEHR_e_BlkHtrBlock CIntSnsr</p> <p>>-1.00 L/min</p> <p>5.0 -15.0 seconds</p> <p>< 75.0 seconds</p> <p>>300.0 seconds</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
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.	<p>This sensor is compared to two other sensors for this diagnostic to function.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr5</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5</p> <p>Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6</p> <p>The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the</p>		<p>Diagnostic is Enabled</p> <p>No Active DTCs</p> <p>Propulsion system Inactive timer error</p> <p>Sensor under diagnosis is not faulted</p> <p>Used comparison sensors are not currently faulted:</p> <ul style="list-style-type: none"> - BiasChkCylHdCIntSnsr - BiasChkBlockCIntSnsr - BiasChkEngInCIntSnsr - BiasChkEngOutCIntSnsr - BiasChkHtrCrInCIntSnsr - BiasChkHtrCrOutCIntSnsr - BiasChkRadOutCIntSnsr - BiasChkByplnCIntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmS 	<p>OAT_PtEstFiltFA PSAR_PropSysInactiveCr s_FA = FALSE</p> <p>EECR_TS5_CktFA</p> <p>EECR_CylHeadCoolant_CktFA EECR_BlockCoolant_CktFA EECR_EngineInlet_CktFA</p> <p>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 EGRTempSensorUPSS_FA</p>	<p>1 failure to set DTC 1 sec/ sample Once per valid cold start</p>	Type B, 2 Trips

[illegible]

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Comparison sensor 2: CeEECR_e_BiasChkByp InCntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater: CeEECR_e_AuxHeaterN ©Effect Threshold A: Threshold B:	12.44 °C 12.44 °C	Comparison sensor 1 & 2 are not ===== Aux Heat Detection Aux heat detection can only be enabled the following are met:	= CeEECR_e_BiasChkNoS election		
			Head Coolant: CeEECR_e_PhysSnsr6 Comparison sensor 1: CeEECR_e_BiasChkBlo ckCntSnsr Comparison sensor 2: CeEECR_e_BiasChkByp InCntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B:	20.03 °C 8.69 °C	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	Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA CeAEHR_e_BlkhtrBlock CntSnsr CeAEHR_e_BlkhtrRadO utCntSnsr >7.67 °C		
			Heater Inlet: CeEECR_e_NoPhysAss gnmnt Comparison sensor 1: CeEECR_e_BiasChkByp InCntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlo ckCntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater:		Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature There are 4 different types of aux heater detection for this application: 2x2 signature Absolute Drop	>21,600 seconds >21,600 seconds >-20.00 °C Enabled Enabled		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B:	17.82 °C 7.74 °C	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)	Disabled Disabled CeAEHR_e_BlkHtrCylHdClntSnsr CeAEHR_e_BlkHtrFuelSnsr CeAEHR_e_BlkHtrRadOutClntSnsr CeAEHR_e_BlkHtrOutsideAirSnsr 10.0 °C 5.0 °C >12.0 °C		
			Heater Outlet: CeEECR_e_NoPhysAssgnmnt Comparison sensor 1: CeEECR_e_BiasChkHtrCrlnClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBypInClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B:	18.83 °C 9.84 °C	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 Insufficient coolant flow is present for	CeAEHR_e_BlkHtrBlockClntSnsr >87.00 L/min 0.1 -20.0 seconds < 80.0 seconds >300.0 seconds		
			Radiator Outlet: CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B:	19.49 °C 17.85 °C	A block heater is detected			
			A failure will be reported if any of the followinga					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>conditions are met. Evaluated in order:</p> <p>1) This sensor is above both comparison sensors</p> <p>2) This sensor is below both comparison sensors</p> <p>3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew</p> <p>4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew</p>	<p>>A °C</p> <p>>A °C</p> <p>>B °C</p> <p>>B °C</p>	<p>if a drop is</p> <p>IAT Drop Criteria: The sensor will be used as IAT for this method</p> <p>A block heater will be detected if:</p> <p>IAT has a drop of during a drive defined by: Drive time Vehicle speed</p> <p>Additional drive time is provided when vehicle speed drops below above threshold as follows</p> <p>This detection method will abort if the engine is off OR Engine runtime</p> <p>Temperature Derivative Criteria: Derivative will be monitored using</p> <p>Derivative will be monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficient coolant flow is present for</p>	<p>>2.0 °C</p> <p>CeAEHR_e_BlkHtrIntake AirSnsr</p> <p>>5.0 °C</p> <p>>400.0 seconds >24.0kph</p> <p>0.5 times the seconds with vehicle speed below the threshold above</p> <p>> 180.0 seconds > 1,800 seconds</p> <p>CeAEHR_e_BlkHtrBlock ClntSnsr</p> <p>>-1.00 L/min</p> <p>5.0 -15.0 seconds</p> <p>< 75.0 seconds</p> <p>>300.0 seconds</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
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.	<p>This sensor is compared to two other sensors for this diagnostic to function.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr6</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5</p> <p>Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6</p> <p>The comparison sensors, temperature thresholds, and aux heater effects can be looked up by finding the location associated with the</p>		<p>Diagnostic is Enabled</p> <p>No Active DTC's</p> <p>Propulsion system Inactive timer error</p> <p>Sensor under diagnosis is not faulted</p> <p>Used comparison sensors are not currently faulted:</p> <ul style="list-style-type: none"> - BiasChkCylHdCIntSnsr - BiasChkBlockCIntSnsr - BiasChkEngInCIntSnsr - BiasChkEngOutCIntSnsr - BiasChkHtrCrInCIntSnsr - BiasChkHtrCrOutCInSnsr - BiasChkRadOutCIntSnsr - BiasChkByplnCIntSnsr - BiasChkEngMetalSnsr - BiasChkIntakeAirSnsr - BiasChkHumTmpSnsr - BiasChkManfldAirSnsr - BiasChkOutsideAirSnsr - BiasChkEngOilSnsr - BiasChk_EGR_UpStrmSnsr - BiasChk_EGR_DwnStmS 	<p>OAT_PtEstFiltFA</p> <p>PSAR_PropSysInactiveCr s_FA</p> <p>= FALSE</p> <p>EECR_TS6_CktFA</p> <p>EECR_CylHeadCoolant_CktFA</p> <p>EECR_BlockCoolant_CktFA</p> <p>EECR_EngineInlet_CktFA</p> <p>EECR_EngineOutlet_CktFA</p> <p>EECR_HeaterCoreInlet_CktFA</p> <p>EECR_HeaterCoreOutlet_CktFA</p> <p>EECR_RadiatorOutlet_CktFA</p> <p>EECR_BypassInlet_CktFA</p> <p>EECR_CylHeadMetal1_CktFA</p> <p>IAT_SensorFA</p> <p>HumTempSnsrFA</p> <p>MnfdTempSensorFA</p> <p>OAT_AmbientSensorFA</p> <p>EngOilTempFA</p> <p>EGRTempSensorUPSS_FA</p>	<p>1 failure to set DTC</p> <p>1 sec/ sample</p> <p>Once per valid cold start</p>	Type B, 2 Trips

[illegible]

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>Comparison sensor 2: CeEECR_e_BiasChkByp InCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater: CeEECR_e_AuxHeaterN ©Effect Threshold A: Threshold B:</p> <p>Head Coolant: CeEECR_e_PhysSnsr6 Comparison sensor 1: CeEECR_e_BiasChkBlo ckCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkByp InCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater: CeEECR_e_AuxHeaterBi asBoth Threshold A: Threshold B:</p> <p>Heater Inlet: CeEECR_e_NoPhysAss gnmnt Comparison sensor 1: CeEECR_e_BiasChkByp InCIntSnsr Comparison sensor 2: CeEECR_e_BiasChkBlo ckCIntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN ©Effect Block Heater:</p>	<p>12.44 °C 12.44 °C</p> <p>20.03 °C 8.69 °C</p>	<p>=====</p> <p>Comparison sensor 1 & 2 are not</p> <p>=====</p> <p>Aux Heat Detection</p> <p>Aux heat detection can only be enabled the following are met:</p> <p>No Active DTCs</p> <p>At power-up a warm sensor and cool sensor are compared Warm sensor</p> <p>Cool sensor</p> <p>If the warm sensor is compared to the cool sensor</p> <p>Propulsion Off Soak Time Engine Off Soak Time Ambient Air Temperature</p> <p>There are 4 different types of aux heater detection for this application:</p> <p>2x2 signature</p>	<p>= CeEECR_e_BiasChkNoS election</p> <p>Same set as listed above and EngineModeNotRunTimer Error EngineModeNotRunTimer _FA VehicleSpeedSensor_FA</p> <p>CeAEHR_e_BlkHtrBlock CIntSnsr CeAEHR_e_BlkHtrRadO utCIntSnsr</p> <p>>7.67 °C</p> <p>>21,600 seconds >21,600 seconds >-20.00 °C</p> <p>Enabled</p>		

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CeEECR_e_AuxHeaterBiasBoth Threshold A: Threshold B:	17.82 °C 7.74 °C	Absolute Drop IAT Drop Temperature Derivative	Enabled Disabled Disabled		
			Heater Outlet: CeEECR_e_NoPhysAssgnmnt Comparison sensor 1: CeEECR_e_BiasChkHtrCrlnClntSnsr Comparison sensor 2: CeEECR_e_BiasChkBypInClntSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B:	18.83 °C 9.84 °C	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)	CeAEHR_e_BlkhtrCylHdClntSnsr CeAEHR_e_BlkhtrFuelSnsr CeAEHR_e_BlkhtrRadOutClntSnsr CeAEHR_e_BlkhtrOutsideAirSnsr 10.0 °C 5.0 °C >12.0 °C		
			Radiator Outlet: CeEECR_e_PhysSnsr3 Comparison sensor 1: CeEECR_e_BiasChkEngInClntSnsr Comparison sensor 2: CeEECR_e_BiasChkManfldAirSnsr Fuel Operated heater: CeEECR_e_AuxHeaterN©Effect Block Heater: CeEECR_e_AuxHeaterBiasLow Threshold A: Threshold B:	19.49 °C 17.85 °C	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 Insufficient coolant flow is present for	CeAEHR_e_BlkhtrBlockClntSnsr >87.00 L/min 0.1 -20.0 seconds < 80.0 seconds >300.0 seconds		
			A failure will be reported if any of the following					

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>conditions are met. Evaluated in order:</p> <p>1) This sensor is above both comparison sensors</p> <p>2) This sensor is below both comparison sensors</p> <p>3) This sensor is above both comparison sensors and an aux heat source has not been detected to cause this skew</p> <p>4) This sensor is below both comparison sensors and an aux heat source has not been detected to cause this skew</p>	<p>>A °C</p> <p>>A °C</p> <p>>B °C</p> <p>>B °C</p>	<p>A block heater is detected if a drop is</p> <p>IAT Drop Criteria: The sensor will be used as IAT for this method</p> <p>A block heater will be detected if:</p> <p>IAT has a drop of during a drive defined by: Drive time Vehicle speed</p> <p>Additional drive time is provided when vehicle speed drops below above threshold as follows</p> <p>This detection method will abort if the engine is off OR Engine runtime</p> <p>Temperature Derivative Criteria: Derivative will be monitored using</p> <p>Derivative will be monitored once coolant flow is AND Flow time is between AND either Engine runtime is OR Insufficient coolant flow is present for</p>	<p>>2.0 °C</p> <p>CeAEHR_e_BlkhtrIntake AirSnsr</p> <p>>5.0 °C</p> <p>>400.0 seconds >24.0kph</p> <p>0.5 times the seconds with vehicle speed below the threshold above</p> <p>> 180.0 seconds > 1,800 seconds</p> <p>CeAEHR_e_BlkhtrBlock ClntSnsr</p> <p>>-1.00 L/min</p> <p>5.0 -15.0 seconds</p> <p>< 75.0 seconds</p> <p>>300.0 seconds</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
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 >20 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 Illum.
Fuel Pump Driver Control Module Configuratio n Command Signal 1 Message Counter Incorrect	P14CD	The FTZM monitors its specific command data serial message frames [message FTZM Commandl \$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 Commandl \$0CE Alive Rolling Counter transmitted from ECM OR FTZM bus CAN Message Commandl \$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) > 8.0 volts d) == TRUE e) > 3,000 msec f) == TRUE g) == TRUE h) == TRUE	15 fail counts out of 16 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 Illum.
Fuel Pump Driver Control Module Configuratio n Command Signal 5 Message Counter Incorrect	P14D6	The FTZM monitors its specific command data serial message frames [message FTZM Commands \$3C6] 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 Commands \$3C6 Alive Rolling Counter transmitted from ECM OR FTZM bus CAN Message Commands \$3C6 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) > 8.0 volts d) == TRUE e) > 3,000 msec f) == TRUE g) == TRUE h) == TRUE	8 fail counts out of 10 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 Illum.
Throttle Position Steady State Actuation Fault	P1516	Detect an inability to maintain a steady state throttle position.	The absolute difference between desired and indicated throttle position is >	2.00%	Run/Crank voltage TPS minimum learn is not active AND Throttle is being Controlled Throttle is considered in a steady state condition when the desired throttle position over a 12.5 ms period is For a settling time period Ignition voltage failure is false	> 6.41 Volts < 0.25 percent > 4.00 seconds P1682	0.49 ms	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Switch State Undertermin ed Legacy	P155A	<p>Detects when cruise switch state cannot be determined, such as low voltage conditions</p> <p>"Emissions Neutral Default Action : When the BCM tells the ECM that the cruise switch "Data Invalid" (latched on/off switch architectures) or "Indeterminate" (momentary 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."</p>	cruise switch state is received as "undetermined" for greater than a calibratable time over a sample period.	fail in the indeterminate state for greater than 3.00 seconds over the sample period of 15.00 seconds	Diagnostic is enabled.		indicate failure for 3.00 seconds/ 15.00 seconds.	Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Set/ Coast Signal 2 Circuit	P155B	<p>Detects a failure of the cruise set 2 switch in a continuously applied state</p> <p>"Emissions Neutral Default Action : When the BCM tells the ECM that the cruise control analog input 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 vehicles with a momentary on/off cruise switch architecture.</p>	Cruise Control Set 2 switch remains applied for greater than a calibratable period of time.	fail in the applied state for greater than 89.00 seconds over the sample period of 99.00 seconds	<p>Diagnostic is enabled.</p> <p>CAN cruise switch diagnostic enable in ECM</p>	1.00	fail for greater than 89.00 seconds/99.00 seconds	<p>Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cruise Control Resume/ Acceleration Signal 2 Circuit	P155C	<p>Detects a failure of the cruise resume 2 switch in a continuously applied state</p> <p>"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."</p>	Cruise Control Resume 2 switch remains applied for greater than a calibratable period of time over a sample period.	fail in the applied state for greater than 89.00 seconds over the sample period of 99.00 seconds	<p>Diagnostic is enabled.</p> <p>CAN cruise switch diagnostic enable in ECM</p>	1.00	fail for greater than 89.00 seconds/99.00 seconds	<p>Type C, 1 Trip No MIL Emissions Neutral , "Emissions Neutral Diagnostics - special type C"</p>

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Wheel Speed Sensor Sequence Number Incorrect	P15FD	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 >4.00 seconds > 5.00 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.	Enabled = Run or Crank >=11.00 Volts	Diagnostic executes in 25ms loop.	Type B, 2 Trips

24OBDG03D Part 1 ECM Summary Tables

[illegible]

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Ignition voltage out of correlation error(P1682) not active and Barometric Pressure Inlet Air Temp Fuel Temp	>= 70.0 KPA >= -40.0 degC -20 <= Temp degC <= 126		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Voltage Correlation	P1682	Detect a continuous or intermittent out of correlation between the Run/Crank Ignition Voltage and the Powertrain Relay Ignition Voltage. The diagnostic monitors the difference in voltage between Run/Crank Voltage and the Powertrain Relay Ignition Voltage and fails the diagnostic when the voltage difference is too high. This diagnostic only runs when the powertrain is commanded on and the Run/Crank Voltage is greater than a threshold based on IAT or the powertrain ignition voltage is high enough the Run/Crank voltage is high enough.	Run/Crank - PT Relay Ignition >	3.00 Volts	Powertrain Relay commanded on AND (Run/Crank voltage > OR PT Relay Ignition voltage >) AND Run/Crank voltage >	Table, f(IAT). See supporting tables: P1682_PT Relay Pull-in Run/Crank Voltage f(IAT) 5.50 Volts 5.50 Volts	240/480 counts; or 0.175 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Relay commanded on AND (Run/Crank voltage > OR PT Relay Ignition voltage >) AND Run/Crank voltage >	Table, f(IAT). See supporting tables: P16A7_PT Relay Pull-in Run/Crank Voltage f(IAT) 5.50 Volts 5.50 Volts	240/480 counts; or 0.175 sec continuous; 12.5 ms/count in main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Controls Ignition Relay Feedback Circuit 2 Low Voltage - (GEN III Controllers ONLY)	P16AF	Detects low voltage in the engine controls ignition relay feedback circuit 2. This diagnostic reports the DTC when low voltage is present. Monitoring occurs when run crank voltage is above a calibrated value.	Engine controls ignition relay feedback circuit 2 low voltage	Relay voltage <= 5.00	Powertrain relay low diag enable Powertrain relay voltage Run Crank voltage Powertrain relay state	= 1.00 >=11.00 >9.00 = ON	5 failures out of 6 samples 1000 ms/ sample	Type C, 1 Trip No MIL Emissions Neutral

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Sensor Bus Relay Control Circuit	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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	Open Circuit: > 200 K Q ohms impedance between output and controller ground	<p>Sensor Bus relay circuit open diagnostic = TRUE</p> <p>Run/Crank Voltage</p>	<p>1.00</p> <p>Voltage > 11.00volts</p>	<p>8 failures out of 10 samples</p> <p>250 ms / sample</p>	<p>Type B, 2 Trips</p> <p>Note: In certain controlle rs P16D8 may also set (Sensor Bus Relay Control Circuit Low).</p>

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Control Module Transfer Case Command State Rationality - 4WD high or 4WD low command not 4wd high or 4WD low ratio	P17D4	The diagnostic monitor compares measured transfer case ratio to the transfer case control module commanded transfer case state. When the measured transfer case gear ratio is 4WD neutral ratio, while, the transfer case control module command state is 4WD high ratio or 4WD low ratio, the DTC is set. The 4WD neutral ratio regions are considered ratios outside the nominal 4WD high and nominal 4WD low ratios. The 4WD ratio is calculated as transmission output shaft speed divided by the transfer case output shaft speed, both speed are measured values based on speed sensors.	transfer case control module transfer case command state AND measured transfer case ratio is NOT in 4WD low ratio window AND measured transfer case ratio is NOT in 4WD high window AND measured transfer case ratio is NOT in 4WD low ratio window AND measured transfer case ratio is NOT in 4WD high window OR vehicle is stopped: transfer case output shaft speed transmission output shaft speed vehicle stopped secondary parameter thresholds met (measured transfer case ratio = transmission output speed / transfer case output speed)	# 4WD neutral 4WD low ratio window < 3.00 > 2.40 4WD high ratio window < 1.30 > 0.70 > 2.90 < 2.00 > 1.20 < 0.80 < 10.0 RPM > 500.0 RPM	vehicle stopped: transmission output shaft speed engine torque engine speed accelerator pedal position accelerator pedal position brake pedal position transmission gear is forward gear: transmission output shaft speed engine torque engine speed accelerator pedal position accelerator pedal position brake pedal position transmission gear is reverse gear: transmission output shaft speed engine torque engine speed accelerator pedal position accelerator pedal position brake pedal position diagnostic monitor enable PTO active engine power limited DTCs not fault active	> 500.0 RPM > 15.0 Nm > 300.0 RPM > 5.0 % hysteresis high NOT < 3.0 % hysteresis low < 100.0 % > 500.0 RPM > -20.0 Nm > 0.0 RPM > 0.0 % hysteresis high NOT < 0.0 % hysteresis low < 100.0 % > 500.0 RPM > 90.0 Nm > 300.0 RPM > 6.0 % hysteresis high NOT < 3.0 % hysteresis low < 100.0 % = 1.00 Boolean = FALSE = FALSE P057B, P057C, P057D, P057E, P279A, P279B, P279C, P0502, P0503, P0722,	fail count > 840.00 counts out of sample count > 1,200.00 counts update rate 12.5 milliseconds for 1 count	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			update rate 12.5 milliseconds			P0723, P2160, P2161		

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Shift Pending	P185F	Detects an error in the ECM transfer case shift pending command value relative to the ECM transfer case command state. The transfer case executes a shift out of 4WD high, 4WD low, or 4WD neutral using the ECM engine torque control and TCM holding clutch control to manage the torque on the transfer case input shaft. As the transfer case is executing one of these shifts, the state is considered "shift pending". It is not possible for the transfer case to command both a "shift pending" and a constant 4WD high or 4WD low or 4WD neutral state; if this condition occurs the DTC is set.	trasnfer case shift pending AND transfer case commnd state OR trasnfer case shift pending AND transfer case commnd state OR trasnfer case shift pending AND transfer case commnd state OR trasnfer case shift pending AND transfer case commnd state	= shift out of 4wd high = 4wd low = shift out of 4wd high = 4wd neutral = shift out of 4wd low = 4wd high = shift out of 4wd neutral = 4wd low	engine mode run run/crank voltage P2771 four wheel drive low circuit, fault fault active transfer case shift pending monitor delay time	= TRUE >= 9.00 volts = FALSE >= 5.00	>= 5 counts (one count per 25 milliseconds)	Type B, 2 Trips

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Actuator Solenoid Circuit High - Bank 1	P2091	Controller specific output driver circuit diagnoses the CAM phaser oil control valve solenoid high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 0.5 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 Illum.
Post Catalyst Fuel Trim System Too Lean Bank 1	P2096	<p>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.</p> <p>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.</p> <p>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</p>	<p>The Average Integral Offset % Authority</p> <p>AND</p> <p>The Average Total Offset % Authority</p> <p>(Note: any value greater than or equal to +100% effectively nullifies the Average Total Offset % Authority criteria)</p> <p>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 $\geq 29\%$ for ≥ 5.0 seconds AND the % Authority metric is approaching the failure threshold.</p> <p>Diagnosis resumes if the purge valve is closed OR the percent vapor is $\leq 25\%$ for ≥ 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.</p>	<p>$\geq 70.0\%$</p> <p>$\geq 50.0\%$</p> <p>If the P2096 is actively failing then the Average Integral Offset must be $< 70.0\%$ and the Average Total Offset must be $< 50.0\%$ for the diagnostic to report a pass.</p>	<p>The post cat fuel trim diagnostic is enabled</p> <p>The diagnostic is enabled during: Deceleration Idle Cruise Light Acceleration Heavy Acceleration</p> <p>Ambient Air Pressure Engine AirFlow Intake Manifold Pressure Induction Air Temperature Start-up Coolant Temp.</p> <p>PTO Intrusive diag. fuel control Ethanol Estimation in Progress</p> <p>02 Heater Learned Resistance</p> <p>Long Term Secondary Fuel Trim Enabled for (see "Long Term Secondary Fuel Trim Enable Criteria" in Supporting Tables)</p> <p>High Vapor Conditions</p> <p>Green Cat System</p>	<p>No No Yes No No</p> <p>$\geq 70\text{ kPa}$ $\geq 0.0\text{ g/s} \leq 10,000.0$ $\geq 0\text{ kPa} \leq 256$ -20 deg. C 200 $\geq -20\text{ deg. C}$ (or OBD Coolant Enable Criteria = TRUE)</p> <p>Not Active Not Active Not Active</p> <p>= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTC's")</p> <p>≥ 2.0 seconds</p> <p>Not Present</p> <p>= Not Valid,</p>	<p>Frequency: Continuous Monitoring in 100ms loop.</p> <p>The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 30.0 seconds (300 samples) before comparing to their respective failure thresholds.</p>	Type B, 2 Trips

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst O2 sensor that is within its optimal operating range (neither rich nor lean).			<p>Condition</p> <hr/> <p>Delay during GPF Regeneration</p> <p>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):</p> <p>Deceleration Idle Cruise Light Acceleration Heavy Acceleration</p> <hr/> <p>No Fault Active for:</p>	<p>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 22 grams/sec.</p> <hr/> <p>No Delay</p> <hr/> <p>AmbientAirDefault AIR System FA Ethanol Composition Sensor FA ECT_Sensor_FA EGRValveCircuit_FA EGRValvePerformance_F A IAT_SensorFA</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						CamSensorAnyLocationFA EvapEmissionSystem_FA EvapFlowDuringNonPurge_FA FuelTankPressureSnrCkt_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	250		
					Idle	250		
					Cruise	0		
					Light Acceleration	250		
					Heavy Acceleration	250		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Post Catalyst Fuel Trim System Too Rich Bank 1	P2097	<p>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.</p> <p>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.</p> <p>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</p>	<p>The Average Integral Offset % Authority</p> <p>AND</p> <p>The Average Total Offset % Authority</p> <p>(Note: any value less than or equal to -100% effectively nullifies the Average Total Offset % Authority criteria)</p> <p>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 $\geq 29\%$ for ≥ 5.0 seconds.</p> <p>Diagnosis resumes if the purge valve is closed OR the percent vapor is $\leq 25\%$ for ≥ 5.0 seconds. This was done to minimize disabling the diagnostic for longer than necessary.</p>	<p>$\leq -82.0\%$</p> <p>$\leq -50.0\%$</p> <p>If the P2097 is actively failing then the Average Integral Offset must be $> -82.0\%$ and the Average Total Offset must be $> -50.0\%$ for the diagnostic to report a pass.</p>	Same as P2096	Same as P2096	<p>Frequency: Continuous Monitoring in 100ms loop.</p> <p>The Integral and Total Offset % Authority metrics are sampled every 100ms and an average is calculated every 30.0 seconds (300 samples) before comparing to their respective failure thresholds.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		and proportional offset values of "0" (i.e. 0% authority) and a post catalyst O ₂ sensor that is within its optimal operating range (neither rich nor lean).						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Throttle Actuator Position Performance	P2101	1) Detect a throttle positioning error. This is determined if the difference between measured throttle position and modeled throttle position is greater than a threshold or less than a threshold. This diagnostic only runs when the engine is running and the voltage is high enough and there is not a voltage failure and the throttle position minimum learn is not active and the throttle is being controlled 2) Throttle control is driving the throttle in the incorrect direction. This is determined if the throttle position is greater than a threshold percent and the powertrain relay voltage is high enough and the throttle position minimum learn is active.	Difference between measured throttle position and modeled position, (modeled = MAX (Commanded vs. Commanded Filtered)) > OR Difference between modeled position (modeled = MIN (Commanded vs. Commanded Filtered)) and measured throttle position >	7.23 % 7.23 %	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)) AND ((Engine shutdown procedure is not complete) OR (Run/Crank signal is	< 5.50 Volts > 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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					active))			
			Throttle Position >	52.71 %	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 Illum.
Throttle Return to Default Performance	P2119	Throttle unable to return to default throttle position after de- energizing ETC motor.	(Normalized TPS1 percent Vref > AND Normalized TPS2 percent Vref > On the main processor) OR (Normalized TPS1 percent Vref < AND Normalized TPS2 percent Vref < On the main processor) (100% corresponds to 5.0 Volt)	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 Illum.
Accelerator Pedal Position (APP) Sensor 1 Lo	P2122	Detects a continuous or intermittent short low or open in the APP sensor #1 by monitoring the APP1 sensor percent Vref and failing the diagnostic when the APP1 percent Vref is too low. This diagnostic only runs when battery voltage is high enough. Detects a continuous or intermittent short low or open in the APP sensor #1 on the Main processor.	APP1 percent Vref < (100% corresponds to 5.0 Volt)	9.25 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P06A3	19/39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 1 Hi	P2123	Detects a continuous or intermittent short high in the APP sensor #1 by monitoring the APP1 sensor percent Vref and failing the diagnostic when the APP1 percent Vref is too high. This diagnostic only runs when battery voltage is high enough. Detect a continuous or intermittent short high in the APP sensor #1 on the Main processor.	APP1 percent Vref > (100% corresponds to 5.0 Volt)	95.00 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	>6.41 Volts P06A3	19/39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Lo	P2127	Detects a continuous or intermittent short low or open in the APP sensor #2 by monitoring the APP2 sensor percent Vref and failing the diagnostic when the APP2 percent Vref is too low. This diagnostic only runs when battery voltage is high enough. Detects a continuous or intermittent short low or open in the APP sensor #2 on the Main processor.	APP2 percent Vref < (100% corresponds to 5.0 Volt)	6.50 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P0697	19/39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Accelerator Pedal Position (APP) Sensor 2 Hi	P2128	Detects a continuous or intermittent short high in the APP sensor #2 by monitoring the APP2 sensor percent Vref and failing the diagnostic when the APP2 percent Vref is too high. This diagnostic only runs when battery voltage is high enough. Detect a continuous or intermittent short high in the APP sensor #2 on the Main processor.	APP2 percent Vref > (100% corresponds to 5.0 Volt)	52.00 % Vref	Run/Crank voltage No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts P0697	19/39 counts; or 14 counts continuous; 12.5 ms/count in the main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Throttle Position (TP) Sensor 1-2 Correlation	P2135	Detect a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor. 1.) The diagnostic monitors the difference in position between TPS1 and the TPS2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. 2.) The diagnostic monitors the difference in reference voltage between normalized min TPS1 and the normalized min TPS2 and fails the diagnostic when the difference is too high. This diagnostic only runs when the battery voltage is high enough. Detects a continuous or intermittent correlation fault between TPS sensors #1 and #2 on Main processor	Difference between TPS1 displaced and TPS2 displaced >	6.797% offset at min. throttle position with a linear threshold to 9.720% at max. throttle position	Run/Crank voltage No TPS sensor faults No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts (P0122, P0123, P0222, P0223) P06A3	79/159 counts; or 58 counts continuous; 3.125 ms/count in the main processor	Type A, 1 Trips
			Difference between (normalized min TPS1) and (normalized min TPS2) > (100% corresponds to 5.0 Volt)	5.000 % Vref	Run/Crank voltage No TPS sensor faults No 5V reference error or fault for # 4 5V reference circuit	> 6.41 Volts (P0122, P0123, P0222, P0223) P06A3	79/159 counts; or 58 counts continuous; 3.125 ms/count in the main processor	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 high side circuit shorted to ground	P2147	Controller specific output driver circuit diagnoses Injector 1 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 1 high side circuit shorted to power	P2148	Controller specific output driver circuit diagnoses Injector 1 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 ≤ 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 high side circuit shorted to ground	P2150	Controller specific output driver circuit diagnoses Injector 2 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 2 high side circuit shorted to power	P2151	Controller specific output driver circuit diagnoses Injector 2 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector3 high side circuit shorted to ground	P2153	Controller specific output driver circuit diagnoses Injector 3 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector3 high side circuit shorted to power	P2154	Controller specific output driver circuit diagnoses Injector 3 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	<= 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 high side circuit shorted to ground	P2156	Controller specific output driver circuit diagnoses Injector 4 high sided driver for a short to ground failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	25 amp >= through High Side Driver	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Injector 4 high side circuit shorted to power	P2157	Controller specific output driver circuit diagnoses Injector 4 high sided driver for a short to power failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	 ≤ 1 volt between signal and controller power	Battery Voltage Engine Run Time	>=11 Volts >=0 Seconds P062B notFAorTFTK	10.00 failures out of 20.00 samples 100 ms /sample Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Vehicle Speed - Output Shaft Speed Correlation	P215B	Detect invalid vehicle speed source. This failure is set by two different conditions. Either the absolute difference between wheel speed vehicle speed and TOS vehicle speed is too high, or secure vehicle speed is not available.	<p>The absolute difference between wheel speed vehicle speed and TOS vehicle speed greater than ></p> <p>OR</p> <p>Secure vehicle speed source is unavailable</p>	6.21 mph		<p>Time since first CAN activity > 0.5000 s</p> <p>Secure vehicle speed source is TOS vehicle speed or wheel speed vehicle speed</p> <p>Trans engaged state is equal to engaged.</p>	<p>400/800 counts for wheel speed correlation</p> <p>or</p> <p>400/800 counts for TOS correlation; 25ms/count</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Minimum Throttle Position Not Learned	P2176	Detect when the throttle position minimum learn on the main processor is not learned. This diagnostic detects this by monitoring if the throttle position is greater than a threshold and the number of learn attempts is greater than a threshold. This diagnostic only runs when the battery voltage is high enough and the throttle position minimum learn is active. Throttle position sensors were not in the minmum learn window after multiple attempts to learn the minimum.	During TPS min learn on the Main processor, TPS percent Vref > AND Number of learn attempts > (100% corresponds to 5.0 Volt)	11.48% Vref 10 counts	Run/Crank voltage TPS minimum learn is active No previous TPS min learn values stored in long term memory	> 6.41 Volts = TRUE	2.0 secs	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_NoUseAssg nmnt Temperature Sensor 5: CeEECR_e_NoUseAssg nmnt Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 47.5 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 47.5 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 47.5 Ohms Temp Sensor 7: 47.5 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 Illum.
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 configurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_NollseAssg nmnt Temperature Sensor 5: CeEECR_e_NollseAssg nmnt 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: 298,262 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 298,262 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 298,262 Ohms Temp Sensor 7: 298,262 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 Illum.
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.	<p>Temperature step change:</p> <p>1) positive step change is greater than calculated high limit</p> <p>OR</p> <p>2) negative step change is lower than calculated low limit.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr2</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p>		<p>Diagnostic is Enabled</p> <p>No Active DTC's</p>	<p>EECR_TS2_Erratic_TFTK 0</p> <p>EECR_TS2_CktHiLo_FA</p>	<p>5 seconds out of a 6 seconds window</p> <p>Continuously sampled</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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	 3.1 seconds -60.0 °C 150.0 °C 7.4 seconds -60.0 °C 150.0 °C 4.4 seconds -60.0 °C 150.0 °C 5.7 seconds -60.0 °C 150.0 °C 4.5 seconds -60.0 °C 150.0 °C 2.8 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 Illum.
			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. *****	2.5 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 Illum.
Bank 1 Air-Fuel Ratio Imbalance	P219A	<p>This monitor determines if there is an Air Fuel Imbalance in the fueling system for a cylinder on Bank 1. Detection is based on a the pre catalyst oxygen sensor voltage. The pre catalyst O2 voltage is used to generate a variance metric that represents the statistical variation of the O2 sensor voltage over a given engine cycle. This metric is proportional to the air-fuel ratio imbalance (variance is higher with an imbalance than without).</p> <p>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.</p> <p>The Ratio metric is calculated by selecting the appropriate threshold calibration from a 17x17 table (see Supporting Table</p>	<p>Standard Mode Filtered Ratio</p> <p>The EWMA calculation uses the weighting coefficient from the following supporting table: P219A EWMA Coefficient</p> <p>For this program, the Optional Mode is NOT used</p> <p>Optional Mode Filtered Ratio</p> <p>The EWMA calculation uses the weighting coefficient from the following supporting table while in Optional Mode:</p>	<p>>0.50</p> <p>If the diagnostic has reported a failure on the prior trip, the EWMA Filtered Ratio must fall below 0.32 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing.</p> <p>> 0.50</p> <p>If the diagnostic has reported a failure on the prior trip, the Optional Mode Filtered Ratio must fall below 0.25 in order to report a pass. This feature prevents the diagnostic from toggling between failing and passing.</p>	<p>The A/F imbalance diagnostic is enabled</p> <p>System Voltage</p> <p>Fuel Level</p> <p>Engine Coolant Temperature</p> <p>Cumulative engine run time</p> <p>Diagnostic enabled at Idle (regardless of other operating conditions)</p> <p>Engine speed range</p> <p>Engine speed delta during a short term sample period</p> <p>Mass Airflow (MAF) range</p> <p>Cumulative delta MAF during a short term sample period</p> <p>Filtered MAF delta between samples Note: first order lag filter coefficient applied to MAF</p>	<p>No lower than 10.5 Volts for more than 0.2 seconds</p> <p>> 10.0% The diagnostic will disregard the fuel level criteria if the fuel sender is faulty.</p> <p>> -20 deg. C (or OBD Coolant Enable Criteria = TRUE)</p> <p>> 0.0 seconds</p> <p>No</p> <p>1,125 to 2,750 RPM</p> <p><375 RPM</p> <p>8 to 260 g/s</p> <p><5 g/s</p> <p><10.00 g/s</p>	<p>Minimum of 1 test per trip, up to 5 tests per trip during RSR or FIR.</p> <p>The front O2 sensor voltage is sampled once per cylinder event. Therefore, the time required to complete a single test (when all enable conditions are met) decreases as engine speed increases. For example, 18.00 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</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>P219A Variance Threshold Bankl Table) and subtracting it from the measured Variance. The result is then divided by a normalizer calibration from another 17 x 17 table (see Supporting Table P219A Normalizer Bankl Table). This quotient is then multiplied by a quality factor calibration from a 17 x 17 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.</p> <p>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</p>	P219A EWMA Coefficient Opt Table		<p>= 0.800</p> <p>Air Per Cylinder (APC)</p> <p>APC delta during short term sample period</p> <p>Filtered APC delta between samples Note: first order lag filter coefficient applied to APC = 0.100</p> <p>Spark Advance</p> <p>Throttle Area (percent of max)</p> <p>Intake Cam Phaser Angle</p> <p>Exhaust Cam Phaser Angle</p> <p>-----</p> <p>Electronic Waste Gate (eWG) present</p> <p>If eWG = yes then Waste Gate Position</p> <p>Intrusive eWG Feature</p> <p>-----</p> <p>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.</p> <p>Intrusive Waste Gate Position Min</p>	<p>560 to 1,400 mg/cylinder</p> <p><400 mg/cylinder</p> <p><4.00 percent</p> <p>-10 to 55 degrees</p> <p>0 to 200 percent</p> <p>0 to 35 degrees</p> <p>0 to 30 degrees</p> <p>-----</p> <p>Yes</p> <p>-5.0 to 105.0</p> <p>Disabled</p> <p>-----</p> <p>-5.0</p>	<p>made within 5 minutes of operation.</p> <p>For RSRorFIR, 10 tests must complete before the diagnostic can report.</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>Ratio.</p> <p>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.</p> <p>Some applications may need to command a unique cam phaser value before performing the above calculations since cam phasing has been shown to have an impact on overall signal quality. This application Does Not Use this feature.</p> <p>For programs using Active Fuel Management or Multiple Cam profiles, a secondary Imbalance Ratio can be calculated while in the secondary operating modes. This secondary ratio is an optional calculation and is labeled as the "Optional Mode Ratio". The Optional Mode Ratio is calculated the same as explained above with the following supporting</p>			<p>Intrusive Waste Gate Position Max</p> <p>-----</p> <p>Delay during GPF Regeneration</p> <p>-----</p> <p>Active Fuel Management Firing Fraction</p> <p>if the Optional Mode is enabled (see Malfunction Criteria) Active Fuel Management Firing fraction for Optional Mode calculations</p> <p>Intrusive Firing Fraction during Fast Initial Response or Rapid Step Response</p> <p>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.</p> <p>-----</p> <p>For programs using multi-step cam profiles:</p> <p>High Lift Cam Profile will use:</p>	<p>105.0</p> <p>-----</p> <p>No Delay</p> <p>-----</p> <p>0.99 to 1.00</p> <p>1.00 to 0.00</p> <p>Disabled</p> <p>>=0.00</p> <p>-----</p> <p>Standard Mode Filtered Ratio</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		tables: P219A Variance Threshold Bank1 Opt Table P219A Normalizer Bank1 Opt Table , and P219A Quality Factor Bank1 Opt Table			<p>Low Lift Cam Profile will use:</p> <p>Quality Factor (QF) QF calibrations are located in a 17x17 lookup table versus engine speed and load (see Supporting Table P219A Quality Factor Bank1 Table). QF values less than "1" indicate that we don't have 4sigma/2sigma robustness in that region. The quality of the data is determined via statistical analysis of Variance data.</p> <p>Fuel Control Status Closed Loop and Long Term FT Enabled for:</p> <p>Device Control AIR pump CASE learn EGR EVAP Engine Over Speed Protection Idle speed control PTO Injector base pulse width</p>	<p>Standard Mode Filtered Ratio</p> <p>≥ 0.99</p> <p>≥ 0.0 seconds (Please see "Closed Loop Enable Clarification" and "Long Term FT Enable Criteria" in Supporting Tables)</p> <p>Not active Not on Not active Not intrusive Not intrusive Not Active</p> <p>Normal Not Active Above min pulse limit</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>O2 learned htr resistance</p> <p>Rapid Step Response (RSR): RSR will trigger if the Ratio result from the last test is AND it exceeds the last Filtered ratio by</p> <p>Once triggered, the filtered ratio is reset to:</p> <p>Fast Initial Response (FIR): FIR will trigger when an NVM reset or code clear occurs. Once triggered, the filtered ratio is reset to:</p> <p>No Fault Active for:</p>	<p>= Valid (the O2 heater resistance has learned since NVM reset)</p> <p>>= 0.50</p> <p>>=0.32</p> <p>0.00</p> <p>0.00</p> <p>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</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						WRAF_Bank_1_FA		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit Low (applications with LIN MAF)	P2228	<p>Detects an erroneously 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.</p> <p>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.</p>	BARO Pressure	< 50.0 kPa	<p>Diagnostic is Enabled</p> <p>LIN communications established with MAF</p>		<p>160 failures out of 200 samples</p> <p>1 sample every 25 msec</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit High (applications with LIN MAF)	P2229	<p>Detects an erroneously 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.</p> <p>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.</p>	BARO Pressure	> 110.0 kPa	<p>Diagnostic is Enabled</p> <p>LIN communications established with MAF</p>		<p>160 failures out of 200 samples</p> <p>1 sample every 25 msec</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure (BARO) Sensor Circuit Intermittent (applications with LIN MAF)	P2230	<p>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.</p> <p>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".</p> <p>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.</p>	<p>String Length</p> <p>Where: "String Length" = sum of "Diff" calculated over</p> <p>And where: "Diff" = ABS(current BARO reading - BARO reading from 25 milliseconds previous)</p>	<p>> 100 kPa</p> <p>40 consecutive BARO readings</p>	<p>Diagnostic is Enabled</p> <p>LIN communications established with MAF</p>		<p>4 failures out of 5 samples</p> <p>Each sample takes 1.0 seconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Pumping Current Circuit/Open Bank 1 Sensor 1 (WRAF& Gen4 ECM	P2237	<p>This DTC determines if the B1S1 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).</p> <p>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.</p>	<p>B1S1 WRAF ASIC indicates a Open circuit on the Pump Current circuit signal.</p> <p>Open fail counts are accumulated to determine fault status.</p> <p><u>Note:</u> This ASIC is referred to as ATIC142 (Continental).</p>	<p>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</p> <p>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.</p>	<p>Diagnostic is Enabled</p> <p>DTC's Not active this key cycle</p> <p>Measure Valid status (ASIC)</p> <p>Controller status (ASIC)</p> <p>Engine Run or Auto stop</p> <p>*****</p> <p>Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete)</p> <p>*****</p>	<p>WRAF_Bank_1_FA P0135, P0030, P0031, P0032</p> <p>= Valid</p> <p>= Ready</p> <p>= True</p> <p>= Complete</p> <p>> 20.0 seconds</p>	<p>20 failures out of 24 samples</p> <p>Continuous in 25 milli - second loop</p>	Type B, 2 Trips
			<p>B1S1 WRAF ASIC indicates a Open circuit on the Pump Current circuit signal.</p> <p>Open fail counts are accumulated to determine fault status.</p> <p>This application uses the following type of WRAF sensor:</p> <p><u>For NGK_ZFAS_U2</u></p> <p><u>For Bosch_LSU_4p9</u></p>	<p>The ASIC provides a fault indication when the pumping current circuit fails the following criteria;</p> <p>Based on the type of WRAF sensor used;</p> <p>CeWRSG_e_Bosch_LSU_4p9</p> <p>element resistance > 400 ohms</p> <p>pump cell reference resistance > Nernst</p>	<p>Diagnostic is Enabled</p> <p>DTC's Not active this key cycle</p> <p>Measure Valid status (ASIC)</p> <p>Controller status (ASIC)</p> <p>Engine Run or Auto stop</p> <p>*****</p> <p>Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete)</p> <p>*****</p>	<p>WRAF_Bank_1_FA P0135, P0030, P0031, P0032</p> <p>= Valid</p> <p>= Ready</p> <p>= True</p> <p>= Complete</p> <p>> 20.0 seconds</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<u>Note: This ASIC is referred to as CJ136 (next Gen version of CJ135 from Bosch).</u>	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 Illum.
02 Sensor Pumping Current Performance Bank 1 (WRAF minus E80 ECM	P223C	<p>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.</p> <p>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.</p>	Fault condition present when the pump current is in any of the fault regions when this test is enabled during DFCO.	<p>The three pump current fault regions are:</p> <p>A) Pump current >5.00 ma</p> <p>B) Pump current < 0.30 ma and > -0.30 ma</p> <p>C) Pump current < -0.10 ma</p> <p>The three fault regions have individual X out of Y calibrations. When the Xout of Y is reached in any region this DTC is set.</p>	<p>Diagnostic is Enabled</p> <p>DTC's Not active this key cycle</p> <p>Measure Valid status (ASIC)</p> <p>Controller status (ASIC)</p> <p>Engine Run or Auto stop</p> <p>*****</p> <p>Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete) *****</p> <p>Test starts when time in DFCO</p> <p>Test stops when time in DFCO</p>	<p>WRAF_Bank_1_FA P0135, P0030, P0031, P0032</p> <p>= Valid</p> <p>= Ready</p> <p>= True</p> <p>= Complete</p> <p>> 20.0 seconds</p> <p>DFCO Active Minimum > Time (seconds) in the Supporting Tables</p> <p>> DFCO Active Maximum Time (seconds) in the Supporting Tables</p>	<p>Region A: 128 failures out of 160 samples</p> <p>OR</p> <p>Region B: 128 failures out of 160 samples</p> <p>OR</p> <p>Region C: 128 failures out of 160 samples</p> <p>Sample rate is 25 msec.</p> <p>Test enabled during DFCO.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Reference Resistance Out Of Range Bank 1 (WRAF Sensor 1 Or Switching w EIC Sensor 1	P223E	<p>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.</p> <p>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.</p>	Measured Reference cell temperature	< 700 Deg C OR >1,000.0 Deg C	<p>Diagnostic is Enabled</p> <p>DTC's Not active this key cycle</p> <p>Measure Valid status (ASIC)</p> <p>Controller status (ASIC)</p> <p>Engine Run or Auto stop *****</p> <p>Heater Warm-up delay Then Delay after WRAF circuit diagnostic delay. *****</p>	<p>WRAF_Bank_1_FA P0135, P0030, P0031, P0032</p> <p>= Valid</p> <p>= Ready</p> <p>= True</p> <p>= Complete</p> <p>> 20.0 seconds</p>	<p>128 failures out of 160 samples</p> <p>Sample rate is 25 msec</p> <p>Continuous</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Reference Voltage Circuit/Open Bank 1 Sensor 1 (WRAF & Gen4 ECM	P2243	<p>This DTC determines if the B1S1 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).</p> <p>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.</p>	<p>B1S1 WRAF ASIC indicates a Open circuit on the Reference Voltage circuit signal.</p> <p>Open fail counts are accumulated to determine fault status.</p> <p><u>Note:</u> This ASIC is referred to as ATIC142 (Continental).</p>	<p>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</p> <p><u>Note:</u> 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.</p>	<p>Diagnostic is Enabled</p> <p>DTC's Not active this key cycle</p> <p>Measure Valid status (ASIC)</p> <p>Controller status (ASIC)</p> <p>Engine Run or Auto stop</p> <p>*****</p> <p>Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete)</p> <p>*****</p>	<p>WRAF_Bank_1_FA P0135, P0030, P0031, P0032</p> <p>= Valid</p> <p>= Ready</p> <p>= True</p> <p>= Complete</p> <p>> 20.0 seconds</p>	<p>20 failures out of 24 samples</p> <p>Continuous in 25 milli - second loop</p>	Type B, 2 Trips
			<p>B1S1 WRAF ASIC indicates a Open circuit on the Reference Voltage circuit signal.</p> <p>Open fail counts are accumulated to determine fault status.</p> <p><u>Note:</u> This ASIC is referred to as CJ136 (next Gen version of CJ135 from Bosch).</p>	<p>The ASIC provides a fault indication when the reference voltage circuit fails the following criteria;</p> <p> Nernst signal - 0.45 > 1.0 volts</p> <p><u>Note:</u> the faults must exist for more than 10 msec to qualify for a fail flag.</p>	<p>DTC's Not active this key cycle</p> <p>Measure Valid status (ASIC)</p> <p>Controller status (ASIC)</p> <p>Engine Run or Auto stop</p> <p>*****</p> <p>Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete)</p> <p>*****</p>	<p>WRAF_Bank_1_FA P0135, P0030, P0031, P0032</p> <p>= Valid</p> <p>= Ready</p> <p>= True</p> <p>= Complete</p> <p>> 20.0 seconds</p>	<p>20 failures out of 24 samples</p> <p>Continuous in 25 milli - second loop</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Reference Ground Circuit/Open Bank 1 Sensor 1 (WRAF& Gen4 ECM	P2251	<p>This DTC determines if the B1S1 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).</p> <p>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.</p>	<p>B1S1 WRAF ASIC indicates a Open circuit on the Reference Ground circuit signal.</p> <p>Open fail counts are accumulated to determine fault status.</p> <p><u>Note:</u> This ASIC is referred to as ATIC142 (Continental).</p>	<p>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</p> <p>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.</p>	<p>Diagnostic is Enabled</p> <p>DTC's Not active this key cycle</p> <p>Measure Valid status (ASIC)</p> <p>Controller status (ASIC)</p> <p>Engine Run or Auto stop</p> <p>*****</p> <p>Heater Warm-up delay Then WRAF circuit diagnostic delay (since heater Warm-up delay is complete)</p> <p>*****</p>	<p>WRAF_Bank_1_FA P0135, P0030, P0031, P0032</p> <p>= Valid</p> <p>= Ready</p> <p>= True</p> <p>= Complete</p> <p>> 20.0 seconds</p>	<p>20 failures out of 24 samples</p> <p>Continuous in 25 milli - second loop</p>	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Turbo/Super Charger Bypass Valve - Mechanical Turbocharge r with wastegate. Not supercharge r with mechanical compressor	P2261	This DTC indicates the compressor recirculation valve being stuck closed. This diagnostic is active at coast down let off conditions, where an airflow pulsation criteria is used as basis of this diagnostic.	When measuring time accumulated air mass flow derivate boost pressure is high pass filtered with filter frequency ***** A failure is detected when Acc. Filtered Air Mass Flow or Acc.Der.Filtered boost pressure	< 0.50 Second, = 10.00 Hz ***** > 140.00 g/s > 99,999.00 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 ***** >= 1,300 rpm ***** > 6.00 % >= 0.25 s ***** > refer to P00C4 P2261: Compressor Surge Line in Supporting Tables 0.80 s ***** TRUE >=25.00 kPa <=-130.00 kPa/s <0.00 kPa >10.00 kPa/s ***** BSTR_b_TurboBypassCkt FA BSTR_b_BoostSnsrFA MAF_SensorFA	7 Failed tests out of 10 tests 25ms/ sample	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Signal Stuck Lean Bank 1 Sensor 2	P2270	<p>The P2270 diagnostic is the first in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, &P013B. ThisDTC 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.</p> <p>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.</p>	<p>Post 02 sensor signal</p> <p>AND</p> <p>The Accumulated mass airflow monitored during the Stuck Lean Voltage Test</p>	<p>< 860mvolts</p> <p>> 75 grams</p>	<p>Diagnostic is Enabled</p> <p>No Active DTCs</p> <p>B1S2 DTCs Not active this key cycle</p> <p>System Voltage Learned heater resistance</p> <p>Green 02S Condition</p>	<p>TPS_ThrottleAuthorityDefaulted ECT_Sensor_FA IAT_SensorFA MAF_SensorFA MAP_SensorFA AIR_System FA FuelInjectorCircuit_FA FuelTrimSystemBI TFTK0 FuelTrimSystemB2 TFTK0 EngineMisfireDetected_FA Ethanol Composition Sensor FA 02S_Bank_ 1_TFTK0 02S_Bank_ 2_TFTK0</p> <p>P013A, P013B, P013E, P013F, P2270 or P2271</p> <p>>10.5 Volts = Valid (the heater resistance has learned since NVM reset, see enable conditions for "H02S Heater Resistance DTCs")</p> <p>= 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:</p>	<p>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.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>Low Fuel Condition Only when FuelLevelDataFault</p> <p>Pedal position</p> <p>Engine Airflow</p> <p>Closed loop integral Closed Loop Active</p> <p>Evap</p> <p>Ethanol Estimation in Progress</p> <p>Post fuel cell</p> <p>Crankshaft Torque</p> <p>EGR Intrusive diagnostic All post sensor heater delays O2S Heater (post sensor) on Time</p> <p>Transmission Temp</p>	<p>B1S2, B282 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.</p> <p>= False</p> <p>= False</p> <p>< 4.0%</p> <p>2.0 < gps < 12.5</p> <p>0.75 < C/L Int < 1.08 = TRUE (Please see “Closed Loop Enable Clarification” in Supporting Tables).</p> <p>not in control of purge</p> <p>= Not Active (Please see “Ethanol Estimation in Progress” in Supporting Tables).</p> <p>= Enabled, refer to Multiple DTC Use - Block learn cells to enable Post oxygen sensor tests for additional info.</p> <p>< 125.0 Nm</p> <p>= not active</p> <p>= not active</p> <p>> 60.0 sec</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Predicted Catalyst temp Fuel State ===== 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) ===== All of the above met for at least 2.5 seconds, and then the Force Cat Rich intrusive stage is requested. ===== During Stuck Lean test the following must stay TRUE or the test will abort: Commanded Fuel Crankshaft Torque	> -40.0 °C 500 < °C < 900 = DFCO possible ===== 950 < RPM < 2,950 900 < RPM < 3,050 40.4 < MPH < 77.7 35.4 < MPH < 82.0 0.95 < EQR < 1.10 < 110.0Nm		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Signal Stuck Rich Bank 1 Sensor 2	P2271	<p>The P2271 diagnostic is the fourth in a sequence of six intrusive secondary 02 monitors which include DTCs P2270, P013E, P013A, P2271, P013F, &P013B. ThisDTC 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.</p> <p>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.</p>	<p>Post 02 sensor signal</p> <p>AND</p> <p>The Accumulated mass airflow monitored during the Stuck Rich Voltage Test</p>	<p>> 100 mvolts</p> <p>>25.0 grams</p>	<p>Diagnostic is Enabled</p> <p>No Active DTCs</p> <p>B1S2 DTCs Not Active this key cycle</p> <p>System Voltage</p> <p>Learned heater resistance</p> <p>Green 02S Condition</p>	<p>TPS_ThrottleAuthorityDefaulted</p> <p>ECT_Sensor_FA</p> <p>IAT_SensorFA</p> <p>MAF_SensorFA</p> <p>MAP_SensorFA</p> <p>AIR_System FA</p> <p>FuelInjectorCircuit_FA</p> <p>FuelTrimSystemBI TFTK0</p> <p>FuelTrimSystemB2 TFTK0</p> <p>EngineMisfireDetected_FA</p> <p>Ethanol Composition Sensor FA</p> <p>02S_Bank_ 1_TFTK0</p> <p>02S_Bank_ 2_TFTK0</p> <p>P013A, P013B, P013E, P013F or P2270</p> <p>>10.5 Volts</p> <p>= Valid (the heater resistance has learned since NVM reset, see enable conditions for "HO2S Heater Resistance DTCs")</p> <p>= Not Valid,</p> <p>Green 02S condition is considered valid until the accumulated air flow is greater than</p> <p>Multiple DTC Use_Green Sensor Delay Criteria - Limit</p> <p>for the following locations:</p>	<p>Frequency: Once per trip</p> <p>Note: if NaPOPD_b_ResetFastRespFunc = FALSE for the given Fuel Bank OR NaPOPD_b_RapidResponseActive = TRUE, multiple tests per trip are allowed.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>Low Fuel Condition Only when FuelLevelDataFault</p> <p>Fuel State</p> <p>DTC's Passed</p> <p>=====</p> <p>After above conditions are met: DFCO mode is continued (w/o driver initiated pedal input).</p>	<p>B1S2, B282 (if applicable) in Supporting Tables tab. Airflow accumulation is only enabled when airflow is above 22.0 grams/sec.</p> <p>= False</p> <p>= False</p> <p>= DFCO possible</p> <p>= P2270</p> <p>= P013E</p> <p>= P013A</p> <p>=====</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor C Circuit Low	P227C	<p>Detects an erroneously 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.</p> <p>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.</p>	BARO C Pressure	< 50.0 kPa	<p>Diagnostic is Enabled</p> <p>LIN communications established with MAF</p>		<p>160 failures out of 200 samples</p> <p>1 sample every 25 msec</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor C Circuit High	P227D	<p>Detects an erroneously 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.</p> <p>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.</p>	BARO C Pressure	> 110.0 kPa	<p>Diagnostic is Enabled</p> <p>LIN communications established with MAF</p>		<p>160 failures out of 200 samples</p> <p>1 sample every 25 msec</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Barometric Pressure Sensor C Circuit Intermittent/ Erratic	P227E	<p>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.</p> <p>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".</p> <p>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.</p>	<p>String Length</p> <p>Where: "String Length" = sum of "Diff" calculated over</p> <p>And where: "Diff" = ABS(current BARO C reading - BARO C reading from 25 milliseconds previous)</p>	<p>> 100 kPa</p> <p>40 consecutive BARO C readings</p>	<p>Diagnostic is Enabled</p> <p>LIN communications established with MAF</p>		<p>4 failures out of 5 samples</p> <p>Each sample takes 1.0 seconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump Performance	P228C	This DTC determines if the high pressure pump is not able to maintain target pressure. The fault is set if the measured fuel rail pressure is lower than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	>= P228C P2C1F-High Pressure Pump Control (HPC) fail threshold of pressure too low Mpa (see supporting tables)	<p>High Pressure Pump Performance Diagnostic Enable</p> <p>Battery Voltage</p> <p>Low Side Fuel Pressure</p> <p>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,ECTNot 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</p>	<p>True</p> <p>>=11 Volts</p> <p>> 0.275 MPa</p> <p>Enabled when a code clear is not active or not exiting device control Engine is not cranking</p>	<p>Positive Pressure Error -</p> <p>10.00 second failures out of 12.50 second samples</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	>= 70.0 KPA >=-40.0 degC -20 <=Temp degC <= 126		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump Performance	P228D	This DTC determines if the high pressure pump is delivering high pressure that desired pressure. The fault is set if the measured fuel rail pressure is higher than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	<= P228D P2C20 - High Pressure Pump Control (HPC) fail threshold for pressure too high Mpa (see supporting tables)	High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECTNot 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 Illum.
					detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	>= 70.0 KPA >= -40.0 DegC -20 <= Temp degC <= 126		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT LOW	P2300	Diagnoses Cylinder #1 Ignition Control (E8T) 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.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.</p>	< 100 Q impedance between signal and controller ground	<p>Engine running</p> <p>Ignition Voltage</p>	> 11.0	<p>50 Failures out of 63 Samples</p> <p>100 msec rate</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #1 CIRCUIT High	P2301	Diagnoses Cylinder #1 Ignition Control (E8T) output driver circuit for a Short to Power fault. Controller specific output driver circuit diagnoses the low sided driver for a short to power failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.	< 100 Q impedance between signal and controller power	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT Low	P2303	Diagnoses Cylinder #2 Ignition Control (E8T) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #2 CIRCUIT High	P2304	Diagnoses Cylinder #2 Ignition Control (E8T) output driver circuit for a Short to Power fault	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 100 Q impedance between signal and controller power	<p>Engine running</p> <p>Ignition Voltage</p>	> 11.0 Volts	<p>50 Failures out of 63 Samples</p> <p>100 msec rate</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT Low	P2306	Diagnoses Cylinder #3 Ignition Control (E8T) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #3 CIRCUIT High	P2307	Diagnoses Cylinder #3 Ignition Control (E8T) output driver circuit for a Short to Power fault	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 100 Q impedance between signal and controller power	<p>Engine running</p> <p>Ignition Voltage</p>	> 11.0 Volts	<p>50 Failures out of 63 Samples</p> <p>100 msec rate</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT Low	P2309	Diagnoses Cylinder #4 Ignition Control (E8T) output driver circuit for a Short to Ground fault. Controller specific output driver circuit diagnoses the low sided driver for a short to ground failure when the output is powered off by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range during driver on state indicates short to ground failure. Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to ground.	< 100 Q impedance between signal and controller ground	Engine running Ignition Voltage	> 11.0 Volts	50 Failures out of 63 Samples 100 msec rate	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
IGNITION CONTROL #4 CIRCUIT High	P2310	Diagnoses Cylinder #4 Ignition Control (E8T) output driver circuit for a Short to Power fault	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 100 Q impedance between signal and controller power	<p>Engine running</p> <p>Ignition Voltage</p>	> 11.0 Volts	<p>50 Failures out of 63 Samples</p> <p>100 msec rate</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Position Sensor Circuit Low	P23C4	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	<42	Diagnostic is Enabled SENT communication 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 B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Position Sensor Circuit High	P23C5	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 communication 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 B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Bypass Valve C Motor Current High	P23C6	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	$8.1\text{ A} < X < 12.8\text{ A}$	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 Illum.
Ignition Switch Run/ Start Position Circuit Low	P2534	Detects a low ignition switch run/start position circuit. This diagnostic reports the DTC when this circuit is low. Monitoring occurs when the ECM 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	106 failures out of 132 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 Illum.
Ignition Switch Run/ Start Position Circuit High	P2535	Detects a high ignition switch run/start position circuit. This diagnostic reports the DTC when this circuit is high. Monitoring occurs when the ECM 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	320 failures out of 400 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 Illum.
Transmission Control Torque Request Circuit	P2544	Determines if the torque request from the TCM is valid	Protect error - Serial Communication message 2's complement not equal (\$189/\$199) OR Rolling count error - Serial Communication message (\$189/\$199) rolling count index value OR Range Error - Serial Communication message - (\$189/\$199) TCM Requested Torque Increase OR Multi-transition error - Trans torque intervention type request change	Message <> two's complement of message Message <> previous message rolling count value + one > 610 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 Illum.
Engine Hood Switch Performance	P257D	This DTC monitors the hood switch rationality	<p>Hood Switch position is in an invalid position. The hood switch reading is invalid in these ranges.</p> <p>Hood Switch Type: CeVIOSe_GlobalB</p> <p>If Hood Switch type is CeVIOSe_GlobalA</p> <p>If Hood Switch type is CeVIOSe_GlobalB</p>	<p>43.4% to 45.7%</p> <p>59.34% to 66.96%</p>	<p>The diagnostic is enabled</p> <p>Enabled when Run/Crank is active only, otherwise Run/Crank is not used as an enable</p>	<p>Enabled</p> <p>Use Run/Crank as Enable</p>	<p>80 failed samples within 100 total samples</p> <p>Diagnostic runs in the 12.5 ms loop</p>	Type B, 2 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
02 Sensor Pumping Current Trim Circuit/Open Bank 1 Sensor 1 (WRAF & E81 ECM) Or (WRAF & Gen4 ECM)	P2626	<p>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.</p> <p>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.</p>	<p>B1S1 Trim circuit Open test.</p> <p>This application uses the following type of WRAF sensor:</p> <p>The ASIC Open trim test detects a fault if the trim circuit resistance is:</p> <p>For NGK_ZFAS_U2</p> <p>For Bosch_LSU_4p9</p> <p>Note: This ASIC is referred to as ATIC142 (Continental).</p>	<p>CeWRSG_e_Bosch_LSU_4p9</p> <p>> 4,644 ohms</p> <p>> 379.5 ohms</p>	<p>Diagnostic is Enabled</p> <p>DTC's Not active this key cycle</p> <p>Run/Crank Signal</p> <p>WRAF circuit diagnostic delay (since heater Warm-up delay is complete)</p> <p>Fuel Control State</p> <p>Off Stoich Closed Loop</p> <p>DFCO</p> <p>WRAF Pump current</p>	<p>WRAF_Bank_1_FA P0135, P0030, P0031, P0032</p> <p>changes from false to true</p> <p>> 20.0 seconds</p> <p>= Closed Loop</p> <p>= Not active</p> <p>= Not active</p> <p>< 1.0 ma</p>	<p>1 fail counts out of 1 samples</p> <p>25 ms /sample</p> <p>Continuous</p>	Type B, 2 Trips
			<p>B1S1 Trim circuit Open test.</p> <p>This application uses the following type of WRAF sensor:</p> <p>The ASIC Open trim test detects a fault if the trim circuit resistance is:</p> <p>For NGK_ZFAS_U2</p> <p>For Bosch_LSU_4p9</p>	<p>CeWRSG_e_Bosch_LSU_4p9</p> <p>< 118 ohms or > 4K ohms</p> <p><30 ohms or >300 ohms</p> <p>AND</p>	<p>Diagnostic is Enabled</p> <p>DTC's Not active this key cycle</p> <p>Run/Crank Signal</p> <p>WRAF circuit diagnostic delay (since heater Warm-up delay is complete)</p> <p>Fuel Control State</p> <p>Off Stoich Closed Loop</p> <p>DFCO</p> <p>WRAF Pump current</p>	<p>WRAF_Bank_1_FA P0135, P0030, P0031, P0032</p> <p>changes from false to true</p> <p>> 20.0 seconds</p> <p>= Closed Loop</p> <p>= Not active</p> <p>= Not active</p>	<p>1 fail counts out of 1 samples</p> <p>25 ms /sample</p> <p>Continuous</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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 Illum.
Control Module Power Off Timer Performance	P262B	<p>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).</p> <p>Count Up Test (CUT): Verifies that the HWIO timer is counting up with the proper increment.</p> <p>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.</p>	<p>Count Up Test:</p> <p>Time difference between the current read and the previous read of the timer</p> <p>Range Test:</p> <p>The variation of the HWIO timer and mirror timer is</p>	<p>> 1.50 seconds</p> <p>> 0.25%.</p>			<p>Count Up Test: 4 failures out of 20 samples</p> <p>1 sec / sample</p> <p>Continuous while run/crank is not active and until controller shutdown is initiated.</p> <p>Range Test: Once per trip when controller shutdown is initiated or run/crank becomes active.</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant 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 circuit 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 Illum.
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	<p>Diagnostic is Enabled</p> <p>No DTCs</p> <p>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</p> <p>Engine Outlet Coolant OR OBD Coolant Enable Criteria</p>	<p>VECR_MRV_LoC_FA VECR_MRV_PstnSnsrCkt_FA VECR_MRV_PstnSnsrCkt_TFTKO VECR_MRV_PstnPerf_FA</p> <p>= Active = Inactive = Inactive = Inactive = Enabled = True = True</p> <p>>-20.0 °C</p> <p>= TRUE</p>	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 Illum.
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	 $\geq 10.00^\circ$ $\geq 55.00^\circ$	Diagnostic is Enabled The following shall be satisfied for [12V System Voltage VECR_BRV_PstnFdbk_A VECR_BRV_PstnFdbk_F ol VECR_BRV_CktLo_FP, VECR_BRV_CktHi_FP VECR_BRV_CktLo_FA, 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 (hysteresis disable < 10.00 V) = No Fault Pending = No Fault Active = No Fault Active = True = between -5.00 ° and 115.00° = 1.00 $\geq -34.00^\circ\text{C}$ (hysteresis disable $\leq -35.00^\circ\text{C}$) Has not been triggered for	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 Illum.
					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.	greater than 37.00 seconds <= 4.00 ° for more than 1.50 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	$\geq 10.00^\circ$ $< 55.00^\circ$	Diagnostic is Enabled The following shall be satisfied for [12V System Voltage VECR_BRV_PstnFdbk_A v VECR_BRV_PstnFdbk_F ol VECR_BRV_CktLo_FP, VECR_BRV_CktHi_FP VECR_BRV_CktLo_FA, 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 (hysteresis disable < 10.00 V) = No Fault Pending = No Fault Active = No Fault Active = True = between -5.00° and 115.00° = 1.00 $\geq -34.00^\circ\text{C}$ (hysteresis disable $\leq -35.00^\circ\text{C}$)	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 Illum.
					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 <= 4.00 ° for more than 1.50 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Coolant Pump Overspeed	P26CE	<p>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.</p> <p>There are two different failure criteria as the pump feedback speed is dependent on the system voltage.</p>	<p>Any of the following fail criteria is met:</p> <p>Criterial: Filtered (Pump Command Speed - Pump Feedback Speed)</p> <p>12V System Voltage</p> <p>Criteria 2: Filtered (Pump Command Speed - Pump Feedback Speed)</p> <p>12V System Voltage</p>	<p>P26CE Pump Overspeed Fail < Threshold</p> <p>$\geq -9,999.00 \text{ V}$</p> <p>P26CE Pump Overspeed Fail Threshold Low < Voltage</p> <p>$< -9,999.00 \text{ V}$</p>	<p>Diagnostic is Enabled</p> <p>Difference in Pump Command Speed from previous data sample to present data sample</p> <p>=====</p> <p>Any of the following criteria is met:</p> <p>Criteria 1: Calibration to use fault pending is TRUE</p> <p>PECR_EMP_SpeedOOR_L_FP PECR_EMP_SpeedOOR_H_FP</p> <p>Criteria 2: Calibration to use fault pending is FALSE</p> <p>If either condition is achieved PECR_EMP_SpeedOOR_L_FA AND PECR_EMP_SpeedOOR_L_TFTKO</p> <p>OR</p> <p>PECR_EMP_SpeedOOR_H_FA AND PECR_EMP_SpeedOOR_H_TFTKO</p> <p>=====</p>	<p>$< 100.00 \text{ RPM for } \geq 3.00 \text{ s}$</p> <p>$= 1.00 (1 \text{ is TRUE})$</p> <p>$= \text{Not Active}$</p> <p>$= 1.00 (0 \text{ is FALSE})$</p> <p>$= \text{Not Active}$</p> <p>$= \text{Not Active}$</p>	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 Illum.
					PECR_MainCoolPmpSpd Act_Av PECR_MainCoolPmpSpd Act_Fol EECR_EngineInlet_FA Engine Inlet Coolant Temperature All of the following criteria are met for 12V System Voltage Pump Command Speed Pump Enable	= Not Active = 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 Illum.
Starter Relay Drive Pinion Circuit Open (12VSS)	P26E4	Controller specific output driver circuit diagnoses the Tandem Starter Pinion Relay high sided driver for an open circuit failure when the output is powered on by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range during driver on state indicates open circuit failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for an open circuit.</p>	<p>$\geq 200 \text{ KOhms}$ impedance between signal and controller ground.</p>	<p>Starter relay pinion diag enable</p> <p>Engine speed</p> <p>Run Crank voltage</p>	<p>Enabled</p> <p>$\geq 0.00 \text{ RPM}$</p> <p>$\geq 11.00 \text{ volts}$</p>	<p>40 failures out of 50 samples</p> <p>50 ms / sample</p>	Type B, 2 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Control Module Transfer Case Command State Rationality - 4WD high command not 4WD high ratio	P279A	Monitor measured transfer case gear ratio is 4WD low ratio or neutral while the transfer case control module command state is 4WD high. The 4WD measured transfer case ratio is calculated as transmission output shaft speed divided by the transfer case output shaft speed, both speed are measured values based on speed sensors.	transfer case control module transfer case command state AND measured transfer case ratio is in 4WD low ratio window OR measured transfer case ratio is in neutral window AND measured transfer case ratio is in 4WD low ratio window (measured transfer case ratio = transmission output speed / transfer case output speed) update rate 12.5 milliseconds	= 4WD high 4WD low ratio window < 3.00 > 2.40 neutral ratio window < 1.20 > 0.80 OR < 2.90 > 2.50 4WD low ratio window < 2.90 > 2.50	transmission gear is forward gear: transmission output shaft speed engine torque engine speed accelerator pedal position brake pedal position transmission gear is reverse gear: transmission output shaft speed engine torque engine speed accelerator pedal position brake pedal position diagnostic monitor enable PTO active engine power limited DTCs not fault active	> 500.0 RPM > 80.0 Nm > 300.0 RPM > 5.0 % < 100.0 % > 500.0 RPM > 80.0 Nm > 300.0 PRM > 5.0 % < 100.0 % = 1.00 Boolean = FALSE = FALSE P057B, P057C, P057D, P057E P17D4, P279B, P279C P0502, P0503, P0722, P0723, P2160, P2161	fail counts > 560.00 counts out of sample counts > 800.00 counts update rate 12.5 milliseconds for 1 count	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Control Module Transfer Case Command State Rationality - 4WD low command not 4WD low ratio	P279B	Monitor measures transfer case gear ratio is 4WD high ratio or neutral while the transfer case control module command state is 4WD low. The 4WD measured transfer case ratio is calculated as transmission output shaft speed divided by the transfer case output shaft speed, both speed are measured values based on speed sensors.	transfer case control module transfer case command state AND measured transfer case ratio is in 4WD high ratio window OR measured transfer case ratio is in neutral window AND measured transfer case ratio is in 4WD high ratio window (measured transfer case ratio = transmission output speed / transfer case output speed) update rate 12.5 milliseconds	= 4WD low 4WD high ratio window < 1.30 > 0.70 neutral ratio window < 1.20 > 0.80 OR < 2.90 > 2.50 4WD high ratio window < 1.20 > 0.80	transmission gear is forward gear: transmission output shaft speed engine torque engine speed accelerator pedal position brake pedal position transmission gear is reverse gear: transmission output shaft speed engine torque engine speed accelerator pedal position brake pedal position diagnostic monitor enable PTO active engine power limited DTCs not fault active	> 500.0 RPM > 80.0 Nm > 300.0 RPM > 5.0 % < 100.0 % = 1.00 Boolean = FALSE = FALSE P057B, P057C, P057D, P057E P17D4, P279A, P279C P0502, P0503, P0722, P0723, P2160, P2161	fail count > 560.00 counts out of sample count > 800.00 counts update rate 12.5 milliseconds for 1 count	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transfer Case Control Module Transfer Case Command State Rationality - 4WD neutral command not 4WD neutral ratio	P279C	Monitor measured transfer case gear ratio is 4WD high ratio or 4WD low ratio while the transfer case control module command state is 4WD neutral. The 4WD measured transfer case ratio is calculated as transmission output shaft speed divided by the transfer case output shaft speed, both speed are measured values based on speed sensors.	transfer case control module transfer case command state AND measured transfer case ratio is in 4WD low ratio window OR measured transfer case ratio is in 4WD high ratio window AND measured transfer case ratio is in 4WD low ratio window or in 4WD high ratio window (measured transfer case ratio = transmission output speed / transfer case output speed) update rate 12.5 milliseconds	= 4WD neutral 4WD low ratio window < 3.00 > 2.40 4WD high ratio window > 1.30 < 0.70 4WD neutral ratio window < 2.90 > 2.50 OR < 1.20 > 0.80	transmission gear is forward gear: transmission output shaft speed engine torque engine speed accelerator pedal position brake pedal position transmission gear is reverse gear: transmission output shaft speed engine torque engine speed accelerator pedal position brake pedal position diagnostic monitor enable PTO active engine power limited DTCs not fault active	> 300.0 RPM > -20.0 Nm > 0.0 RPM > 0.0 % < 100.0 % > 500.0 RPM > 80.0 Nm > 300.0 PRM > 5.0 % < 100.0 % = 1 AND = 1.00 Boolean = FALSE = FALSE P057B, P057C, P057D, P057E P17D4, P279A, P279B P0502, P0503, P0722, P0723, P2160, P2161	fail count > 840.00 counts out of sample count > 1,200.00 counts update rate 12.5 milliseconds for 1 count	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range Sensor B Circuit Low	P2802	Controller specific PWM circuit diagnoses the internal range sensor (IRS) B for a short to ground failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates short to ground failure Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to ground	< 0.5 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 inversely proportional circuit sensor type	= 1 Boolean > 0.00 volts < 9.70 % > 9.70 % CeTRGD_e_VoltDirctPro P	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 Illum.
Transmission Range Sensor B Circuit High	P2803	Controller specific PWM circuit diagnoses the internal range sensor (IRS) B for a power short or open circuit failure by comparing a voltage measurement to controller specific voltage thresholds.	Voltage measurement outside of controller specific acceptable range indicates an open circuit or power short failure Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit or power short	< 0.5 Q 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 inversely proportional circuit sensor type	= 1 Boolean > 0.00 volts > 90.30 % < 90.30 % 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 Illum.
Engine Coolant Bypass Valve Position Sensor Circuit Low Voltage	P29FA	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	< -13.00°	Diagnostic is Enabled 12V System Voltage VECR_BRV_PstnFdbk_A V VECR_BRV_PstnFdbk_F ol PowertrainRelayStateOn_ FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On Diagnostic Position Override Enable	>= 11.00 V (hysteresis disable < 10.00 V) = No Fault Pending = No Fault Active = True = False	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 Illum.
Engine Coolant Bypass Valve Position Sensor Circuit High Voltage	P29FB	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	> 123.00°	Diagnostic is Enabled 12V System Voltage VECR_BRV_PstnFdbk_A V VECR_BRV_PstnFdbk_F ol PowertrainRelayStateOn_ FA , Powertrain Relay Feedback Circuit DTCs P0689, P0690 Powertrain Relay Commanded On Diagnostic Position Override Enable	>= 11.00 V (hysteresis disable < 10.00 V) = No Fault Pending = No Fault Active = True = False	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 Illum.
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	<-5.0%	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 Illum.
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 Illum.
Cylinder 1 Injection Pulse Performance	P2B00	Diagnostic to determine if any of the commanded injection pulses for cylinder 1 was not delivered due to the injector pintle/armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude Misisng Pulse Fail Limit (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	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 Illum.
Cylinder 2 Injection Pulse Performance	P2B01	Diagnostic to determine if any of the commanded injection pulses for cylinder 2 was not delivered due to the injector pintle/armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F-Opening Magnitude Misisng Pulse Fail Limit (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	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 Illum.
Cylinder 3 Injection Pulse Performance	P2B02	Diagnostic to determine if any of the commanded injection pulses for cylinder 3 was not delivered due to the injector pintle/armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F-Opening Magnitude Misisng Pulse Fail Limit (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	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 Illum.
Cylinder 4 Injection Pulse Performance	P2B03	Diagnostic to determine if any of the commanded injection pulses for cylinder 4 was not delivered due to the injector pintle/armature not moving. The detection is based on the voltage flux feedback that occurs in the injector coil from the pintle/armature movement. The voltage feedback is measured in the ECM across the enable & command wires using an analog to digital converter.	Injector voltage feedback is not able to detect an opening magnitude Or Measured Voltage feedback converted to Injector Opening Magnitude	=< P2B00 P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F-Opening Magnitude Misisng Pulse Fail Limit (See supporting table)	Small Pulse General Diagnostic Enable (See Definition in Supporting Material below) Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)	= True = True	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 Illum.
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 Illum.
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 Mising 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 Illum.
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 Mising 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 Illum.
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 Mising 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 Illum.
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 configurable sensor reading system. This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr5 Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_NoUseAssgnmnt Temperature Sensor 5: CeEECR_e_NoUseAssgnmnt Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 47.5 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 47.5 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 47.5 Ohms Temp Sensor 7: 47.5 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 Illum.
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 configurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_NollseAssg nmnt Temperature Sensor 5: CeEECR_e_NollseAssg nmnt 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: 298,262 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 298,262 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 298,262 Ohms Temp Sensor 7: 298,262 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 Illum.
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 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 Illum.
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 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 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnostic is Enabled</p> <p>System supply</p> <p>Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
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 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 Illum.
Exhaust Camshaft Profile Actuator 2 Circuit Low Voltage	P2B3A	Controller specific output driver circuit diagnoses the Exhaust 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 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 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 Illum.
Exhaust Camshaft Profile Actuator 2 Circuit High Voltage	P2B3B	Controller specific output driver circuit diagnoses the Exhaust 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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnostic is Enabled</p> <p>System supply</p> <p>Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
Intake Camshaft Profile Actuator 2 Performance	P2B4F	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 2	Detected an Unintended pin firing without 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 Illum.
Exhaust Camshaft Profile Actuator 2 Performance	P2B51	An unintended pin firing without controller command. Exhaust Camshaft Profile Actuator 2	Detected an Unintended pin firing without 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 Illum.
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 Illum.
Wastegate Position Sensor "A" Circuit Performance	P2B81	<p>Detects a performance failure on the electronic wastegate actuator system</p> <p>The diagnose will fail if at least one of supervision fails.</p> <ul style="list-style-type: none"> * Position deviation supervision * Actuator current supervision * Actuator Duty Cycle supervision <p>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.</p>	Actuator is in Normal operation Abs(Position Error) for at least	>20.0% >2.0 sec	Diagnostic enabled ***** Engine not in crank mode Engine is not in cold start conditions Diagnostic system not disabled Device control Component test not active	True *****	25 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 not in cold start conditions Diagnostic system not disabled Device control Component test not active	True *****	25 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 not in cold start conditions Diagnostic system not disabled Device control Component test not active	True *****	25 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 Illum.
Engine Coolant Pump Underspeed	P2B85	<p>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.</p> <p>There are two different failure criteria as the pump feedback speed is dependent on the system voltage.</p>	<p>Any of the following fail criteria is met:</p> <p>Criterial:</p> <p>Filtered (Pump Command Speed - Pump Feedback Speed)</p> <p>12V System Voltage</p> <p>Criteria 2:</p> <p>Filtered (Pump Command Speed - Pump Feedback Speed)</p> <p>12V System Voltage</p>	<p>P2B85 Pump Underspeed Fail > Threshold</p> <p>$\geq -9,999.00 \text{ V}$</p> <p>P2B85 Pump Underspeed Fail Threshold Low > Voltage</p> <p>$< -9,999.00 \text{ V}$</p>	<p>Diagnostic is Enabled</p> <p>Difference in Pump Command Speed from previous data sample to present data sample</p> <p>=====</p> <p>Any of the following criteria is met:</p> <p>Criteria 1:</p> <p>Calibration to use fault pending is TRUE</p> <p>PECR_EMP_SpeedOOR_L_FP PECR_EMP_SpeedOOR_H_FP</p> <p>Criteria 2:</p> <p>Calibration to use fault pending is FALSE</p> <p>If either condition is achieved PECR_EMP_SpeedOOR_L_FA AND PECR_EMP_SpeedOOR_L_TFTKO</p> <p>OR</p> <p>PECR_EMP_SpeedOOR_H_FA AND PECR_EMP_SpeedOOR_H_TFTKO</p> <p>=====</p>	<p>$< 100.00 \text{ RPM for } \geq 3.00 \text{ s}$</p> <p>$= 1.00 (1 \text{ is TRUE})$</p> <p>$= \text{Not Active}$</p> <p>$= 1.00 (0 \text{ is FALSE})$</p> <p>$= \text{Not Active}$</p>	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 Illum.
					PECR_MainCoolPmpSpd Act_Av PECR_MainCoolPmpSpd Act_Fol EECR_EngineInlet_FA Engine Inlet Coolant Temperature All of the following criteria are met for 12V System Voltage Pump Command Speed Pump Enable	= 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 Illum.
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	> 90.0 % ***** ***** = 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	< 55.0 % < 1.00 % > 0.13sec	Diagnostic enabled when electronic waste gate is present. ***** Coolant Temperature ***** No DTCs:	True ***** >=80.0 °C *****	on event	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	<p>Injector voltage feedback is not able to detect an opening magnitude on any pulse for any cylinder</p> <p>Or</p> <p>Measured Voltage feedback converted to Injector Opening Magnitude on any pulse for any cylinder</p>	<p>=<</p> <p>P2B96 - Opening Magnitude Missing Pulse Fail Limit</p> <p>(See supporting table)</p>	<p>Small Pulse General Diagnostic Enable (See Definition in Supporting Material below)</p> <p>Fuel Pulse Voltage Feedback Data Ready (See Definition in Supporting Material below)</p> <p>OBD Manufacturer Enable Counter</p> <p>To enable the diagnostic, the Cold Start Emission Reduction Strategy Must Be Active per the following:</p> <p>Catalyst Temperature AND Engine Coolant AND Engine Coolant AND Barometric Pressure</p> <p>In addition, Multi Pulse Strategy Is Enabled and Active Per the following:</p> <p>Engine Speed</p> <p>Accel Position</p> <p>Engine Run Time</p>	<p>= True</p> <p>= True</p> <p>= 0</p> <p>< 500.00 degC AND > -12.00degC AND <= 66.00 degC AND >= 72.00 KPa</p> <p>>= 300.00 RPM <= 2,600.00 RPM</p> <p><= 25.00 Pct</p> <p>< 30 seconds</p>	<p>Runs once per trip when the cold start emission reduction strategy is active and Dual Pulse is enabled and active.</p> <p>Frequency: 100ms</p> <p>Test completes after Dual Pulse is no longer active OR The first 500 engine cycles have been reached</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>The Cold Start Emission Reduction strategy must not be exiting. The strategy will exit per the following:</p> <p>Catalyst Temperature AND Engine Run Time</p> <p>OR</p> <p>Engine Run Time</p> <p>OR</p> <p>Barometric Pressure</p> <p>Multi Pulse Strategy will exit per the following:</p> <p>Engine Speed OR Accel Position</p> <p>Engine Run Time</p>	<p>>= 800.00 degC</p> <p>>= 22.00 seconds</p> <p>></p> <p>P050D_P1400_CatalystLightOffExtendedEngineRunTimeExit</p> <p>This Extended Engine run time exit table is a function of percent ethanol and Catmons NormRatioEWMA. Refer to "Supporting Tables" for details.</p> <p>< 72.00 KPa</p> <p>> 2,800.00 RPM</p> <p>> 35.00 Pct</p> <p>>= 30 seconds</p>		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						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 Illum.
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 Illum.
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_MainCoolPmpSpd Act_Av PECR_MainCoolPmpSpd Act_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 Illum.
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.	<p>Temperature step change:</p> <p>1) positive step change is greater than calculated high limit</p> <p>OR</p> <p>2) negative step change is lower than calculated low limit.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr5</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p>		<p>Diagnostic is Enabled</p> <p>No Active DTC's</p>	<p>EECR_TS5_Erratic_TFTK 0</p> <p>EECR_TS5_CktHiLo_FA</p>	<p>5 seconds out of a 6 seconds window</p> <p>Continuously sampled</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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	 3.1 seconds -60.0 °C 150.0 °C 7.4 seconds -60.0 °C 150.0 °C 4.4 seconds -60.0 °C 150.0 °C 5.7 seconds -60.0 °C 150.0 °C 4.5 seconds -60.0 °C 150.0 °C 2.8 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 Illum.
			<p>Temperature Sensor 7:</p> <p>1) Sensor time constant</p> <p>2) Sensor low limit</p> <p>3) Sensor high limit</p> <p>*****Generic Example*****</p> <p>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.</p> <p>The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid.</p> <p>*****</p>	<p>2.5 seconds</p> <p>-60.0 °C</p> <p>150.0 °C</p>				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_NoUseAssg nmnt Temperature Sensor 5: CeEECR_e_NoUseAssg nmnt Temperature Sensor 6: CeEECR_e_EngCoolantTempSnsr5 Temperature Sensor 7: CeEECR_e_EngCoolantTempSnsr6	< X Ohms X is equal to: Temp Sensor 1: 55 Ohms Temp Sensor 2: 47.5 Ohms Temp Sensor 3: 41.1 Ohms Temp Sensor 4: 47.5 Ohms Temp Sensor 5: 41.1 Ohms Temp Sensor 6: 47.5 Ohms Temp Sensor 7: 47.5 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 Illum.
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 configurable sensor reading system. This DTC is associated with the temp sensor that is equal to: RadCoolantTempSnsr Temperature Sensor 1: CeEECR_e_EngCoolantTempSnsr1 Temperature Sensor 2: CeEECR_e_EngCoolantTempSnsr2 Temperature Sensor 3: CeEECR_e_RadCoolantTempSnsr Temperature Sensor 4: CeEECR_e_NollseAssg nmnt Temperature Sensor 5: CeEECR_e_NollseAssg nmnt 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: 298,262 Ohms Temp Sensor 3: 354,667 Ohms Temp Sensor 4: 298,262 Ohms Temp Sensor 5: 354,667 Ohms Temp Sensor 6: 298,262 Ohms Temp Sensor 7: 298,262 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 Illum.
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.	<p>Temperature step change:</p> <p>1) positive step change is greater than calculated high limit</p> <p>OR</p> <p>2) negative step change is lower than calculated low limit.</p> <p>This program uses a highly configurable sensor reading system.</p> <p>This DTC is associated with the temp sensor that is equal to: EngCoolantTempSnsr6</p> <p>Temperature Sensor 1: CeEECR_e_EngCoolant TempSnsr1</p> <p>Temperature Sensor 2: CeEECR_e_EngCoolant TempSnsr2</p> <p>Temperature Sensor 3: CeEECR_e_RadCoolant TempSnsr</p> <p>Temperature Sensor 4: CeEECR_e_NollseAssg nmnt</p> <p>Temperature Sensor 5: CeEECR_e_NollseAssg nmnt</p>		<p>Diagnostic is Enabled</p> <p>No Active DTC's</p>	<p>EECR_TS6_Erratic_TFTK 0</p> <p>EECR_TS6_CktHiLo_FA</p>	<p>5 seconds out of a 6 seconds window</p> <p>Continuously sampled</p>	Type B, 2 Trips

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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	 3.1 seconds -60.0 °C 150.0 °C 7.4 seconds -60.0 °C 150.0 °C 4.4 seconds -60.0 °C 150.0 °C 5.7 seconds -60.0 °C 150.0 °C 4.5 seconds -60.0 °C 150.0 °C 2.8 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 Illum.
			<p>Temperature Sensor 7:</p> <p>1) Sensor time constant</p> <p>2) Sensor low limit</p> <p>3) Sensor high limit</p> <p>*****Generic Example*****</p> <p>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.</p> <p>The next reading (after the 90 °C reading) must be between 73 °C and 101 °C to be valid.</p> <p>*****</p>	<p>2.5 seconds</p> <p>-60.0 °C</p> <p>150.0 °C</p>				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
"A" Camshaft Profile Actuator Position SensorA 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 Illum.
"A" Camshaft Profile Actuator Position SensorA Range/ Performance Bank 1	P2C06	Intake Hall Sensor 1 position feedback not matching expected	<p>DTC detects shift Pin Position Hall feedback failures</p> <p>If Hall Feedback signal seen but no shift command was sent to actuator.</p> <p>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)</p>	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00,	<p>Diagnostic is Enabled</p> <p>System Voltage</p> <p>Engine Running</p> <p>No active PCODES</p>	<p>> 11.00 Volts</p> <p>= TRUE</p> <p>CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO</p>	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 Illum.
"A" Camshaft Profile Actuator Position SensorA 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 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 Illum.
"A" Camshaft Profile Actuator Position SensorA Circuit High Bank 1	P2C08	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Actuator Position SensorA 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 Q 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 Illum.
"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 Illum.
"A" Camshaft Profile Actuator Position Sensor B Range/ Performance Bank 1	P2C0A	Intake Hall Sensor 2 position feedback not matching expected	<p>DTC detects shift Pin Position Hall feedback failures</p> <p>If Hall Feedback signal seen but no shift command was sent to actuator.</p> <p>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)</p>	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	<p>Diagnostic is Enabled</p> <p>System Voltage</p> <p>Engine Running</p> <p>No active P codes</p>	<p>> 11.00 Volts</p> <p>= TRUE</p> <p>CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO</p>	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 Illum.
"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 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 Illum.
"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 Q 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 Illum.
"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 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 Illum.
"A" Camshaft Profile Actuator Position Sensor C Range/ Performance Bank 1	P2C0E	Intake Hall Sensor 3 position feedback not matching expected	<p>DTC detects shift Pin Position Hall feedback</p> <p>If Hall Feedback signal seen but no shift command was sent to actuator.</p> <p>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)</p>	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	<p>Diagnostic is Enabled</p> <p>System Voltage</p> <p>Engine Running</p> <p>No Active P codes</p>	<p>> 11.00 Volts</p> <p>= TRUE</p> <p>CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO</p>	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 Illum.
"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 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 Illum.
"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 Q 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 Illum.
"B" Camshaft Profile Actuator Position SensorA 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 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 Illum.
"B" Camshaft Profile Actuator Position SensorA Range/ Performance Bank 1	P2C13	Exhaust Hall Sensor 1 position feedback not matching expected	<p>DTC detects shift Pin Position Hall feedback</p> <p>If Hall Feedback signal seen but no shift command was sent to actuator.</p> <p>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)</p>	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	<p>Diagnostic is Enabled</p> <p>System Voltage</p> <p>Engine Running</p> <p>No Active P Codes</p>	<p>> 11.00 Volts</p> <p>= TRUE</p> <p>CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO</p>	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 Illum.
"B" Camshaft Profile Actuator Position SensorA 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 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	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 Illum.
"B" Camshaft Profile Actuator Position SensorA Circuit High Bank 1	P2C15	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Actuator Position SensorA 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 Q 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 Illum.
"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 Illum.
"B" Camshaft Profile Actuator Position Sensor B Range/ Performance Bank 1	P2C17	Exhaust Hall Sensor 2 position feedback not matching expected	<p>DTC detects shift Pin Position Hall feedback failures</p> <p>If Hall Feedback signal seen but no shift command was sent to actuator.</p> <p>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)</p>	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	<p>Diagnostic is Enabled</p> <p>System Voltage</p> <p>Engine Running</p> <p>No Active P Codes</p>	<p>> 11.00 Volts</p> <p>= TRUE</p> <p>CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO</p>	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 Illum.
"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 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 Illum.
"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 Q 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 Illum.
Internal Control Module SIDI High Pressure Pump min/ max authority During Catalyst Warm Up	P2C1E	This DTC determines when the high pressure pump control has reached to its max or min authority during Catalyst Warm up	High Pressure Fuel Pump Delivery Angle OR High Pressure Fuel Pump Delivery Angle	$\geq 92^\circ$ $\leq 0^\circ$	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 ≥ -40.0 degC $-20 \leq \text{Temp degC} \leq 126$ $= \text{True}$	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 Illum.
					Crank Sensor Not FA and IAT,IAT2,ECTNot FA and Low side Fuel Pump Relay ckt Not FA and Estimate fuel rail pressure is valid and Green Engine (In assembly plant) is not enabled and Not if low fuel condition and Low side Fuel Pump is on and Injector Flow Test is not active and Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true andManufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
SIDI High Pressure Pump Performance During Catalyst Warm Up	P2C1F	This DTC determines if the high pressure pump is not able to maintain target pressure Catalyst Warm Up. The fault is set if the measured fuel rail pressure is lower than desired fuel pressure by a value that can impact emission and drivability for a number of pump events.	Fuel Pressure Error (Desired Pressure - Measure Pressure)	>= P228C P2C1F-High Pressure Pump Control (HPC) fail threshold of pressure too low Mpa (see supporting tables)	Catalyst Warm Up High Pressure Pump Performance Diagnostic Enable Battery Voltage Low Side Fuel Pressure Catalyst Warm up enabled (See Definition in Supporting Material below) Additional Enable Conditions: All must be true (High Pressure Pump is enabled and High Fuel pressure sensor ckt is Not (FA,FP or TFTKO) and High Pressure fuel pump ckt is Not (FA,FP or TFTKO) and Cam or Crank Sensor Not FA and IAT,IAT2,ECTNot 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 Illum.
					Device control commanded pressure is false and Device control pump ckt enabled on is false and Engine movement detected is true and Manufacturers enable counter is 0) Flex Fuel Sensor Not FA Ignition voltage out of correlation error(P1682) not active Barometric Pressure Inlet Air Temp Fuel Temp	>= 70.0 KPA >=-40.0 degC -20 <=Temp degC <= 126		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 >= -40.0 DegC -20 <= Temp degC <= 126		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 <u>To indicate an fast fail:</u> Absolute value of Powerup EOT - Powerup ECT AND Absolute value of Powerup IAT - Powerup ECT <u>To indicate a fast pass:</u> 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 AND < 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_SensorCkt_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 <u>Pass Condition 1:</u> Absolute value of Powerup EOT - Powerup ECT AND Absolute value of Powerup EOT - minIAT OR <u>Pass Condition 2:</u> 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		

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			<p>AND (IAT minimum observed with Block Heater or (IAT minimum observed and Absolute value of power up IAT - min. observed IAT))</p> <p>AND Absolute value of Powerup EOT - Powerup IAT</p> <p>AND Absolute value of Powerup EOT - minIAT</p> <p><u>Fail Condition:</u> Absolute value of Powerup EOT - Powerup EOT</p> <p>AND (IAT minimum observed with Block Heater or (IAT minimum observed and Absolute value of power up IAT - min. observed IAT))</p> <p>AND (Absolute value of Powerup EOT - Powerup IAT or Absolute value of Powerup EOT - minIAT)</p> <p>AND Absolute value of Powerup ECT - Powerup IAT</p>	<p>AND</p> <p>> -7 Deg C</p> <p>> -10 Deg C</p> <p><= 5 Deg C</p> <p>AND</p> <p><= 16 Deg C</p> <p><= 16 Deg C</p> <p>> 16 Deg C</p> <p>AND</p> <p>> -7 Deg C</p> <p>> -10 Deg C</p> <p><= 5 Deg C</p> <p>AND</p> <p>> 16 Deg C</p> <p>> 16 Deg C</p> <p>AND</p> <p><= 16 Deg C</p>	<p>Time above Minimum Vehicle Speed</p> <p>Time less than Vehicle speed resets above timer</p> <p>No active DTC's</p>	<p>> 9 MPH for > 400 seconds</p> <p>< 15.0 for > 20.0 seconds</p> <p>Fault bundles: IgnitionOffTimer_FA IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuit FA</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			AND	AND				
			Absolute value of Powerup ECT - minIAT	<= 16 Deg C				
			Warmup Test <u>Warm Up Fail Condition:</u> EOT <u>Warm Up Test Pass Condition:</u> 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_TotalAccumulate dFlow (See P0196 details on Supporting Tables Tab) Fault bundles: IAT_SensorFA ECT_Sensor_Ckt_FA MAF_SensorFA EngOilTempSensorCircuit FA	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 Illum.
			Continuous Test <u>Pass Condition:</u> (Measured Oil Temperature A - Measured Oil Temperature B) OR Absolute value of (Measured Oil Temperature A - Measured Oil Temperature B) <u>Fail Condition:</u> (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 ≥ -7 and ≤ 105 Deg C ≥ 45 and ≤ 105 Deg C ≥ 70 Deg C Enabled and \geq 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 Illum.
Cold Start Wastegate Position SensorA Circuit Performance	P2C9B	Detects a performance failure on the electronic wastegate actuator 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	>20.0% >2.0 sec	Diagnostic enabled ***** Engine not in crank mode Engine is in cold start conditions Diagnostic system not disabled Device control Component test not active	True *****	25 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 start conditions Diagnostic system not disabled Device control Component test not active	True *****	25 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 start conditions Diagnostic system not disabled Device control Component test not active	True *****	25 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 Illum.
Cooling Fan 2 Underspeed Performance Fault [LIN Bus Electric PWM Fans Only- Internal or External controller]	P2CB9	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] P2CB9_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 i] == 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 Illum.
Cooling Fan 3 Underspeed Performance Fault [LIN Bus Electric PWM Fans Only- Internal or External controller]	P2CBB	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] P2CBB_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 Illum.
Cold Start Engine Coolant Bypass Valve C Range/ Performance	P2DE7	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 Coolant system mode Catalyst Warmup 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	= Low Flow or Low Flow Autostop = TRUE VECR_MRV_LoC_FA VECR_MRV_PstnSnsrCkt_FA VECR_MRV_PstnSnsrCkt_TFTKO VECR_MRV_PstnPerf_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 Illum.
Cold Start Engine Coolant Bypass Valve D Stuck Open	P2DE8	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	> 10.00°	Diagnostic is Enabled	= Low Flow or Low Flow Autostop = TRUE >0.10 seconds > 11.00V (hystersis disable < 10.00 V) = No Fault Pending = No Fault Active = No Fault Active = True = between -5.00 ° and 115.00° = 1.00	4 seconds out of a 5 seconds window	Type B, 2 Trips
			AND		Catalyst Warmup Enabled			
			Coolant Valve Position Feedback	> 55.00°	The following shall be satisfied for [
				12V System Voltage				
				VECR_BRV_PstnFdbk_Av, VECR_BRV_PstnFdbk_Fol, VECR_BRV_CktLo_FP, VECR_BRV_CktHi_FP				
				VECR_BRV_CktLo_FA, 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 [

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Engine Block Coolant Enable Temperature] Coolant Valve Calibration 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.	> -34.00 °C (hysteresis disabled -35.00 °C) Has not been triggered for greater than 37.00 seconds < 4.00° for more than 1.50 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cold Start Engine Coolant Pump Underspeed	P2DE9	<p>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.</p> <p>There are two different failure criteria as the pump feedback speed is dependent on the system voltage.</p>	Pump speed request - Pump speed feedback	>200 RPM	<p>Diagnostic is Enabled</p> <p>Coolant system mode</p> <p>Catalyst Warmup Enabled</p> <p>Difference in Pump Command Speed from previous data sample to present data sample</p> <p>=====</p> <p>EECR_EngineInlet_FA Engine Inlet Coolant Temperature</p> <p>=====</p> <p>Any of the following criteria is met:</p> <p>Criteria 1: Calibration to use fault pending is TRUE PECR_EMP_SpeedOOR_L_FP PECR_EMP_SpeedOOR_H_FP</p> <p>Criteria 2: Calibration to use fault pending is FALSE</p> <p>If either condition is achieved PECR_EMP_SpeedOOR_L_FA AND</p>	<p>= Low Flow or Low Flow Autostop</p> <p>= TRUE</p> <p><100.00 RPM for >=3.00 s</p> <p>= Not Active</p> <p>>= -40.00 °C</p> <p>= 1.00(1 is TRUE)</p> <p>= Not Active</p> <p>= 1.00 (0 is FALSE)</p>	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 Illum.
					PECR_EMP_SpeedOOR L_TFTKO OR PECR_EMP_SpeedOOR H_FA AND PECR_EMP_SpeedOOR H_TFTKO	= Not Active = Not Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cold Start Engine Coolant Bypass Valve D Stuck Closed	P2E81	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	> 10.00° < 55.00°	Diagnostic is Enabled Coolant system mode Catalyst Warmup Enabled The following shall be satisfied for [12V System Voltage VECR_BRV_PstnFdbk_A v VECR_BRV_PstnFdbk_F ol VECR_BRV_CktLo_FP, VECR_BRV_CktHi_FP VECR_BRV_CktLo_FA, 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 [= Low Flow or Low Flow Autostop =TRUE >0.10 seconds > 11.00 V (hysteresis disable < 10.00 V) = No Fault Pending = No Fault Active = No Fault Active = True = between -5.00 ° and 115.00° = 1.00	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 Illum.
					<p>Engine Block Coolant Enable Temperature]</p> <p>Coolant Valve Calibration Run**</p> <p>Change in Two Consecutive Coolant Valve Position Command]</p> <p>** Calibration run is a set of pre-defined valve movements for calibrating the position sensor and learning the position of the endstops.</p>	<p>>-34.00 °C (hysteresis disable <= -35.00 °C)</p> <p>Has not been triggered for greater than 37.00 seconds</p> <p>> 4.00° for more than 1.50 seconds</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cold Start Engine Coolant Pump Overspeed	P2E82	<p>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.</p> <p>There are two different failure criteria as the pump feedback speed is dependent on the system voltage.</p>	Pump speed request - Pump speed feedback	< -200 RPM	<p>Diagnostic is Enabled</p> <p>Coolant system mode</p> <p>Catalyst Warmup Enabled</p> <p>Difference in Pump Command Speed from previous data sample to present data sample</p> <p>=====</p> <p>EECR_EngineInlet_FA Engine Inlet Coolant Temperature</p> <p>=====</p> <p>Any of the following criteria is met:</p> <p>Criteria 1: Calibration to use fault pending is TRUE PECR_EMP_SpeedOOR_L_FP PECR_EMP_SpeedOOR_H_FP</p> <p>Criteria 2: Calibration to use fault pending is FALSE</p> <p>If either condition is achieved PECR_EMP_SpeedOOR_L_FA AND</p>	<p>= Low Flow or Low Flow Autostop</p> <p>= TRUE</p> <p><100.00 RPM for >=3.00 s</p> <p>= Not Active</p> <p>>= -40.00 °C</p> <p>= 1.00(1 is TRUE)</p> <p>= Not Active</p> <p>= 1.00 (0 is FALSE)</p>	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 Illum.
					PECR_EMP_SpeedOOR L_TFTKO OR PECR_EMP_SpeedOOR H_FA AND PECR_EMP_SpeedOOR H_TFTKO	= Not Active = Not Active		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Crank Control Circuit High Voltage	P305D	Diagnoses the DC/DC Converter Crank Control Circuit for circuit high faults	DC/DC Converter Crank Control	<> ECM Crank Control	Diagnostic enabled 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 1 TRUE TRUE FALSE FALSE >= 6.60 Volts	320 failed samples out of 400 samples in 12.50 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
DC/DC Converter Crank Control Circuit Low Voltage	P305E	Diagnoses the DC/DC Converter Crank Control Circuit for circuit low faults	DC/DC Converter Crank Control	<> ECM Crank Control	Diagnostic enabled 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 1 TRUE TRUE FALSE TRUE >= 6.60 Volts	26 failed samples out of 30 samples in 12.50 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	$\leq -10.00\text{RPM}$	Diagnostic is Enabled All of the following criteria are met for 12V System Voltage PECR_MainCoolPmp SpdAct_Av PECR_MainCoolPmp SpdAct_Fol	$\geq 3.00\text{ s}$ $> 11.00\text{ V}$ (with hysteresis disable $< 10.00\text{ V}$) = Not Active	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 Illum.
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	$\geq 6,350.00$ RPM	Diagnostic is Enabled All of the following criteria are met for 12V System Voltage PECR_MainCoolPmp SpdAct_Av PECR_MainCoolPmp SpdAct_Fol	≥ 3.00 s > 11.00 V (with hysteresis disable < 10.00 V) = Not Active	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 Illum.
Engine Coolant Pump Current Out of Range Low	P3073	<p>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.</p> <p>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.</p>	Pump Motor AC Current	< 0.00A	<p>Diagnostic is Enabled</p> <p>12V System Voltage</p> <p>PECR_MainCoolPmpMtr ACC_Av PECR_MainCoolPmpMtr ACC_Fol</p>	<p>> 11.00 V (with hysteresis disable < 10.00 V)</p> <p>= Not Active</p>	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 Illum.
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 PECR_MainCoolPmpMtr ACC_Fol	> 11.00 V (with hysteresis disable < 10.00 V) = Not Active	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 Illum.
Engine Coolant Pump Low Current Performance	P3075	<p>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.</p> <p>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</p>	<p>Intrusive Test:</p> <p>Any of the following criteria is met</p> <p>Criteria 1:</p> <p>P3075 3076 Pump</p> <p>a) Current Scaled (A)</p> <p>b) EECR_EngineInlet F A is Not Active</p> <p>Criteria 2:</p> <p>a) Pump Motor AC Current</p> <p>(See supporting tables for the above threshold values)</p> <p>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.</p>	<p><</p> <p>P3075 Pump Low Current Performance Failure Threshold (A)</p> <p>(See supporting tables for the above threshold values)</p>	<p>Diagnostic is Enabled</p> <p>12V System Voltage</p> <p>PECR_MainCoolPmpMtr ACC_Av PECR_MainCoolPmpMtr ACC_Fol PECR_MainCoolPmpSpd Act_Av PECR_MainCoolPmpSpd Act_FoFA PECR_MainCoolPmpSpd Act_Fol PECR_MainCoolPmpSpd Act_LcFA 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</p> <p>Pump Enable</p> <p>Engine Block Valve Coolant Flow in Range</p> <p>Coolant Flow Restriction Factor in Range</p> <p>Pump Intrusive Test Timer</p> <p>Pump Speed Feedback in</p>	<p>>= 10.20 V</p> <p>= Not Active</p> <p>= True</p> <p>20.00 to 100.00%</p> <p>0.60 to 1.00</p> <p>< 15.00 s</p>	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 Illum.
		diagnostic reports a PASS.			<p>Range</p> <p>All of the following criteria are met for</p> <p>a) Coolant Distribution Mode (Criteria is met when the array table for the given distribution mode is TRUE)</p> <p>b) Coolant System Mode (Criteria is met when the array table for the given distribution mode is TRUE)</p> <p>Any of the following criteria is met for Criteria 1:</p> <p>a) Passive Test Result</p> <p>b) Desired Air Per Cylinder</p> <p>Criteria 2:</p> <p>a) Passive Test Result</p> <p>b) Desired Air Per Cylinder</p> <p>Any of the following criteria is met: Criteria 1:</p> <p>a)</p>	<p>3,800.00 RPM to 4,200.00 RPM</p> <p>>= 2.00 s</p> <p>P3075 3076 Pump Current Performance Coolant Distribution =Mode (1 is TRUE)</p> <p>P3075 3076 Pump Current Performance Coolant System Mode =Select (1 is TRUE)</p> <p>>= 2.00 s</p> <p>= Fail</p> <p>> 100.00 mg (with hysteresis disable <80.00 mg)</p> <p>= Not Fail</p> <p>> 100.00 mg (with hysteresis disable < 80.00 mg)</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					PECR_EMP_CurrPerf Hi_TPTKO PECR_EMP_CurrPerf Lo_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 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_Fol PECR_MainCoolPmpSpd Act_Av PECR_MainCoolPmpSpd Act_FoFA PECR_MainCoolPmpSpd Act_Fol PECR_MainCoolPmpSpd Act_LcFA PECR_EMP_CurrOORL_ FA PECR_EMP_CurrOORH_ FA	>= 10.20 V	8 seconds out of a 10 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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 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 6,250.00 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 Illum.
Engine Coolant Pump High Current Performance	P3076	<p>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.</p> <p>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</p>	<p>Intrusive Test</p> <p>Any of the following criteria is met</p> <p>Criteria 1: P3075 3076 Pump a) Current Scaled (A)</p> <p>b) EECR_EngineInlet F A is Not Active</p> <p>Criteria 2: a) Pump Motor AC Current</p> <p>(See supporting tables for the above threshold values)</p> <p>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.</p>	<p>></p> <p>P3076 Pump High Current Performance Failure Threshold (A)</p> <p>(See supporting tables for the above threshold values)</p>	<p>Diagnostic is Enabled</p> <p>12V System Voltage</p> <p>PECR_MainCoolPmpMtr ACC_Av PECR_MainCoolPmpMtr ACC_Fol PECR_MainCoolPmpSpd Act_Av PECR_MainCoolPmpSpd Act_FoFA PECR_MainCoolPmpSpd Act_Fol PECR_MainCoolPmpSpd Act_LcFA 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</p> <p>Pump Enable</p> <p>Engine Block Valve Coolant Flow in Range</p> <p>Coolant Flow Restriction Factor in Range</p> <p>Pump Intrusive Test Timer</p> <p>Pump Speed Feedback in</p>	<p>$\geq 10.20 \text{ V}$</p> <p>= Not Active</p> <p>= True</p> <p>20.00 to 100.00%</p> <p>0.60 to 1.00</p> <p>< 15.00 s</p>	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 Illum.
		diagnostic reports a PASS.			<p>Range</p> <p>All of the following criteria are met for</p> <p>a) Coolant Distribution Mode (Criteria is met when the array table for the given distribution mode is TRUE)</p> <p>b) Coolant System Mode (Criteria is met when the array table for the given distribution mode is TRUE)</p> <p>Any of the following criteria is met for Criteria 1:</p> <p>a) Passive Test Result</p> <p>b) Desired Air Per Cylinder</p> <p>Criteria 2:</p> <p>a) Passive Test Result</p> <p>b) Desired Air Per Cylinder</p> <p>Any of the following criteria is met:</p>	<p>3,800.00 RPM to 4,200.00 RPM</p> <p>>= 2.00 s</p> <p>P3075 3076 Pump Current Performance Coolant Distribution =Mode (1 is TRUE)</p> <p>P3075 3076 Pump Current Performance Coolant System Mode =Select (1 is TRUE)</p> <p>>= 2.00 s</p> <p>= Fail</p> <p>> 100.00 mg (with hysteresis disable <80.00 mg)</p> <p>= Not Fail</p> <p>> 100.00 mg (with hysteresis disable < 80.00 mg)</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Criteria 1: a) PECR_EMP_CurrPerf Hi_TPTKO PECR_EMP_CurrPerf Lo_TPTKO = Not Active b) Pump Intrusive Test Attempts <= 3.00 Count Criteria 2: a) Passive Test Result = Fail b) Pump Passive Requests <= 3.00 Count Any of the following criteria is met: a) Engine Outlet Coolant Temperature >= 50.00 °C b) OBD Coolant Enable = 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_MainCoolPmpMtr ACC_Av PECR_MainCoolPmpMtr ACC_Fol PECR_MainCoolPmpSpd Act_Av PECR_MainCoolPmpSpd Act_FoFA PECR_MainCoolPmpSpd Act_Fol PECR_MainCoolPmpSpd Act_LcFA PECR_EMP_CurrOORL_ FA	>= 10.20 V	8 seconds out of a 10 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			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_SpdBndI_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 6,250.00 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 Illum.
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 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 Illum.
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 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 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnostic is Enabled</p> <p>System supply</p> <p>Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
Intake Camshaft Profile Actuator 4 Performance	P3083	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 4	Detected an Unintended pin firing without 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 Illum.
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 Illum.
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 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 Illum.
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 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 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnostic is Enabled</p> <p>System supply</p> <p>Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
Intake Camshaft Profile Actuator 5 Performance	P3088	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 5	Detected an Unintended pin firing without 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 Illum.
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 Illum.
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 Illum.
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 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 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnostic is Enabled</p> <p>System supply</p> <p>Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
Intake Camshaft Profile Actuator 6 Performance	P308D	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 6	Detected an Unintended pin firing without 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 Illum.
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 Illum.
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 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 Illum.
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 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 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnostic is Enabled</p> <p>System supply</p> <p>Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
Intake Camshaft Profile Actuator 7 Performance	P3092	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 7	Detected an Unintended pin firing without 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 Illum.
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 Illum.
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 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 Illum.
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 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 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnostic is Enabled</p> <p>System supply</p> <p>Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>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 Illum.
Intake Camshaft Profile Actuator 8 Performance	P3097	An unintended pin firing without controller command. Intake Camshaft Profile Actuator 8	Detected an Unintended pin firing without 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 Illum.
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 Illum.
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 Q impedance between signal and controller ground.	Diagnosis 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 Illum.
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 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 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range during driver off state indicates short to power failure.</p> <p>Controller specific output driver circuit voltage thresholds are set to meet the following controller specification for a short to power.</p>	< 0.5 Q impedance between signal and controller power	<p>Diagnostic is Enabled</p> <p>System supply</p> <p>Output driver is commanded on</p> <p>Ignition switch is in crank or run position</p>	>11.00 Volts	<p>4.00</p> <p>fails out of 5.00</p> <p>samples</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Exhaust Camshaft Profile Actuator 4 Performance	P309C	An unintended pin firing without controller command. Exhaust Camshaft Profile Actuator 4	Detected an Unintended pin firing without 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 Illum.
"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 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 Illum.
"A" Camshaft Profile Actuator Position Sensor D Range/ Performance Bank 1	P30B1	Intake Hall Sensor 4 position feedback not matching expected	<p>DTC detects shift Pin Position Hall feedback</p> <p>If Hall Feedback signal seen but no shift command was sent to actuator.</p> <p>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)</p>	Pin Hall Feedback registers below 55.00 , then below 45.00 , then above 68.00 ,	<p>Diagnostic is Enabled</p> <p>System Voltage</p> <p>Engine Running</p> <p>No Active P Codes</p>	<p>> 11.00 Volts</p> <p>= TRUE</p> <p>CrankSensor_FA CrankSensor_TFTKO CamLctnIntFA CamSnsrIntTFTKO CamLctnExhFA CamSnsrExhTFTKO</p>	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 Illum.
"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 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 Illum.
"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 Q 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 Illum.
"A" Camshaft Profile Control Sleeve Position SensorA Circuit Bank 1	P30BE	Controller specific output driver circuit diagnoses the Intake Camshaft Profile Position SensorA 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 Illum.
"A" Camshaft Profile Control Sleeve Position SensorA Range/ Performance Bank 1	P30BF	Monitors the output of the Sliding Cam Position Sensor for expected and in range signals. Intake sensor 1	<p>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.</p> <p>The diagnostic looks at the number of rising and falling edges seen in an engine cycle. 2 edges per engine cycle = PASS</p> <p>0 edges per engine cycle with signal low = Short to Ground or Open</p> <p>OR</p> <p>0 edges per engine cycle with signal High = Short to Power</p> <p>OR (2nd SECTION)</p> <p>Failed lift state change attempt signal sequence.</p> <p>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</p>	<p>number of edges read this engine cycle <> 2.00</p> <p>Buffer reading low signals</p> <p>Buffer reading High signals</p> <p>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</p>	<p>Diagnostic is Enabled</p> <p>system voltage</p> <p>engine running</p> <p>No active Pcodes</p>	<p>>11.00 Volts</p> <p>= TRUE</p> <p>CamSensorAnyLctnTFTKO CrankSensor_TFTKO</p>	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 Illum.
			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 Illum.
"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 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 Illum.
"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	<p>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</p> <p>0 edges per engine cycle with signal low = Short to Ground or Open</p> <p>OR</p> <p>0 edges per engine cycle with signal High = Short to Power</p> <p>OR (2nd SECTION)</p> <p>Failed lift state change attempt signal sequence.</p> <p>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)</p>	<p>number of edges read this engine cycle <> 2.00</p> <p>Buffer reading low signals</p> <p>Buffer reading High signals</p> <p>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.</p>	<p>Diagnostic is Enabled</p> <p>system voltage</p> <p>engine running</p> <p>No active Pcodes</p>	<p>>11.00 Volts</p> <p>= TRUE</p> <p>CamSensorAnyLctnTFTKO CrankSensor_TFTKO</p>	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 Illum.
			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 Illum.
"B" Camshaft Profile Control Sleeve Position SensorA Circuit Bank 1	P30C6	Controller specific output driver circuit diagnoses the Exhaust Camshaft Profile Position SensorA 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 Illum.
"B" Camshaft Profile Control Sleeve Position SensorA Range/ Performance Bank 1	P30C7	Monitors the output of the Sliding Cam Position Sensor for expected and in range signals Exhaust 1	<p>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</p> <p>0 edges per engine cycle with signal low = Short to Ground or Open</p> <p>OR</p> <p>0 edges per engine cycle with signal High = Short to Power</p> <p>OR (2nd SECTION)</p> <p>Failed lift state change attempt signal sequence.</p> <p>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)</p>	<p>number of edges read this engine cycle <> 2.00</p> <p>Buffer reading low signals</p> <p>Buffer reading High signals</p> <p>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.</p>	<p>Diagnostic is Enabled</p> <p>system voltage</p> <p>engine running</p> <p>No active Pcodes</p>	<p>>11.00 Volts</p> <p>= TRUE</p> <p>CamSensorAnyLctnTFTKO CrankSensor_TFTKO</p>	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 Illum.
			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 Illum.
"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 System supply voltage Output driver is commanded on Ignition switch is in crank or run positionsystem voltage 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 Illum.
"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	<p>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</p> <p>0 edges per engine cycle with signal low = Short to Ground or Open</p> <p>OR</p> <p>0 edges per engine cycle with signal High = Short to Power</p> <p>OR (2nd SECTION)</p> <p>Failed lift state change attempt signal sequence.</p> <p>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)</p> <p>We expect to see all 3</p>	<p>number of edges read this engine cycle <> 2.00</p> <p>Buffer reading low signals</p> <p>Buffer reading High signals</p> <p>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.</p> <p>Observation window.</p>	<p>Diagnostic is Enabled</p> <p>system voltage</p> <p>engine running</p> <p>No active Pcodes</p>	<p>>11.00 Volts</p> <p>= TRUE</p> <p>CamSensorAnyLctnTFTKO CrankSensor_TFTKO</p>	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 Illum.
			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 Illum.
"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.	<p>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.</p> <p>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.</p>	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.	<p>Diagnostic is Enabled</p> <p>system voltage</p> <p>engine run state</p> <p>No active Pcodes</p>	<p>>11.00 Volts</p> <p>= TRUE</p> <p>CamSensorAnyLctnTFTK0</p> <p>CrankSensor_TFTKO</p>	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 Illum.
"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.	<p>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.</p> <p>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.</p>	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	<p>Diagnostic is Enabled</p> <p>system voltage</p> <p>engine run state</p> <p>No active Pcodes</p>	<p>>11.00 Volts</p> <p>= TRUE</p> <p>CamSensorAnyLctnTFTK0</p> <p>CrankSensor_TFTKO</p>	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 Illum.
"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.	<p>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.</p> <p>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.</p>	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	<p>Diagnostic is Enabled</p> <p>system voltage</p> <p>engine run state</p> <p>No active Pcodes</p>	<p>>11.00 Volts</p> <p>= TRUE</p> <p>CamSensorAnyLctnTFTK0</p> <p>CrankSensor_TFTKO</p>	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 Illum.
"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.	<p>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.</p> <p>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.</p>	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	<p>Diagnostic is Enabled</p> <p>system voltage</p> <p>engine run state</p> <p>No P codes active</p>	<p>>11.00 Volts</p> <p>= TRUE</p> <p>CamSensorAnyLctnTFTK0</p> <p>CrankSensor_TFTKO</p>	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 Illum.
Injector Circuit Range/ Performance	P30D4	Diagnostic to determine if any of the voltage feedback measured from the analog to digital converter on any cylinder is rational (total engine based). The measured voltage is checked when the injection pulse width is large enough ensuring the injector pintle has achieved max travel and the injector voltage flux through the coil has reach the max stabilization limit.	<p>Injector voltage feedback is not able to detect an opening magnitude</p> <p>OR</p> <p>Measured Voltage feedback converted to Injector Opening Magnitude</p> <p>OR</p> <p>Measured Voltage feedback converted to Injector Opening Magnitude</p> <p>OR</p> <p>Injector voltage feedback is not able to detect a closing time</p> <p>OR</p> <p>Measured Voltage feedback converted to Injector closing time</p> <p>OR</p> <p>Measured Voltage</p>	<p>=<</p> <p>P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Opening Magnitude (See supporting table)</p> <p>>=</p> <p>P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Maximum Injector Opening Magnitude (See supporting table)</p> <p>=<</p> <p>P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Minimum Injector Closing Time (See supporting table)</p> <p>>=</p>	<p>Small Pulse General Diagnostic Enable (See Definition in Supporting Material below)</p> <p>Fuel Pulse Voltage Feedback Data Valid (See Definition in Supporting Material below)</p> <p>Injection Pulse Width</p>	<p>= True</p> <p>>=</p> <p>P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width</p>	<p>2.50 Second Fail count out of 10.00 seconds Samples</p> <p>Continuous</p>	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 1	P30D6	This DTC detects intermittent 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 Illum.
Control Module Serial Peripheral Interface Bus 2	P30D7	This DTC detects intermittent 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 Illum.
Control Module Serial Peripheral Interface Bus 3	P30D8	This DTC detects intermittent 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 Illum.
Control Module Serial Peripheral Interface Bus 4	P30D9	This DTC detects intermittent 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 Illum.
Control Module Serial Peripheral Interface Bus 5	P30DA	This DTC detects intermittent 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 Illum.
Control Module Serial Peripheral Interface Bus 6	P30DB	This DTC detects intermittent 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 Illum.
Control Module Serial Peripheral Interface Bus 7	P30DC	This DTC detects intermittent 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 Illum.
Control Module Serial Peripheral Interface Bus 8	P30DD	This DTC detects intermittent 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 Illum.
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 Illum.
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 Illum.
Cooling Fan 2 Out of Range Low [LIN Bus Electric PWM Fans Only- Internal or External controller]	P30F0	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 Fan2 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 Illum.
Cooling Fan 2 Out of Range High [LIN Bus Electric PWM Fans Only- Internal or External controller]	P30F1	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 Fan2 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 Illum.
Cooling Fan 3 Out of Range Low [LIN Bus Electric PWM Fans Only- Internal or External controller]	P30F2	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 Fan3 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 Illum.
Cooling Fan 3 Out of Range High [LIN Bus Electric PWM Fans Only- Internal or External controller]	P30F3	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 Fan3 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 Illum.
P3186 (Internal Control Module Security Peripheral Performance)	P3186	This DTC indicates the security peripheral has experienced an internal fault indicating that MAC verification results are unreliable.	MAC verification has falsely passed a configurable number of times.	2.00	Calibration enable	= 1.00 Boolean		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Performance - Under Pressure	P3187	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	> Threshold [Supporting Table] P3187_Threshold	a) Diagnostic is .. b) Timer - Engine Running Minimum c1) Fuel Flow Rate Valid c2) Ambient Air Pressure Value Defaulted c3) Fault bundle FDB_FuelPresSnsrCktFA c4) Reference Voltage Fault Status [DTC P0641] c5) Exhaust AfterTreatment Fuel Injector A Control Circuit Short Low Fault [DTC P20CD] c6) Fuel Pres Sensor Performance Fault Active [DTC P018B] c7) Use Calculated Flow Performance Fault Thresholds c8) Engine Speed Status Valid c9) Fault bundle FAB_FuelPmpCktFA c10) Fuel Control Enable Fault Active [DTC P12A6] c11) Fuel Pump Driver Module OverTemp Fault	a) Enabled b) >= 30.00 seconds c1) == TRUE c2) == False c3) == False c4) == False c5) == False c6) == False c7) == False c8) ==TRUE c9) == False c10) == False d 1) == False	1 sample/ 12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Active [DTC P1255] c12) Fuel Pump Speed Fault Active [DTCP129F] c13) CAN Sensor Bus message \$0C3 Comm Fault [DTCP165C] c14) CAN Sensor Bus Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [DTC U18A7] c15) Sensor Configuration [is Wired To FTZM?] c16) Sensor Bus Relay On d) Emissions Fuel Level Low [Message \$3FB] e) Fuel Control Enable f) Fuel Pump Control State g) Input circuit minimum voltage h) High Pres Fuel Pump Mode Management Active j) High Pres Fuel Pump Control Mode mI) Fuel Pmp Speed Command Alive Rollina	c12) == False c13) == False c14) == False c15) == CeFDBR_e_WiredTo_FT ZM c16) == TRUE d) == False e) == TRUE f) == normal g) >= 9.00 volts h) == False j) == Not Disabled Mode AND == Not ZeroFlow Mode mI) == False		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Count and Checksum Error [CAN Bus C \$0CE] [DTC P14CD] 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 C \$0C3] [DTC U18A7] n) Timer - Diagnostic Enable	m2) == TRUE m3) == False n) > 2.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Pump Performance - Over Pressure	P3188	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	\leq Threshold [Supporting Table] P3188_Threshold	a) Diagnostic is .. b1) CAN Sensor Bus Fuel Pmp Spd Command ARC and Checksum Comm Fault Code [Cmd1 DTC U131D] b2) Sensor Configuration b3) Fuel Pres Sensor Serial Comm Ready b4) Fuel Pres Sensor Serial Comm Fault Pending [DTC P14D5] b5) Sensed Fuel Control Enable Serial Comm Ready b6) Sensed Fuel Control Enable Serial Comm Fault Pending c1) Fuel Flow data Valid c2) Ambient Air Pressure Value Defaulted c3) Fuel Pres Sensor Type c4) Fault Bundle FDB_FuelPresSnsrCktFA c5) Reference Voltage	a) Enabled b1) == False b2) == CeFDBR_e_WiredTo_FT ZM b3) == TRUE b4) == False b5) == TRUE b6) == False c1) == TRUE c2) == False c3) == CeFDBR_e_GaugePressure c4) == False c5) == False	1 sample/ 12.5 millisec	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Fault Status [DTC P0641] c6) Fuel Pres Sensor Performance Fault Active [DTC P018B] c7) Use Calculated Flow Performance Fault Thresholds c8) Engine Speed Status Valid c9) Fault bundle FAB_FuelPmpCktFA c10) Fuel Pump Driver Module OverTemp Fault Active [DTC P1255] c11) Fuel Pump Speed Fault Active [DTCP129F] c12) Fuel Pump Duty Cycle Fault Active [DTC P2BB3] c13) CAN Sensor Bus message \$0C3 Comm Fault [DTCP165C] c14) Fuel Pres Sensor Serial Comm Fault Active [DTC P14D5] c15) Sensor Bus Relay On d1) Timer -- Minimum Engine Running d2) Diaanostic Data	c6) == False c7) == False c8) ==TRUE c9) == False c10) == False d 1) == False c12) == False c13) ==False c14) == False c15) == TRUE d1)>= 30.00 seconds d2) == TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Integrity OK e) Fuel Control Enable f) Fuel Pump Control State g) Instantaneous Fuel Flow h) Fuel Control Enable Fault Active [DTC P12A6] j) Emissions Fuel Level Low [Message \$3FB] k) High Pres Fuel Pump Mode Management Enabled l) High Pres Fuel Pump Control Mode m) Diagnostic Data OK n) Timer - Diagnostic Enable	e) == TRUE f) == Normal AND == NOT Over Response Active g) >= 0.05 gms /sec h) == False j) == False k) == False l) == NOT Disabled Mode AND NOT Over Response Active Mode m) == TRUE n) > 2.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Stop/Start System Performance	P31C3	This diagnostic indicates that an autostart attempt has failed and the retry strategy has not been successful in re-starting the engine.	A successful Auto Start has occurred using the primary auto start actuator.	Engine Start Stop State = ENGINE RUNNING	Engine Start Stop State Previous During last transition of Engine Start Stop State from ENGINE OFF to ENGINE STARTING: Propulsion System Active AND Remedial Action Start Request Actuator Low Voltage	!= ENGINE RUNNING = TRUE = FALSE	Pass condition met for 12.5 ms (1 sample)	Type A, 1 Trips
			After an Auto Stop, the engine was not successfully restarted and the retry strategy was not available or was not successful in restarting the engine. Note: When attempting to restart the engine, only 1 start retry is allowed per available actuator for each Auto Start event. The number of total retries (all available actuators) is calibratable and limited each key cycle to 255.00 retry attempt(s). Note: Low Fuel Condition is always determined in the ECM.	Engine Start Fail = TRUE	P31C2 Low Fuel Condition Engine Positioning Fault (Cam or Crank) Propulsion Allowed	= NOT Fault Active = FALSE (% Total Fuel Level < 10.00% for > 30.00 sec) = FALSE = TRUE	Fail condition met for 12.5 ms (1 sample)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communicati on Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures equals or exceeds	>= 10.00 counts in a sliding window of 50 samples	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: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled	> 15,000.00 milliseconds >8.41 Volts >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts Disabled	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Control Module Communicati on Bus B Off	U0074	This DTC monitors for a BUS B off condition	Bus off failures equals or exceeds	≥ 10.00 counts in a sliding window of 50 samples	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: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled	$> 15,000.00$ milliseconds > 8.41 Volts $\geq 5,000.00$ milliseconds > 11.00 Volts ≤ 18.00 Volts ≥ 11.00 Volts Disabled	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Control Module Communicati on Powertrain Sensor CAN Bus Off	U0076	This DTC monitors for a Powertrain Sensor Bus S off condition	Bus off failures equals or exceeds	>= 10.00 counts in a sliding window of 50 samples	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: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled	> 15,000.00 milliseconds >8.41 Volts >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts Disabled	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>=11.00 Volts		

24OBDG03D Part 1 ECM Summary Tables

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If calibratable low voltage disable mode is not Never Disabled</p> <p>If OBDII: Run/Crank ignition voltage</p> <p>If Secure: Starter motor engaged for Or Run/Crank ignition voltage</p> <p>If Hybrid Secure: Run/Crank ignition voltage</p> <p>If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/crank</p> <p>Battery voltage</p>	<p>>=11.00 Volts</p> <p>> 15,000.00 milliseconds</p> <p>> 8.41 Volts</p> <p>>=6.41 Volts</p> <p>Disabled</p> <p>>=11.00 Volts</p>		

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on 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 \$010:	>425.00 milliseconds	General Enable Criteria: All below criteria have been met for	>= 5,000.00 milliseconds	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips
			Message \$202:	>10,000.00 milliseconds	If message is on Bus A: U0073 not active			
			Message \$203:	>325.00 milliseconds	If message is on Bus B: U0074 not active			
			Message \$204:	>10,000.00 milliseconds	If message is on Bus S: U0076 not active			
			Message \$205:		CAN channel is requesting full communications			
			Message \$228:	>10,000.00 milliseconds	Normal CAN transmission on Bus is enabled			
			Message \$25E:	>10,000.00 milliseconds	If bus type is Sensor Bus, sensor bus relay is on			
			Message \$274:	>10,000.00 milliseconds	Accessory mode to off mode not pending			
			Message \$284:		Battery voltage	>11.00 Volts		
			Message \$404:	>10,000.00 milliseconds	Conroller is an OBD controller Or	<=18.00 Volts		
			Message \$407:	>325.00 milliseconds	Battery Voltage			
			Message \$409:	>700.00 milliseconds	Controller type: OBD Controller			
			Message \$40A:	>10,000.00 milliseconds	If power mode = Run/ Crank: Power Mode is run			

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Message \$40C:	>10,000.00 milliseconds	If calibratable low voltage disable mode is not Never Disabled			
			Message \$413:					
			Message \$460:	>10,000.00 milliseconds	If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
			Message \$461:	>10,000.00 milliseconds	If Secure: Starter motor engaged for Or Run/Crank ignition voltage	> 15,000.00 milliseconds > 8.41 Volts		
			Message \$47E:	>10,000.00 milliseconds		>=6.41 Volts		
			Message \$47F:		If Hybrid Secure: Run/Crank ignition voltage			
			Message \$481:	>10,000.00 milliseconds		Disabled		
			Message \$49F:	>10,000.00 milliseconds	If power mode = Accessory:			
			Message \$4E7:	>10,000.00 milliseconds	Off key cycle diagnostics are enabled Or Controller is an OBD controller			
			Message \$4EB:		Controller shutdown is not impending			
			Message \$590:	>10,000.00 milliseconds		>=11.00 Volts		
				>10,000.00 milliseconds	Power Mode is not run/ crank			
				>10,000.00 milliseconds	Battery voltage			
				>10,000.00 milliseconds				
				>10,000.00 milliseconds				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				milliseconds > 2,000.00 milliseconds >10,000.00 milliseconds				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Restraints Control Module	U0151	This DTC monitors for a loss of communication with the Restraints Control Module.	<p>Message is not received from controller for Message \$024:</p> <p>Message \$0D1:</p> <p>Message \$0D2:</p> <p>Message \$441:</p> <p>Message \$442:</p>	<p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>2,000.00 milliseconds</p> <p>>2,000.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type C, 1 Trip No MIL Emissio ns Neutral

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled If OBDII: 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 > 15,000.00 milliseconds > 8.41 Volts >=6.41 Volts Disabled >=11.00 Volts		

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Active Grill Air Shutter Module A	U0284	This DTC monitors for a loss of communication on the LIN bus 1 with Shutter Module A.	Message is not received from controller for ACM1_Rsp	 >=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 Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run Run/Crank ignition voltage	Enabled Enabled >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	Disabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Active Grill Air Shutter Module B	U0285	This DTC monitors for a loss of communication on the LIN bus with Shutter Module B.	Message is not received from device for ACM2_Rsp	 >=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 Run/Crank ignition voltage	Enabled Enabled Disabled >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	Disabled >=11.00 Volts		

24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with EVAP Purge Pump	U02BB	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: Run/Crank ignition voltage If power mode = Accessory:	Enabled Enabled Disabled >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts Disabled	LIN bus communication executes in 500ms loop	Type B, 2 Trips

24OBDG03D Part 1 ECM Summary Tables

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24OBDG03D Part 1 ECM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Transmissio n Control Module	U0402	This DTC monitors for an error in communication with the Transmission Control Module.	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.		Executes in 12.5ms loop.	Type A, 1 Trips
			TGI2P_ARC:	5.00 fail counts out of 11.00 sample counts	All the following conditions are met for:	>= 5,000.00 milliseconds		
			TrnsGnrInfo2_Prtctd:	5.00 fail counts out of 11.00 sample counts	Battery voltage	>= 11.00 volts		
			TORSP_ARC:	5.00 fail counts out of 11.00 sample counts	Accessory mode to off mode transition not pending			
			TransOutRotSts_Prtctd:	5.00 fail counts out of 11.00 sample counts	If controller is a non-OBD controller then battery voltage	<= 18.00 volts		
			TGIP_ARC:	5.00 fail counts out of 11.00 sample counts	Controller type: OBD Controller			
			TrnsGnrInfo_Prtctd:	5.00 fail counts out of 11.00 sample counts				
			TRDP-ARC:	5.00 fail counts out of 11.00 sample counts				
			TCMGnrInfo1_Prtctd:	5.00 fail counts out of 11.00 sample counts				
			TEGP_ARC:	5.00 fail counts out of				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			TrnsEstGr_Prtctd:	11.00 sample counts 5.00 fail counts out of 11.00 sample counts				
			SD79P_ARC:	8.00 fail counts out of 18.00 sample counts				
			SrlDat79_Prtctd:	8.00 fail counts out of 11.00 sample counts				
			TGI3_ARC:	8.00 fail counts out of 11.00 sample counts				
			TGI3_CS:	8.00 fail counts out of 11.00 sample counts				
			TGI4_ARC:	5.00 fail counts out of 11.00 sample counts				
			TGI4_CS:	5.00 fail counts out of 11.00 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Transfer Case Control Module	U0403	This DTC monitors for an error in communication with the Transfer Case Control Module.	<p>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:</p> <p>SAP_ARC:</p> <p>SecAxl_Prtctd:</p>	<p>5.00 fail counts out of 11.00 sample counts</p> <p>5.00 fail counts out of 11.00 sample counts</p>	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Brake System Control Module	U0418	This DTC monitors for an error in communication with the Brake System Control Module.	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.		Executes in 12.5ms loop.	Type A, 1 Trips
			BSIS2P_ARC:	8.00 fail counts out of 11.00 sample counts	All the following conditions are met for:	>= 5,000.00 milliseconds		
			BrkSysInfoSts2_Prtctd:	8.00 fail counts out of 11.00 sample counts	Battery voltage	>= 11.00 volts		
			CSBTP-ARC:	5.00 fail counts out of 11.00 sample counts	Accessory mode to off mode transition not pending			
			ChsSysBrkTrq_Prtctd:	5.00 fail counts out of 11.00 sample counts	If controller is a non-OBD controller then battery voltage	<= 18.00 volts		
			FrntAngVel_Prtctd:	5.00 fail counts out of 11.00 sample counts	Controller type: OBD Controller			
			RearAngVel_Prtctd:	5.00 fail counts out of 11.00 sample counts				
			BSIRP_ARC:	5.00 fail counts out of 11.00 sample counts				
			EBCMGnrInfo1_Prtctd:	5.00 fail counts out of 11.00 sample counts				
			SWIP_ARC:	8.00 fail counts out of				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				11.00 sample counts				
			StrgWhlInfo_Prtctd:	8.00 fail counts out of 11.00 sample counts				
			BSISP_ARC:	4.00 fail counts out of 10.00 sample counts				
			BrkSysInfoSts_Prtctd:	4.00 fail counts out of 10.00 sample counts				
			WRDSP.ARC:	7.00 fail counts out of 10.00 sample counts				
			EBCMGnrInfo2_Prtctd:	7.00 fail counts out of 10.00 sample counts				
			DMCP_ARC:	4.00 fail counts out of 10.00 sample counts				
			EBCMGnrInfo3_Prtctd:	4.00 fail counts out of 10.00 sample counts				
			BSIR3P_ARC:	7.00 fail counts out of 10.00 sample counts				
			BrkSysInfoReqs3_Prtctd:	7.00 fail counts out of 10.00 sample counts				
			EPBSP_ARC:	4.00 fail counts out of 10.00 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			ElecPrkBrkSts_Prtctd: BSSIP_ARC: BrkSysStsInfo_Prtctd:	4.00 fail counts out of 10.00 sample counts 7.00 fail counts out of 10.00 sample counts 7.00 fail counts out of 10.00 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Power Steering Control Module	U0420	This DTC monitors for an error in communication with the Power Steering Control Module.	<p>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:</p> <p>SWIP_ARC:</p> <p>StrgWhlInfo_Prtctd:</p>	<p>8.00 fail counts out of 11.00 sample counts</p> <p>8.00 fail counts out of 11.00 sample counts</p>	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type C, 1 Trip No MIL Emissions Neutral "Emissions Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Body Control Module	U0422	This DTC monitors for an error in communication with the Body Control Module.	<p>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:</p> <p>BGI3P_ARC:</p> <p>BdyGenInfo3_Prtctd:</p> <p>BVSCP_ARC:</p> <p>BdyVehSpdCtl_Prtctd:</p> <p>SPMP_ARC:</p> <p>SysPwrMode_Prtctd:</p> <p>BGI1P.ARC:</p> <p>BdyGenInfo1_Prtctd:</p> <p>CCHI_ARC:</p>	<p>5.00 fail counts out of 11.00 sample counts</p> <p>5.00 fail counts out of 11.00 sample counts</p> <p>4.00 fail counts out of 10.00 sample counts</p> <p>4.00 fail counts out of 10.00 sample counts</p> <p>4.00 fail counts out of 10.00 sample counts</p> <p>4.00 fail counts out of 10.00 sample counts</p> <p>4.00 fail counts out of 10.00 sample counts</p> <p>4.00 fail counts out of 10.00 sample counts</p> <p>7.00 fail counts out of</p>	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			CCHI_CS: RTPP_ARC: BCMGnrInfo1_Prtctd: CCCGI-ARC: CCCGI_CS:	10.00 sample counts 7.00 fail counts out of 10.00 sample counts 4.00 fail counts out of 10.00 sample counts 5.00 fail counts out of 11.00 sample counts 7.00 fail counts out of 10.00 sample counts 3.00 fail counts out of 10.00 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Gateway A	U0447	This DTC monitors for an error in communication with the Gateway A.	<p>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:</p> <p>BSPMP_ARC:</p> <p>BkupSysPwrMode_Prtctd:</p>	<p>4.00 fail counts out of 10.00 sample counts</p> <p>4.00 fail counts out of 10.00 sample counts</p>	<p>Message frame containing the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Restraints Control Module	U0452	This DTC monitors for an error in communication with the Restraints Control Module.	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: IMUSR2_ARC: IMUSR2_CS: IMUSR1P.ARC: IMUSnsrRw1_Prtctd: ORIP-ARC: OccptRstrntInfo_Prtctd: PCIP_ARC: PstClsnInfo_Prtctd:	 8.00 fail counts out of 11.00 sample counts 8.00 fail counts out of 11.00 sample counts 8.00 fail counts out of 11.00 sample counts 8.00 fail counts out of 11.00 sample counts 4.00 fail counts out of 10.00 sample counts 4.00 fail counts out of 10.00 sample counts 4.00 fail counts out of 10.00 sample counts 4.00 fail counts out of 10.00 sample 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	 >= 5,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Executes in 12.5ms loop.	Type C, 1 Trip No MIL Emissions Neutral "Emissions Neutral Diagnostic - Type C"

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received from Active Grill Air Shutter Module A	U0585	This DTC monitors for an error in communication with the Active Grill Air Shutter Module A.	<p>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:</p> <p>ACMIJnitStatARC:</p>	7.00 fail counts out of 10.00 sample counts	<p>Message frame containing the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received from Active Grill Air Shutter Module B	U0586	This DTC monitors for an error in communication with the Active Grill Air Shutter Module B.	<p>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:</p> <p>ACM2_InitStatARC:</p>	7.00 fail counts out of 10.00 sample counts	<p>Message frame containing the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From DC/DC Converter Control Module A	U0599	This DTC monitors for an error in communication with the DC/DC Converter Control Module A.	<p>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:</p> <p>DCCnvActrVltADCValAR C:</p> <p>DCCnvActrVltADCValPVal :</p> <p>DCCCnvCrnkCtlTrmStAR C:</p> <p>DCCCnvCrnkCtlTrmStPV al:</p>	<p>8.00 fail counts out of 11.00 sample counts</p> <p>8.00 fail counts out of 11.00 sample counts</p> <p>8.00 fail counts out of 11.00 sample counts</p> <p>8.00 fail counts out of 11.00 sample counts</p>	<p>Message frame containing the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Throttle Position Sensor 1	U0606	<p>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.</p> <p>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.</p> <p>This diagnostic only runs when battery voltage is high enough.</p>	<p>Voltage for wave pulse is below state threshold as defined by SAE J2716 SENT Protocol</p> <p>OR</p> <p>Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol</p> <p>OR</p> <p>Message Pulse < Message Pulse ></p> <p>OR</p> <p>Message Age Limit >=</p> <p>OR</p> <p>Signal CRC fails</p>	<p>0.5 V</p> <p>OR</p> <p>4.1 V</p> <p>OR</p> <p>0.125977 ms 0.209991 ms</p> <p>OR</p> <p>3.125 ms</p>	Run/Crank voltage	> 6.41 Volts	<p>79/159 counts;</p> <p>57 counts continuous;</p> <p>3.125 ms /count in the ECM main processor</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Throttle Position Sensor 2	U0607	<p>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.</p> <p>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.</p> <p>This diagnostic only runs when battery voltage is high enough.</p>	<p>Voltage for wave pulse is below state threshold as defined by SAE J2716 SENT Protocol</p> <p>OR</p> <p>Voltage for wave pulse is above state threshold as defined by SAE J2716 SENT Protocol</p> <p>OR</p> <p>Message Pulse < Message Pulse ></p> <p>OR</p> <p>Message Age Limit >=</p> <p>OR</p> <p>Signal CRC fails</p>	<p>0.5 V</p> <p>OR</p> <p>4.1 V</p> <p>OR</p> <p>0.125977 ms 0.209991 ms</p> <p>OR</p> <p>3.125 ms</p>	Run/Crank voltage	> 6.41 Volts	<p>79/159 counts;</p> <p>57 counts continuous;</p> <p>3.125 ms /count in the ECM main processor</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Mass or Volume Air Flow Sensor A	U060F	This DTC monitors for a loss of communication on the LIN bus 2 with Mass or Volume Air Flow Sensor A.	Message is not received from controller for MAF1_Press_Rsp MAF1_TmpHum_Rsp	 >=62.50 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 Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled Or	 Enabled Enabled >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts Disabled	LIN bus communication executes in 500ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Lost Communicati on 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	<p>If any of the following conditions are met a failure count will be recorded:</p> <p>Condition 1: HWIO message faults</p> <p>Condition 2: Pulse count delta AND Message age</p> <p>Condition 3: Voltage on SENT pin is greater than a controller specific threshold AND Message age</p> <p>Condition 4: Voltage on SENT pin is less than a controller specific threshold AND Message age</p>	<p>= No Fault</p> <p>>0</p> <p>>6.25 ms</p> <p>>6.25 ms</p> <p>>6.25 ms</p>	<p>Diagnostic is Enabled</p> <p>Run Crank Ignition in Range</p> <p>Engine not cranking</p> <p>Engine Diag System</p>	<p>= True</p> <p>= True</p> <p>= Enabled</p>	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 Illum.
Lost Communicati on with Engine Coolant Bypass Valve D	U0618	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	 >= 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 Run/Crank ignition voltage	Enabled Enabled Disabled >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	Disabled >=11.00 Volts		

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

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 1 LIN Communication Failure	U0632	This DTC monitors for a loss of communication on the LIN bus 1 with Cooling Fan 1.	Message is not received from controller for CFM1_RSP	 >=2,500.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is 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 All below criteria have been met for Accessory mode to off mode not pending Battery voltage Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run Run/Crank ignition voltage	Enabled Enabled >=1.00 milliseconds >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	Disabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 2 LIN Communicati on Failure	U0633	This DTC monitors for a loss of communication on the LIN bus 1 with Cooling Fan 2.	Message is not received from controller for CFM2_RSP	 >=2,500.00 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is 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 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 Run/Crank ignition voltage	Enabled Enabled >=1.00 milliseconds >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts	LIN bus communication executes in 500ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	Disabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	True 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 Illum.
Lost Communicati on with Fuel Temperature SensorA	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 Illum.
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

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Engine Coolant Pump	U0672	This DTC monitors for a loss of communication on the LIN bus with the Engine Coolant Pump	<p>Message is not received from controller for</p> <p>MWP_Rsp_0F_C05</p>	>= 250.00 milliseconds	<p>General Enable Criteria:</p> <p>Diagnostic is enabled</p> <p>LIN channel is enabled</p> <p>LIN module is initialized Slave is calibrated as present</p> <p>Actuator relay is powered Or Powertrain Relay is on and powertrain relay state feedback is enabled</p> <p>All below criteria have been met for</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p> <p>Run/Crank ignition voltage</p> <p>If power mode =</p>	<p>Enabled</p> <p>Disabled</p> <p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p> <p>>=11.00 Volts</p>	LIN bus communication executes in 500ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	Disabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Cooling Fan 3 LIN Communication Failure	U067C	This DTC monitors for a loss of communication on the LIN bus with Cooling Fan 3.	Message is not received from device for CFM3_Rsp	 >=2,437.50 milliseconds	General Enable Criteria: Diagnostic is enabled LIN channel is 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 All below criteria have been met for Accessory mode to off mode not pending Battery voltage Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/ Crank: Power Mode is run Run/Crank ignition	Enabled Enabled >= 1.00 seconds >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts	LIN bus communication executes in 500ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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	Disabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Communicati on CAN Bus 1 Off	U1002	This DTC monitors for a Central Gateway Module Communication CAN Bus 1 Off as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Communication CAN Bus 1 Off DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Communicati on CAN Bus 3 Off	U1004	This DTC monitors for a Central Gateway Module Communication CAN Bus 3 Off as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Communication CAN Bus 3 Off DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Communicati on CAN Bus 5 Off	U1006	This DTC monitors for a Central Gateway Module Communication CAN Bus 5 Off as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Communication CAN Bus 5 Off DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Fuel Tank Zone Module Configuratio n Error	U101A	FTZM Pump Control Configuration Management provides a method for a Diagnostic and Emissions-Critical Electronic Control Unit (DEC ECU) to communicate configuration information to an OBD Smart Device (SD); in this case the FTZM. The FTZM contains pre-loaded sets of calibrations, each of which specifies proper tuning values for electronic commutation of corresponding fuel pump motor variants including a default value that denotes a non-operational [factory default] pump variant. This configuration management feature provides a method to reduce the number of FTZM end-item part numbers. The Configuration Error Diagnostic runs every 100ms to verify that a calibration index value is present that is not the factory default value. When the diagnostic identifies that the default index value is loaded, the	FTZM Fuel Pump Configuration Calibration Index Value	= Factory Default Index Value OR = Not Configured Index Value [device failed to accept calibration value on 1st wake-up]	a] Diagnostic is .. b] Device feedback Faulted; c] Diagnostic system disabled; d] CAN serial data message \$3C8 received	a] Enabled b] <> True; c] <>True; d] =TRUE	6 failures of 8 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 Illum.
		DTC is set.						

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Fuel Rail Pressure Sensor Bank1 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 Illum.
Invalid Data Received from Cooling Fan Motor 1	U1314	This DTC monitors for an error in communication with the Cooling Fan Motor 1.	<p>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:</p> <p>PrplCoolFn1_ARC:</p>	7.00 fail counts out of 10.00 sample counts	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received from Cooling Fan Motor 2	U1315	This DTC monitors for an error in communication with the Cooling Fan Motor 2.	<p>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:</p> <p>PrplCoolFn2_ARC:</p>	7.00 fail counts out of 10.00 sample counts	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received from Cooling Fan Motor 3	U1316	This DTC monitors for an error in communication with the Cooling Fan Motor 3.	<p>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:</p> <p>PrplCoolFn3_ARC:</p>	7.00 fail counts out of 10.00 sample counts	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received from Mass Air Flow Sensor 1	U1319	This DTC monitors for an error in communication with the Mass Air Flow Sensor 1.	<p>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:</p> <p>PAMITempHmdtyARC:</p> <p>PAMIPresARC:</p>	<p>7.00 fail counts out of 10.00 sample counts</p> <p>8.00 fail counts out of 11.00 sample counts</p>	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received from Main Water Pump Motor	U131B	This DTC monitors for an error in communication with the Main Water Pump Motor.	<p>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:</p> <p>MainCoolPmpARC:</p>	7.00 fail counts out of 10.00 sample counts	<p>Message frame containing the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received from Fuel Tank Zone Module	U131D	This DTC monitors for an error in communication with the Fuel Tank Zone Module.	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.		Executes in 12.5ms loop.	Type A, 1 Trips
			FTZMInfoIARC:	8.00 fail counts out of 11.00 sample counts	All the following conditions are met for:	>= 5,000.00 milliseconds		
			FTZMInfoIChksm:	8.00 fail counts out of 11.00 sample counts	Battery voltage	>= 11.00 volts		
			FTZMInfo11ARC:	8.00 fail counts out of 11.00 sample counts	Accessory mode to off mode transition not pending			
			FTZMInfo11Chksm:	8.00 fail counts out of 11.00 sample counts	If controller is a non-OBD controller then battery voltage	<= 18.00 volts		
			FTZMInfo8ARC:	8.00 fail counts out of 11.00 sample counts	Controller type: OBD Controller			
			FTZMInfo8Chksm:	8.00 fail counts out of 11.00 sample counts				
			FTZMInfo2ARC:	8.00 fail counts out of 11.00 sample counts				
			FTZMInfo2Chksm:	8.00 fail counts out of 11.00 sample counts				
			FTZMInfo12ARC:	8.00 fail counts out of				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				11.00 sample counts				
			FTZMInfo12Chksm:	8.00 fail counts out of 11.00 sample counts				
			FTZMInfo14ARC:	8.00 fail counts out of 11.00 sample counts				
			FTZMInfo14Chksm:	8.00 fail counts out of 11.00 sample counts				
			FTZMInfo3ARC:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo3Chksm:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo4ARC:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo4Chksm:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo5ARC:	8.00 fail counts out of 11.00 sample counts				
			FTZMInfo5Chksm:	8.00 fail counts out of 11.00 sample counts				
			FTZMInfo16ARC:	7.00 fail counts out of 10.00 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			FTZMInfo16Chksm:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo6ARC:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo6Chksm:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo7ARC:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo7Chksm:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo9ARC:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo9Chksm:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo13ARC:	7.00 fail counts out of 10.00 sample counts				
			FTZMInfo13Chksm:	7.00 fail counts out of 10.00 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Engine Control Module LIN Bus 1	U1345	This DTC monitors for a LIN bus off condition on LIN Bus 1.	Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus 1 Or LIN channel Wakeup Method: LIN channel wakeup repetition counter	= Total number of slave nodes on LIN Bus 1 that have reported lost communications DTCs >= 10.00 counts	Loss of Communication Method: Diagnostic is enabled LIN channel is enabled LIN module is initialized All below criteria have been met 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 Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics	Enabled Enabled >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts Disabled	Dependent on bus loading.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage LIN channel Wakeup Method: Diagnostic is enabled LIN channel is enabled 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 Controller is an OBD controller Or Battery Voltage	>=11.00 Volts Enabled Enabled >= 5,000.00 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 Illum.
Engine Control Module LIN Bus 2	U1346	This DTC monitors for a LIN bus off condition on LIN Bus 2.	Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus 2 Or LIN channel Wakeup Method: LIN channel wakeup repetition counter	= Total number of slave nodes on LIN Bus 2 that have reported lost communications DTCs >=10.00 counts	Loss of Communication Method: Diagnostic is enabled LIN channel is enabled LIN module is initialized All below criteria have been met 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 Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled	Enabled Enabled >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts Disabled	Dependent on bus loading.	Type A, 1 Trips

24OBDG03D Part 1 ECM Summary Tables

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communicati on LIN Bus 3 Off	U1347	This DTC monitors for a LIN bus 3 off condition.	Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus 3 Or LIN channel Wakeup Method: LIN channel wakeup repetition counter	= Total number of slave nodes on LIN Bus 3 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 Run/Crank ignition voltage If power mode = Accessory Off key cycle diagnostics are enabled	Enabled Enabled >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts Disabled	Dependent on bus loading.	Type B, 2 Trips

24OBDG03D Part 1 ECM Summary Tables

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 Run/Crank ignition voltage Off key cycle diagnostics are enabled Or Controller is an OBD controller	Enabled Enabled >= 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts Disabled	Dependent on bus loading.	Type A, 1 Trips

24OBDG03D Part 1 ECM Summary Tables

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received from Block Coolant Valve Actuator	U1379	This DTC monitors for an error in communication with the Block Coolant Valve Actuator.	<p>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:</p> <p>BRV_ARC:</p>	7.00 fail counts out of 10.00 sample counts	<p>Message frame containing the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>$\geq 5,000.00$ milliseconds</p> <p>≥ 11.00 volts</p> <p>≤ 18.00 volts</p>	Executes in 12.5ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received from EVAP Purge Pump	U137A	This DTC monitors for an error in communication with the EVAP Purge Pump.	<p>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:</p> <p>EVAPPurgPmpARC:</p>	7.00 fail counts out of 10.00 sample counts	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSUM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Invalid Data Received from Body Control Module	U137F	This DTC monitors for a Central Gateway Module Invalid Data Received from Body Control Module error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Invalid Data Received from Body Control Module DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p> <p>BCM</p>	<p>is being received</p> <p>is present on the bus</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Gateway A on CAN 2	U1608	This DTC monitors for a loss of communication with the Gateway A on CAN 2.	<p>Message is not received from controller for Message \$209:</p> <p>Message \$425:</p> <p>Message \$427:</p> <p>Message \$490:</p> <p>Message \$494:</p> <p>Message \$561:</p> <p>Message \$562:</p>	<p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Conroller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If calibratable low voltage disable mode is not Never Disabled</p> <p>If OBDII: Run/Crank ignition voltage</p> <p>If Secure: Starter motor engaged for Or Run/Crank ignition voltage</p> <p>If Hybrid Secure: Run/Crank ignition voltage</p> <p>If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/crank</p> <p>Battery voltage</p>	<p>>=11.00 Volts</p> <p>> 15,000.00 milliseconds</p> <p>> 8.41 Volts</p> <p>>=6.41 Volts</p> <p>Disabled</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Central Gateway Module on CAN Bus 3	U1609	This DTC monitors for a loss of communication with the Central Gateway Module on CAN Bus 3.	<p>Message is not received from controller for Message \$209:</p> <p>Message \$20D:</p> <p>Message \$25F:</p> <p>Message \$457:</p> <p>Message \$458:</p> <p>Message \$45A:</p> <p>Message \$561:</p>	<p>>10,000.00 milliseconds</p> <p>>325.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Conroller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If calibratable low voltage disable mode is not Never Disabled</p> <p>If OBDII: Run/Crank ignition voltage</p> <p>If Secure: Starter motor engaged for Or Run/Crank ignition voltage</p> <p>If Hybrid Secure: Run/Crank ignition voltage</p> <p>If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/crank</p> <p>Battery voltage</p>	<p>>=11.00 Volts</p> <p>> 15,000.00 milliseconds</p> <p>> 8.41 Volts</p> <p>>=6.41 Volts</p> <p>Disabled</p> <p>>=11.00 Volts</p>		

24OBDG03D Part 1 ECM Summary Tables

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If calibratable low voltage disable mode is not Never Disabled</p> <p>If OBDII: Run/Crank ignition voltage</p> <p>If Secure: Starter motor engaged for Or Run/Crank ignition voltage</p> <p>If Hybrid Secure: Run/Crank ignition voltage</p> <p>If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/crank</p> <p>Battery voltage</p>	<p>>=11.00 Volts</p> <p>> 15,000.00 milliseconds</p> <p>> 8.41 Volts</p> <p>>=6.41 Volts</p> <p>Disabled</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Brake System Control Module 1 on CAN Bus 2	U1610	This DTC monitors for a loss of communication with the Brake System Control Module 1 on CAN Bus 2.	<p>Message is not received from controller for Message \$012:</p> <p>Message \$014:</p> <p>Message \$015:</p> <p>Message \$017:</p> <p>Message \$01A:</p> <p>Message \$081:</p> <p>Message \$082:</p> <p>Message \$210:</p> <p>Message \$211:</p> <p>Message \$219:</p> <p>Message \$21B:</p> <p>Message \$42A:</p> <p>Message \$57D:</p>	<p>>10,000.00 milliseconds</p> <p>>425.00 milliseconds</p> <p>>425.00 milliseconds</p> <p>>425.00 milliseconds</p> <p>>425.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>500.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>325.00 milliseconds</p> <p>>10,000.00</p>	<p>General Enable Criteria:</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Controller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				milliseconds >10,000.00 milliseconds	If calibratable low voltage disable mode is not Never Disabled If OBDII: 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 > 15,000.00 milliseconds > 8.41 Volts >=6.41 Volts Disabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Transmissio n Control Module on CAN Bus 2	U1643	This DTC monitors for a loss of communication with the Transmission Control Module on CAN Bus 2.	<p>Message is not received from controller for Message \$01E:</p> <p>Message \$026:</p> <p>Message \$027:</p> <p>Message \$02D:</p> <p>Message \$02E:</p> <p>Message \$031:</p> <p>Message \$032:</p> <p>Message \$0BB:</p> <p>Message \$216:</p> <p>Message \$27A:</p> <p>Message \$452:</p> <p>Message \$459:</p>	<p>>418.75 milliseconds</p> <p>>418.75 milliseconds</p> <p>>418.75 milliseconds</p> <p>>418.75 milliseconds</p> <p>>418.75 milliseconds</p> <p>>418.75 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>9,887.50 milliseconds</p> <p>>362.50 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>2,000.00 milliseconds</p>	<p>General Enable Criteria: All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Conroller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If calibratable low voltage disable mode is not Never Disabled</p> <p>If OBDII: Run/Crank ignition voltage</p> <p>If Secure: Starter motor engaged for Or Run/Crank ignition voltage</p> <p>If Hybrid Secure: Run/Crank ignition voltage</p> <p>If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/crank</p> <p>Battery voltage</p>	<p>>=11.00 Volts</p> <p>> 15,000.00 milliseconds</p> <p>> 8.41 Volts</p> <p>>=6.41 Volts</p> <p>Disabled</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Fuel Pump Driver Control Module	U18A2	This DTC monitors for a loss of communication with the Fuel Pump Driver Control Module.	<p>Message is not received from controller for Message \$0C3:</p> <p>Message \$0C4:</p> <p>Message \$0CB:</p> <p>Message \$0CC:</p> <p>Message \$1E6:</p> <p>Message \$2C1:</p> <p>Message \$2D7:</p> <p>Message \$2D9:</p> <p>Message \$3C8:</p> <p>Message \$3EB:</p> <p>Message \$3EC:</p> <p>Message \$3EE:</p> <p>Message \$4C6:</p>	<p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p>	<p>General Enable Criteria: All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Conroller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank: Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				>10,000.00 milliseconds >10,000.00 milliseconds >10,000.00 milliseconds	If calibratable low voltage disable mode is not Never Disabled If OBDII: 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 > 15,000.00 milliseconds > 8.41 Volts >=6.41 Volts Disabled >=11.00 Volts		

24OBDG03D Part 1 ECM Summary Tables

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If calibratable low voltage disable mode is not Never Disabled</p> <p>If OBDII: Run/Crank ignition voltage</p> <p>If Secure: Starter motor engaged for Or Run/Crank ignition voltage</p> <p>If Hybrid Secure: Run/Crank ignition voltage</p> <p>If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/crank</p> <p>Battery voltage</p>	<p>>=11.00 Volts</p> <p>> 15,000.00 milliseconds</p> <p>> 8.41 Volts</p> <p>>=6.41 Volts</p> <p>Disabled</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Key Table Not Provisioned / Authoritative Counter At Maximum	U1960	This DTC indicates that the ECU security peripheral key slots are not provisioned OR ECU message authentication Authoritative Counters are at MAX value	<p>During controller initialization:</p> <p>IF (Any Security Peripheral Key Slot reports as Empty) -OR- (Any Authoritative Counter is at MAX value)</p> <p>During controller operation:</p> <p>IF (A Security Peripheral Key Slot reports as Empty) -OR- (An Authoritative Counter is at MAX value)</p>		Calibration enable	= 1.00 Boolean		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
U1961 (Security Peripheral Performance)	U1961	This DTC indicates that the ECU security peripheral has reported that it has failed.	The ECU security peripheral reports that the security peripheral hardware has failed.		Calibration enable	= 1.00 Boolean		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
U1962 (Unable to Authenticate Serial Data Message)	U1962	This DTC indicates that serial data message authentication on any key slot has failed a configurable number of times this key cycle.	Message authentication on a single key slot has failed a configurable number of times.	KeSSAR_Cnt_SecKey SlotFailLimit	Calibration enable	= 1.00 Boolean		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Vehicle Identification Number of First Vehicle Not Programmed	U1978	This DTC checks that the VIN of the first vehicle is correctly written	At least one of the programmed VIN of the first vehicle digits	Not a valid ASCII value	Calibration enable	= 1	250 ms / test Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Self- Learn Did Not Execute	U197B	This DTC monitors for a Central Gateway Module Self-Learn Did Not Execute error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Self-Learn Did Not Execute DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module ECU Identification List Memory Fault	U197C	This DTC monitors for a Central Gateway Module ECU Identification List Memory Fault error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module ECU Identification List Memory Fault DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Self- Learn Invalid Due To VIN Mismatch	U197D	This DTC monitors for a Central Gateway Module Self-Learn Invalid Due To VIN Mismatch error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Self-Learn Invalid Due To VIN Mismatch DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Key Table Not Provisioned	U1982	This DTC monitors for a Central Gateway Module Key Table Not Provisioned error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Key Table Not Provisioned DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Security Peripheral Performance – Performance or Incorrect Operation	U1983	This DTC monitors for a Central Gateway Module Security Peripheral Performance - Performance or Incorrect Operation error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Security Peripheral Performance - Performance or Incorrect Operation DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Unable To Authenticate Serial Data Message	U1984	This DTC monitors for a Central Gateway Module Unable To Authenticate Serial Data Message error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Unable To Authenticate Serial Data Message DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Lost Communicati on with Body Control Module	U2203	This DTC monitors for a Central Gateway Module Lost Communication with Body Control Module error as determined by the CGM	A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Lost Communication with Body Control Module 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 BCM	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 Illum.
Central Gateway Module Lost Communication with HVAC Display - Front	U2209	This DTC monitors for a Central Gateway Module Lost Communication with HVAC Display - Front error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Lost Communication with HVAC Display - Front DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p> <p>HVAC Display - Front</p>	<p>is being received</p> <p>is present on the bus</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Lost Communicati on with Transmissio n Control Module	U220F	This DTC monitors for a Central Gateway Module Lost Communication with Transmission Control Module error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Lost Communication with Transmission Control Module DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module TCM</p>	<p>is being received</p> <p>is present on the bus</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	<p>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.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p>	<p>is being received</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Lost Communication with Brake System Control Module on CAN Bus 1	U2418	This DTC monitors for a Central Gateway Module Lost Communication with Brake System Control Module on CAN Bus 1 error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Lost Communication with Brake System Control Module on CAN Bus 1 DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module</p> <p>BSCM</p>	<p>is being received</p> <p>is present on the bus</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Lost Communication with Brake System Control Module on CAN Bus 2	U2419	This DTC monitors for a Central Gateway Module Lost Communication with Brake System Control Module on CAN Bus 2 error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Lost Communication with Brake System Control Module on CAN Bus 2 DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module BSCM</p>	<p>is being received</p> <p>is present on the bus</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Lost Communication with Engine Control Module on CAN Bus 2	U241C	This DTC monitors for a Central Gateway Module Lost Communication with Engine Control Module on CAN Bus 2 error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Lost Communication with Engine Control Module on CAN Bus 2 DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module ECM</p>	<p>is being received</p> <p>is present on the bus</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Central Gateway Module Lost Communication with Engine Control Module on CAN Bus3	U241D	This DTC monitors for a Central Gateway Module Lost Communication with Engine Control Module on CAN Bus 3 error as determined by the CGM	<p>A corresponding index within the CGM Diagnostic Status Message Signal indicates that the Central Gateway Module Lost Communication with Engine Control Module on CAN Bus 3 DTC has set in the CGM.</p> <p>See CGM summary pages for more information.</p>		<p>General Enable Criteria:</p> <p>The corresponding index within the CGM Diagnostic Status Message Signal</p> <p>Central Gateway Module ECM</p>	<p>is being received</p> <p>is present on the bus</p> <p>is present on the bus</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Odometer Vehicle Identification Number Not Programmed	U2A90	This DTC checks that the odometer VIN is correctly written	At least one of the programmed odometer VIN digits	Not a valid ASCII value	Calibration enable	= 1	250 ms / test Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Odometer Vehicle Identification Number Invalid Configuratio n	U2A91	This DTC checks that the odometer VIN matches the ECU VIN	At least one of the programmed odometer VIN digits	Does not match the ECU VIN digits.	Calibration enable	= 1	250 ms / test Continuous	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Input Power Circuit A - Ignition Input On/Start Circuit Correlation	U3023	Detect a Power A vs RunCrank correlation error	Power A - RunCrank - Voltage	> 3.00	PowerA- RunCrank Correlation monitoring enable = TRUE Battey Present RunCrank Active Starter Motor NOT Engaged	Diagnostcis 1.00 Battey Present = TRUE RunCrank Active = TRUE Starter Motor Engaged = FALSE	50.00 failures out of 63.00	Type C, 1 Trip No MIL Emissio ns Neutral

Initial Supporting table - CalculatedPerfMaxEd

Description: Maximum desired camshaft position for Exhaust CAM - BankI**Value Units:** Maximum desired camshaft position (degCam)**X Unit:** Engine Oil Temperature (degC)

[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]

[-40 -28 -16 -4 8 20 32 44 56 68 80 92 104 116 128 140 152]

Y Units: Engine Speed (rpm)

[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]

[400 800 1200 1600 2000 2400 2800 3200 3600 4000 4400 4800 5200 5600 6000 6400 6800]

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
2	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
3	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
4	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
5	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
6	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
7	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
8	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
9	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
10	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
11	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
12	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
13	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
14	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
15	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
16	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
17	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0

Initial Supporting table - CalculatedPerfMaxIcl

Description: Maximum desired camshaft position for Intake CAM - BankI**Value Units:** Maximum desired camshaft position (degCam)**X Unit:** Engine Oil Temperature (degC)

[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]

[-40 -28 -16 -4 8 20 32 44 56 68 80 92 104 116 128 140 152]

Y Units: Engine Speed (rpm)

[1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17]

[400 800 1200 1600 2000 2400 2800 3200 3600 4000 4400 4800 5200 5600 6000 6400 6800]

y/x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
2	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
3	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
4	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
5	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
6	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
7	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
8	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
10	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
11	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
12	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
13	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
14	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
15	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
16	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
17	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0

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	23	24	25	26	27	28	29	30	31	32
1	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	

Maximum number of iterations allowed for torque solver - Part 2

y/x	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	
1	30	30	30	30	30	30	30	30	30	30	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_WrmllpEnrgyLimTestO**Value Units:** Cooling system energy failure threshold (kJ)**X Unit:** Minimum ECT for the key cycle (°C)

y/x	-20.0	-5.0	10.0	30.0	45.0	60.0	75.0
1.0	12,746.0	11,003.0	9,259.0	6,935.0	5,191.0	3,448.0	1,705.0

Initial Supporting table - P0128 Maximum Acculated Energy - Secondary**Description:** KtETHD_E_EOR_WrmllpEnrgyLimTest1**Value Units:** Cooling system energy failure threshold (kJ)**X Unit:** Minimum ECT for the key cycle (°C)

y/x	-20.0	-5.0	10.0	30.0	45.0	60.0	75.0
1.0	12,566.0	10,297.0	8,029.0	5,005.0	2,736.0	468.0	468.0

Initial Supporting table - P0128 Maximum Acculated Energy - Tertiary

Description: KtETHD_E_EOR_WrmllpEnrgyLimTest2

Value Units: Cooling system energy failure threshold (kJ)

X Unit: Minimum ECT for the key cycle (°C)

y/x	-20.0	-5.0	10.0	30.0	45.0	60.0	75.0
1.0	12,566.0	10,297.0	8,029.0	5,005.0	2,736.0	468.0	468.0

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

Description: KtETHD_P_CDD_HeatToCoolantMin

Value Units: Indicated Power (kW)

X Unit: Firing Fraction

Y Units: Ambient temperature (°C)

y/x	0.00	0.25	0.50	0.75	1.00
-9.0	16.0	16.0	16.0	16.0	20.0
0.0	16.0	16.0	16.0	16.0	20.0
10.0	16.0	16.0	16.0	16.0	11.0
20.0	16.0	16.0	16.0	16.0	11.0
50.0	16.0	16.0	16.0	16.0	11.0

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	270	300	300

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	1,800	1,800

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	2,000	3,000	4,000	5,000	6,000	7,000
60	10	3	1	1	1	1	1
80	7	2	1	1	1	1	1
100	3	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
2,000.0	0.0	0.0	0.0
3,000.0	0.0	0.0	0.0
4,000.0	0.0	0.0	0.0
5,000.0	0.0	0.0	0.0
6,000.0	0.0	0.0	0.0
7,000.0	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	200	250	300	350	400	480
1,500	-100	-96	-25	-24	-15	-15
2,000	-100	-96	-25	-24	-15	-15
3,000	-100	-40	-25	-24	-15	-15
4,000	-100	-30	-25	-24	-15	-15
5,000	-100	-27	-25	-24	-15	-15
6,000	-100	-25	-25	-24	-15	-15
7,000	-100	-25	-25	-24	-15	-15

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	8.0	8.0	8.0	8.0	8.0

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	9.0	9.0	9.0	9.0	9.0

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	2,750	2,750	2,750	2,750	2,750

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 time as a function of fuel level and barometric pressure

Description: Purge valve leak test time as a function of fuel level (%) and barometric pressure (kPa)**Value Units:** Time (Seconds)**X Unit:** Barometric pressure (kPa)**Y Units:** Fuel level (%)

y/x	70	80	90	100	110
0	90	90	90	90	90
6	90	90	90	90	90
13	88	88	88	88	88
19	86	86	86	86	86
25	84	84	84	84	84
31	82	82	82	82	82
38	81	81	81	81	81
44	79	79	79	79	79
50	77	77	77	77	77
56	75	75	75	75	75
63	73	73	73	73	73
69	71	71	71	71	71
75	69	69	69	69	69
81	66	66	66	66	66
88	64	64	64	64	64
94	62	62	62	62	62
100	60	60	60	60	60

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	820	820	820	820	820	820	820	820	820
1,500	820	820	820	820	820	820	820	820	820
2,000	820	820	820	820	820	820	820	820	820
2,500	820	820	820	820	820	820	820	820	820
3,000	820	820	820	820	820	820	820	820	820
3,500	820	820	820	820	820	820	820	820	820
4,000	820	820	820	820	820	820	820	820	820
4,500	820	820	820	820	820	820	820	820	820
5,000	820	820	820	820	820	820	820	820	820

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	60	60	60	60	74	89	108	127	148

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	60	80	100	120	140	160
1	500	450	450	450	450	450	430	400	350

Initial Supporting table - P06D)D_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	4,000	5,000	6,000	7,000
-20	100	100	100	100	100	100	125	125	125
0	100	100	100	100	100	100	125	125	125
20	75	75	75	75	75	80	125	125	125
60	75	75	75	75	75	80	125	125	125
80	75	75	75	75	75	80	125	125	125
100	75	75	75	75	75	80	125	125	125
120	75	75	75	75	75	80	125	125	125
140	75	75	75	75	75	80	125	125	125
160	75	75	75	75	75	80	125	125	125

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	60	80	100	120	140	160
1	200	200	175	150	150	150	160	200	300

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	0.17	0.17	0.17	0.17	0.17

Initial Supporting table - P219A EWMA Coefficient Opt Table**Description:** The bank 1 EWMA coefficient used to filter the AFIM Variance Ratio while in Optional Mode, if used.**Value Units:** Unitless Scalar**X Unit:** Unitless Scalar

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

Initial Supporting table - P219A Quality Factor Bank1 Table

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

Value Units: Unitless Scalar

X Unit: Engine Speed (RPM)

Y Units: Air Per Cylinder (APC) (mg/cylinder)

y/x	250	500	750	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,063	3,500	4,000	4,500	5,000	5,500
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
240	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
320	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
400	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
480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
560	0.00	0.00	0.00	0.00	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
640	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
720	0.00	0.00	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
800	0.00	0.00	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
880	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
960	0.00	0.00	0.00	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
1,040	0.00	0.00	0.00	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
1,120	0.00	0.00	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
1,200	0.00	0.00	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
1,280	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,390	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	0	-250	-250	-300	-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	0	200	200	300	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	1.0	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	3	3	3	3	3	3	2	3	3
1,000	1	3	3	3	3	3	3	3	3	3
1,200	1	3	3	3	3	3	3	3	3	3
1,600	1	3	4	4	4	4	4	4	4	4
2,000	1	5	5	5	6	6	6	6	6	6
2,500	1	7	7	8	8	8	8	9	9	9
3,000	1	9	10	10	11	11	12	12	12	12
4,000	1	15	16	17	18	19	20	20	20	20
5,000	1	23	24	27	28	29	30	31	31	31
6,250	1	36	38	41	44	46	47	49	49	49

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	0.5	15.2	15.8	17.3	18.3	19.0	19.5	20.0	20.2	20.0

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	4	4	4	4	5	4	5	5	5
1,000	80	4	4	5	5	5	5	5	5	5
1,200	80	5	5	5	5	5	5	5	5	6
1,600	80	6	6	6	7	7	7	7	7	7
2,000	80	8	8	9	9	9	9	10	10	10
2,500	80	11	11	12	12	13	13	13	14	14
3,000	80	14	15	16	17	17	18	19	19	19
4,000	80	24	24	27	28	29	31	31	31	31
5,000	80	37	38	41	43	45	47	48	48	49
6,250	80	56	58	64	68	70	74	76	76	77

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	23.9	24.4	26.8	28.2	29.1	30.5	31.4	31.4	31.5

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 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	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	-10	0	7	15	20	80	100	100	120	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	750	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	2.346	2.346	2.334	2.346	2.334	2.260	2.301	2.381	2.418	2.500	3.000	3.000	3.000	3.000	3.000	3.000	3.000

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	2,700	2,900	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750	5,000	5,500	6,000	6,500	7,000	7,500	8,500
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Initial Supporting table - P0330_OpenCktThrshMin2 (20 kHz)

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

y/x	750	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	1.258	1.252	1.240	1.244	1.217	1.188	1.215	1.500	1.650	1.900	2.400	2.400	2.400	2.400	2.400	2.400	2.400

Initial Supporting table - P0330_OpenCktThrshMin2 (NN)

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

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

Initial Supporting table - P0331_AbnormalLo2

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

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314

Initial Supporting table - P0331_AbnormalLoAFM_2

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

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314

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	400	1,200	1,600	2,000	2,400	2,800	3,200	3,600	5,000
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	400	1,200	1,600	2,000	2,400	2,800	3,200	3,600	5,000
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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	70	80	90	100	110	120	130	140	150
1	5.22	4.16	3.13	2.53	2.15	1.78	1.47	1.30	1.10

Initial Supporting table - P04DB: MAP Transient Delay Active Time**Description:** MAP Transient Delay Active Time**Value Units:** MAP Transient Delay (seconds*10)**X Unit:** MAP Transient Delta (kPa)**Y Units:** None

y/x	175.0	185.0	196.0	207.0	218.0	239.0	240.0
1	0	0	0	0	0	0	0

Initial Supporting table - P04DB: MAP Transient Delta Threshold**Description:** MAP Transient Delta Threshold**Value Units:** MAP Transient Delta (kPa)**X Unit:** Engine Speed (RPM)**Y Units:** None

y/x	500	800	1,100	1,400	1,700	2,000	2,300
1	175.0	185.0	196.0	207.0	218.0	239.0	240.0

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	750	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	0.201	0.201	0.201	0.215	0.217	0.221	0.252	0.256	0.371	0.371	0.371	0.371	0.371	0.371	0.371	0.371	0.371

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	750	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	0.100	0.100	0.102	0.105	0.104	0.111	0.123	0.127	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178

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	450	2,330	2,331	2,332	2,333	2,334	2,335	2,336	2,337	2,338	2,340	2,341	2,342	2,343	2,344	2,345
1	0	240	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080

Initial Supporting table - P2CB9_LIN_Threshold**Description:** Tabulated LIN Fan2 Speed Low Limits**Value Units:** rpm**X Unit:** Commanded LIN Fan2 Speed rpm**Y Units:** Sensed LIN Fan2 Speed Lower Limit rpm

y/x	0	650	2,660	2,661	2,663	2,664	2,665	2,666	2,667	2,668	2,669	2,670	2,671	2,672	2,673	2,674	2,675
1	0	440	2,390	2,390	2,390	2,390	2,390	2,390	2,390	2,390	2,390	2,390	2,390	2,390	2,390	2,390	2,390

Initial Supporting table - P2CBB_LIN_Threshold

Description: Tabulated LIN Fan3 Speed Low Limits

Value Units: rpm

X Unit: Commanded LIN Fan3 Speed rpm

Y Units: Sensed LIN Fan3 Speed Lower Limit rpm

y/x	0	400	401	1,750	2,280	2,281	2,282	2,283	2,284	2,285	2,286	2,287	2,288	2,289	2,290	2,291	2,292
1	0	200	200	1,550	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080

Initial Supporting table - Shutter 1 AC OFF - Open / Close Commands

Description: Open / Close Commands for Shutter 1 - AC OFF**Value Units:** Percent**X Unit:** KPH**Y Units:** Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	100	100	100	100	100	100	100	100	100
6	0	100	100	100	100	100	100	100	100	100
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 1 AC OFF - Percent Fan Command Axis**Description:** Percent Fan Command Axis for Shutter 1 - AC OFF Table**Value Units:** Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	0	11	12	13	17	18	28	29	80	100

Initial Supporting table - Shutter 1 AC OFF - Vehicle Speed Axis**Description:** Vehicle Speed Axis for Shutter 1 - AC OFF Table**Value Units:** KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	48	70	130	200	201	202	203	204	205

Initial Supporting table - Shutter 1 AC ON - Open / Close Commands

Description: Open / Close Commands for Shutter 1 - AC ON**Value Units:** Percent**X Unit:** KPH**Y Units:** Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	100	100	100	100	100	100	100	100	100
6	0	100	100	100	100	100	100	100	100	100
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 1 AC ON - Percent Fan Command Axis**Description:** Percent Fan Command Axis for Shutter 1 - AC ON Table**Value Units:** Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	0	11	12	13	17	18	28	29	80	100

Initial Supporting table - Shutter 1 AC ON - Vehicle Speed Axis**Description:** Vehicle Speed Axis for Shutter 1 - AC ON Table**Value Units:** KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	48	70	130	200	201	202	203	204	205

Initial Supporting table - Shutter 2 AC OFF - Open / Close Commands

Description: Open / Close Commands for Shutter 2 - AC OFF

Value Units: Percent

X Unit: KPH

Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	100	100	100	100	100	100	100	100	100
6	0	100	100	100	100	100	100	100	100	100
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 2 AC OFF - Percent Fan Command Axis**Description:** Percent Fan Command Axis for Shutter 2 - AC OFF Table**Value Units:** Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	0	4	7	9	10	13	15	25	50	100

Initial Supporting table - Shutter 2 AC OFF - Vehicle Speed Axis**Description:** Vehicle Speed Axis for Shutter 2 - AC OFF Table**Value Units:** KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - Shutter 2 AC ON - Open / Close Commands

Description: Open / Close Commands for Shutter 2 - AC ON

Value Units: Percent

X Unit: KPH

Y Units: Fan Command Percent

y/x	0	1	2	3	4	5	6	7	8	9
0	0	100	100	100	100	100	100	100	100	100
1	0	100	100	100	100	100	100	100	100	100
2	0	100	100	100	100	100	100	100	100	100
3	0	100	100	100	100	100	100	100	100	100
4	0	100	100	100	100	100	100	100	100	100
5	0	100	100	100	100	100	100	100	100	100
6	0	100	100	100	100	100	100	100	100	100
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Initial Supporting table - Shutter 2 AC ON - Percent Fan Command Axis**Description:** Percent Fan Command Axis for Shutter 2 - AC ON Table**Value Units:** Percent

y/x	1	2	3	4	5	6	7	8	9	10
1	0	4	7	9	10	13	15	25	50	100

Initial Supporting table - Shutter 2 AC ON - Vehicle Speed Axis**Description:** Vehicle Speed Axis for Shutter 2 - AC ON Table**Value Units:** KPH

y/x	1	2	3	4	5	6	7	8	9	10
1	0	55	70	95	110	120	140	150	180	200

Initial Supporting table - P129F Threshold High

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

Value Units: revs / min

X Unit: revs / min [commanded pump speed]

Y Units: kiloPascals [requested fuel pressure]

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

Initial Supporting table - P129F Threshold Low

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

Value Units: revs / min

X Unit: revs / min [commanded pump speed]

Y Units: kiloPascals [requested fuel pressure]

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

Initial Supporting table - P3187_Threshold

Description: P3187 Filtered Fuel Pressure Error Threshold [under-performing pump]**Value Units:** kilo Pascals**X Unit:** kPa [commanded fuel pressure]**Y Units:** grams / sec [fuel flow]

y/x	200.00	250.00	300.00	350.00	400.00	450.00	500.00	550.00	600.00
0.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
1.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
3.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
4.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
6.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
7.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
9.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
10.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
12.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
13.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
15.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
16.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
18.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
19.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
21.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
22.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
24.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
25.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
27.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
28.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
30.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
31.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
33.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
34.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
36.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
37.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
39.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
40.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
42.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
43.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
45.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00

Initial Supporting table • P3187_Threshold

46.50	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00
48.00	30.00	37.50	45.00	52.50	60.00	67.50	75.00	82.50	90.00

Initial Supporting table - P3188_Threshold

Description: P3188 Filtered Fuel Pressure Error Threshold [over-performing pump]**Value Units:** kilo pascals [kPa]**X Unit:** kPa [commanded fuel pressure]**Y Units:** grams/sec [fuel flow]

y/x	200.00	250.00	300.00	350.00	400.00	450.00	500.00	550.00	600.00
0.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
1.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
3.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
4.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
6.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
7.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
9.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
10.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
12.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
13.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
15.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
16.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
18.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
19.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
21.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
22.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
24.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
25.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
27.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
28.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
30.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
31.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
33.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
34.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
36.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
37.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
39.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
40.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
42.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
43.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
45.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00

Initial Supporting table • P3188_Threshold

46.50	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00
48.00	-490.00	-440.00	-390.00	-340.00	-290.00	-240.00	-190.00	-140.00	-90.00

Initial Supporting table - DFCO Active Maximum Time (seconds)

Description: DFCO active maximum time versus engine airflow (gps)

Value Units: Time (seconds)

X Unit: Engine airflow (gps)

y/x	2	3	4	6	8	10	12	14	16	18	20	25	30	35	40	50	60
1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Initial Supporting table - DFCO Active Minimum Time (seconds)**Description:** DFCO active minimum time versus engine airflow (gps)**Value Units:** Time (seconds)**X Unit:** Engine airflow (gps)

y/x	2	3	4	6	8	10	12	14	16	18	20	25	30	35	40	50	60
1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

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

Description: This table describes the adaptive (Block Learn) cells in which to enable the Post (Secondary) Oxygen sensor response tests.

Note: When the table column heading matches the calibration value below it, that individual cell is enabled.

The cell numbers in the table are defined as:

CeFADR_e_Cell00_PurgOnAirMode5 = 0,
 CeFADR_e_Cell01_PurgOnAirMode4 = 1,
 CeFADR_e_Cell02_PurgOnAirMode3 = 2,
 CeFADR_e_Cell03_PurgOnAirMode2 = 3,
 CeFADR_e_Cell04_PurgOnAirMode1 = 4,
 CeFADR_e_Cell05_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 accumulated 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: Accumulated 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 - POOI1_CamPosErrorLimlc1

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_EngOilPressEnblIc

Description: Delay time before the oil pressure enable flag is set assuming all the oil pressure enable criteria are met**Value Units:** Time (sec)**X Unit:** Engine Coolant Temperature (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	14	12	9	6	4	3	3	3	3	2	2	2	2	2	2	2	2

Initial Supporting table - P0011_P0021_P05CC_P05CD_HiEngSpdHiDsbllc**Description:** Minimum engine speed to disable Intake cam**Value Units:** Engine Speed (rpm)**X Unit:** Engine Oil Temp (degC)

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

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

Value Units: Engine Speed (rpm)

X Unit: Engine Oil Temp (degC)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
1	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_LoPresHiEnblc**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	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130

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	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120

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	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330

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	24	24	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2

Initial Supporting table - P0011_P(05CC_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	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,200	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,600	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,000	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,200	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,600	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,000	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,200	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,600	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,000	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Initial Supporting table - P00114_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	14	12	9	6	4	3	3	3	3	2	2	2	2	2	2	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	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130

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	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120

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	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330

Initial Supporting table - P0014_PO)5CE_StablePositionTimeEc1

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

Value Units: Minimum time (sec)

X Unit: Engine Oil Temperature (degC)

Y Units: Engine Speed (rpm)

y/x	-40	-28	-16	-4	8	20	32	44	56	68	80	92	104	116	128	140	152
400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,200	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1,600	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,000	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2,800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,200	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
3,600	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,000	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4,800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,200	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
5,600	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,000	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,400	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
6,800	100.0	80.0	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Initial Supporting table - 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	25.0	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	1.0	1.0

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	2.0	2.0

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	-0.2	-0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4
5.0	-0.2	-0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4
10.0	-0.2	-0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4
20.0	-0.2	-0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4
30.0	-0.2	-0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4
40.0	-0.2	-0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4
50.0	-0.2	-0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4
60.0	-0.2	-0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4
70.0	-0.2	-0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.4

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	0.00	28.95	76.66	185.00	215.90	254.00
1	1.000	1.364	2.362	2.690	2.995	3.780

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 or P010B
188	T	F	T	T	T	F	F	T	P0101 or P010B
189	T	F	T	T	T	F	T	F	P0101 or P010B
190	T	F	T	T	T	F	T	T	P0101 or P010B
191	T	F	T	T	T	T	F	F	P1101
192	T	F	T	T	T	T	F	T	P1101
193	T	F	T	T	T	T	T	F	P1101
194	T	F	T	T	T	T	T	T	P1101
195	T	T	F	F	F	F	F	F	P1101
196	T	T	F	F	F	F	F	T	P1101
197	T	T	F	F	F	F	T	F	P1101
198	T	T	F	F	F	F	T	T	P0236
199	T	T	F	F	F	T	F	F	P1101
200	T	T	F	F	F	T	F	T	P0121
201	T	T	F	F	F	T	T	F	P1101
202	T	T	F	F	F	T	T	T	P0236
203	T	T	F	F	T	F	F	F	P1101
204	T	T	F	F	T	F	F	T	P1101
205	T	T	F	F	T	F	T	F	P1101
206	T	T	F	F	T	F	T	T	P0236
207	T	T	F	F	T	T	F	F	P1101
208	T	T	F	F	T	T	F	T	P0121
209	T	T	F	F	T	T	T	F	P1101
210	T	T	F	F	T	T	T	T	P0236
211	T	T	F	T	F	F	F	F	P1101
212	T	T	F	T	F	F	F	T	P1101
213	T	T	F	T	F	F	T	F	P1101
214	T	T	F	T	F	F	T	T	P1101
215	T	T	F	T	F	T	F	F	P1101
216	T	T	F	T	F	T	F	T	P1101
217	T	T	F	T	F	T	T	F	P1101
218	T	T	F	T	F	T	T	T	P1101
219	T	T	F	T	T	F	F	F	P1101
220	T	T	F	T	T	F	F	T	P1101
221	T	T	F	T	T	F	T	F	P1101

Initial Supporting table - P0101, P0106, P010B, P0121, P0236, P1101: Turbocharger Intake Flow Rationality Diagnostic Failure Matrix

222	T	T	F	T	T	F	T	T	P1101
223	T	T	F	T	T	T	F	F	P1101
224	T	T	F	T	T	T	F	T	P1101
225	T	T	F	T	T	T	T	F	P1101
226	T	T	F	T	T	T	T	T	P1101
227	T	T	T	F	F	F	F	F	P1101
228	T	T	T	F	F	F	F	T	P1101
229	T	T	T	F	F	F	T	F	P1101
230	T	T	T	F	F	F	T	T	P1101
231	T	T	T	F	F	T	F	F	P1101
232	T	T	T	F	F	T	F	T	P1101
233	T	T	T	F	F	T	T	F	P1101
234	T	T	T	F	F	T	T	T	P1101
235	T	T	T	F	T	F	F	F	P1101
236	T	T	T	F	T	F	F	T	P1101
237	T	T	T	F	T	F	T	F	P1101
238	T	T	T	F	T	F	T	T	P1101
239	T	T	T	F	T	T	F	F	P1101
240	T	T	T	F	T	T	F	T	P1101
241	T	T	T	F	T	T	T	F	P1101
242	T	T	T	F	T	T	T	T	P1101
243	T	T	T	T	F	F	F	F	P1101
244	T	T	T	T	F	F	F	T	P1101
245	T	T	T	T	F	F	T	F	P1101
246	T	T	T	T	F	F	T	T	P1101
247	T	T	T	T	F	T	F	F	P1101
248	T	T	T	T	F	T	F	T	P1101
249	T	T	T	T	F	T	T	F	P1101
250	T	T	T	T	F	T	T	T	P1101
251	T	T	T	T	T	F	F	F	P1101
252	T	T	T	T	T	F	F	T	P1101
253	T	T	T	T	T	F	T	F	P1101
254	T	T	T	T	T	F	T	T	P1101
255	T	T	T	T	T	T	F	F	P1101
256	T	T	T	T	T	T	F	T	P1101
257	T	T	T	T	T	T	T	F	P1101
258	T	T	T	T	T	T	T	T	P1101

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAPI Residual Weight Factor based on RPM
Description: P0101_P0106_P0121_P012B_P0236_P1101 MAPI Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)

X Unit: Engine Speed (RPM)

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,200
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.850	0.800	0.900	0.800	0.900	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAP2 Residual Weight Factor based on RPM**Description:** P0101_P0106_P0121_P012B_P0236_P1101 MAP2 Residual Weight Factor based on RPM**Value Units:** Weight Factor (Unitless)**X Unit:** Engine Speed (RPM)

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,200
1	1.000	1.000	1.000	1.000	1.000	1.000	0.850	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: MAP3 Residual Weight Factor based on RPM**Description:** P0101_P0106_P0121_P012B_P0236_P1101 MAP3 Residual Weight Factor based on RPM**Value Units:** Weight Factor (Unitless)**X Unit:** Engine Speed (RPM)

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,200
1	1.000	1.000	1.000	1.000	1.000	0.943	0.850	0.990	0.970	1.000	1.000	0.950	0.850	1.000	1.000	0.800	1.000

Initial Supporting table - P0101, P0106, P0121, P012B, P0236, P1101: TPS Residual Weight Factor based on RPM
Description: P0101_P0106_P0121_P012B_P0236_P1101 TPS Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)

X Unit: Engine Speed (RPM)

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,200
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	0.900	0.900	1.000	1.000

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP Residual Weight Factor based on RPM
Description: P0101_P0106_P0121_P0236_P1101 TIAP Residual Weight Factor based on RPM

Value Units: Weight Factor (Unitless)

X Unit: Engine Speed (RPM)

y/x	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,200
1	1.000	1.000	0.873	1.000	0.900	0.850	0.800	0.700	0.670	0.640	0.850	0.840	0.710	0.762	0.815	0.630	1.000

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max Air Flow**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max Air Flow**Value Units:** Engine Air Flow (Grams/Second)**X Unit:** Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	13.0	13.0	13.0	16.0	20.0	24.0	28.0	31.0	32.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Max MAP**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Max MAP**Value Units:** Manifold Pressure (kPa)**X Unit:** Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-Baro Correlation Offset**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-Baro Correlation Offset**Value Units:** Pressure Difference (kPa)**X Unit:** Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	0.0	1.5	3.5	6.0	9.0	12.0	16.0	20.0	25.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min Air Flow**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min Air Flow**Value Units:** Engine Air Flow (Grams/Second)**X Unit:** Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	17.0	20.0	22.0	40.0	50.0	65.0	90.0	110.0	120.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Min MAP**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Min MAP**Value Units:** Manifold Pressure (kPa)**X Unit:** Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	100.0	100.0	100.0	100.0	100.0	100.0	122.0	122.0	122.0

Initial Supporting table - P0101, P0106, P0121, P0236, P1101: TIAP-MAP Correlation Offset**Description:** P0101_P0106_P0121_P0236_P1101 TIAP-MAP Correlation Offset**Value Units:** Pressure Difference (kPa)**X Unit:** Engine Speed (RPM)

y/x	1,000	1,750	2,500	3,250	4,000	4,750	5,500	6,250	7,000
1	5.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0

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	22	22	22	22	22
0.125	22	22	22	22	22
0.250	22	22	22	22	22
0.375	22	22	22	22	22
0.500	22	22	22	22	22
0.625	22	22	22	22	22
0.750	22	22	22	22	22
0.875	22	22	22	22	22
1.000	22	22	22	22	22

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	22	22	22	22	22
0.125	22	22	22	22	22
0.250	22	22	22	22	22
0.375	22	22	22	22	22
0.500	22	22	22	22	22
0.625	22	22	22	22	22
0.750	22	22	22	22	22
0.875	22	22	22	22	22
1.000	22	22	22	22	22

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	5	5	6	10	15	20	30
1	0	0	0	1	1	1	1	1	1

Initial Supporting table - P1400_ColdStartDiagnosticDelayBasedOnEngineRunTimeCalAxis**Description:** This is the x-axis for the KtCED_K_TimeWght calibration table. Refer to the description for KtCED_K_TimeWght for details.

y/x	1	2	3	4	5	6	7	8	9
1	0	3	5	5	6	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	800	850	900	950	1,000	1,020	1,050	1,100	1,150	1,200	1,250	1,300	1,350	1,400	1,450	1,500
1	0	2	3	6	7	12	13	13	14	14	15	16	20	20	20	22	25

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. ExhEngyPerIInitMass 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	-19	-12	-10	-2	4	6	8	10	12
1	2.19	1.81	0.19	0.19	0.19	0.19	0.06	0.06	0.06

Initial Supporting table - P0101, P0106, P010B, P0121, P012B, P0236, P1101: MAF1 Residual Weight Factor based on MAF Est**Description:** P0101_P0106_P010B_P01 21_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	90	105	120	135	150	165	180	195	210	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	0	400	800	1,200	1,600	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,200
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970	0.880	0.750	0.703	0.850	0.839	0.703	1.000	1.000

Initial Supporting table - P0606 PFM Sequence Fail f(Loop Time)

Description: Fail threshold for PFM per operating loop.

Value Units: Fail threshold for PFM (count)

X Unit: Operating Loop (enum)

P0606 PFM Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msFlow	CePISR_e_3p125msFlow	CePISR_e_5msFlow	CePISR_e_6p25msFlow
1	8	8	8	8

P0606 PFM Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_10msFlow	CePISR_e_12p5msFlow	CePISR_e_20msFlow	CePISR_e_25msFlow
1	8	8	8	8

P0606 PFM Sequence Fail f(Loop Time) - Part 3

y/x	CePISR_e_40msFlow	CePISR_e_50msFlow	CePISR_e_80msFlow	CePISR_e_100msFlow
1	4	4	2	2

P0606 PFM Sequence Fail f(Loop Time) - Part 4

y/x	CePISR_e_250msFlow			
1	2			

Initial Supporting table - P0606 PFM Sequence Sample f(Loop Time)

Description: Sample threshold for PFM per operating loop.

Value Units: Sample threshold for PFM (count)

X Unit: Operating Loop (enum)

P0606 PFM Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msFlow	CePISR_e_3p125msFlow	CePISR_e_5msFlow	CePISR_e_6p25msFlow
1	10	10	10	10

P0606 PFM Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_10msFlow	CePISR_e_12p5msFlow	CePISR_e_20msFlow	CePISR_e_25msFlow
1	10	10	10	10

P0606 PFM Sequence Sample f(Loop Time) - Part 3

y/x	CePISR_e_40msFlow	CePISR_e_50msFlow	CePISR_e_80msFlow	CePISR_e_100msFlow
1	5	5	3	3

P0606 PFM Sequence Sample f(Loop Time) - Part 4

y/x	CePISR_e_250msFlow			
1	3			

Initial Supporting table - P0606 PFM Enable f(Loop Time)

Description: PFM Enable**Value Units:** PFM enable flag (boolean)**X Unit:** Operating Loop Time Sequence (enum)**P0606 PFM.Enable f(Loop Time) - Part 1**

y/x	CePISR_e_2p5msFlow	CePISR_e_3p125msFlow	CePISR_e_5msFlow	CePISR_e_6p25msFlow
1	0	0	0	0

P0606 PFM.Enable f(Loop Time) - Part 2

y/x	CePISR_e_10msFlow	CePISR_e_12p5msFlow	CePISR_e_20msFlow	CePISR_e_25msFlow
1	0	0	0	0

P0606 PFM.Enable f(Loop Time) - Part 3

y/x	CePISR_e_40msFlow	CePISR_e_50msFlow	CePISR_e_80msFlow	CePISR_e_100msFlow
1	0	0	0	0

P0606 PFM.Enable f(Loop Time) - Part 4

y/x	CePISR_e_250msFlow			
1	0			

Initial Supporting table - P060C_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	32.98	32.98	32.98	32.98	32.98	32.98

Initial Supporting table - P060C_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	121.10	92.76	93.10	90.10	53.60	26.10
450.00	121.10	92.76	93.10	90.10	53.60	26.10
550.00	121.10	92.76	93.10	90.10	53.60	26.10
650.00	121.10	92.76	93.10	90.10	53.60	26.10
700.00	129.43	99.67	99.29	95.58	57.02	29.02
800.00	156.81	124.20	122.39	117.26	74.56	35.54
900.00	191.02	155.57	153.48	146.92	95.24	39.01
1,000.00	210.68	172.76	174.60	157.10	107.35	37.01
1,100.00	224.60	180.01	196.10	164.72	146.35	67.01
1,200.00	237.51	184.27	207.36	172.62	167.98	96.97
1,300.00	250.00	199.01	204.44	183.86	173.05	122.26
1,400.00	283.30	214.74	204.81	196.91	157.51	120.38
2,000.00	149.89	95.34	76.84	59.08	37.25	29.23
2,500.00	-111.40	-111.40	-111.40	-111.40	-111.40	-111.40
3,000.00	-122.54	-122.54	-122.54	-122.54	-122.54	-122.54
4,000.00	-133.68	-133.68	-133.68	-133.68	-133.68	-133.68
6,000.00	-144.82	-144.82	-144.82	-144.82	-144.82	-144.82

Initial Supporting table - Closed Loop Enable Clarification - KaFCLP U SlphrIntglOfst Thrsh

Description: Integral Offset voltage thresholds (bank and cell specific calcs) 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
CiFCLP_LightAccel	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 02 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 02 integral terms to be updated.**Value Units:** Celcius

y/x	1
1	1,000

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 converter temperature

Value Units: Celcius

y/x	1
1	425

Initial Supporting table - Closed Loop Enable Clarification - KeFULC T WRAF SensorReadyThrsh**Description:** Pumping cell temperature threshold above which the wideband oxygen sensor will be considered ready for use**Value Units:** Degrees Celcius

y/x	1
1	700

Initial Supporting table - Closed Loop Enable Clarification - KeWRSC T HtrCntrlCL**Description:** WRAF heater temperature enabling threshold for transition from Open Loop to Closed Loop**Value Units:** Degrees Celcius

y/x	1
1	628

Initial Supporting table - Closed Loop Enable Clarification - KeWRSI T PumpCurrentEnable**Description:** WRAF heater temperature threshold for enabling the sensor pump current**Value Units:** Degrees Celcius

y/x	1
1	628

Initial Supporting table - Closed Loop Enable Clarification - KfFCLL T AdaptiveLoCoolant**Description:** LTM learning is inhibited if the engine coolant temperature is below this calibration.**Value Units:** Degrees Celcius

y/x	1
1	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	1,250

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	16.0	16.0	16.0	16.0	16.0	17.0	18.0	18.0	18.0

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	400.0	100.0	100.0	100.0	40.0	40.0	40.0	40.0	40.0	20.0	20.0	20.0	20.0

Initial Supporting table - Closed Loop Enable Clarification - KtFCLPtPostIntglRamplnTime

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	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	40.0	30.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0

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	300.0	300.0	230.0	90.0	80.0	32.0	20.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
25	300.0	300.0	230.0	90.0	80.0	32.0	20.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
50	300.0	300.0	230.0	90.0	80.0	32.0	20.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
75	300.0	300.0	230.0	90.0	80.0	32.0	20.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
100	300.0	300.0	230.0	90.0	80.0	32.0	20.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

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	300.0	300.0	230.0	160.0	95.0	32.0	32.0	32.0	32.0	32.0	17.0	17.0	17.0	30.0	45.0	45.0	45.0
25	300.0	300.0	230.0	160.0	95.0	32.0	32.0	32.0	32.0	32.0	17.0	17.0	17.0	30.0	45.0	45.0	45.0
50	300.0	300.0	230.0	160.0	95.0	32.0	32.0	32.0	32.0	32.0	17.0	17.0	17.0	30.0	45.0	45.0	45.0
75	300.0	300.0	230.0	160.0	95.0	32.0	32.0	32.0	32.0	32.0	17.0	17.0	17.0	30.0	45.0	45.0	45.0
100	300.0	300.0	230.0	160.0	95.0	32.0	32.0	32.0	32.0	32.0	17.0	17.0	17.0	30.0	45.0	45.0	45.0

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	45	45	45	45	49	57	105	173	340	500	500	500	500	500	500	500	500

Initial Supporting table - P0442 Engine Off Time Before Vehicle Off Maximum as a Function of Estimated Ambient Temperature**Description:** Maximum engine off time before vehicle off time as a function of estimated ambient temperature (EAT)**Value Units:** Maximum Engine Off Time Before Vehicle Off Time (seconds)**X Unit:** Estimated Ambient Temperature (Deg C)

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

Initial Supporting table - P0442 EON' V 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	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
2	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
3	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
4	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
5	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
6	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
7	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
8	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
9	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
10	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
11	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
12	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
13	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
14	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
15	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
16	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5
17	-311.4	-299.7	-288.0	-276.3	-264.7	-253.0	-241.3	-229.6	-218.0	-206.3	-194.6	-182.9	-171.2	-159.6	-147.9	-136.2	-124.5

Initial Supporting table - 1st_FireAftrMisfr_Acel

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	600	800	1,000	1,200	1,600	2,000	2,400	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
2	1.09	1.17	1.33	1.90	1.28	1.45	1.81	2.08	0.93	0.93	0.96	1.76	1.07	1.00	0.95	1.12	1.29
8	-0.38	0.36	0.73	2.25	1.43	0.69	1.48	1.52	0.98	0.98	1.23	1.27	1.05	1.11	1.13	1.42	1.70
12	0.13	0.76	0.94	1.71	0.83	0.66	0.95	0.73	0.80	0.93	1.05	1.07	1.05	1.13	1.31	1.60	1.89
16	0.41	1.00	1.51	1.10	0.57	0.56	0.64	0.58	0.77	0.83	0.98	1.03	1.00	1.19	1.54	1.77	2.00
20	0.67	1.24	1.56	0.81	0.46	0.47	0.69	0.66	0.71	0.75	1.00	0.79	0.83	1.26	1.53	1.81	2.09
24	0.90	1.50	1.60	0.65	0.39	0.44	0.72	0.46	0.65	0.77	0.91	0.69	0.65	1.04	1.53	1.80	2.07
30	1.15	1.76	1.68	0.50	0.32	0.42	0.77	0.66	0.61	0.73	0.67	0.59	0.57	0.74	1.19	1.35	1.52
40	1.47	1.98	1.73	0.37	0.25	0.41	0.82	0.75	0.86	0.86	0.68	0.57	0.48	0.51	0.95	1.09	1.23
60	1.83	2.08	1.78	0.25	0.18	0.39	0.89	0.83	1.05	0.97	0.71	0.53	0.41	0.34	0.69	0.80	0.91

Initial Supporting table - 1st_FireAftrMisfr_Jerk

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	600	800	1,000	1,200	1,600	2,000	2,400	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500
2	-0.96	-0.88	-1.03	-0.94	-0.31	-0.14	-0.11	0.51	0.23	0.12	0.37	0.30	0.25	0.60	1.17	1.22	1.26
8	-0.56	-0.60	-0.88	-0.69	-1.17	-0.99	-0.80	-0.81	-0.86	-0.82	-0.47	-0.36	-0.07	0.21	0.60	0.82	1.04
12	-0.62	-0.60	-1.07	-0.67	-1.27	-1.13	-0.87	-0.70	-1.10	-0.98	-0.94	-1.00	-0.69	-0.16	0.00	0.26	0.52
16	-0.70	-0.69	-1.17	-0.75	-1.29	-1.26	-0.87	-0.63	-0.97	-0.80	-0.90	-1.02	-0.98	-0.71	-0.48	-0.28	-0.08
20	-0.76	-0.75	-1.22	-0.82	-1.20	-0.97	-0.72	-0.73	-0.84	-0.83	-0.76	-1.04	-1.12	-0.92	-0.80	-0.69	-0.59
24	-0.82	-0.80	-1.13	-0.87	-1.17	-0.81	-0.69	-0.78	-0.95	-0.88	-0.74	-1.09	-1.16	-1.00	-0.88	-0.89	-0.91
30	-0.88	-0.86	-1.13	-0.93	-1.09	-0.84	-0.73	-0.89	-0.96	-0.81	-0.72	-1.11	-1.20	-1.05	-0.93	-0.93	-0.93
40	-0.96	-0.95	-1.13	-0.98	-1.16	-0.93	-0.86	-1.07	-1.06	-1.10	-0.95	-1.15	-1.19	-1.17	-1.00	-0.96	-0.93
60	-1.07	-1.05	-1.14	-1.04	-1.10	-1.22	-1.05	-1.42	-1.18	-1.35	-1.16	-1.18	-1.18	-1.17	-1.06	-0.99	-0.93

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	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	0	0	0	0	0	0	0	1	1
6	0	-1	-1	-1	-1	-1	0	0	1
8	-1	-1	-1	-1	-1	-1	-1	0	0
10	-1	-1	-1	-1	-1	-1	-1	-1	0
12	-1	-1	-1	-1	-1	-1	-1	-1	0
16	-1	-1	-1	-1	-1	-1	-1	-1	0
20	-1	-1	-1	-1	-1	-1	-1	-1	-1
25	-1	-1	-1	-1	-1	-1	-1	-1	-1
40	-1	-1	-1	-1	-1	-1	-1	-1	-1

Initial Supporting table - IstFireAfrMisAcelAFM

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	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	1	1	1	1	1	1	1	1	1
6	0	0	0	0	0	0	0	0	1
8	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
12	0	0	-1	-1	0	0	0	0	0
16	-1	-1	-1	-1	-1	-1	-1	-1	0
20	-1	-1	-1	-1	-1	-1	-1	-1	-1
25	-1	-1	-1	-1	-1	-1	-1	-1	-1
40	-1	-1	-1	-1	-1	-1	-1	-1	-1

Initial Supporting table - Abnormal Cyl Mode

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

Value Units: Number of consecutive number of decelerating cylinders (integer)

X Unit: thousands of RPM (rpm/1000)

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

Initial Supporting table - Abnormal Rev Mode

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

Value Units: Number of consecutive number of decelerating cylinders (integer)

X Unit: thousands of RPM (rpm/1000)

y/x	0	1	2	3	4	5	6	7	8
1	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Initial Supporting table - Abnormal SCD Mode

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

Value Units: Number of consecutive number of decelerating cylinders (integer)

X Unit: thousands of RPM (rpm/1000)

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

Initial Supporting table ■Bank_SCD_Decel

Description: Used for P0300 - P0308, Multitplier 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	500	650	750	850	1,000	1,200	1,400	1,600	1,800
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 - Bank_SCD_Jerk

Description: Used for P0300 - P0308, Multplier 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: multplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	750	850	1,000	1,200	1,400	1,600	1,800
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, Multiplier to Lores Decel to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	800	900	1,000	1,200	1,400	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
8	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
12	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
16	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
20	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
24	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
30	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
40	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
60	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	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, Multiplier to Lores Jerk to account for different pattern of Paired cylinder misfire. Multipliers are a function of engine rpm and % engine Load.

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	800	900	1,000	1,200	1,400	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
8	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
12	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
16	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
20	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
24	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
30	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
40	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
60	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	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	44.9	29.7	12.5	12.5	12.5	12.5	12.5	12.5
10	22.4	22.4	12.5	12.5	12.5	8.3	12.5	12.5
20	22.4	22.4	12.5	12.5	8.3	8.3	6.3	6.3
30	12.5	12.5	12.5	12.5	6.3	4.6	4.6	4.6
40	12.5	12.5	8.3	6.3	4.6	4.6	4.6	4.6
50	8.3	8.3	8.3	6.3	4.6	4.6	4.6	4.6
60	6.3	6.3	6.3	4.6	4.6	4.6	4.6	4.6
70	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
80	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
90	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
100	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6

Initial Supporting table - ClyAfterAFM_Decel

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	0.88	0.65	0.63	0.55	0.61	0.56	0.54	0.47	0.45
6	0.61	0.47	0.36	0.32	0.30	0.27	0.24	0.15	0.13
8	0.53	0.35	0.29	0.26	0.25	0.23	0.17	0.08	0.06
10	0.46	0.34	0.28	0.26	0.24	0.23	0.20	0.10	0.06
12	0.45	0.33	0.30	0.30	0.24	0.24	0.27	0.12	0.09
16	0.46	0.36	0.36	0.36	0.29	0.28	0.32	0.20	0.17
20	0.46	0.39	0.39	0.38	0.33	0.33	0.37	0.27	0.24
25	0.46	0.40	0.42	0.40	0.35	0.38	0.40	0.33	0.34
40	0.45	0.43	0.47	0.44	0.41	0.46	0.47	0.41	0.46

Initial Supporting table - QlyBeforeAFM_Jerk

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	3.75	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
6	3.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
8	2.00	15.00	10.00	15.00	15.00	15.00	15.00	15.00	15.00
10	1.50	8.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
12	1.50	7.50	15.00	15.00	15.00	15.00	15.00	15.00	15.00
16	1.50	6.25	11.00	15.00	15.00	15.00	15.00	15.00	15.00
20	1.50	4.25	8.00	15.00	15.00	15.00	15.00	15.00	15.00
25	1.50	3.00	4.50	15.00	15.00	15.00	15.00	15.00	15.00
40	1.50	2.00	3.00	8.00	15.00	15.00	15.00	15.00	15.00

Initial Supporting table - CombustModelIdleTbl

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)

CombustModelIdleTbl - Part 1

y/x	0	1	2	3	4	5
1	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max

CombustModelIdleTbl - Part 2

y/x	6	7	8	9	10	11
1	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max

CombustModelIdleTbl - Part 3

y/x	12	13	14	15	16	
1	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	

Initial Supporting table - (ConsecCylModDecel

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	800	900	1,000	1,200	1,400	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.11	0.87	1.23	1.00	0.95	1.24	1.36	1.30	1.49	1.46	1.07	0.88	0.79	0.76	0.75	0.89	1.09
8	0.59	1.13	1.06	0.96	0.95	0.52	1.10	1.53	1.70	1.82	1.46	1.49	1.12	1.00	1.11	1.13	1.27
12	0.65	1.17	0.92	0.65	1.35	0.62	0.76	1.13	1.28	1.61	1.45	1.45	1.30	1.14	1.31	1.31	1.26
16	0.71	1.02	0.88	0.66	1.21	0.67	0.64	0.84	1.01	1.27	1.22	1.39	1.30	1.25	1.31	1.31	1.10
20	0.77	1.01	0.90	0.78	1.15	0.73	0.59	0.69	0.81	0.98	1.07	1.36	1.19	1.23	1.37	1.20	1.10
24	0.82	1.07	0.92	0.82	1.11	0.77	0.64	0.62	0.67	0.79	1.05	1.26	1.18	1.10	1.15	1.00	0.96
30	0.86	1.12	0.96	0.90	1.08	0.81	0.77	0.56	0.52	0.67	0.90	1.15	1.19	1.04	0.97	0.81	0.81
40	0.92	1.10	0.98	0.94	1.05	0.84	0.84	0.50	0.40	0.55	0.74	0.93	1.13	1.03	0.86	0.78	0.76
60	0.97	1.08	1.00	1.00	1.03	0.88	0.89	0.43	0.43	0.53	0.68	0.89	1.16	1.01	0.81	0.69	0.68

Initial Supporting table - ConsecCylModeJerk

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	800	900	1,000	1,200	1,400	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1	1	1	1	1	1	2	1	1	1	1	1	0	0	0	0	0
8	0	0	0	0	0	0	-1	-1	-2	-1	-1	0	-1	-1	-1	0	0
12	0	0	0	0	0	0	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1	0
16	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0
20	0	0	0	0	0	0	0	-1	-2	-1	-1	-1	-1	-1	-1	-1	0
24	0	0	0	0	0	0	0	-1	-1	-2	-1	-1	-1	0	0	0	0
30	0	0	0	0	0	0	0	-1	-1	-2	-1	-1	-1	0	0	0	0
40	0	0	0	0	0	0	0	-1	-1	-2	-1	-1	-1	0	0	0	0
60	0	0	0	0	0	0	0	-1	-1	-2	-1	-1	-1	0	0	0	0

Initial Supporting table - ConsecSCD_Decel

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	750	850	1,000	1,200	1,400	1,600	1,800
2	0.89	0.98	0.88	0.80	0.92	1.16	1.21	1.19	1.07
8	0.89	1.01	0.88	0.84	0.75	0.87	0.84	0.79	0.70
12	0.81	0.87	0.90	0.82	0.65	0.83	0.74	0.68	0.66
16	0.76	0.74	0.84	0.82	0.69	0.83	0.70	0.59	0.61
20	0.73	0.70	0.77	0.79	0.74	0.77	0.68	0.59	0.59
24	0.70	0.67	0.71	0.73	0.77	0.75	0.75	0.57	0.50
30	0.67	0.64	0.67	0.69	0.77	0.76	0.69	0.49	0.49
40	0.64	0.61	0.63	0.62	0.66	0.63	0.63	0.49	0.49
60	0.61	0.58	0.59	0.56	0.56	0.55	0.61	0.48	0.48

Initial Supporting table ■ConsecSCD_Jerk

Description: Used for P0300 - P0308, Multplier 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	500	650	750	850	1,000	1,200	1,400	1,600	1,800
2	-0.34	-0.03	-0.55	-1.64	-1.47	-1.10	-1.71	-0.38	-0.68
8	-0.33	-0.20	-0.60	-1.69	-2.00	-2.18	-2.16	-1.10	-0.81
12	-0.32	-0.25	-0.53	-1.55	-2.15	-2.80	-2.39	-1.15	-0.71
16	-0.31	-0.27	-0.50	-1.42	-2.06	-2.78	-2.19	-1.13	-0.66
20	-0.29	-0.29	-0.45	-1.19	-1.96	-2.62	-1.92	-1.08	-0.63
24	-0.25	-0.30	-0.39	-1.02	-1.76	-2.15	-1.82	-1.01	-0.59
30	-0.21	-0.29	-0.35	-0.86	-1.43	-1.70	-1.44	-0.97	-0.55
40	-0.17	-0.22	-0.30	-0.52	-0.85	-1.02	-0.97	-0.75	-0.52
60	-0.12	-0.14	-0.19	-0.30	-0.44	-0.55	-0.60	-0.55	-0.49

Initial Supporting table - CylAfterAFM Jerk

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	0	0	0	0	0	0	1	1	1
6	0	-1	-1	-1	0	0	0	0	-1
8	0	-1	-1	-1	-1	0	-1	-1	-1
10	0	-1	-1	-1	-1	0	0	-1	0
12	0	-1	-1	-1	0	0	0	0	0
16	0	-1	-1	0	0	0	0	0	0
20	0	-1	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0

Initial Supporting table - QylBeforeAFM_Decel

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	5.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
6	4.50	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
8	3.50	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
10	3.00	11.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
12	2.50	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
16	2.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
20	1.88	13.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
25	1.76	9.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
40	1.50	4.00	6.50	15.00	15.00	15.00	15.00	15.00	15.00

Initial Supporting table - CylModeDecel

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

Value Units: Delta time per cylinder (usec)

X Unit: RPM

Y Units: percent load of max indicated torque (%)

CylModeDecel - Part 1

y/x	500	650	750	800	850	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
3	4,232	2,229	1,283	1,090	887	740	556	393	341	264	240	199	147
6	5,131	1,844	1,194	1,107	876	695	417	360	288	200	238	192	167
8	5,508	1,776	1,354	1,339	1,082	833	626	411	320	188	242	257	188
10	5,847	2,219	1,791	1,822	1,418	1,193	778	551	457	238	307	287	191
12	6,299	2,663	2,486	2,275	1,807	1,583	860	660	567	340	373	313	211
14	6,676	3,277	3,077	2,869	2,261	1,943	1,106	799	707	466	438	332	241
16	7,016	3,925	3,721	3,233	2,599	2,317	1,352	967	835	551	503	382	297
18	7,317	4,402	4,052	3,598	2,936	2,627	1,599	1,153	949	608	569	433	366
20	7,657	4,833	4,480	3,963	3,273	2,936	1,845	1,281	1,064	648	625	484	420
22	7,996	5,182	4,918	4,327	3,611	3,246	2,091	1,474	1,178	725	700	534	463
24	8,260	5,372	5,137	4,692	3,948	3,556	2,338	1,647	1,292	802	742	585	494
26	8,524	5,690	5,603	5,057	4,286	3,866	2,584	1,821	1,407	903	728	635	517
30	9,428	6,338	6,075	5,677	4,961	4,240	3,077	2,168	1,636	1,055	831	738	563
40	11,276	8,447	7,951	7,446	6,648	5,663	4,309	3,035	2,207	1,455	1,080	936	678
60	15,288	12,666	11,703	11,009	10,022	8,342	6,712	4,770	3,350	2,256	1,628	1,333	908
78	19,116	16,358	14,987	14,448	12,974	10,854	8,633	6,288	4,350	2,957	2,107	1,679	1,097
97	23,490	20,577	18,893	18,095	16,435	13,993	10,829	8,023	5,493	3,758	2,655	2,076	1,326

CylModeDecel - Part 2

y/x	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,500
3	126	87	70	59	52	43	34	25	17	15	12	10	7
6	95	79	64	51	42	36	27	18	13	12	9	8	6
8	108	79	60	47	40	34	27	18	13	11	9	8	5
10	120	83	66	49	42	35	28	18	13	11	8	7	5
12	147	96	79	58	44	38	29	20	14	11	8	7	5
14	172	113	90	68	47	42	34	22	15	11	8	7	5
16	200	128	100	76	53	46	36	23	17	12	8	7	5
18	226	146	111	85	62	52	40	25	19	13	9	7	5
20	255	160	124	94	67	57	44	27	21	15	10	8	6
22	279	178	137	104	74	62	47	29	23	18	11	9	6
24	302	195	150	113	80	64	49	33	26	20	13	10	7

Initial Supporting table - CylModeDecel

26	329	211	164	122	86	69	54	37	28	23	15	11	8
30	360	243	190	141	99	81	62	42	32	27	19	14	11
40	449	316	255	186	134	108	86	62	43	37	29	20	16
60	627	461	398	278	205	169	136	98	66	57	47	35	27
78	783	631	523	358	267	217	179	130	85	74	64	49	36
97	961	827	667	450	337	272	228	166	108	94	83	64	47

Initial Supporting table - CylModeJerk

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

Value Units: Change in Delta time per cylinder from last cylinder (usec)

Y Units: percent load of max indicated torque (%)

CylModeJerk - Part 1

y/x	500	650	750	800	850	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
3	3,420	1,917	1,215	773	769	643	527	400	375	234	172	158	141
6	5,391	2,517	1,351	1,303	975	951	705	490	427	355	233	190	185
8	6,977	4,281	2,133	2,175	1,491	1,364	998	864	489	410	300	237	203
10	7,788	5,812	2,487	2,384	2,197	1,795	1,453	1,189	629	513	386	292	243
12	8,343	6,462	2,842	2,693	2,747	2,173	1,958	1,484	756	624	468	363	311
14	8,653	6,908	3,197	3,002	3,271	2,528	2,226	1,715	862	674	534	405	340
16	9,093	7,353	3,552	3,312	3,405	2,966	2,569	1,834	973	759	581	476	377
18	9,534	7,799	4,046	3,621	3,538	3,280	2,850	2,018	1,163	852	728	578	462
20	9,975	8,245	5,073	4,002	3,936	3,616	3,081	2,201	1,286	1,040	908	680	545
22	10,416	8,691	5,886	4,611	4,293	3,952	3,343	2,385	1,415	1,140	988	748	586
24	10,856	9,136	6,571	5,220	4,685	4,287	3,605	2,568	1,555	1,257	1,085	801	666
26	11,297	9,582	6,996	5,660	5,076	4,623	3,868	2,752	1,669	1,324	1,168	891	701
30	12,180	10,691	7,956	6,542	5,861	5,296	4,393	3,119	1,963	1,476	1,239	982	825
40	14,384	12,663	10,353	8,743	7,820	6,974	5,704	4,037	2,640	1,667	1,391	1,138	973
60	18,792	16,880	15,147	13,145	11,737	10,332	8,325	5,872	4,175	2,530	1,941	1,507	1,197
78	22,649	21,506	19,342	16,996	15,165	13,270	10,619	7,478	5,377	3,566	2,671	2,201	1,704
97	27,056	26,793	24,135	21,399	19,082	16,628	13,241	9,314	6,751	4,805	3,919	3,111	2,530

CylModeJerk - Part 2

y/x	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,500
3	119	90	79	49	50	42	37	33	27	20	23	15	17
6	129	87	77	50	51	37	32	26	20	16	17	14	15
8	149	110	90	68	54	42	37	27	18	15	17	13	14
10	174	143	101	77	57	49	42	28	17	15	16	12	13
12	194	172	114	87	75	57	46	32	20	16	16	12	13
14	233	193	144	110	94	66	56	37	24	19	15	11	12
16	291	221	166	125	109	82	69	41	29	21	16	12	12
18	333	239	176	138	121	91	74	50	34	23	16	12	13
20	360	254	182	142	124	91	75	55	38	26	19	13	15
22	393	277	200	150	130	97	81	59	42	28	21	14	16
24	425	311	225	163	137	103	82	63	46	32	23	16	17

Initial Supporting table - CylModeJerk

26	466	332	244	172	146	116	86	70	50	34	26	18	18
30	559	395	285	202	169	134	104	83	59	40	31	22	21
40	666	552	399	288	233	185	141	116	79	57	41	32	28
60	824	865	625	459	360	287	215	183	120	91	67	51	41
78	1,412	1,139	824	609	472	376	280	241	156	121	88	67	52
97	2,000	1,452	1,050	781	599	478	354	302	197	154	112	86	62

Initial Supporting table - DeacCylInversionDecel

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

Value Units: Delta time per cylinder (usec)

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	226	116	93	78	71	57	45	37	28
6	269	120	93	77	67	53	39	32	25
8	390	182	130	98	75	59	40	34	29
10	514	242	179	136	97	67	51	44	34
12	641	325	238	181	133	92	70	57	40
16	895	505	383	301	232	176	123	89	60
20	1,150	692	529	425	336	259	178	129	78
25	1,468	924	724	583	465	364	240	169	100
40	2,422	1,622	1,306	1,054	855	676	431	289	177

Initial Supporting table - DeacCylInversionJerk

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

Value Units: Change in Delta time per cylinder from last cylinder (usec)

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	319	211	179	157	131	114	80	52	36
6	350	196	153	127	106	93	70	50	34
8	438	218	160	123	101	82	64	53	39
10	593	287	192	141	110	84	68	55	47
12	867	409	294	223	161	128	92	70	56
16	1,291	665	502	387	292	233	160	113	84
20	1,741	921	711	561	427	339	233	162	113
25	2,303	1,241	971	779	595	471	324	224	154
40	3,990	2,201	1,753	1,431	1,100	866	597	410	295

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	6,000	6,000	6,000	6,000	6,000	5,900	6,000

EngineOverSpeedLimit - Part 2

y/x	CeTGRR_e_TransGr10	CeTGRR_e_TransGrNeut	CeTGRR_e_TransGrReverse	CeTGRR_e_TransGrPark	CeTGRR_e_TransGr7	CeTGRR_e_TransGr8	
1	6,000	4,000	6,000	4,000	6,000	6,000	

Initial Supporting table - InfrequentRegen

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

Value Units: Enumerated value of different combustion modes (enumeration)

X Unit: Current Combustion Mode (enumeration)

InfrequentRegen - Part 1

y/x	0	1	2	3	4	5
1	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max

InfrequentRegen - Part 2

y/x	6	7	8	9	10	11
1	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max

InfrequentRegen - Part 3

y/x	12	13	14	15	16	
1	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_CombModes Max	CeCMBR_i_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	3	3	3	3	3	3

Initial Supporting table - P00C6 - High Pressure Pump Control Mode timeout**Description:** High Pressure Pump Control Mode timeout**Value Units:** Time (Seconds)**X Unit:** Coolant Temperature (Deg C)

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	5.0	5.0	5.0	4.8	4.0	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

jp jorting table - P00C6 - maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start

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

Value Units: maximum acceptable counts of fuel rail pressure below KtFHPD_p_HPS_PressFallLoThrsh after High Pressure Start (Count)

X Unit: Coolant Temperature (Deg C)

Y Units: Ethanol Precent (%)

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
13	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
25	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
38	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
50	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
63	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
75	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
88	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
100	2.0	2.0	2.0	2.0	2.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

Initial Supporting table - P00C6 - Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery**Description:** This calibration is the minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery**Value Units:** Minimum pressure in MPa that will exit High Pressure Start mode and allow fuel delivery**X Unit:** Coolant Temperature (Deg C)**Y Units:** Ethanol Percent (%)

y/x	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	15.0	15.0	14.2	11.9	10.0	8.9	6.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
13	15.0	15.0	14.2	11.9	10.0	8.9	6.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
25	15.0	15.0	14.2	11.9	10.0	8.9	6.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
38	15.0	15.0	14.2	11.9	10.0	8.9	6.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50	15.0	15.0	14.2	11.9	10.0	8.9	6.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
63	15.0	15.0	14.2	11.9	10.0	8.9	6.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
75	15.0	15.0	14.2	11.9	10.0	8.9	6.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
88	15.0	15.0	14.2	11.9	10.0	8.9	6.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
100	15.0	15.0	14.2	11.9	10.0	8.9	6.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Initial Supporting table - Pair_SCD_Decel

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	750	850	1,000	1,200	1,400	1,600	1,800
2	0.89	0.71	0.70	0.70	0.82	1.14	1.05	0.94	0.74
8	0.98	0.96	0.91	0.93	0.88	1.09	0.95	0.75	0.71
12	1.05	0.84	0.93	1.04	0.98	1.08	1.02	0.80	0.72
16	1.10	0.90	0.97	1.11	1.11	1.03	1.05	0.89	0.92
20	1.13	0.97	0.97	1.15	1.20	0.88	1.19	1.09	1.21
24	1.16	0.99	0.97	1.15	1.27	0.89	1.38	1.14	1.15
30	1.18	1.01	0.98	1.14	1.32	0.98	1.18	1.08	1.09
40	1.21	1.03	0.99	1.06	1.13	0.91	0.99	1.03	1.05
60	1.25	1.05	1.00	1.00	0.98	0.86	0.96	0.97	1.01

Initial Supporting tablej - Pair_SCD_Jerk

Description: Used for P0300 - P0308, Multitplier 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	500	650	750	850	1,000	1,200	1,400	1,600	1,800
2	1.46	2.33	1.75	1.75	2.06	1.98	1.68	2.06	1.97
8	1.50	1.32	1.13	1.38	1.70	1.77	1.73	1.97	1.70
12	1.47	1.22	0.84	1.34	1.85	1.89	1.95	1.49	1.50
16	1.45	1.39	0.95	1.55	1.93	1.78	2.11	1.36	1.52
20	1.44	1.45	1.11	1.69	2.04	1.91	2.19	1.36	1.54
24	1.43	1.49	1.24	1.80	2.36	2.20	2.21	1.46	1.49
30	1.42	1.49	1.38	2.04	2.56	2.44	2.12	1.58	1.46
40	1.41	1.47	1.47	1.81	2.16	2.08	1.91	1.59	1.44
60	1.39	1.42	1.53	1.58	1.73	1.75	1.69	1.52	1.41

Initial Supporting table - PairCylModeDecel

Description: Used for P0300 - P0308, Multplier 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: multplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	800	900	1,000	1,200	1,400	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	0.87	0.75	0.98	0.71	0.99	1.23	0.71	0.68	0.79	0.87	0.91	0.67	0.74	0.83	0.83	1.00	1.18
8	0.50	0.85	0.69	0.79	0.76	0.76	0.80	0.56	0.71	0.41	0.33	0.77	0.88	0.77	0.94	1.07	1.13
12	0.82	1.09	0.73	0.69	0.77	0.56	0.62	0.71	0.79	0.82	0.78	0.65	0.56	0.67	0.88	1.08	0.98
16	0.97	0.93	0.71	0.65	0.69	0.53	0.61	0.76	0.86	1.01	0.88	0.78	0.73	0.58	0.94	0.85	0.92
20	0.99	0.92	0.75	0.65	0.66	0.53	0.75	0.86	0.92	1.03	0.84	0.92	0.74	0.63	1.00	0.67	0.88
24	1.02	0.99	0.77	0.65	0.64	0.53	1.06	0.95	0.93	1.01	0.85	0.86	0.71	0.60	0.81	0.68	0.81
30	1.03	1.02	0.81	0.69	0.63	0.54	1.39	1.02	0.91	0.99	0.79	0.79	0.69	0.58	0.68	0.74	0.73
40	1.04	1.00	0.84	0.70	0.61	0.54	1.28	1.11	0.87	0.94	0.70	0.67	0.65	0.58	0.61	0.68	0.64
60	1.04	0.99	0.87	0.72	0.61	0.54	0.98	1.09	0.85	0.90	0.62	0.60	0.62	0.58	0.57	0.63	0.59

Initial Supporting table - PairCylModeJerk

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	800	900	1,000	1,200	1,400	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.87	1.18	2.32	1.76	2.07	1.74	1.69	1.30	1.20	1.38	2.16	1.31	1.15	1.15	0.98	1.10	1.04
8	0.77	0.55	0.70	0.76	0.81	0.97	1.24	1.08	0.91	0.81	1.14	0.87	1.28	1.27	1.21	1.20	1.14
12	0.91	0.79	1.05	0.70	0.47	0.88	0.94	0.95	1.06	0.85	0.93	0.81	0.82	0.97	1.03	1.30	1.23
16	0.98	0.82	1.09	0.74	0.58	0.99	1.03	0.96	0.93	0.87	0.99	0.98	0.83	0.76	0.77	0.87	0.83
20	0.98	0.84	1.09	0.79	0.66	1.39	1.20	1.41	1.08	1.04	1.09	1.00	0.80	0.88	0.76	0.80	0.76
24	0.98	0.85	0.98	0.83	0.72	1.51	1.53	1.43	1.06	1.15	1.12	0.97	0.75	0.89	0.85	0.84	0.76
30	0.98	0.85	0.96	0.86	0.78	1.26	1.67	1.29	1.06	1.10	1.01	0.83	0.70	0.83	0.79	0.80	0.78
40	0.98	0.89	0.93	0.90	0.84	1.24	1.84	1.36	1.03	1.01	0.91	0.71	0.65	0.73	0.79	0.79	0.76
60	0.98	0.93	0.91	0.94	0.91	1.04	1.71	1.55	1.00	0.92	0.82	0.60	0.60	0.64	0.73	0.77	0.73

Initial Supporting table - Random_SCD_Decel

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	750	850	1,000	1,200	1,400	1,600	1,800
2	1.04	1.00	1.01	1.01	1.01	1.01	1.01	1.02	1.00
8	1.08	1.32	1.37	1.27	1.09	1.06	1.02	1.00	1.02
12	1.06	1.27	1.63	1.49	1.08	1.03	1.03	1.06	1.11
16	1.05	1.14	1.55	1.55	1.18	1.02	1.04	1.16	1.24
20	1.04	1.10	1.44	1.53	1.33	1.05	1.07	1.19	1.33
24	1.03	1.08	1.33	1.44	1.45	1.04	1.16	1.20	1.23
30	1.02	1.06	1.26	1.39	1.55	1.04	1.09	1.15	1.18
40	1.02	1.04	1.19	1.27	1.37	1.02	1.05	1.11	1.15
60	1.01	1.02	1.14	1.17	1.21	1.01	1.02	1.05	1.12

Initial Supporting table - Random_SCD_Jerk

Description: Used for P0300 - P0308, Multitplier 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	500	650	750	850	1,000	1,200	1,400	1,600	1,800
2	1.00	1.02	1.00	1.00	1.02	1.01	1.00	1.02	1.00
8	1.00	1.15	1.05	1.11	1.25	1.04	1.03	1.13	1.08
12	1.00	1.34	1.09	1.12	1.22	1.04	1.06	1.11	1.01
16	1.00	1.32	1.11	1.13	1.10	1.00	1.04	1.08	1.06
20	1.00	1.31	1.12	1.28	1.32	1.01	1.04	1.01	1.08
24	1.00	1.30	1.15	1.39	1.56	1.03	1.02	1.02	1.04
30	1.00	1.26	1.17	1.56	1.73	1.19	1.07	1.07	1.03
40	1.00	1.20	1.14	1.36	1.49	1.16	1.09	1.06	1.02
60	1.00	1.12	1.09	1.23	1.27	1.08	1.08	1.04	1.01

Initial Supporting table - RandomAFM_Decl

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
6	1.26	1.28	1.29	1.29	1.30	1.31	1.34	1.37	1.39
8	1.32	1.35	1.36	1.38	1.39	1.41	1.45	1.49	1.52
10	1.38	1.42	1.44	1.46	1.48	1.50	1.56	1.62	1.65
12	1.44	1.49	1.52	1.54	1.57	1.59	1.67	1.74	1.79
16	1.57	1.64	1.67	1.71	1.74	1.78	1.88	1.99	2.06
20	1.69	1.78	1.83	1.87	1.92	1.96	2.10	2.24	2.33
25	1.85	1.96	2.02	2.08	2.14	2.20	2.37	2.55	2.66
40	2.00	2.14	2.21	2.29	2.36	2.43	2.64	2.86	3.00

Initial Supporting table - RandomAFM_Jerk

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	1,000	1,200	1,300	1,400	1,500	1,600	1,900	2,200	2,500
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Initial Supporting table - RandomCylModDecel

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

Value Units: Multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	800	900	1,000	1,200	1,400	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.02	1.01	1.01	1.04	1.00	1.02	1.00	1.00	1.00	1.03	1.01	1.06	1.03	1.07	1.17	1.11	1.09
8	1.16	2.16	1.98	1.91	2.23	1.81	1.04	1.26	1.33	1.49	1.22	1.40	1.35	1.14	1.11	1.07	1.13
12	1.14	2.08	1.55	1.82	2.36	1.44	1.03	1.59	1.74	2.16	1.88	2.03	1.89	1.90	1.69	1.54	1.71
16	1.14	1.56	1.31	1.50	1.85	1.26	1.16	1.65	1.96	2.40	2.11	2.43	2.12	2.13	2.31	2.08	2.14
20	1.15	1.42	1.26	1.38	1.61	1.21	1.38	1.69	2.00	2.10	1.95	2.55	2.12	2.00	2.42	2.20	2.33
24	1.17	1.42	1.21	1.31	1.47	1.18	1.40	1.58	1.87	1.87	1.95	2.34	2.04	1.78	2.08	2.11	2.20
30	1.16	1.39	1.20	1.31	1.35	1.15	1.47	1.47	1.66	1.73	1.88	2.12	1.97	1.64	1.76	1.85	1.85
40	1.15	1.27	1.15	1.24	1.24	1.13	1.40	1.37	1.41	1.54	1.74	1.80	1.88	1.56	1.54	1.68	1.66
60	1.12	1.15	1.11	1.19	1.15	1.09	1.29	1.26	1.10	1.36	1.60	1.57	1.78	1.48	1.39	1.43	1.41

Initial Supporting table - RandomCylModJerk

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

Value Units: multiplier

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	800	900	1,000	1,200	1,400	1,800	2,200	2,600	3,000	3,500	4,000	4,500	5,000	5,500	6,000
2	1.00	1.18	1.09	1.16	1.04	1.03	1.13	1.05	1.03	1.00	1.01	1.05	1.06	1.15	1.02	1.14	1.07
8	1.01	1.01	1.15	1.12	1.01	1.05	1.00	1.03	1.01	1.06	1.01	1.04	1.17	1.17	1.03	1.04	1.00
12	1.02	1.04	1.30	1.21	1.05	1.05	1.05	1.12	1.04	1.05	1.02	1.02	1.15	1.09	1.03	1.04	1.02
16	1.03	1.04	1.32	1.13	1.06	1.03	1.02	1.04	1.06	1.04	1.00	1.02	1.05	1.07	1.03	1.04	1.02
20	1.03	1.04	1.32	1.11	1.06	1.04	1.01	1.08	1.27	1.08	1.08	1.08	1.03	1.04	1.05	1.08	1.04
24	1.02	1.03	1.18	1.10	1.06	1.03	1.02	1.05	1.26	1.17	1.18	1.13	1.04	1.05	1.02	1.06	1.05
30	1.01	1.01	1.15	1.08	1.05	1.03	1.04	1.01	1.25	1.20	1.19	1.11	1.05	1.06	1.00	1.02	1.02
40	1.01	1.04	1.11	1.07	1.05	1.04	1.04	1.03	1.21	1.23	1.19	1.12	1.09	1.07	1.02	1.03	1.02
60	1.01	1.05	1.08	1.05	1.04	1.01	1.07	1.05	1.16	1.26	1.20	1.12	1.13	1.10	1.01	1.02	1.02

Initial Supporting table - FandomRevModDecI

Description: Used for P0300 - P0308, Multitplier 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	4.50	4.50	4.75	6.50	6.50	6.20	5.50	5.50	5.50

Initial Supporting table - RevMode_Decel

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

Value Units: Delta time between revolutions (usec)

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	1,100	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000
3	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
6	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
8	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
12	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
22	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
24	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
26	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
30	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
40	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
60	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
78	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
97	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - Ring Filter**Description:** Used for P0300-P0308. Driveline Ring Filter

After a low level misfire, another misfire may not be detectable until driveline ringing ceases. If no ringing seen, stop filter early.

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

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

Initial Supporting table - SCD_Decel

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

Value Units: Delta time per cylinder (usec)

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	750	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	1,391	583	407	320	218	155	103	65	47	43	36	26	21
6	1,413	617	385	308	220	172	128	82	65	57	47	30	22
8	1,628	650	407	318	258	198	141	91	74	56	47	39	28
10	1,850	795	460	339	292	244	164	100	81	60	49	39	30
12	2,073	954	520	391	342	271	187	109	85	67	57	44	32
14	2,296	1,197	615	467	378	298	210	118	93	76	64	48	34
16	2,518	1,378	735	534	423	325	234	131	102	85	71	56	36
18	2,741	1,558	854	602	469	353	257	151	122	93	79	61	38
20	2,964	1,739	996	680	514	380	280	175	136	103	85	67	40
22	3,186	1,920	1,149	789	560	407	303	200	149	111	98	76	47
24	3,409	2,101	1,290	908	606	434	326	228	164	119	107	84	55
26	3,632	2,281	1,431	1,027	651	462	350	254	185	134	119	96	63
30	4,078	2,643	1,712	1,265	753	527	386	303	226	185	150	122	79
40	5,191	3,547	2,416	1,860	1,145	822	630	500	395	308	238	185	119
60	7,418	5,354	3,822	3,049	1,927	1,438	1,118	891	708	535	414	320	199
78	9,366	6,935	5,053	4,090	2,610	1,977	1,544	1,233	983	734	569	437	268
97	11,593	8,743	6,460	5,279	3,392	2,593	2,031	1,624	1,296	961	745	571	348

Initial Supporting table - SCD_Jerk

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

Value Units: Change in Delta time per cylinder from last cylinder (usec)

X Unit: RPM

Y Units: percent load of max indicated torque (%)

y/x	500	650	750	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,800
3	1,176	388	301	252	165	131	97	65	47	42	33	25	17
6	1,442	643	412	306	184	157	123	87	63	51	36	27	21
8	1,644	788	497	354	208	171	131	92	71	55	39	31	27
10	1,846	933	610	434	237	189	142	99	75	59	45	38	33
12	2,048	1,079	738	511	274	209	159	105	79	63	52	45	40
14	2,250	1,224	848	587	311	245	182	122	86	72	59	52	47
16	2,452	1,369	981	664	342	270	206	140	103	84	68	60	54
18	2,654	1,515	1,088	740	373	298	221	148	119	97	79	70	60
20	2,857	1,660	1,195	816	403	316	237	171	137	113	91	80	67
22	3,059	1,805	1,302	893	434	334	252	190	154	125	102	90	76
24	3,261	1,951	1,409	969	465	353	267	209	175	144	118	102	85
26	3,463	2,096	1,516	1,046	495	371	282	224	196	161	135	112	93
30	3,867	2,444	1,734	1,199	559	433	331	267	236	200	170	134	109
40	4,878	3,323	2,378	1,791	964	723	583	454	397	313	265	199	148
60	6,899	5,172	3,742	3,009	1,801	1,372	1,110	869	734	562	447	343	228
78	8,667	6,789	4,936	4,074	2,534	1,940	1,571	1,232	1,029	804	600	461	298
97	10,688	8,638	6,301	5,292	3,371	2,590	2,098	1,647	1,343	1,052	774	596	375

Initial Supporting table - SnapDecayAfterMisfire

Description: Used for P0300 - P0308, multiplier times the dtjerk value 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	2.00	3.00	3.00	4.00	4.00	3.60	3.00	3.00	3.00
1	2.00	3.00	3.00	4.00	4.00	3.60	3.00	3.00	3.00
1	2.00	3.00	2.80	2.20	2.50	3.60	2.70	3.00	3.00
1	2.00	3.00	2.80	2.20	2.50	3.60	2.70	3.00	3.00
2	2.00	3.00	2.70	2.00	1.50	1.75	2.30	3.00	3.00
2	2.00	2.50	2.60	1.90	1.50	1.50	2.00	2.50	3.00
3	1.80	2.30	2.00	1.60	1.50	1.50	2.00	2.50	2.00
5	1.80	2.20	2.50	1.80	3.00	3.00	2.80	2.60	2.25
6	1.50	2.00	2.50	3.00	3.00	3.00	3.00	3.00	3.00

Initial Supporting table - TCSSRoughRoadThres

Description: Used for P0300-P0308. Only used if Rough Road source = TOSS: dispersion Value on Transmission Output Speed Sensor above which rough road is indicated present

Value Units: change in rpm per sec (rpm)

X Unit: Engine Speed (RPM)

Y Units: Transmission Speed (RPM)

y/x	600	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,000
100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
500	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
600	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
700	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
800	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
900	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,000	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,200	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,300	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1,400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Initial Supporting table - WaitToStart

Description: Used for P0300-P0308. Number of engine cycles to delay if diesel engine is cranked before wait to start lamp is extinguished. This lookup table determines the delay length by taking into account the coolant temperature.

Value Units: Number of Engine Cycles (integer)

X Unit: Engine Coolant (deg C)

y/x	-20	-10	0	10	20	30	40	50	60
1	0	0	0	0	0	0	0	0	0

Initial Supporting table - WSSRoughRoadThres

Description: Used for P0300-P0308. Only used if Wheel speed from ABS is used. If difference between wheel speed readings is larger than this limit, rough road is present

Value Units: acceleration

X Unit: Vehicle Speed (KPH)

y/x	0	12	24	36	48	60	72	85	97	109	121	133	145	157	169	181	193
1	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

Initial Supporting table - ZeroTorqueAFM

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

Value Units: Percent of Maximum Brake torque (%)

X Unit: RPM

Y Units: Barometric Pressure (kPa)

ZeroTorqueAFM - Part 1

y/x	500	650	750	800	850	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
65	-0.93	-0.93	-0.93	-0.93	-0.93	-0.93	-1.28	-0.97	-0.46	-0.10	0.40	1.48	1.96
75	-0.42	-0.42	-0.42	-0.42	-0.42	-0.42	-1.04	-0.91	-0.20	0.03	0.46	0.87	1.50
85	-0.75	-0.75	-0.75	-0.75	-0.75	-0.75	-0.92	-0.67	-0.13	0.13	0.52	0.78	1.14
95	-0.53	-0.53	-0.53	-0.53	-0.53	-0.53	-0.79	-0.73	-0.35	0.10	0.48	0.65	0.85
105	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.67	-0.79	-0.57	0.07	0.43	0.53	0.57

ZeroTorqueAFM - Part 2

y/x	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,500
65	2.00	2.03	1.68	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
75	2.00	2.10	1.62	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
85	1.18	1.34	0.89	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
95	1.01	1.03	0.68	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06
105	0.85	0.72	0.46	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17	-0.17

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	650	750	800	850	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
65	-0.48	-0.56	-0.70	-0.68	-0.93	-1.32	-1.68	-1.54	-0.91	-0.54	-0.12	0.27	0.37
75	-0.48	-0.52	-0.64	-0.87	-1.14	-1.39	-1.67	-1.58	-0.43	0.12	0.45	0.45	0.38
85	-0.62	-0.77	-0.86	-0.90	-1.04	-0.99	-1.20	-0.57	-0.15	0.05	0.21	0.36	0.38
95	-0.57	-0.86	-0.84	-0.87	-0.90	-1.06	-0.99	-0.56	-0.36	-0.13	0.08	0.26	0.41
105	-0.52	-0.95	-0.83	-0.83	-0.76	-1.14	-0.79	-0.60	-0.42	-0.17	0.00	0.23	0.34

ZeroTorqueEngLoad - Part 2

y/x	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,500
65	0.34	-0.08	-0.65	-0.89	-1.10	-1.06	-1.37	0.24	1.84	3.45	5.06	6.67	9.88
75	0.14	-0.15	-1.23	-1.01	-0.67	-0.76	-0.74	0.83	2.40	3.98	5.55	7.13	10.28
85	0.31	-0.05	-0.93	-0.96	-0.54	-0.24	0.08	1.53	2.98	4.44	5.90	7.35	10.25
95	0.31	0.00	-0.52	-0.49	-0.33	-0.36	-0.68	0.92	2.51	4.11	5.71	7.31	10.50
105	0.30	0.04	-0.12	-0.02	-0.12	-0.49	-1.45	0.29	2.04	3.78	5.52	7.26	10.74

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	3	3	3
4,000	3	3	3
6,250	4	4	4

Initial Supporting table - P057B KtBRKI K CmpltTestPointWeight**Description:**

y/x	0.000	0.001	0.011	0.037	0.047	0.057	0.094	0.142	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	0.037	0.047	0.057	0.094	0.142	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	45.0	45.0	45.0

Initial Supporting table - DFCO DriverRequestZeroPedalTrq DsblOf

Description:

DFCO_DriverRequestZeroPedalTrq_DsblOf - Part 1

y/x	CeDTRR_e_TrqShapingRateA	CeDTRR_e_TrqShapingRateB	CeDTRR_e_TrqShapingRateC	CeDTRR_e_TrqShapingRateD	CeDTRR_e_TrqShapingRateE
CeTCOR_e_Exh_Normal	1	1	1	1	1
CeTCOR_e_Exh_Sport	1	1	1	1	1
CeTCOR_e_Exh_Track	1	1	1	1	1

DFCO_DriverRequestZeroPedalTrq_DsblOf - Part 2

y/x	CeDTRR_e_TrqShapingRateF	CeDTRR e TrqShapingRate G	CeDTRR_e_TrqShapingRateH	CeDTRR_e_TrqShapingRateI	CeDTRR_e_TrqShapingRateJ
CeTCOR_e_Exh_Normal	1	1	1	1	1
CeTCOR_e_Exh_Sport	1	1	1	1	1
CeTCOR_e_Exh_Track	1	1	1	1	1

Initial Supporting table - DFCO DriverRequestZeroPedalTrq EnbIOf

Description:

DFCO_DriverRequestZeroPedalTrq_EnbIOf - Part 1

y/x	CeDTRR_e_TrqShapingRateA	CeDTRR_e_TrqShapingRateB	CeDTRR_e_TrqShapingRateC	CeDTRR_e_TrqShapingRateD	CeDTRR_e_TrqShapingRateE
CeTCOR_e_Exh_Normal	12	12	12	12	12
CeTCOR_e_Exh_Sport	12	12	12	12	12
CeTCOR_e_Exh_Track	12	12	12	12	12

DFCO_DriverRequestZeroPedalTrq_EnbIOf - Part 2

y/x	CeDTRR_e_TrqShapingRateF	CeDTRR e TrqShapingRate G	CeDTRR_e_TrqShapingRateH	CeDTRR_e_TrqShapingRateI	CeDTRR_e_TrqShapingRateJ
CeTCOR_e_Exh_Normal	12	12	12	12	12
CeTCOR_e_Exh_Sport	12	12	12	12	12
CeTCOR_e_Exh_Track	12	12	12	12	12

Initial Supporting table - DFCO_DsblLo_Vehicle_Speed

Description:		
y/x	CeTCOR_e_NonEcoMode	CeTCOR_e_EcoMode
CeTGRR_e_TransGr1	25	25
CeTGRR_e_TransGr2	24	24
CeTGRR_e_TransGr3	19	19
CeTGRR_e_TransGr4	0	0
CeTGRR_e_TransGr5	0	0
CeTGRR_e_TransGr6	0	0
CeTGRR_e_TransGr9	0	0
CeTGRR_e_TransGr10	0	0
CeTGRR_e_TransGrNeut	0	0
CeTGRR_e_TransGrRvrs	0	0
CeTGRR_e_TransGrPark	0	0
CeTGRR_e_TransGr7	0	0
CeTGRR_e_TransGr8	0	0

Initial Supporting table - DFCO EnbIHi Vehicle Speed

Description:		
y/x	CeTCOR_e_NonEcoMode	CeTCOR_e_EcoMode
CeTGRR_e_TransGr1	35.0	35.0
CeTGRR_e_TransGr2	33.0	33.0
CeTGRR_e_TransGr3	29.0	29.0
CeTGRR_e_TransGr4	0.0	0.0
CeTGRR_e_TransGr5	0.0	0.0
CeTGRR_e_TransGr6	0.0	0.0
CeTGRR_e_TransGr9	0.0	0.0
CeTGRR_e_TransGr10	0.0	0.0
CeTGRR_e_TransGrNeut	0.0	0.0
CeTGRR_e_TransGrRvrs	0.0	0.0
CeTGRR_e_TransGrPark	0.0	0.0
CeTGRR_e_TransGr7	0.0	0.0
CeTGRR_e_TransGr8	0.0	0.0

Initial Supporting table - DFCO EngSpdEnblOfst**Description:**

y/x	-1,750	-1,500	-1,250	-1,000	-750	-500	-300	-100	0
1	500	400	250	125	50	0	0	0	0

Initial Supporting table - DFCO ZeroPedalTorqueDisableOfst

Description:

DFCO_ZeroPedalTorqueDisableOfst - Part 1

y/x	CeDTRR_e_TrqShapingRateA	CeDTRR_e_TrqShapingRateB	CeDTRR_e_TrqShapingRateC	CeDTRR_e_TrqShapingRateD	CeDTRR_e_TrqShapingRateE
CeTCOR_e_Exh_Normal	35	35	35	35	35
CeTCOR_e_Exh_Sport	35	35	35	35	35
CeTCOR_e_Exh_Track	35	35	35	35	35

DFCO_ZeroPedalTorqueDisableOfst - Part 2

y/x	CeDTRR_e_TrqShapingRateF	CeDTRR e TrqShapingRate G	CeDTRR_e_TrqShapingRateH	CeDTRR_e_TrqShapingRateI	CeDTRR_e_TrqShapingRateJ
CeTCOR_e_Exh_Normal	35	35	35	35	35
CeTCOR_e_Exh_Sport	35	35	35	35	35
CeTCOR_e_Exh_Track	35	35	35	35	35

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	6.81	13.61	18.49	23.36	28.23	33.11	43.11	71.55	100.00
1.00	21.69	21.69	25.30	28.90	32.50	36.10	255.00	255.00	255.00

Initial Supporting table - P0068_Delta MAP Threshold f(TPS)

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

Value Units: Delta MAP Values (kPa)

X Unit: Desired Throttle Position (Pct)

y/x	6.81	13.61	18.49	23.36	28.23	33.11	43.11	71.55	100.00
1.00	34.09	34.09	33.82	33.54	33.27	32.98	255.00	255.00	255.00

Initial Supporting table - P0068_Maximum MAF f(RPM)

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

Value Units: Delta MAF Values (dm)

X Unit: Engine Speed (RPM)

y/x	600.00	1,400.00	2,200.00	3,000.00	3,800.00	4,600.00	5,400.00	6,200.00	7,000.00
1.00	9.90	75.15	121.95	171.00	236.00	261.00	266.00	261.00	200.00

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	406.55	406.55	406.55	406.55	406.55	406.55	406.55	406.55	406.55

Initial Supporting table - P0326_P0331_AbnormalNoise_Thresh_AFM**Description:** Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine IS in AFM mode**Value Units:** Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.**X Unit:** Engine Speed (RPM)**Y Units:** N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314

Initial Supporting table - P1682 PT Relay Pull-in Run/Crank Voltage f(IAT)**Description:** The Run/Crank voltages required to pull in the PT relay as a function of induction air temperature.**Value Units:** Run/Crank Voltages required to pull in PT Relay (V)**X Unit:** Induction Air Temperature (deg C)

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

Initial Supporting table - P16A7 PT Relay Pull-in Run/Crank Voltage f(IAT)**Description:** The Run/Crank voltages required to pull in the PT relay as a function of induction air temperature.**Value Units:** Run/Crank Voltages required to pull in PT Relay (V)**X Unit:** Induction Air Temperature (deg C)

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

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

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

Value Units: Sample Counts per loop rate of 100ms (divide by 10 to get seconds)

X Unit: Long Term Fuel Trim Cell I.D. (no units) (Only PurgeOff cells are used)

Minimum Non-Purge Samples for Purge Vapor Fuel - Part 1

y/x	CeFADR_e_Cell00_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_Cell 10_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2
1	550	65,535	65,535	65,535

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

y/x	CeFADR_e_Cell 12_PurgOffAirMode 1	CeFADR_e_Cell13_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell1 5_PurgOffDecel
1	65,535	65,535	65,535	65,535

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

Description: Identifies which Long Term Fuel Trim Cell I.D.s are used for diagnosis. Only cells identified as "CeFADD_e_Non8electedCeH" are not used for diagnosis.

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 1

y/x	CeFADR_e_Cell00_PurgOnAirMode 5	CeFADR_e_Cell01_PurgOnAirMode 4	CeFADR e_Cell02_PurgOnAirMode 3	CeFADR_e_Cell03_PurgOnAirMode 2
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 2

y/x	CeFADR_e_Cell04_PurgOnAirMode 1	CeFADR e_Cell05_PurgOnAirMode 0	CeFADR_e_Cell06_PurgOnIdle	CeFADR_e_Cell07_PurgOnDecel
1	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_SelectedPurgeCell	CeFADD_e_NonSelectedCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 3

y/x	CeFADR_e_Cell08_PurgOffAirMode 5	CeFADR_e_Cell09_PurgOffAirMode 4	CeFADR e_Cell10_PurgOffAirMode 3	CeFADR_e_Cell11_PurgOffAirMode 2
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell

P0171_P0172_P0174_P0175 Long-Term Fuel Trim Cell Usage - Part 4

y/x	CeFADR_e_Cell12_PurgOffAirMode 1	CeFADR e_Cell13_PurgOffAirMode 0	CeFADR_e_Cell14_PurgOffIdle	CeFADR_e_Cell15_PurgOffDecel
1	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_SelectedNonPurgeCell	CeFADD_e_NonSelectedCell

Initial Supporting table - Startup Engine Coolant adjustment 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	190	190	140	100	100	80	60	40	20	0	0	0	0	0	0	0	0

Initial Supporting table - RufCyl Decel

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

Value Units: Delta time per cylinder (usec)

X Unit: rpm

Y Units: percent load of max indicated torque (%)

RufCyl_Decel - Part 1

y/x	500	650	750	800	850	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
3	4,386	2,163	1,268	1,479	1,136	959	697	469	359	273	144	155	139
4	4,617	2,064	1,245	1,487	1,139	961	721	495	378	284	135	133	115
6	5,131	1,844	1,194	1,839	1,417	1,244	943	544	407	370	201	202	123
8	5,508	1,776	1,354	2,418	2,077	1,583	1,186	671	499	452	178	200	176
10	5,847	2,219	1,791	2,829	2,469	1,854	1,426	835	590	553	204	242	198
12	6,299	2,663	2,762	3,043	2,783	2,205	1,621	991	702	651	261	287	223
14	6,676	3,277	3,295	3,097	3,025	2,525	1,848	1,146	829	740	336	333	256
16	7,016	3,925	3,721	3,253	3,108	2,700	2,030	1,277	959	805	443	384	306
18	7,317	4,402	4,052	3,568	3,241	2,905	2,182	1,408	1,033	875	560	438	353
20	7,657	4,833	4,480	3,918	3,374	3,131	2,264	1,533	1,134	962	619	492	400
22	7,996	5,182	4,918	4,267	3,609	3,255	2,334	1,641	1,281	1,066	678	546	447
24	8,260	5,372	5,137	4,617	3,932	3,508	2,332	1,769	1,449	1,202	737	600	494
26	8,524	5,690	5,603	4,967	4,271	3,761	2,574	1,926	1,564	1,313	725	654	541
28	8,976	6,014	5,839	5,317	4,609	4,014	2,817	2,082	1,699	1,395	780	708	588
30	9,428	6,338	6,075	5,667	4,947	4,267	3,059	2,239	1,834	1,459	835	762	635
32	9,798	6,760	6,450	6,017	5,286	4,520	3,302	2,396	1,969	1,539	900	816	682
34	10,167	7,182	6,825	6,368	5,625	4,774	3,544	2,553	2,105	1,612	1,004	877	729

RufCyl_Decel - Part 2

y/x	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,500
3	144	94	64	43	49	42	40	29	17	14	12	9	6
4	143	86	58	40	44	38	35	26	16	13	11	9	6
6	130	66	45	34	33	30	23	18	13	11	10	8	6
8	134	66	51	38	29	25	18	15	12	9	8	8	5
10	151	74	69	49	34	26	19	15	11	9	8	7	5
12	170	96	79	58	41	35	24	16	11	9	8	7	5
14	203	113	90	68	47	42	31	19	13	11	8	6	5
16	235	134	100	76	53	50	36	23	16	12	8	6	4
18	267	153	111	85	62	59	40	26	20	13	9	7	5
20	275	173	124	94	67	63	44	28	23	15	9	8	5
22	293	185	137	104	74	67	47	30	26	18	11	8	6

Initial Supporting table - RufCyl Decel

24	311	195	150	113	80	70	49	34	29	20	14	9	7
26	329	211	164	122	86	75	54	38	32	23	15	9	9
28	347	227	177	132	92	80	58	42	35	25	17	11	10
30	365	243	190	141	99	86	62	46	38	27	19	12	11
32	382	257	203	150	106	91	67	50	41	29	21	14	12
34	400	272	216	159	113	97	72	54	44	31	23	15	13

Initial Supporting table - RufCyl Jerk

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

Value Units: Delta time per cylinder (usec)

X Unit: rpm

Y Units: percent load of max indicated torque (%)

RufCyl_Jerk - Part 1

y/x	500	650	750	800	850	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
3	3,758	2,020	1,239	1,007	1,115	816	602	448	357	258	213	179	166
4	4,265	2,174	1,274	1,106	1,128	838	619	460	370	256	179	176	167
6	5,391	2,517	1,351	1,325	1,398	916	819	637	462	323	176	187	144
8	6,977	4,281	2,133	2,350	1,964	1,288	1,048	809	573	391	200	204	187
10	7,788	5,812	2,487	2,617	2,610	1,790	1,273	983	729	521	200	208	283
12	8,343	6,462	2,842	2,917	3,003	2,090	1,576	1,166	881	627	300	296	321
14	8,653	6,908	3,197	3,323	3,240	2,440	1,878	1,366	1,099	701	449	426	340
16	9,093	7,353	3,552	3,729	3,454	2,791	2,180	1,613	1,270	796	585	480	395
18	9,534	7,799	4,046	4,134	3,804	3,141	2,482	1,776	1,339	936	705	557	450
20	9,975	8,245	5,073	4,540	4,160	3,492	2,784	1,979	1,317	1,170	825	627	504
22	10,416	8,691	5,886	4,946	4,517	3,843	3,087	2,182	1,280	1,215	944	713	559
24	10,856	9,136	6,571	5,352	4,874	4,193	3,389	2,386	1,344	1,110	1,064	802	614
26	11,297	9,582	6,996	5,757	5,230	4,544	3,691	2,589	1,426	1,240	1,159	892	669
28	11,738	10,136	7,476	6,163	5,587	4,894	3,993	2,792	1,829	1,307	1,201	929	723
30	12,180	10,691	7,956	6,569	5,943	5,245	4,295	2,994	1,951	1,393	1,243	966	778
32	12,621	11,086	8,435	6,975	6,300	5,595	4,597	3,197	2,091	1,480	1,285	1,003	833
34	13,061	11,480	8,915	7,382	6,657	5,947	4,900	3,401	2,232	1,566	1,327	1,040	888

RufCyl_Jerk - Part 2

y/x	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,500
3	170	101	77	60	56	52	46	37	33	26	21	18	17
4	166	102	74	59	55	48	41	34	29	24	20	17	16
6	155	103	67	57	53	37	30	26	20	20	18	16	14
8	157	139	90	69	58	49	37	27	18	16	18	15	13
10	201	143	101	77	57	49	42	28	17	15	18	13	13
12	236	172	114	87	75	57	46	32	22	16	18	12	13
14	272	193	144	117	94	66	56	37	25	19	16	11	12
16	307	221	166	125	109	82	69	41	29	21	16	12	12
18	343	239	176	138	121	91	74	50	34	23	16	12	13
20	378	254	182	142	124	91	75	55	38	26	19	13	15
22	414	277	189	150	130	97	81	59	42	28	21	14	16

Initial Supporting table - RufCyl Jerk

24	449	311	225	163	137	103	82	63	46	32	23	16	17
26	484	335	244	172	146	116	86	70	50	34	26	18	18
28	520	357	264	187	157	125	95	76	54	37	28	20	19
30	555	379	285	202	169	134	104	83	59	40	31	22	21
32	577	395	308	219	182	144	112	90	63	44	33	24	22
34	601	411	331	236	195	155	119	96	67	47	35	26	24

Initial Supporting table - RufSCD Decel

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

Value Units: Delta time per cylinder (usec)

X Unit: rpm

Y Units: percent load of max indicated torque (%)

RufSCD_Decel - Part 1

y/x	500	650	750	800	850	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
3	1,328	591	392	298	268	214	145	120	81	64	59	64	46
4	1,328	591	392	298	268	214	145	120	81	64	58	62	44
6	1,574	669	431	324	305	227	156	137	82	71	66	69	46
8	1,748	747	474	350	340	240	167	156	91	79	81	76	50
10	1,921	825	518	375	375	253	178	175	100	88	85	78	54
12	2,094	903	561	401	410	266	189	194	109	120	94	89	58
14	2,267	981	605	426	445	279	200	213	118	114	101	97	61
16	2,440	1,059	648	452	480	292	211	232	127	133	105	101	61
18	2,614	1,138	691	477	515	305	221	250	136	144	107	99	61
20	2,787	1,216	735	503	550	318	232	269	145	144	109	101	63
22	2,926	1,294	778	529	585	331	243	288	154	160	109	107	67
24	3,104	1,372	822	554	621	344	254	307	163	168	113	113	71
26	3,283	1,450	865	580	656	357	265	326	172	177	117	121	75
28	3,461	1,528	909	605	691	370	276	344	181	192	123	130	80
30	3,640	1,606	952	631	726	383	287	363	190	208	132	138	84
32	3,819	1,684	996	657	761	396	298	382	199	224	140	147	88
34	3,997	1,762	1,039	682	797	409	309	401	208	240	148	155	92

RufSCD_Decel - Part 2

y/x	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,500
3	21	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	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
6	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
8	28	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
10	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
12	32	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
14	34	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	36	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
18	38	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	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
22	47	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	55	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	63	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
28	71	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	79	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
32	87	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
34	95	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767

Initial Supporting table - RufSCD Jerk

Description: Used for P0300-P0308. Crankshaft jerk threshold while in SCD mode during Idle or GPF regen. SCD mode uses smaller windows near TDC. Thresholds are a function of rpm and % engine Load.

Value Units: Delta time per cylinder (usec)

X Unit: rpm

Y Units: percent load of max indicated torque (%)

RufSCD_Jerk - Part 1

y/x	500	650	750	800	850	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600
3	1,290	396	309	250	229	157	152	101	128	82	58	41	26
4	1,290	396	309	250	229	157	152	101	117	80	53	41	26
6	1,442	502	415	328	291	195	178	121	101	91	58	51	31
8	1,644	567	509	416	363	274	194	144	120	98	65	62	37
10	1,846	631	607	513	434	353	222	166	142	105	55	59	42
12	2,048	696	705	609	505	432	249	189	165	118	59	70	42
14	2,250	761	803	706	576	511	276	214	187	118	69	68	39
16	2,452	825	902	803	647	590	304	255	210	125	71	64	41
18	2,654	890	1,000	900	719	655	331	285	233	133	69	64	44
20	2,857	954	1,098	996	790	734	358	315	255	136	68	67	47
22	3,059	1,019	1,196	1,093	861	813	386	346	278	141	74	73	49
24	3,261	1,084	1,294	1,190	932	892	413	376	300	152	81	77	52
26	3,463	1,148	1,392	1,286	1,003	970	441	406	323	159	92	81	55
28	3,665	1,213	1,490	1,383	1,075	1,049	468	436	346	166	95	84	57
30	3,867	1,278	1,589	1,480	1,146	1,128	495	467	368	173	99	88	60
32	4,069	1,342	1,687	1,576	1,217	1,207	523	497	391	180	103	91	62
34	4,271	1,407	1,785	1,673	1,289	1,286	550	527	413	187	107	95	65

RufSCD_Jerk - Part 2

y/x	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,500	4,000	4,500	5,000	5,500	6,500
3	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
4	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
6	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
8	23	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	25	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	27	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	28	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
16	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
18	32	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
20	33	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	35	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	37	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	38	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
28	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
30	42	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
32	43	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767	32,767
34	45	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	775	1,075	1,325	1,575	1,825	2,075	2,325	2,575	2,825

Initial Supporting table - Misfire_IMEP_BinID_vs_RPM_Load

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

Value Units: Bin ID

X Unit: RPM range

Y Units: Cylinder Load Range

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

Initial Supporting table - Misfire_IMEP_Thresh_vs_BinID

Description: Crankshaft Indicated Mean Effective Pressure (IMEP) Estimate that below which will be considered misfire. Misfire calibrations used with Crankshaft Based IMEP (Indicated Mean Effective Pressure) estimation do not interpolate versus speed and load. Instead they use unique calibrations within each small speed load region or "bin". Each Bin has its own "BinID". This BinID keeps all the Crank Based IMEP estimate calculations and various Misfire calibrations synchronized while minimizing 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

XUnit: 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	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200

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	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200

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	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200

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	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200

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	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200

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	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200

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	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200

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	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200

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
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Initial Supporting table - Misfire_IMEP_Thresh_vs_BinID																
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1	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200
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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	7.00	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	7.00	15.00	20.00	25.00	27.50	32.00	36.00
1.00	0.76	0.81	0.81	0.81	0.81	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:** Measured Fuel Rail Pressure (MPa)

y/x	0.40	2.00	4.00	5.00	6.00	8.00	9.00	10.00	11.00	12.00	14.00	16.00	18.00	19.00	20.00	21.00	24.00
1.00	385	336	281	263	246	217	202	190	180	170	151	135	120	112	105	98	79

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:** Measured Fuel Rail Pressure (MPa)

y/x	0.40	2.00	4.00	5.00	6.00	8.00	9.00	10.00	11.00	12.00	14.00	16.00	18.00	19.00	20.00	21.00	24.00
1.00	989	989	982	997	996	1,000	1,005	1,000	987	991	990	986	989	989	984	976	952

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:** Measured Fuel Rail Pressure (MPa)

y/x	0.40	2.00	4.00	5.00	6.00	8.00	9.00	10.00	11.00	12.00	14.00	16.00	18.00	19.00	20.00	21.00	24.00
1.00	385	336	281	263	246	217	202	190	180	170	151	135	120	112	105	98	79

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:** Measured Fuel Rail Pressure (MPa)

y/x	0.40	2.00	4.00	5.00	6.00	8.00	9.00	10.00	11.00	12.00	14.00	16.00	18.00	19.00	20.00	21.00	24.00
1.00	389	389	382	397	396	400	405	400	387	391	390	386	389	389	384	376	352

al: Supporting table - P02EE P02EF P02F0 P02F1 P02F2 P02F3 P02F4 P02F5 P30D4 - Voltage Feedback Rationalities Minimum Pulse Width

Description: Minimum injection pulse width function of measured fuel rail pressure where the voltage feedback measured from the analog to digital converter is rationalized**Value Units:** Pulse Width (ms)**X Unit:** Measured Fuel Rail Pressure (MPa)

y/x	0.40	2.00	4.00	5.00	6.00	8.00	9.00	10.00	11.00	12.00	14.00	16.00	18.00	19.00	20.00	21.00	24.00
1.00	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Initial Supporting table - 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:** Measured Fuel Rail Pressure (MPa)**Y Units:** Injection Pulse Width (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
2.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
4.00	-0.03	-0.03	-0.04	-0.04	-0.05	-0.05	-0.05	-0.06	-0.06	-0.07	-0.07
5.00	-0.03	-0.03	-0.04	-0.04	-0.04	-0.05	-0.05	-0.06	-0.06	-0.06	-0.07
6.00	-0.03	-0.04	-0.04	-0.04	-0.05	-0.05	-0.06	-0.06	-0.06	-0.07	-0.07
8.00	-0.03	-0.04	-0.04	-0.04	-0.05	-0.05	-0.06	-0.06	-0.06	-0.07	-0.07
9.00	-0.03	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.06	-0.06	-0.07	-0.07
10.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.06	-0.06	-0.06	-0.07
11.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.06	-0.06	-0.07
12.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.06	-0.06	-0.07
14.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.06	-0.06
16.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.06
18.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05
19.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05
20.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05
21.00	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
24.00	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-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
2.00	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14	-0.14
4.00	-0.07	-0.08	-0.08	-0.09	-0.09	-0.09	-0.10	-0.10	-0.11	-0.11	-0.13
5.00	-0.07	-0.08	-0.08	-0.08	-0.09	-0.09	-0.10	-0.10	-0.10	-0.11	-0.13
6.00	-0.08	-0.08	-0.08	-0.09	-0.09	-0.10	-0.10	-0.10	-0.11	-0.11	-0.13
8.00	-0.08	-0.08	-0.08	-0.09	-0.09	-0.10	-0.10	-0.10	-0.11	-0.11	-0.13
9.00	-0.07	-0.08	-0.08	-0.09	-0.09	-0.09	-0.10	-0.10	-0.11	-0.11	-0.13
10.00	-0.07	-0.08	-0.08	-0.08	-0.09	-0.09	-0.10	-0.11	-0.12	-0.12	-0.14
11.00	-0.07	-0.08	-0.08	-0.08	-0.09	-0.09	-0.09	-0.11	-0.12	-0.12	-0.14
12.00	-0.07	-0.07	-0.08	-0.08	-0.09	-0.09	-0.09	-0.10	-0.12	-0.12	-0.14
14.00	-0.07	-0.07	-0.07	-0.08	-0.08	-0.09	-0.09	-0.09	-0.12	-0.12	-0.14

Initial Supporting table - P10A3 P10A5 P10A7 P10A9 P10AB P10AD P10AF P10B1 - Minimum Small Pulse Compensation Limit

16.00	-0.06	-0.07	-0.07	-0.07	-0.08	-0.08	-0.09	-0.09	-0.09	-0.13	-0.14
18.00	-0.06	-0.06	-0.06	-0.07	-0.07	-0.08	-0.08	-0.08	-0.09	-0.09	-0.14
19.00	-0.05	-0.06	-0.06	-0.07	-0.07	-0.07	-0.08	-0.08	-0.09	-0.09	-0.14
20.00	-0.06	-0.06	-0.06	-0.07	-0.07	-0.08	-0.08	-0.08	-0.09	-0.09	-0.14
21.00	-0.05	-0.05	-0.05	-0.06	-0.06	-0.07	-0.07	-0.07	-0.08	-0.08	-0.18
24.00	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.19

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	-0.19	-0.24	-0.29	-0.34	-0.39	-0.44	-0.49	-0.50	-0.50	-0.50	-0.50
2.00	-0.19	-0.24	-0.29	-0.34	-0.39	-0.44	-0.49	-0.50	-0.50	-0.50	-0.50
4.00	-0.18	-0.23	-0.28	-0.33	-0.38	-0.43	-0.48	-0.50	-0.50	-0.50	-0.50
5.00	-0.18	-0.23	-0.28	-0.33	-0.38	-0.43	-0.48	-0.50	-0.50	-0.50	-0.50
6.00	-0.18	-0.23	-0.28	-0.33	-0.38	-0.43	-0.48	-0.50	-0.50	-0.50	-0.50
8.00	-0.18	-0.23	-0.28	-0.33	-0.38	-0.43	-0.48	-0.50	-0.50	-0.50	-0.50
9.00	-0.18	-0.23	-0.28	-0.33	-0.38	-0.43	-0.48	-0.50	-0.50	-0.50	-0.50
10.00	-0.18	-0.23	-0.28	-0.33	-0.38	-0.43	-0.48	-0.50	-0.50	-0.50	-0.50
11.00	-0.18	-0.23	-0.28	-0.33	-0.38	-0.43	-0.48	-0.50	-0.50	-0.50	-0.50
12.00	-0.18	-0.23	-0.28	-0.33	-0.38	-0.43	-0.48	-0.50	-0.50	-0.50	-0.50
14.00	-0.17	-0.22	-0.27	-0.32	-0.37	-0.42	-0.47	-0.50	-0.50	-0.50	-0.50
16.00	-0.17	-0.22	-0.27	-0.32	-0.37	-0.42	-0.47	-0.50	-0.50	-0.50	-0.50
18.00	-0.16	-0.21	-0.26	-0.31	-0.36	-0.41	-0.46	-0.50	-0.50	-0.50	-0.50
19.00	-0.16	-0.21	-0.26	-0.31	-0.36	-0.41	-0.46	-0.50	-0.50	-0.50	-0.50
20.00	-0.16	-0.21	-0.26	-0.31	-0.36	-0.41	-0.46	-0.50	-0.50	-0.50	-0.50
21.00	-0.19	-0.20	-0.25	-0.30	-0.35	-0.40	-0.45	-0.50	-0.50	-0.50	-0.50
24.00	-0.19	-0.19	-0.22	-0.27	-0.32	-0.37	-0.42	-0.47	-0.50	-0.50	-0.50

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:** Measured Fuel Rail Pressure (MPa)**Y Units:** Injection Pulse Width (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
2.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
4.00	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
6.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
8.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
9.00	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
11.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
12.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
14.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
16.00	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
24.00	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
2.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
4.00	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
6.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
8.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
9.00	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
11.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
12.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
14.00	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

16.00	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
24.00	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
2.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
4.00	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
6.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
8.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
9.00	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
11.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
12.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
14.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
16.00	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
24.00	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	7	15	20	25	28	32	36
1	0	2	3	3	5	5	5	5	5

Initial Supporting table - P228D P2C20 - High Pressure Pump Control (HPC) fail threshold for pressure too high**Description:** The High Pressure Pump Control (HPC) fail threshold for pressure too high test as a function of desired fuel pressure.**Value Units:** Pressure Error - Desired pressure - Actual Pressure (Mpa)**X Unit:** Desired Pressure (Mpa)

y/x	1.50	3.00	7.00	15.00	20.00	25.00	27.50	32.00	36.00
1	-3.00	-3.00	-3.00	-3.00	-2.00	-2.00	-2.00	-2.00	-2.00

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

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

y/x	0	1	2	3	4	5
0	3,600	3,000	2,300	3,600	3,600	3,600
1	3,000	0	0	3,000	3,000	3,000

P2B01P2B02 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	2.00	4.00	5.00	6.00	8.00	9.00	10.00	11.00	12.00	14.00	16.00	18.00	19.00	20.00	21.00	24.00
1.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00	65.00

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	2.00	4.00	5.00	6.00	8.00	9.00	10.00	11.00	12.00	14.00	16.00	18.00	19.00	20.00	21.00	24.00
1.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00	525.00

P2B01 P2B02 P2B03 P2B04 P2B05 P2B06 P2B07 P2B96 P2B08 P2B09 P2B0A P2B0B P2B0C P2B0D P2B0E P2B0F- Opening Magnitude r																	
Description: Opening Magnitude threshold to detect missing injection pulse																	
Value Units: Opening Magnitude Voltage X Unit: Measured Fuel Rail Pressure																	
y/x	0.40	2.00	4.00	5.00	6.00	8.00	9.00	10.00	11.00	12.00	14.00	16.00	18.00	19.00	20.00	21.00	24.00
1.00	0.00	0.00	230.81	192.81	202.81	198.50	195.31	152.38	226.50	194.31	190.31	213.31	190.13	205.69	187.00	174.63	182.19

Initial Supporting table - P0324_PerCyl_ExcessiveKnock_Threshold**Description:** Fail threshold for the Knock Performance per-cylinder Excessive Knock Diagnostic**Value Units:** Filtered Knock Intensity. Unit-less term scaled from 0.0 (no knock) to 5.0 (maximum/large knock)**X Unit:** Engine Speed (RPM)**Y Units:** N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Initial Supporting table - P0325_P0330_OpenCktThrshMax (20 kHz)**Description:** Knock Open Circuit Diagnostic Maximum Threshold when using the 20 kHz method (see "OpenMethod" description)**Value Units:** Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.**X Unit:** Engine Speed (RPM).**Y Units:** N/A

y/x	750	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	2.3457	2.3457	2.3340	2.3457	2.3340	2.2598	2.3008	2.3809	2.4180	2.5000	2.5508	2.5313	2.5137	2.5137	2.5137	2.5137	2.5137

Initial Supporting table - P0325_P0330_OpenCktThrshMax (Normal Noise)

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

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.

X Unit: Engine Speed (RPM)

Y Units: N/A

y/x	2,700	2,900	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750	5,000	5,500	6,000	6,500	7,000	7,500	8,500
1	0.0195	0.0195	0.0195	0.0195	0.0195	0.0195	0.0195	0.0430	0.0664	0.0918	0.1172	0.1172	0.1172	0.1172	0.1172	0.1172	0.1172

Initial Supporting table - P0325_P0330_OpenCktThrshMin (20 kHz)

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

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.

X Unit: Engine (RPM)

Y Units: N/A

y/x	750	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	1.2578	1.2520	1.2402	1.2441	1.2168	1.1875	1.2148	1.5000	1.6504	1.9004	2.4004	2.4004	2.4004	2.4004	2.4004	2.4004	2.4004

Initial Supporting table - P0325_P0330_OpenCktThrshMin (Normal Noise)

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

Value Units: Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.

X Unit: Engine Speed (RPM)

Y Units: N/A

y/x	2,700	2,900	3,000	3,250	3,500	3,750	4,000	4,250	4,500	4,750	5,000	5,500	6,000	6,500	7,000	7,500	8,500
1	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0332	0.0566	0.0488	0.0410	0.0410	0.0410	0.0410	0.0410	0.0410	0.0410

Initial Supporting table - P0325_P0330_OpenMethod_2

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

Value Units: Identifies one of two diagnostic methods (either 20 kHz or Normal Noise) used (as a function of engine speed) for Open Circuit detection

X Unit: Engine Speed Index, 500 to 8500 (RPM) by 500 rpm increments (Index 0, 1, 2.... 16 = 500, 1000, 1500.... 8500 RPM)

Y Units: N/A

P0325_P0330_OpenMethod_2 - Part 1

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

P0325_P0330_OpenMethod_2 - Part 2

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

P0325_P0330_OpenMethod_2 - Part 3

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

P0325_P0330_OpenMethod_2 - Part 4

y/x	15	16			
1	CeKNKD_e_Open_20KHz	CeKNKD_e_Open_20KHz			

Initial Supporting table - P0326_P0331_AbnormalNoise_CylsEnabled

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

Value Units: Boolean that indicates which engine cylinders are being used for the per-sensor Knock Performance diagnostic (0 = not used, 1 = used)

X Unit: Cylinder number in firing order (i.e. Cyl 0 = first cylinder in firing order, Cyl 1 = second cylinder in firing order....)

Y Units: N/A

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

Initial Supporting table - P0326_P0331_AbnormalNoise_Threshold**Description:** Fail threshold for the Knock Performance Abnormal Noise Diagnostic when engine is NOT in AFM mode**Value Units:** Filtered background engine noise. Unit-less term from the Knock Detection Fast Fourier Transform (FFT) for a selected frequency range.**X Unit:** Engine Speed (RPM)**Y Units:** N/A

y/x	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500
1	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314

Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMax

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

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.

X Unit: Engine Speed (RPM)

Y Units: N/A

y/x	750	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	0.201	0.201	0.201	0.215	0.217	0.221	0.252	0.256	0.371	0.371	0.371	0.371	0.371	0.371	0.371	0.371	0.371

Initial Supporting table - P06B6_P06B7_OpenTestCktThrshMin

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

Value Units: Unit-less, filtered term from the Knock Detection Fast Fourier Transform (FFT) for the 20 kHz frequency range.

X Unit: Engine Speed (RPM).

Y Units: N/A

y/x	750	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	0.100	0.100	0.102	0.105	0.104	0.111	0.123	0.127	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178

Initial Supporting table - KtPCVD_t_PCV_PresSnsrEquilib_table**Description:**

y/x	-40	-30	-20	-10	0	10	20
1	10	10	10	10	10	10	10

24OBDG03D Part 1 EPS Summary Tables

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Hand Wheel Angle Sensor	C0051	Monitors system angle sensor 0. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	\$1F1 (SYSTEMPOWERMODE) \$0C9 (ENGINE RUN ACTIVE) DIAGNOSTICENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors system angle sensor 1. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	\$1F1 (SYSTEMPOWERMODE) \$0C9 (ENGINE RUN ACTIVE) DIAGNOSTICENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors system angle sensor 2. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	\$1F1 (SYSTEMPOWERMODE) \$0C9 (ENGINE RUN ACTIVE) DIAGNOSTICENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors system angle sensor 3. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	\$1F1 (SYSTEMPOWERMODE) \$0C9 (ENGINE RUN ACTIVE) DIAGNOSTICENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors motor sensor 0. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	\$1F1 (SYSTEMPOWERMODE) \$0C9 (ENGINE RUN ACTIVE) DIAGNOSTICENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/sample)	Safety Emissions Neutral Diagnostic - Type C
Hand Wheel Angle Sensor	C0051	Monitors motor sensor 1. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Failure to communicate with sensor, Protection value faults, sensor power supply faults.	Fault Detected	\$1F1 (SYSTEMPOWERMODE) \$0C9 (ENGINE RUN ACTIVE) DIAGNOSTICENABLED Voltage	= RUN/ACC = TRUE TRUE 6V < voltage < 16V	4ms (2 failures/ 2ms/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 Illum.
Electronic Control Unit Hardware	B101D	<p>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.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within B101D.</p>	<p>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 \$AA the algorithm will write \$55, then read the value back, if the value is not \$55 the DTC will set.</p>	For any RAM Memory Address, the written/ready memory value # \$AA or \$55 (for the second pass test)	<p>Vehicle Power Mode</p> <p>Secondary Parameters</p> <p>Virtual Network condition</p> <p>Calibration is Enabled B101D_34_ENABLE</p>	<p>= Any</p> <p>= 9 - 16 V</p> <p>= Any Virtual Network that the ECU participates in is active</p> <p>= TRUE</p>	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.	Type D, SDA1 Trip Safety END
			<p>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.</p>	Checksum # 0	<p>Vehicle Power Mode</p> <p>Secondary Parameters</p> <p>Virtual Network condition</p> <p>Calibration is Enabled B101D_35_ENABLE</p>	<p>= Any</p> <p>= 9 - 16 V</p> <p>= Any Virtual Network that the ECU participates in is active</p> <p>= TRUE</p>	The Flash Test algorithm will run once at Power up until it completes.	
			<p>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.</p> <p>OR</p> <p>Secondary micro</p>	Three failed Checksums	<p>Vehicle Power Mode</p> <p>Secondary Parameters</p> <p>Virtual Network condition</p> <p>Calibration is enabled B101D_36_ENABLE</p>	<p>= Any</p> <p>= 9 - 16 V</p> <p>= Any Virtual Network that the ECU participates in is active</p> <p>= TRUE</p>	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 Illum.
			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 Illum.
			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 Illum.
Electronic Control Unit Software	B101E	<p>This diagnostic monitors for multiple software errors within the FCM. This can include communications, calibrations, or VIN programming.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within B101E.</p>	<p>Internal Communications Failure - No interprocessor communications</p> <p>OR</p> <p>Cyclic redundancy check failure within the Video Processing Engine internal data structure</p> <p>OR</p> <p>Video Processing Engine identifies corruption within internal input signal data storage.</p>	Fault Detected	<p>Vehicle Power Mode</p> <p>Secondary Parameters</p> <p>Virtual Network condition</p> <p>Calibration is enabled B101E_3C_ENABLE</p>	<p>= RUN</p> <p>= 9- 16 V</p> <p>= Any Virtual Network that the ECU participates in is active</p> <p>= TRUE</p>	50 seconds	Type D, SDA1 Trip Safety END
			<p>Default calibrations are still stored and have not been written</p>		<p>Vehicle Power Mode</p> <p>Secondary Parameters</p> <p>Virtual Network condition</p> <p>Calibration is enabled B101E_42_ENABLE</p>	<p>= RUN</p> <p>= 9- 16 V</p> <p>= Any Virtual Network that the ECU participates in is active</p> <p>= TRUE</p>		
			<p>VIN stored in EEPROM contains all bytes with 0xFF.</p>		<p>Vehicle Power Mode</p> <p>Secondary Parameters</p> <p>Virtual Network condition</p> <p>Manufacturing requirement: MIC</p> <p>Calibration is enabled</p>	<p>= RUN</p> <p>= 9- 16 V</p> <p>= Any Virtual Network that the ECU participates in is active</p> <p>>= Manufacturing Enable Counter</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					B101E_47_ENABLE	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	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	Type D, SDA1 Trip Safety END
		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	> 16.0V (+/-0.5V)	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 Illum.
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 sent 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.	Type D, SDA1 Trip Safety END

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 malfunction 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	Type D, SDA1 Trip Safety END

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Camera Misaligned	B395D	<p>The diagnostic reports the Video Processing Engine's test for Camera alignment. This diagnostic also covers end-of-line (EOL) and in-use alignment.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur.</p>	<p>Camera Alignment is not successful either at EOL / Service Station</p> <p>OR</p> <p>Video Processing Engine reported camera is out of severe alignment</p>	Fault Detected by Video Processing Engine	<p>Vehicle Power Mode</p> <p>Secondary Parameters</p> <p>Virtual Network condition</p> <p>Manufacturing requirement</p> <p>Calibration is enabled B395D_08_ENABLE</p>	<p>= RUN</p> <p>= 9 - 16 V</p> <p>= Any Virtual Network that the ECU participates in is active</p> <p>>= Manufacturing Enable Counter</p> <p>= TRUE</p>	At Power-up and every 0.05 seconds	Type D, SDA1 Trip Safety END

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Loss of Communications or Invalid Data with Transmission Controller	DID \$05-enm_VBACC_Manual_Inhibit_Reason	<p>This diagnostic monitors critical CAN message frames from the transmission controller to ensure it is communicating. This diagnostic also monitors Invalid data from the transmission controller.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID \$18.</p>	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	Type D, SDA1 Trip Safety END
			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 Illum.
Loss of Communications or Invalid Data with Brake Control Module	DID \$18-enm_VBACC_Automaticjnhit_Reason	<p>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.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID \$18</p>	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	< 3 s	Type D, SDA1 Trip Safety END
			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 Illum.
Loss of Communications or Invalid Data with Engine Control Module	DID \$18-enm_VBACC_Automaticjnhit_Reason	<p>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.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID \$18.</p>	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	< 3 s	Type D, SDA1 Trip Safety END
			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 Illum.
Loss of Communications or Invalid Data with Inertial Measurement Unit	DID \$18-enm_VBACC_Automatic inhibit_Reason	<p>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.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID \$18</p>	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	< 3 s	Type D, SDA1 Trip Safety END
			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 Illum.
Loss of Communications or Invalid Data with Steering Angle Sensor	DID \$18-enm_VBACC_Automatic inhibit_Reason	<p>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.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within DID \$18</p>	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	< 3 s	Type D, SDA1 Trip Safety END
			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 Illum.
Low Speed CAN Bus Off	DID \$18- enm_V BACC_ Autom aticjn hibit_ Reaso n	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	Type D, SDA1 Trip Safety END

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	Type D, SDA1 Trip Safety END

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Body Control Module	U0140	<p>This diagnostic monitors critical CAN message frames from Body Control Module to ensure it is communicating.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur.</p>	Key CAN messages from the Body Control Module are not received	No activity of BCM signals for 3 seconds	<p>Vehicle Power Mode Virtual Network condition</p> <p>ECU Operational condition</p> <p>Calibration is enabled U0140_00_ENABLE</p>	<p>= RUN</p> <p>= Any Virtual Network that the ECU participates in is active</p> <p>= TRUE</p>	3 seconds	Type D, SDA1 Trip Safety END

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Body Control Module	U0422	<p>This diagnostic monitors for failures in message validity, alive rolling counter, and signal protection between the Body Control Module and Front Camera Module.</p> <p>Upon fault detection the emissions neutral default action of disabling adaptive cruise control will occur. This applies to all malfunctions listed within U0422.</p>	<p>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.</p> <ul style="list-style-type: none"> - 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	<p>Vehicle Power Mode Virtual Network condition</p> <p>ECU Operational condition</p>	<p>= RUN</p> <p>= Any Virtual Network that the ECU participates in is active</p>	5 seconds	Type D, SDA1 Trip Safety END
			<p>A sliding window monitors for Alive Counters that are incorrect or not updated.</p> <p>The following messages are monitored:</p> <ul style="list-style-type: none"> -Brake Pedal Switch -Cruise Control Switches 	3 out of 10 missing or incorrect messages	<p>Vehicle Power Mode Virtual Network condition</p> <p>5 second delay after Com_enable and voltage in valid range (9 to 16V)</p> <p>Calibration is enabled U0422_72_ENABLE</p>	<p>= RUN</p> <p>= TRUE</p>	0.15 second out of 0.5 second window	
			<p>A sliding window monitors for Data Protection Calculations that are incorrect or not updated.</p> <p>The following messages are monitored:</p>	3 out of 10 missing or incorrect messages	<p>Vehicle Power Mode Virtual Network condition</p> <p>5 second delay after Com_enable and voltage in valid range (9 to 16V)</p>	= 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 Illum.
			-Brake Pedal Switch -Cruise Control Switches		Calibration is enabled U0422_74_ENABLE	= TRUE		

24OBDG03D Part 1 SDM Summary Tables

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.Ov = 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.Ov = 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 occurrences	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNCTC_ASSERT	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurrences	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNCTC_DEASSERT	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurrences	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 occurrences	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNCAP	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurrences	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNBIST_START	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurrences	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_RUNBIST	IMU Power up self test failure	Fault Detected	SDM Power	= ON	2 occurrences	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_WRONG_SENSOR	IMU IC reports an incorrect configuration	Fault Detected	SDM Power	= ON	1 occurrence	Safety Non-MIL Emissions Neutral Diagnostic
		IMU_IC_INIT_STAT	IMU IC reports internal error on power up	Fault Detected	SDM Power	= ON	2 occurrences	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 occurrences	Safety Non-MIL Emissions Neutral Diagnostic
		IMUJC-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 offset 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 Illum.
Longitudinal Acceleration Sensor Performance	C0552	<p>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.</p> <p>Emission neutral default state sets lateral longitudinal acceleration signal = 0.0 g.</p>	<p>ABS(TOSS vehicle speed acceleration - raw longitudinal acceleration signal)</p> <p>update raw longitudinal acceleration signal fail time, 50 millisecond update rate</p> <p>update raw longitudinal acceleration signal region 1 fail time, 50 millisecond update rate</p>	> 0.0800 g	<p>battery voltage run crank voltage diagnostic monitor enable region 1 specific enable</p> <p>update raw lateral longitudinal acceleration signal stability 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 diagnostic 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)</p> <p>update region 1 sample time: brake pedal position engine torque TOSS vehicle speed acceleration TOSS vehicle speed TOSS vehicle speed</p>	<p>> 11.00 volts > 11.00 volts = 1 Boolean = 1 Boolean</p> <p>> 15.0 KPH < 0.5300 g = TRUE = TRUE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th > 0.5300 g < 3.8500 g < 0.70 % > 50.0 Nm > 0.0800 g > 2.0 KPH < 120.0 KPH</p>	<p>raw longitudinal acceleration signal stability time > 10.0 seconds</p> <p>raw longitudinal acceleration signal fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate</p> <p>region 1 fail time > 4.0 seconds out of region 1 sample time > 5.0 seconds, 50 millisecond update rate</p>	Emissions Neutral Diagnostic- Type C

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 stability 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 = TRUE = TRUE = 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 Illum.
					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 stability 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 diagnostic 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	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 Illum.
					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	> 0.1700 g	battery voltage run crank voltage diagnostic monitor enable region 3 specific enable update raw lateral longitudinal acceleration signal stability 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 = 1 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 Illum.
					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 % < 50.0 Nm < -0.1700 g > 2.0 KPH < 120.0 KPH < 0.5300 g = FALSE = FALSE VehicleSpeedSensor_FA VehicleSpeedSensorError	region 4 fail time > 2.0 seconds out of region 4 sample time > 2.5 seconds, 50 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Circuit Low	C0553	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_VoltageDirec tProp = 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	Emissio ns Neutral Diagnost ic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Longitudinal Acceleration Sensor Circuit High	C0554	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_VoltageDirec tProp = 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	Emissio ns Neutral Diagnost ic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit Low	C0697	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_VoltageDirec tProp = 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	Emissio ns Neutral Diagnost ic-Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Circuit High	C0698	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_VoltageDirec tProp = 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	Emissio ns Neutral Diagnost ic-Type C

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lateral Acceleration Sensor Performance	C0699	<p>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.</p> <p>Emission neutral default state sets lateral acceleration signal = 0.0 g.</p>	<p>ABS(raw lateral acceleration signal) AND ABS(raw lateral acceleration signal)</p> <p>update raw lateral acceleration signal fail, 50 millisecond update rate</p>	<p>> 0.5300 g</p> <p>< 3.8500 g</p>	<p>battery voltage run crank voltage diagnostic monitor enable</p> <p>update raw lateral acceleration signal stability time: TOSS vehicle speed automatic transmission is clutch to clutch OR dual clutch high side drive 1 enable high side drive 2 enable diagnosotic 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</p> <p>ABS(raw lateral acceleration signal) update sample time</p> <p>U0073 fault active U0073 test fail this key on DTCs not fault active</p>	<p>> 11.00 volts > 11.00 volts = 1 Boolean</p> <p>> 15.0 KPH = TRUE</p> <p>= TRUE = TRUE = FALSE</p> <p>= FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = 1st thru 10th</p> <p>< 0.5300 g</p> <p>= FALSE = FALSE VehicleSpeedSensor_FA</p>	<p>raw lateral acceleration signal stability time > 10.0 seconds, fail time > 75.0 seconds out of sample time > 120.0 seconds, 50 millisecond update rate</p>	<p>Emissions Neutral Diagnostic-Type C</p>

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECU RAM Failure	P0604	Indicates that the TCM 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 an illegal write attempt to protected RAM. Number of illegal writes are >	65,534 counts			Diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal ECU Processor Integrity Fault	P0606	Indicates that the TCM 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 processors.	Time new seed not received exceeded			always running	500 milliseconds	Type A, 1 Trips
			MAIN processor receives seed in wrong order			always running	18 / 17 counts intermittent. 50 ms/count in the TCM main processor	
			2 fails in a row in the MAIN processor's ALU check			Test enabel calibration: CPU 1 enabled = 0 CPU 2 enabled = 1 CPU 3 enabled = 0 CPU 4 enabled = 0 CPU 5 enabled = 0 CPU 6 enabled = 0 CPU 7 enabled = 0 CPU 8 enabled = 0 (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 >=	5.00		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 200 milliseconds continuous; 50 ms/count in the TCM main processor	
			Checks for ECC (error	3 (results in MIL),		Test is Enabled:	variable,	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			correcting code) circuit test errors reported by the hardware for flash memory. Increments counter during controller initialization if ECC error occurred since last controller initialization. Counter >=	5 (results in MIL and remedial action)		1 (If 0, this test is disabled)	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 occurred 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: 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 PFM.Enable f (Loop Time) (If 0, this test is disabled)	Fail Table, f(Loop Time). See supporting tables: P0606 PFM Sequence Fail f (Loop Time) / Sample Table, f (Loop Time)See supporting tables:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
							P0606 PFM Sequence Sample f(Loop Time) counts 50 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 Illum.
Internal ECU Processor Integrity Performance	P0607	Indicates that the TCM 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 TCM 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 occurred 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 occurred 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 Illum.
Internal Control Module Monitoring Processor Performance	P060A	Indicates that the monitoring processor has detected an internal performance fault.	Checks for stack over or underflow in secondary processor by looking for corruption of known pattern at stack boundaries. Checks number of stack over/underflow since last powerup reset >=	5		KeMEMD_b_StackLimitTestEnbl == 1 Value of KeMEMD_b_StackLimitTestEnbl is: 1 . (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	Type A, 1 Trips
			MAIN processor is verified by responding to a seed sent from the secondary with a key response to secondary. Checks number of incorrect keys received > or Secondary processor has not received a new within time limit	2 incorrect seeds within 8 messages, 0.2000 seconds		ignition in Run or Crank	150 ms for one seed continually failing	
			2 fails in a row in the Secondary processor's ALU check			KePISD_b_ALU_TestEnbl d == 1 Value of KePISD_b_ALU_TestEnbl d is: 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			KePISD_b_ConfigRegTestEnbl d == 1 Value of KePISD_b_ConfigRegTestEnbl d is: 1 . (If 0, this test is disabled)	12.5 to 25 ms	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Redundant Memory Performance , P060C = previous model years P16F3	P060C	<p>The diagnostic monitor is a rationalization of command values: command clutch pressures, command gear, and commanded direction. The monitor is broken up into three fault detection routines, command pressure (tie up) fault detection, command gear/shift fault detection, and commanded direction.</p> <p>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</p>	<p>For each combination of clutches which can lead to an output lock:</p> <p>Commanded Clutch PCS Pressure</p> <p>OR</p> <p>For each combination of clutches which can lead to a mult-clutch tie-up:</p> <p>Commanded Clutch PCS Pressure</p>	<p>> Cmnd Tie Up Monitor Output Lock Thresh * Clutch PCS Pressure Gain + Clutch PCS Pressure Offset</p> <p>transfer case range is 4WD Low: > Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo * Clutch PCS Pressure Gain + Clutch PCS Pressure Offset</p> <p>Else > Cmnd Tie Up Monitor Multi-Clutch Thresh * Clutch PCS Pressure Gain +</p>			when fail timer reaches 100, set DTC	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>rational, one or more of 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.</p> <p>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 transfer case range</p>	<p>if above criteria met, increment fail timer by 3.125 6.25 ms update rate</p>	<p>Clutch PCS Pressure Offset</p>	<p>commanded tie up monitor enable calibration</p> <p>vehicle speed OR commanded tie up fault pending OR (vehicle speed AND monitor enabled in previous loop)</p> <p>High Side Driver 1 On High Side Driver 2 On</p> <p>Service Fast Learn OR (Service Fast Learn AND Vehicle Speed for vehicle speed time)</p> <p>Number of fill factor conditions below which need to be met</p> <p>Clutch 1 volume fill factor Clutch 2 volume fill factor Clutch 3 volume fill factor Clutch 4 volume fill factor Clutch 5 volume fill factor Clutch 6 volume fill factor SOWC volume fill factor (GF9 only)</p>	<p>= 1 (1 to enable, 0 to disable)</p> <p>> 5.0 KPH</p> <p>= TRUE</p> <p>> 5.0 KPH</p> <p>= TRUE</p> <p>= TRUE = TRUE</p> <p>= FALSE = TRUE</p> <p>> 8.0 KPH > 2.50 seconds</p> <p>= 3 Filled Clutches</p> <p>> 1.00 > 1.00 > 1.00 > 1.00 > 1.00 > 1.00 > 1.00</p> <p>Transfer case range is 4WD Lo:</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		The command direction fault detection is designed to verify the clutches commanded on will result in the commanded direction (e.g. reverse clutches are being commanded on when the commanded range is reverse). This is used to prevent an incorrect direction safety hazard.			output shaft deceleration	< -441.3 RPM/sec Else < -163.5 RPM/sec		
					DTCs Not Fault Active DTCs Not Test Failed This Key On	P077C, P077D P0723, P0722		
			<p>Commanded Gear</p> <p>AND at least one of the following:</p> <p>Previous Loop Commanded Gear and current loop commanded</p> <p>OR</p> <p>current commanded gear and previous loop commanded gear</p> <p>OR</p> <p>incorrect downshift fail timer</p> <p>if above conditions are met, increment incorrect downshift fail timer 6.25 ms update rate</p> <p>Alternatively, if commanded gear increment invalid commanded gear fail</p>	<p><</p> <p>Shift Monitor Lowest Allowed Gear</p> <p>> Current Loop Commanded Gear (i.e a downshift) = a forward, locked gear</p> <p>= a forward, locked gear # a forward, locked gear</p> <p>>0.0</p> <p>= NULL</p>			when incorrect downshift fail timer reaches 4.63 sec, set DTC	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			timer 6.25 ms update rate		command shift monitor enable calibration Service Fast Learn OR (Service Fast Learn AND Vehicle Speed for vehicle speed time) High Side Driver 1 On High Side Driver 2 On DTCs Not Fault Active DTCs Not Test Failed This Key On	= 1 (1 to enable, 0 to disable) = FALSE = TRUE > 8.0 KPH > 2.50 seconds = TRUE = TRUE P077C, P077D, P0721 P0723, P0722, P172A, P172B		
			Criteria based on driver requested range: Drive: An invalid combination of drive clutches commanded on* driver requested range Incorrect drive enable calibration Incrorrect drive disable calibration Reverse: An invalid combination of reverse clutches commanded on*	Illegal Drive Clutch = Combinations = Drive = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable) = Illegal Reverse Clutch Combinations			Fault pending fail timer Clutch Connectivity Wrong > Direction FP Fail time based on driver requested range: Incorrect Drive Fail Time Incorrect Reverse Fail Time Incorrect Neutral Fail Time Incorrect Park Fail Time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			driver requested range	= Reverse			6.25 ms update rate	
			Incorrect reverse enable calibration	= 1 (1 to enable, 0 to disable)	Current driver requested range	= previous driver requested range	>	Incorrect Direction Range Change Delay Time
			Incrorrect reverse disable calibration	= 0 (0 to enable, 1 to enable)				
			Neutral:		(vehicle speed AND vehicle speed OR Fail Timer)	> -6.00 KPH		
			An invalid combinatio of neutral clutches commanded on*	= Illegal Park-Neutral Clutch Combinations		> 6.00 KPH		
						>0.0		
			driver requested range	= Neutral	clutch connectivity monitor enable	= 0 (1 to enable, 0 to disable)		
			Incorrect neural enable calibration	= 1 (1 to enable, 0 to disable)	OR clutch connectivity monitor disable	= 1 (0 to enable, 1 to disable)		
			Incrorrect neutral disable calibration	= 0 (0 to enable, 1 to disable)	Service Fast Learn OR (Service Fast Learn AND Vehicle Speed for vehicle speed time)	= FALSE		
			Park:			= TRUE		
			An invalid combination of reverse clutches commanded on*	= Illegal Park-Neutral Clutch Combinations	High Side Driver 1 On High Side Driver 2 On	> 8.0 KPH > 2.50		
			driver requested range	= Park		= TRUE = TRUE		
			Incorrect park enable calibration	= 1 (1 to enable, 0 to disable)	DTCs Not Fault Active	P077C, P077D, P0721		
			Incrorrect park disable calibration	= 0 (0 to enable, 1 to disable)	DTCs Not Test Failed This Key On	P0723, P0722, P172A, P172B		
					* Note, clutch is considered "on" when the following conditions are met:			
					Clutch commanded	>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					pressure	Clutch Connectivity C1 On Threshold OR > Clutch Connectivity C2 On Threshold OR > Clutch Connectivity C3 On Threshold OR > Clutch Connectivity C4 On Threshold OR > Clutch Connectivity C5 On Threshold OR > Clutch Connectivity C6 On Threshold OR > Clutch Connectivity C7 On Threshold		
					Current clutch pressure command * 0.25 + 1st derivative of pressure command * 0.25 + 2nd derivative of pressure command * -0.25 + 3rd derivative of pressure command * -0.25	= 0.0 OR > -1.00 kPa		
			ratio monitor fault pending	= TRUE	If all conditions below are		increment fail timer by	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Output speed direction OR Output speed direction Plus following criteria based on driver requested range: Drive: driver requested range Incorrect drive enable calibration Incorrect drive disable calibration Reverse: driver requested range Incorrect reverse enable calibration Incorrect reverse disable calibration Neutral: driver requested range Incorrect neutral enable calibration Incorrect neutral disable calibration Park: driver requested range	= FORWARD = REVERSE = Drive = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable) = Reverse = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to enable) = Neutral = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable) = Park	met, increment ratio monitor fault pending timer: vehicle speed OR vehicle speed (note: fault pending will remain latched if vehicle speed max thresholds are exceeded) Monitor Armed Measured output speed direction Input speed default direction Current driver requested range for range time based on PRNDL position: driver requested range AND transmission measured speed ratio AND Loop-to-loop change in measured ratio AND (Direction By Ratio OR Direction By Clutch Slio)	> 0.50 AND < 6.00 KPH <-0.50 AND >-6.00 KPH = TRUE = REVERSE or FORWARD = REVERSE or FORWARD = previous driver requested range > Incorrect Direction Range Change Delay Time = Reverse > 0.40 > -8.00 = FORWARD = a FORWARD Gear	Ratio Monitor Fail Increment Rate (Percent per Loop) when timer reaches 100, set fault pending Fail time based on driver requested range (once fault pending has matured): Incorrect Drive Fail Time Incorrect Reverse Fail Time Incorrect Neutral Fail Time Incorrect Park Fail Time 6.25 ms update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Incorrect park enable calibration Incorroct park disable calibration	= 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable)	driver requested range AND transmission measured speed ratio AND Loop-to-loop change in measured speed ratio AND (Direction By Ratio OR Direction By Clutch Slip) ***** Monitor Armed Enables: if Range Shift enable cal: THEN Range Shift State OR if Attained Gear enable cal: THEN Attained Gear ALSO Engine Speed Ratio Monitor enable cal OR Ratio Monitor disable cal ***** Direction By Ratio: (vehicle speed OR vehicle speed) WHEN: Measured output speed direction AND	= Drive < -0.40 < 8.00 = REVERSE = REVERSE ***** = 0 (1 to enable, 0 to disable) = Range Shift Complete = 0 (1 to enable, 0 to disable) # Neutral AND # Park > 400 RPM = 0 (1 to enable, 0 to disable) = 1 (0 to enable, 1 to disable) ***** > 0.50 KPH -0.50 KPH = reverse		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Absolute measured gear ratio THEN Direction by Ratio ELSE WHEN Measured output speed direction AND Absolute measured gear ratio THEN Direction by Ratio ***** Direction by Clutch Slip: C1 clutch slip valid C2 clutch slip valid C5 clutch slip valid C3C4 dual clutch slip valid C3C6 dual clutch slip valid C4C6 dual clutch slip valid Direction by Clutch Slip Enable cal (vehicle speed OR vehicle speed) for each clutch: current clutch slip clutch held combination matches a valid gear in:	> 3.75 AND < 3.87 = REVERSE = forward > 4.51 AND < 0.03 = FORWARD ***** = TRUE = TRUE = TRUE = TRUE = TRUE = TRUE = 0 (1 to enable, 0 to disable) > 0.50 KPH < -0.50 KPH Ratio Monitor Slip < Threshold (if slip condition met, clutch held = 1, else held = 0) Ratio Monitor Clutch States		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					***** General enables: Transmission Type Service Fast Learn OR (Service Fast Learn AND Vehicle Speed for vehicle speed time) High Side Driver 1 On High Side Driver 2 On DTCs Not Fault Pending DTCs Not Fault Active DTCs Not Test Failed This Key On	***** = RWD 10 Spd Automatic = FALSE = TRUE > 8.0 KPH > 2.50 seconds = TRUE = TRUE P0716, P0717, P07BF, P07C0, P0721, P0722, P0723, P077C, P077D, P172A, P172B, P1783, P17CE P0716, P0717, P07BF, P07C0, P077C, P077D, P0721, P17CE, P1783 P0721, P0722, P0723, P172A, P172B		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Powertrain Internal Control Module EEPROM Error	P062F	This DTC detects a NVM long term performance. There are two types of diagnostics that run during controller power up. One for HWIO reports that writing to NVM (at shutdown) will not succeed, and the other HWIO reports the assembly calibration integrity check has failed.	HWIO reports that writing to NVM (at shutdown) will not succeed				Diagnostic runs at controller power up.	Type 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 Illum.
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 or an open circuit.	< 0.5 Q impedance between signal and controller ground OR > 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail count and increment sample count, otherwise increment only sample count	(ground short diagnostic monitor enable calibration OR open circuit diagnostic monitor enable calibration) high side drive ON service mode \$04 active	= 1 Boolean = 1 Boolean = TRUE = FALSE	ground short fail count > 6 counts within sample count of 2,400 counts OR open circuit fail count > 6 counts within sample count of 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 Illum.
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.	<p>when PWM sensor type and PWM voltage direct conditional internal range sensor A PWM duty cycle</p> <p>when PWM sensor type and PWM voltage inverse conditional internal range sensor A PWM duty cycle</p> <p>Increment fail and sample time, update rate 25 milliseconds</p> <p>Controller specific PWM duty cycle thresholds are set to meet the following controller specification for a short to ground.</p>	<p>< 8.331 % duty cycle</p> <p>> 8.331 % duty cycle</p> <p>< 0.5 Q impedance between signal and controller ground</p>	<p>diagnostic monitor enable battery voltage</p> <p>when sensor type is PWM duty cycle direct or inverse conditional for fail threshold is used conditional type check calibration</p>	<p>= 1 Boolean >9.00 volts</p> <p>= CeTRGD_e_VoltDirctProp</p>	<p>fail time > 0.500 seconds out of sample time > 1.500 seconds</p> <p>battery voltage time > 1.000 seconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Range (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.	<p>when PWM sensor type and PWM voltage direct conditional internal range sensor A PWM duty cycle</p> <p>when PWM sensor type and PWM voltage inverse conditional internal range sensor A PWM duty cycle</p> <p>Increment fail and sample time, update rate 25 milliseconds</p> <p>Controller specific PWM duty cycle thresholds are set to meet the following controller specification for a short to power.</p>	<p>> 92.001 % duty cycle</p> <p>< 92.001 % duty cycle</p> <p>< 0.5 Q impedance between signal and controller power</p>	<p>diagnostic monitor enable battery voltage</p> <p>when sensor type is PWM duty cycle direct or inverse conditional for fail threshold is used conditional type check calibration</p> <p>ECM Message Available Communication Check Enable for ECM message</p> <p>Vehicle is in a mode that enables accessory power</p>	<p>= 1 Boolean</p> <p>>9.00 volts</p> <p>= CeTRGD_e_VoltDirctProp</p> <p>= TRUE</p> <p>= 1.00 Boolean</p> <p>= TRUE</p>	<p>fail time > 0.900 seconds out of sample time > 1.100 seconds</p> <p>battery voltage time > 1.000 seconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Temperature (TFT) Sensor Performance	P0711	The diagnostic monitor will verify the time to transmission fluid temperature warm up based on the raw transmission fluid temperature sensor, any intermittent signal that causes multiple unrealistic delta changes (intermittent faults) based on the raw transmission fluid temperature sensor, and, raw transmission fluid temperature sensor signal stuck in valid range.	raw transmission fluid temperature and the transmission fluid temperature warm up time has elapsed	< -6.7 °C	diagnostic 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 pedal 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 > -70.0 °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 Illum.
					TFT Warmup Pass P0711 test fail this key on	EngineTorqueEstInaccu rate AcceleratorPedalFailure CrankSensor_FA ECT_Sensor_FA VehicleSpeedSensor_FA = FALSE = FALSE		
			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	diagnsotic monitor enable P0712 NOT fault active P0713 NOT fault active battery voltage run crank voltage intermittent test enable	= 1 Boolean >9.00 volts >9.00 volts = 1 Boolean	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 battery voltage time > 0.100 seconds run crank voltage time > 0.100 seconds	

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					propulsion system active	= TRUE		
			raw transmission fluid temperature - previous raw transmission fluid temperature, update rate 100 milliseconds, update fail time	< 0.0000 °C	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 > -70.0 °C < 150.0 °C	fail time > 300.0 seconds 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 Illum.
Transmission Fluid Temperature Sensor Circuit Low Voltage	P0712	Controller specific analog circuit diagnoses the transmission fluid temperature sensor and wiring for a short to ground fault by comparing a voltage measurement to controller specific voltage thresholds, converted to a resistance value.	circuit resistance update fail time 1 seconds update rate	< 47.450 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 > 4.00 seconds out of sample time > 5.00 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 Illum.
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	>105,445.0 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 > 4.00 seconds out of fail time > 5.00 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 Illum.
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 accumulated 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	> 850.0 RPM	service mode \$04 active run crank voltage diagnostic monitor enable P0717 test fail this key on P07BF test fail this key on P07C0 test fail this key on high side driver 1 enable high side driver 2 enable service fast learn active run crank voltage last valid raw transmission input speed OR valid raw transmission input speed (before drop event) last valid raw transmission input speed updates every 25 milliseconds when stability time complete as long as (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	= FALSE >9.00 volts = 1 Boolean = FALSE = FALSE = FALSE = TRUE = TRUE = FALSE > 5.00 volts > 148.0 RPM > 148.0 RPM < 320.0 RPM > 148.0 RPM > 230.0 RPM > 5.0 % < 8,191.9 Nm > 30.0 Nm > 500.0 RPM	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 Illum.
					DTCs not fault active	AcceleratorPedalFailure EngineTorqueEstInaccurate	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 Illum.
Input Speed Sensor Circuit Low Voltage	P0717	Detects no activity in raw transmission input speed signal RPM due to open circuit 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 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 < 175.0 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 sensor must be OBDII to use brake pedal conditional brake pedal position sensor 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_Sixth > CeCGSR_e_CR_First > 72.0 RPM < CeCGSR_e_CR_Tenth > CeCGSR_e_CR_Sixth > 230.0 RPM = FALSE = FALSE	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 Illum.
					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	= 0 Boolean = 1 Boolean > 500.0 RPM EngineTorqueEstInaccuracy	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 Illum.
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

[illegible]

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					OR {}{Wheel Speed Rationality Enable AND Transfer Case Range Valid AND Vehicle Speed Fault AND Tease state AND Wheel Speed Sensor Present AND Output Speed calculate from wheel speed} TISS/TOSS has single power supply calibration AND TISS AND TISS) OR TISS/TOSS has single power supply calibration AND TISS AND TISS) P0716 test fail this key on P0717 test fail this key on P07BF test fail this key on P07C0 test fail this key on PTO check: PTO enable calibration is FALSE OR	= 1.00 Boolean =TRUE = FALSE != Neutral = TRUE >= 100.00 rpm = 0 Boolean < 8,191.9 RPM > 175.0 RPM = 0 Boolean < 8,191.9 RPM > 8,191.9 RPM = FALSE = FALSE = FALSE = FALSE # 1 Boolean	Wheel Speed Rationality met = 0 s counts down from 0.25 s	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(PTO enable calibration is TRUE AND PTO active) run crank voltage service fast learn active run crank voltage transmission fluid temperature P0723 test fail this key on P077C test fail this key on P077D test fail this key on P0722 fault active P0722 test fail this key on transmission hydraulic pressure available: engine speed DTCs not fault active	= 1 Boolean = TRUE > 5.00 volts = FALSE >9.00 volts > -40.00 °C = FALSE = FALSE = FALSE = FALSE = FALSE > 500.0 RPM AcceleratorPedalFailure EngineTorqueEstInaccu te	run crank voltage time > 25 milliseconds 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 Illum.
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 accumulated 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.	<p>delta raw transmission output speed = raw transmission output speed previous loop - raw transmission output speed, 25 millisecond update rate</p> <p>Failing criteria depends on below decision tree for failure threshold</p> <p>If 4WD low engaged and wheel speed usage is not enabled Else If Wheel speed usage enabled for failing TOS drop diagnostic Else (Not 4WD and not Wheel Speed usage) If 4WD low is engaged and Wheel speed usage enabled</p>	<p>> 500.0 RPM</p> <p>P0723 Wheel Speed Calc function of output speed</p> <p>> 500.0 RPM</p> <p>> Above threshold * 1.00</p>	<p>service mode \$04 active diagnostic monitor enable</p> <p>transmission engaged state</p> <p>4WD low state</p> <p>PTO check: PTO enable calibration is FALSE OR (PTO enable calibration is TRUE AND PTO active)</p> <p>run crank voltage</p> <p>service fast learn active run crank voltage P077C test fail this key on P077D test fail this key on</p> <p>when PRNDL is moved to</p>	<p>= FALSE = 1 Boolean</p> <p># not engaged</p> <p>= 4WD low state previous loop, 25 millisecond update rate</p> <p># 1 Boolean</p> <p>= 1 Boolean</p> <p>= TRUE</p> <p>> 5.00 volts</p> <p>= FALSE >9.00 volts = FALSE = FALSE</p>	<p>fail time > 1.500 seconds updated fail event count, fail event count > 5 counts, 25 millisecond update rate</p> <p>transmission engaged state time > P0723 (MY21) transmission engaged state time threshold</p> <p>4WD low change time > 3.0 seconds</p> <p>run crank voltage time > 25 milliseconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 PRNDL OR PRNDL OR raw transmission output speed OR last valid raw transmission output speed determine if raw transmission input speed is stable: ((raw transmission input speed - raw transmission input speed previous, 25 millisecond update AND raw transmission input speed) OR Wheel speed usage enabled for failing TOS drop diagnostic) OR (TISS/TOSS has single power suddlv calibration	= CeTRGR_e_PRNDL_Neu tral = CeTRGR_e_PRNDL_Tra nsitional8 N-D transitional = CeTRGR_e_PRNDL_Tra nsitionalU R-N transitional > 250.0 RPM > 250.0 RPM < 4,095.9 RPM > 148.0 RPM = TRUE = 0 Boolean	raw transmission input speed stability time > 2.00 seconds no time required	

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					AND raw transmission input speed)	= 0.0 RPM		
					select delta RPM fail theshold: (4WD low state AND4WD low valid) select P0723 4WD TOSS delta fail threshold otherwise use P0723 TOSS delta fail threshold	= TRUE = TRUE		
					last valid raw transmission output speed OR valid raw transmission output speed (before drop event)	> 36.0 RPM > 36.0 RPM	raw transmission output speed time > 2.00 seconds	
					Wheel speed usage enabled for failing TOS drop diagnostic AND TOS - Calculated TOS from Wheel Speed	= TRUE > 150.00 rpm		
					last valid raw transmission output speed updates every 25 milliseconds when stablity time complete as long as (delta delta raw transmission output speed AND raw transmission output speed)	< 140.0 RPM > 36.0 RPM	stability time > 0.100 seconds	
					transmission hydraulic pressure available: enaine speed	> 500.0 RPM	engine speed time >	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					DTCs not fault active	AcceleratorPedalFailure EngineTorqueEstInaccurate	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 Illum.
Pressure Control (PC) Solenoid A Stuck Off (GRW and 8SPD)	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 or at zero RPM. 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 millisecond update	> 200.0 RPM	<p>*****</p> <p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage)</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)</p> <p>TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled</p> <p>TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled</p> <p>service fast learn active</p> <p>service solenoid cleaning</p>	<p>*****</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= FALSE Boolean</p>	<p>fail time > 1.00 seconds, update fail count, fail count > 2 counts 6.25 millisecond update</p> <p>battery voltage time > 0.100 seconds</p> <p>run crank voltage time > 0.100 seconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 C1 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) C1 clutch slip speed valid	= FALSE Boolean = TRUE ***** = FALSE = TRUE # initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE > 100.0 RPM > 2.00 % > 1,500.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation)	> 0.450 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 C1 (GR10 CB123456R or 8 SPD CB1278R) clutch pressure control solenoid.			C1 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ***** DTCs not fault pending DTCs not fault active	= mapped to line 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 = 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 P17D3 P17C5 P0721		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not test fail this key on</p> <p>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</p>	<p>AcceleratorPedalFailure CrankSensor_FA</p> <p>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</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 millisecond update	< 150.0 RPM < 100.00 RPM < 150.0 RPM			Base fail time: shift type is power down shift: fail time > 0.60 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 Illum.
		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			<p>*****</p> <p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage)</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)</p>	<p>*****</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p>	<p>Clutch Stuck On Fail Offset Time CD Shifts</p> <p>negative torque upshift: Clutch Clip Press NU Shifts</p> <p>clutch staging shift: Clutch Stuck On Fail Offset Time STGR Shifts</p> <p>update fail count, fail count > 3 counts 6.25 millisecond update</p> <p>battery voltage time > 0.100 seconds</p> <p>run crank voltage time > 0.100 seconds</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 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 ((C1 off going clutch pressure control ramp time out complete AND off going clutch pressure ramp control ramp time out enable) OR C1 off going clutch command pressure)	= TRUE Boolean = TRUE Boolean = FALSE Boolean = FALSE Boolean = TRUE ***** # range shift complete = OFF GOING CLUTCH TEST > 100.0 RPM = TRUE = 0 (1 to enable, 0 to disable) < 350.0 kPa	all delay times exhaust delay by shift type: 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:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	> 120.0 Nm = 0 (0 is enable, 1 is enable) = TRUE # clutch fill phase > pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: C2 Torque-Based Pressure Clip OR C3 Torque-Based Pressure Clip OR C4 Torque-Based Pressure Clip OR C5 Torque-Based Pressure Clip OR C6 Torque-Based Pressure Clip clip thresholds for all other shift types:	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 Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: C2 Oncoming Post-Torque Phase Delay + wheel slip delay OR C3 Oncoming Post-Torque Phase Delay + wheel slip delay OR	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>garage shifts: Clutch Clip Press GS Shifts closed throttle downshift: C2 Clutch Clip Press CD Shifts C3 Clutch Clip Press CD Shifts C4 Clutch Clip Press CD Shifts C5 Clutch Clip Press CD Shifts C6 Clutch Clip Press CD Shifts negative torque upshift: Clutch Clip Press NU Shifts open throttle downshift: Clutch Clip Press PD Shifts</p> <p>C1 clutch slip speed valid, all speed sensors are functional for lever node clutch slip speed calculation</p> <p>*****</p> <p>conditions needed to trigger test:</p> <p>(current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND shift type enable cal for current shift</p>	<p>= TRUE</p> <p>*****</p> <p># Garage shift</p> <p>Clutch Stuck On Shift = Type Enable (0 table value will disable, 1 will enable)</p> <p>= FALSE</p> <p>= 0 (0 will enable, 1 will enable)</p>	<p>C4 Oncoming Post-Torque Phase Delay + wheel slip delay OR C5 Oncoming Post-Torque Phase Delay + wheel slip delay OR C6 Oncoming Post-Torque Phase Delay + wheel slip delay</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ***** DTCs not fault pending	= 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 = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ***** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not fault active</p> <p>DTCs not test fail this key on</p> <p>*****</p> <p>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</p>	<p>P0723 P0722 P077D P077C P176C P176D P176B P17D6</p> <p>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</p> <p>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 *****</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>automatic transmission shift due to two conditions:</p> <p>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.</p> <p>AND</p> <p>That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold.</p> <p>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:</p> <p>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.</p> <p>OR</p>			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>The automatic transmission shift completes, range shift state = range shift complete.</p> <p>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 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</p>			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Pressure Control (PC) Solenoid B Stuck Off (GRW and 8SPD)	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 or at zero RPM. 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 millisecond update	> 200.0 RPM	<p>*****</p> <p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage)</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)</p> <p>TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled</p> <p>TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled</p> <p>service fast learn active</p> <p>service solenoid cleaning</p>	<p>*****</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= FALSE Boolean</p>	<p>fail time > 1.00 seconds, update fail count, fail count > 2 counts 6.25 millisecond update</p> <p>battery voltage time > 0.100 seconds</p> <p>run crank voltage time > 0.100 seconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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	= FALSE Boolean = TRUE ***** = FALSE = TRUE # initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE > 100.0 RPM > 2.00 % > 1,500.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation)	> 0.450 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 C2 (GR10 CB128910R or 8SPD CB12345R) clutch pressure control solenoid.			C2 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ***** DTCs not fault pending DTCs not fault active	= mapped to line 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 = 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 P17D3 P17C5 P0721		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not test fail this key on</p> <p>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</p>	<p>AcceleratorPedalFailure CrankSensor_FA</p> <p>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</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 design, requiring	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 millisecond update	< 50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time > 0.60 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 Illum.
		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			<p>*****</p> <p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage)</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)</p>	<p>*****</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p>	<p>Clutch Stuck On Fail Offset Time CD Shifts</p> <p>negative torque upshift: Clutch Clip Press NU Shifts</p> <p>clutch staging shift: Clutch Stuck On Fail Offset Time STGR Shifts</p> <p>update fail count, fail count > 3 counts 6.25 millisecond update</p> <p>battery voltage time > 0.100 seconds</p> <p>run crank voltage time > 0.100 seconds</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to the GF9 C2 CB29, GR10C2 CB128910R, or 8 Speed C2 CB12345R 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 ((C2 off going clutch pressure control ramp time out complete AND off going clutch pressure ramp control ramp time out enable) OR C2 off going clutch command pressure)	= TRUE Boolean = TRUE Boolean = FALSE Boolean = FALSE Boolean = TRUE ***** # range shift complete = OFF GOING CLUTCH TEST > 100.0 RPM = TRUE = 0 (1 to enable, 0 to disable) < 350 kPa	all delay times exhaust delay by shift type: closed throttle upshift: C2 exhaust delay open throttle power on up shift open throttle upshift: C2 exhaust delay open throttle power on up shift garage shifts:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	> 135 Nm = 0 (0 is enable, 1 is enable) = TRUE # clutch fill phase > pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: C1 Torque-Based Pressure Clip OR C3 Torque-Based Pressure Clip OR C4 Torque-Based Pressure Clip OR C5 Torque-Based Pressure Clip OR C6 Torque-Based Pressure Clip clip thresholds for all other shift types: aaraae 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 Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: C1 Oncoming Post-Torque Phase Delay + wheel slip delay OR C3 Oncoming Post-Torque Phase Delay + wheel slip delay OR	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>C2 clutch slip speed valid, all speed sensors are functional for lever node cluth slip speed calculation</p> <p>*****</p> <p>conditions needed to trigger test:</p> <p>(current shift type AND shift type enable cal for current shift type)</p> <p>OR</p> <p>(Intrusive shift active AND shift type enable cal for garage shift AND</p>	<p>Clutch Clip Press GS Shifts closed throttle downshift: C1 Clutch Clip Press CD Shifts C3 Clutch Clip Press CD Shifts C4 Clutch Clip Press CD Shifts C5 Clutch Clip Press CD Shifts C6 Clutch Clip Press CD Shifts negative torque upshift: Clutch Clip Press NU Shifts open throttle downshift: Clutch Clip Press PD Shifts</p> <p>= TRUE</p> <p>*****</p> <p># Garage shift</p> <p>Clutch Stuck On Shift = Type Enable (0 table value will disable, 1 will enable)</p> <p>= FALSE</p> <p>= 0 (0 will enable, 1 will enable)</p>	<p>C4 Oncoming Post-Torque Phase Delay + wheel slip delay OR C5 Oncoming Post-Torque Phase Delay + wheel slip delay OR C6 Oncoming Post-Torque Phase Delay + wheel slip delay</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ***** DTCs not fault pending	= 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 = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ***** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not fault active</p> <p>DTCs not test fail this key on</p> <p>*****</p> <p>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</p>	<p>P077C P176C P176D P176B P17D6</p> <p>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</p> <p>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 *****</p>		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>transmission shift completes, range shift state = range shift complete.</p> <p>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 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</p>			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
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 sensor 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, fail count > 16 counts 6.25 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 Illum.
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 sensor 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, fail count > 16 counts 6.25 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 Illum.
Pressure Control (PC) Solenoid C Stuck Off (GRW and 8SPD)	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 or at zero RPM. 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 millisecond update	> 200.0 RPM	<p>*****</p> <p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage)</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)</p> <p>TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled</p> <p>TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled</p> <p>service fast learn active</p> <p>service solenoid cleaning</p>	<p>*****</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= FALSE Boolean</p>	<p>fail time > 1.00 seconds, update fail count, fail count > 2 counts 6.25 millisecond update</p> <p>battery voltage time > 0.100 seconds</p> <p>run crank voltage time > 0.100 seconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 C3 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) C3 clutch slip speed valid	= FALSE Boolean = TRUE ***** = FALSE = TRUE # initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE > 100.0 RPM > 2.00 % > 1,500.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation)	> 0.450 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 (GR10 C23457910 or 8SPD C13567) clutch pressure control solenoid.			C3 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ***** DTCs not fault pending DTCs not fault active	= mapped to line pressure, C3 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 = 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 P17D3 P17C5 P0721		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not test fail this key on</p> <p>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</p>	<p>AcceleratorPedalFailure CrankSensor_FA</p> <p>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</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 millisecond update	< 100.00 RPM < 100.00 RPM < 100.00 RPM			Base fail time: shift type is power down shift: fail time > 0.60 seconds shift type is garage shift: fail time > 0.35 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 Illum.
		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			<p>*****</p> <p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage)</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)</p>	<p>*****</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p>	<p>Clutch Stuck On Fail Offset Time CD Shifts</p> <p>negative torque upshift: Clutch Clip Press NU Shifts</p> <p>clutch staging shift: Clutch Stuck On Fail Offset Time STGR Shifts</p> <p>update fail count, fail count > 3 counts 6.25 millisecond update</p> <p>battery voltage time > 0.100 seconds</p> <p>run crank voltage time > 0.100 seconds</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to the GF9 C3 CB38, GR10C3 C23457910, or 8 Speed C3C13567 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 ((C3 off going clutch pressure control ramp time out complete AND off going clutch pressure ramp control ramp time out enable) OR C3 off going clutch command pressure)	= TRUE Boolean = TRUE Boolean = FALSE Boolean = FALSE Boolean = TRUE ***** # range shift complete = OFF GOING CLUTCH TEST > 100.0 RPM = TRUE = 0 (1 to enable, 0 to disable) < 350 kPa	all delay times exhaust delay by shift type: 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:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	> 120 Nm = 0 (0 is enable, 1 is enable) = TRUE # clutch fill phase > pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: C1 Torque-Based Pressure Clip OR C2 Torque-Based Pressure Clip OR C4 Torque-Based Pressure Clip OR C5 Torque-Based Pressure Clip OR C6 Torque-Based Pressure Clip clip thresholds for all other shift types: aaraae 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 Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: C1 Oncoming Post-Torque Phase Delay + wheel slip delay OR C2 Oncoming Post-Torque Phase Delay + wheel slip delay OR	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>C3 clutch slip speed valid, all speed sensors are functional for lever node clutch slip speed calculation</p> <p>*****</p> <p>conditions needed to trigger test:</p> <p>(current shift type AND shift type enable cal for current shift type)</p> <p>OR</p> <p>(Intrusive shift active AND shift type enable cal for current shift</p>	<p>Clutch Clip Press GS Shifts closed throttle downshift: C1 Clutch Clip Press CD Shifts C2 Clutch Clip Press CD Shifts C4 Clutch Clip Press CD Shifts C5 Clutch Clip Press CD Shifts C6 Clutch Clip Press CD Shifts negative torque upshift: Clutch Clip Press NU Shifts open throttle downshift: Clutch Clip Press PD Shifts</p> <p>= TRUE</p> <p>*****</p> <p># Garage shift</p> <p>Clutch Stuck On Shift = Type Enable (0 table value will disable, 1 will enable)</p> <p>= FALSE</p> <p>= 0 (0 will enable, 1 will enable)</p>	<p>C4 Oncoming Post-Torque Phase Delay + wheel slip delay OR C5 Oncoming Post-Torque Phase Delay + wheel slip delay OR C6 Oncoming Post-Torque Phase Delay + wheel slip delay</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ***** DTCs not fault pending	= 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 = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ***** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not fault active</p> <p>DTCs not test fail this key on</p> <p>*****</p> <p>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</p>	<p>P0723 P0722 P077D P077C P176C P176D P176B P17D6</p> <p>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</p> <p>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 *****</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>automatic transmission shift due to two conditions:</p> <p>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.</p> <p>AND</p> <p>That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold.</p> <p>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:</p> <p>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.</p> <p>OR</p>			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>The automatic transmission shift completes, range shift state = range shift complete.</p> <p>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 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</p>			

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

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 input/turbine speed sensor 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, fail count > 16 counts 6.25 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 Illum.
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, fail count > 16 counts 6.25 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 Illum.
Transmission Fluid Pressure (TFP) Sensor A Performance (8 speed specific)	P0841	This monitor diagnoses the lube hydraulic circuit pressure sensor for electrical performance faults. The monitor measures the pressure sensor response just after engine crank occurs to verify the transition from zero pressure to the expected minimum dynamic pressure, or, the monitor measures the pressure sensor response just after engine shutdown occurs to verify the transition from the minimum dynamic pressure to zero pressure.	post engine crank evaluation: when lube pressure sensor raw pressure, update post engine crank fail time	< 40.0 kPa	post engine crank evaluation: engine crank evaluation calibration enable raw lube pressure at start of evaluation (OBD power mode AND OBD power mode previous) P0842 fault active P0843 fault active system hydraulic pressure available when engine speed, update engine crank delay time engine crank delay time	= 1 Boolean < 40.0 kPa = CRANK # CRANK = FALSE Boolean = FALSE Boolean = TRUE Boolean > 200 RPM > lube pressure sensor engine crank delay time	post engine crank fail time > lube pressure sensor post engine crank final fail time 6.25 millisecond update rate	
			post engine shutdown evaluation: lube pressure sensor raw pressure	> 40.0 kPa	post engine shutdown evaluation: engine shutdown evaluation calibration enable raw lube pressure at start of evaluation ((OBD power mode OR OBD power mode) AND OBD power mode previous) P0842 fault active P0843 fault active when system hydraulic pressure available, update engine shutdown delay time engine shutdown delay time	= 1 Boolean > 40.0 kPa = OFF = ACC = RUN = FALSE Boolean = FALSE Boolean = FALSE Boolean > lube pressure sensor engine shutdown delay time	post engine shutdown fail time > 0.400 seconds 6.25 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Pressure (TFP) Sensor A Circuit Low Voltage (8 speed specific)	P0842	Controller specific diagnostic monitor, diagnoses the lube hydraulic circuit pressure sensor for an electrical open circuit failure or an electrical short to ground circuit failure based on the raw sensor % duty cycle signal.	pressure sensor raw % duty cycle	<p>< 9.00 % duty cycle</p> <p>(< 0.5 Q impedance between signal and controller ground</p> <p>OR</p> <p>> 200 K Q impedance between signal and controller ground)</p> <p>When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time</p>	<p>diagnostic monitor enable calibration</p> <p>battery voltage for time</p> <p>run crank voltage for time</p>	<p>= 1 Boolean</p> <p>>9.00 volts > 0.100 seconds</p> <p>>9.00 volts > 0.100 seconds</p>	<p>fail time > 0.300 seconds in sample window of 0.500 seconds</p> <p>6.25 millisecond update rate</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Transmission Fluid Pressure (TFP) Sensor A Circuit High Voltage (8 speed specific)	P0843	Controller specific diagnostic monitor, diagnoses the lube hydraulic circuit pressure sensor for an electrical short to voltage circuit failure based on the raw sensor % duty cycle signal.	pressure sensor raw % duty cycle	<p>> 91.00 % duty cycle</p> <p>(< 0.5 Q impedance between signal and controller voltage source)</p> <p>When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time</p>	<p>diagnostic monitor enable calibration</p> <p>battery voltage for time</p> <p>run crank voltage for time</p>	<p>= 1 Boolean</p> <p>>9.00 volts > 0.100 seconds</p> <p>>9.00 volts > 0.100 seconds</p>	<p>fail time > 0.300 seconds in sample window of 0.500 seconds</p> <p>6.25 millisecond update rate</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 > 0.10 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode)) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 > 0.10 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 Illum.
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	> 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 > 0.10 seconds out of sample time > 0.50 seconds 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 Illum.
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	> 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 > 0.10 seconds out of sample time > 0.50 seconds 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 Illum.
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.	Enabled = Run or Crank >=11.00 Volts	Diagnostic executes in 25ms loop.	Emissions Neutral Diagnostics - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Internal Control Module Redundant Memory Performance	P16F3	<p>The diagnostic monitor is a rationalization of command values: command clutch pressures, command gear, and commanded direction. The monitor is broken up into three fault detection routines, command pressure (tie up) fault detection, command gear/shift fault detection, and commanded direction.</p> <p>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</p>	<p>For each combination of clutches which can lead to an output lock:</p> <p>Commanded Clutch PCS Pressure</p> <p>OR</p> <p>For each combination of clutches which can lead to a mult-clutch tie-up:</p> <p>Commanded Clutch PCS Pressure</p>	<p>> Cmnd Tie Up Monitor Output Lock Thresh * Clutch PCS Pressure Gain + Clutch PCS Pressure Offset</p> <p>transfer case range is 4WD Low: > Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo * Clutch PCS Pressure Gain + Clutch PCS Pressure Offset</p> <p>Else > Cmnd Tie Up Monitor Multi-Clutch Thresh * Clutch PCS Pressure Gain +</p>				Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		<p>rational, one or more of 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.</p> <p>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 transfer case range</p>	<p>if above criteria met, increment fail timer by 3.125 6.25 ms update rate</p>	<p>Clutch PCS Pressure Offset</p>	<p>commanded tie up monitor enable calibration</p> <p>vehicle speed OR commanded tie up fault pending OR (vehicle speed AND monitor enabled in previous loop)</p> <p>High Side Driver 1 On High Side Driver 2 On</p> <p>Service Fast Learn OR (Service Fast Learn AND Vehicle Speed)</p> <p>Number of fill factor conditions below which need to be met</p> <p>Clutch 1 volume fill factor Clutch 2 volume fill factor Clutch 3 volume fill factor Clutch 4 volume fill factor Clutch 5 volume fill factor Clutch 6 volume fill factor SOWC volume fill factor (GF9 only)</p> <p>output shaft deceleration</p>	<p>= 1 (1 to enable, 0 to disable)</p> <p>> 5.0 KPH</p> <p>= TRUE</p> <p>> 5.0 KPH</p> <p>= TRUE</p> <p>= TRUE = TRUE</p> <p>= FALSE = TRUE</p> <p>> 8.0 KPH</p> <p>= 3 Filled Clutches</p> <p>> 1.00 > 1.00 > 1.00 > 1.00 > 1.00 > 1.00 > 1.00</p> <p>Transfer case range is 4WD Lo: < -441.3 RPM/sec</p>	<p>when fail timer reaches 100, set DTC</p> <p>>2.50 sec</p>	

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		The command direction fault detection is designed to verify the clutches commanded on will result in the commanded direction (e.g. reverse clutches are being commaned on when the commanded range is reverse). This is used to prevent an incorrect direction safety hazard.			DTCs Not Fault Active DTCs Not TestFailed This Key On	Else < -163.5 RPM/sec P077C, P077D P0723, P0722		
			Commanded Gear AND at least one of the following: Previous Loop Commanded Gear and current loop commanded OR current commanded gear and previous loop commanded gear OR incorrect downshift fail timer if above conditions are met, increment incorrect downshift fail timer 6.25 ms update rate Alternatively, if commanded gear increment invalid commanded gear fail timer	< Shift Monitor Lowest Allowed Gear > Current Loop Commanded Gear (i.e a downshift) = a forward, locked gear = a forward, locked gear # a forward, locked gear >0.0 = NULL			when incorrect downshift fail timer reaches 4.63 sec, set DTC when invalid fail timer reaches 4.63 sec, set DTC	
					command shift monitor	= 1 (1 to enable, 0 to		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			6.25 ms update rate		enable calibration Service Fast Learn OR (Service Fast Learn AND Vehicle Speed) High Side Driver 1 On High Side Driver 2 On DTCs Not Fault Active DTCs Not Test Failed This Key On	disable) = FALSE = TRUE > 8.0 KPH = TRUE = TRUE P077C, P077D, P0721 P0723, P0722, P172A, P172B	>2.50 sec	
			Criteria based on driver requested range: Drive: An invalid combination of drive clutches commanded on* driver requested range Incorrect drive enable calibration Incorrect drive disable calibration Reverse: An invalid combination of reverse clutches commanded on* driver requested range	 Illegal Drive Clutch = Combinations = Drive = 1 (1 to enable, 0 to disable) = 0 (0 to enable, 1 to disable) = Illegal Reverse Clutch Combinations = Reverse			Fault pending fail timer Clutch Connectivity Wrong > Direction FP Fail time based on driver requested range: Incorrect Drive Fail Time Incorrect Reverse Fail Time Incorrect Neutral Fail Time Incorrect Park Fail Time 6.25 ms update rate	

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Incorrect reverse enable calibration	= 1 (1 to enable, 0 to disable)	Current driver requested range	= previous driver requested range	>	
			Incrorrect reverse disable calibration	= 0 (0 to enable, 1 to enable)			Incorrect Direction Range Change Delay Time	
			Neutral:		(vehicle speed AND vehicle speed OR Fail Timer)	> -6.00 KPH		
		An invalid combinatio of neutral clutches commanded on*	= Illegal Park-Neutral Clutch Combinations			> 6.00 KPH		
						>0.0		
		driver requested range	= Neutral		clutch connectivity monitor enable OR clutch connectivity monitor disable	= 0 (1 to enable, 0 to disable)		
		Incorrect neural enable calibration	= 1 (1 to enable, 0 to disable)			= 1 (0 to enable, 1 to disable)		
		Incrorrect neutral disable calibration	= 0 (0 to enable, 1 to disable)		Service Fast Learn OR (Service Fast Learn AND Vehicle Speed)	= FALSE		
		Park:				= TRUE		
		An invalid combination of reverse clutches commanded on*	= Illegal Park-Neutral Clutch Combinations		High Side Driver 1 On High Side Driver 2 On	= TRUE = TRUE		
		driver requested range	= Park		DTCs Not Fault Active	P077C, P077D, P0721	>2.50 sec	
		Incorrect park enable calibration	= 1 (1 to enable, 0 to disable)		DTCs Not Test Failed This Key On	P0723, P0722, P172A, P172B		
		Incrorrect park disable calibration	= 0 (0 to enable, 1 to disable)		* Note, clutch is considered "on" when the following conditions are met: Clutch commanded pressure	> Clutch Connectivity C1 On Threshold OR >		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
						Clutch Connectivity C2 On Threshold OR > Clutch Connectivity C3 On Threshold OR > Clutch Connectivity C4 On Threshold OR > Clutch Connectivity C5 On Threshold OR > Clutch Connectivity C6 On Threshold OR > Clutch Connectivity C7 On Threshold		
					Current clutch pressure command * 0.25 + 1st derivative of pressure command * 0.25 + 2nd derivative of pressure command * -0.25 + 3rd derivative of pressure command * -0.25	= 0.0 OR > -1.00 kPa		
			ratio monitor fault pending Output speed direction OR Output speed direction	= TRUE = FORWARD = REVERSE			increment fail timer by Ratio Monitor Fail Increment Rate (Percent per Loop) when timer	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Plus following criteria based on driver requested range:				reaches 100, set fault pending	
			Drive:				Fail time based on driver requested range (once fault pending has matured):	
			driver requested range	= Drive				
			Incorrect drive enable calibration	= 1 (1 to enable, 0 to disable)				
			Incorrect drive disable calibration	= 0 (0 to enable, 1 to disable)			Incorrect Drive Fail Time	
			Reverse:				Incorrect Reverse Fail Time	
			driver requested range	= Reverse				
			Incorrect reverse enable calibration	= 1 (1 to enable, 0 to disable)			Incorrect Neutral Fail Time	
			Incorrect reverse disable calibration	= 0 (0 to enable, 1 to enable)	*****	*****	Incorrect Park Fail Time	
			Neutral:		If all conditions below are met, increment ratio monitor fault pending timer:		6.25 ms update rate	
			driver requested range	= Neutral				
			Incorrect neutral enable calibration	= 1 (1 to enable, 0 to disable)	vehicle speed OR vehicle speed (note: fault pending will remain latched if vehicle speed max thresholds are exceeded)	> 0.50 AND < 6.00 KPH <-0.50 AND >-6.00 KPH		
			Incorrect neutral disable calibration	= 0 (0 to enable, 1 to disable)				
			Park:					
			driver requested range	= Park	Monitor Armed	= TRUE		
			Incorrect park enable calibration	= 1 (1 to enable, 0 to disable)	Measured output speed direction	= REVERSE or FORWARD		
			Incorrect Park disable	= 0 (0 to enable, 1 to enable)	Input speed default			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			calibration	disable)	direction Current driver requested range based on PRNDL position: driver requested range AND transmission measured speed ratio AND Loop-to-loop change in measured ratio AND (Direction By Ratio OR Direction By Clutch Slip) driver requested range AND transmission measured speed ratio AND Loop-to-loop change in measured speed ratio AND (Direction By Ratio OR Direction By Clutch Slip) ***** Monitor Armed Enables: if Range Shift enable cal: THEN Range Shift State OR if Attained Gear enable cal:	= REVERSE or FORWARD = previous driver requested range = Reverse > 0.40 > -8.00 = FORWARD = a FORWARD Gear = Drive < -0.40 < 8.00 = REVERSE = REVERSE ***** = 0 (1 to enable, 0 to disable) = Range Shift Complete = 0 (1 to enable, 0 to disable)	> Incorrect Direction Range Change Delay Time	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					THEN Attained Gear ALSO Engine Speed Ratio Monitor enable cal OR Ratio Monitor disable cal ***** Direction By Ratio: Direction By Ratio Enable cal (vehicle speed OR vehicle speed) WHEN: Measured output speed direction AND Absolute measured gear ratio THEN Direction by Ratio ELSE WHEN Measured output speed direction AND Absolute measured gear ratio THEN Direction by Ratio ***** Direction by Clutch Slip: C1 clutch slio valid	# Neutral AND # Park > 400 RPM = 0 (1 to enable, 0 to disable) = 1 (0 to enable, 1 to disable) ***** = 1 (1 to enable, 0 to disable) > 0.50 KPH < -0.50 KPH = reverse > 3.75 AND < 3.87 = REVERSE = forward > 4.51 AND < 0.03 = FORWARD ***** = TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					C2 clutch slip valid C5 clutch slip valid C3C4 dual clutch slip valid C3C6 dual clutch slip valid C4C6 dual clutch slip valid Direction by Clutch Slip Enable cal (vehicle speed OR vehicle speed) for each clutch: current clutch slip clutch held combination matches a valid gear in: ***** General enables: Genral Ratio Monitor Detection enable cal Transmission Type Service Fast Learn OR (Service Fast Learn AND Vehicle Speed) High Side Driver 1 On High Side Driver 2 On DTCs Not Fault Pending	= TRUE = TRUE = TRUE = TRUE = TRUE = 0 (1 to enable, 0 to disable) > 0.50 KPH < -0.50 KPH Ratio Monitor Slip < Threshold (if slip condition met, clutch held = 1, else held = 0) Ratio Monitor Clutch States ***** = 1 (1 to enable, 0 to disable) = RWD 10 Spd Automatic = FALSE = TRUE > 8.0 KPH = TRUE = TRUE P0716, P0717, P07BF, P07C0. P0721. P0722.	>2.50 sec	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs Not Fault Active</p> <p>DTCs Not Test Failed This Key On</p>	<p>P0723, P077C, P077D, P172A, P172B, P1783, P17CE</p> <p>P0716, P0717, P07BF, P07C0, P077C, P077D, P0721, P17CE, P1783</p> <p>P0721, P0722, P0723, P172A, P172B</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Output Speed Sensor Circuit Forward Direction Error	P172A	The TOS sensor is a directional sensor, and raw TOS direction is rationalized based on attained gear and multiple speed sensors. Attained gear is a true indication of gear based on measured gear ratio, TISS/TOSS. If the raw TOS direction is not a forward gear but attained gear is a forward gear, and, TISS and intermediate speed sensors confirm consistent direction, the raw TOS direction is in error.	(raw TOS direction OR raw TIS direction OR intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	# forward # forward intermediate speed sensor 1 or 2 # predicted direction intermediate speed sensor 1 or 2 # predicted direction > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	speed sensor directional rationality =enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds > 1st gear < 10th gear = FALSE = range shift complete > 1.00 seconds	2.50 seconds	Type A, 1 Trips
			(raw TOS direction OR intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	# forward intermediate speed sensor 1 or 2 # predicted direction intermediate speed sensor 1 or 2 # predicted direction > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	>9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds > 1st gear < 10th gear = FALSE = range shift complete > 1.00 seconds		
			(raw TOS direction OR raw TIS direction OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	# forward # forward intermediate speed sensor 1 or 2 # predicted direction > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete)	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enable time	> 1.00 seconds		
			(raw TOS direction OR raw TIS direction OR intermediate speed sensor 1 direction raw) AND attained gear AND attained gear	# forward # forward intermediate speed sensor 1 or 2 # predicted direction > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnosic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds > 1st gear < 10th gear = FALSE = range shift complete > 1.00 seconds	2.50 seconds	
			(raw TOS direction OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	# forward intermediate speed sensor 1 or 2 # predicted direction > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnosic monitor enable TOSS sensor type must be directional engine speed engine speed time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM >	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	engine speed time for transmission hydraulic pressure available >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds > 1st gear < 10th gear = FALSE = range shift complete > 1.00 seconds		
			(raw TOS direction OR intermediate speed sensor 1 direction raw) AND attained gear AND attained gear	# forward intermediate speed sensor 1 or 2 # predicted direction > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnosic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds > 1st gear < 10th gear = FALSE	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					range shift state (auto trans shift complete) enable time	= range shift complete > 1.00 seconds		
			(raw TOS direction OR raw TIS direction) AND attained gear AND attained gear	# forward # forward > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnosic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time (attained gear AND attained gear) P0721 Fault Active range shift state (auto trans shift complete) enable time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds > 1st gear < 10th gear = FALSE = range shift complete > 1.00 seconds	2.50 seconds	
			raw TOS direction attained gear	# forward > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnosic monitor enable TOSS sensor type must be directional	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional	2.50 seconds	

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	unintended decel test system fault unintended decel test system fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active AND unintended deceleration latent fault fail count)) UPDATE unintended decel test system fault time *default gear option active occurs when emission MIL active due to transmission default gear	= FALSE = TRUE = TRUE = FALSE = TRUE = 100 counts	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE continue execute only IF: calibrated for a back up signal to longitudinal acceleration and total brake axle torque using and wheel speed or TOSS OR U0121 (loss comm ABS/EBCM) occurs OR brake pedal position fault THEN SET unintended decel test system fault occur = TRUE	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE = TRUE > 18.0 KPH > 120.0 seconds = CeTSDD_e_WhlSpdBac kUp	unintended decel test system fault time > 10.0 seconds UPDATE unintended deceleration latent fault fail count SET unintended decel test system fault = TRUE unintended deceleration latent fault fail count > 100 counts 25 millisecond update rate	Type A, 1 Trips
			ECM range sensor fault ECM range sensor fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active	= FALSE = TRUE = TRUE = FALSE = TRUE	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE	ECM range sensor fault time > 10.0 seconds UPDATE ECM range sensor latent fault fail count SET ECM range sensor fault = TRUE	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		counts the run/crank ignition cycles before the latent fault DTC is set fault active.	AND ECM range sensor latent fault fail count)) UPDATE ECM range sensor fault time *default gear option active occurs when emission MIL active due to transmission default gear	= 100 counts	met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE IF ECM P2802 fault active OR ECM P2803 fault active SET ECM range sensor fault occur = TRUE	= TRUE > 18.0 KPH > 120.0 seconds = TRUE = TRUE	ECM range sensor latent fault fail count > 100 counts 25 millisecond update rate	
			TCM range sensor fault TCM range sensor fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active AND TCM range sensor latent fault fail count)) UPDATE TCM range sensor fault time *default gear option active occurs when emission MIL active due to transmission default gear	= FALSE = TRUE = TRUE = FALSE = TRUE = 255 counts	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE IF TCM P0707 fault active OR TCM P0708 fault active SET TCM range sensor fault occur = TRUE	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE = TRUE > 18.0 KPH > 120.0 seconds = TRUE = TRUE	TCM range sensor fault time > 409.0 seconds UPDATE TCM range sensor latent fault fail count SET TCM range sensor fault = TRUE TCM range sensor latent fault fail count > 255 counts 25 millisecond update rate	
			TOSS fault TOSS fault occur RunCrankVoltageMet (*default gear option	= FALSE = TRUE = TRUE = FALSE	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage	= 1 Boolean = 6.00 volts	TOSS fault time > 10.0 seconds UPDATE TOSS latent fault fail	

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			active OR (*default gear option active AND TOSS sensor latent fault fail count)) UPDATE TOSS fault time *default gear option active occurs when emission MIL active due to transmission default gear	= TRUE = 100 counts	for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE IF P077C or P077D fault active OR P0722 or P0723 test fail this key on SET TOSS fault occur = TRUE	> 12.5 milliseconds = FALSE = TRUE > 18.0 KPH > 120.0 seconds = TRUE = TRUE	SET TOSS fault = TRUE TOSS latent fault fail count > 100 counts 25 millisecond update rate	
			tie-up fault tie-up fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active AND tie-up latent fault fail count)) UPDATE tie-up fault time *default gear option active occurs when emission MIL active due to transmission default gear	= FALSE = TRUE = TRUE = FALSE = TRUE = 100 counts	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE IF P077C or P077D fault active OR P0722 or P0723 test fail this key on	= 1 Boolean = 5.00 volts = 12.5 milliseconds = FALSE = TRUE > 18.0 KPH > 120.0 seconds = TRUE = TRUE	tie-up fault time > 10.0 seconds UPDATE tie-up latent fault fail count SET tie-up fault = TRUE tie-up latent fault fail count > 100 counts 25 millisecond update rate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					SET tie-up fault occur = TRUE			
			trans range fault trans range fault occur	= FALSE = TRUE	test enable calibration	= 1 Boolean	trans range fault time > 10.0 seconds	
			RunCrankVoltageMet (*default gear option active OR (*default gear option active AND tie-up latent fault fail count))	= TRUE = FALSE = TRUE = 200 counts	RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time	> 5.00 volts > 12.5 milliseconds	UPDATE trans range latent fault fail count SET trans range fault = TRUE	
			UPDATE trans range fault time		vehicle speed trip criteria met when: vehicle speed trip criteria met	= FALSE	trans range latent fault fail count > 200 counts	
			*default gear option active occurs when emission MIL active due to transmission default gear		RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE	= TRUE > 18.0 KPH > 120.0 seconds	25 millisecond update rate	
					IF [(P0717 or P07C0 or P07BF fault active or P077D or P077C fault active or P723 test fail this key on or P0723 or P077D or P077C or P0722 fault pending or P0716 or P07C0 or P07BF or P0717 fault pending or P172B or P172A or P0721 fault pending or P1783 or P17CE fault active or	= TRUE = TRUE = TRUE = TRUE = TRUE = TRUE = TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					P1783 or P17CE fault pending or P172A or P172B test fail this key on or P0721 fault active) AND (safety disable cal not FALSE OR safety enable cal TRUE)] OR [(P176C or P160E or P0963 or P078F or P0707 fault pending or P18AA fault active) AND (safety disable cal not FALSE OR safety enable cal TRUE)] SET trans range fault occur = TRUE	= TRUE = TRUE = TRUE = 1 Boolean = 0 Boolean = TRUE = TRUE = 1 Boolean = 0 Boolean		
			tie-up test disable fault tie-up test disable fault occur RunCrankVoltageMet (*default gear option active OR (*default gear option active AND tie-up test latent fault fail count)) UPDATE tie-up test latent fault time *default gear option active	= FALSE = TRUE = TRUE = FALSE = TRUE = 100 counts	test enable calibration RunCrankVoltageMet = TRUE when: run crank voltage for run crank voltage time vehicle speed trip criteria met when: vehicle speed trip criteria met RunCrankVoltageMet vehicle speed for vehicle speed time THEN SET vehicle speed trip criteria met = TRUE	= 1 Boolean > 5.00 volts > 12.5 milliseconds = FALSE = TRUE > 18.0 KPH > 120.0 seconds	tie-up test latent fault time > 10.0 seconds UPDATE tie-up test latent fault fail count SET tie-up test disable fault = TRUE tie-up test latent fault fail count > 100 counts 25 millisecond update rate	

24OBDG03D Part 1 TCM Summary Tables

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					active, test fail this key on OR P17C7 fault pending, fault active, test fail this key on OR P17CC fault pending, fault active, test fail this key on OR P17CD fault pending, fault active, test fail this key on OR P17CE fault pending, fault active, test fail this key on OR P17D3 fault pending, fault active, test fail this key on OR P17D6 fault pending, fault active, test fail this key on) SET tie-up test disable fault occur = TRUE	= TRUE = TRUE = TRUE = TRUE = TRUE = TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	$\text{delta1} = \text{ABS}(\text{transmission input speed} - (\text{transmission output speed} * \text{gear ratio commanded}))$ update fail time 25 millisecond update rate	> 10.0 RPM	diagnostic monitor enable speed sensor configuration calibration is single OR dual ratio calibration is function of command gear and intermediate speed sensor when not REVERSE ratio calibration is function of command gear and intermediate speed sensor when REVERSE ***** delay time updates when: estimated transmission intermediate speed (transmission input	= 1 Boolean = CeTNSR_e_NSPD_SingleSpdSnr 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	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 Illum.
					speed / ratio calibration) 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	see supporting tables P176B minimum transmission input speed to enable fail > evaluation see supporting tables P176B holding clutch = states see supporting tables = REVERSE OR = 1st thru 10th ***** > 240.0 RPM > 36.0 RPM = nueutral idle mode ON = range shift complete = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE >9.00 volts = FALSE	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 Illum.
					service fast learn active run crank voltage transmission hydraulic pressure available: engine speed	>9.00 volts > 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 Illum.
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 sensor raw voltage, update fail time, 12.5 millisecond update rate	< 0.25 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 = 1.00 Boolean = FALSE = FALSE > 10.00 volts > 10.00 volts = FALSE = FALSE	fail time > 0.05 seconds, update fail count, fail count > 40.00 counts 6.25 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 Illum.
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 sensor raw voltage, update fail time, 12.5 millisecond update rate	> 4.75 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 = 1.00 Boolean = FALSE = FALSE > 10.00 volts > 10.00 volts = FALSE = FALSE	fail time > 0.05 seconds, update fail count, fail count > 40.00 counts 6.25 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 Illum.
Input Speed Sensor Direction Not Plausible - Forward	P1783	The TIS sensor is a directional sensor, and raw TIS direction is rationalized based on attained gear and multiple speed sensors. Attained gear is a true indication of gear based on measured gear ratio, TISS/TOSS. If the raw TIS direction is not reverse but attained gear is reverse, or, if the raw TIS direction is not forward but attained gear is a forward gear, the raw TIS direction is in error.	raw TIS direction AND attained gear	# FORWARD = REVERSE	when the following conditions are met update the enable time: diagnotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds	2.50 seconds	Type A, 1 Trips
			raw TIS direction AND attained gear AND attained gear	# FORWARD > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnotic monitor enable TOSS sensor type must be directional engine speed engine speed time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	>9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds		
			intermediate speed sensor 1 direction raw AND TIS direction AND attained gear	intermediate speed sensor 1 or 2 # predicted direction # FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete)	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enable time			
			intermediate speed sensor 1 direction raw AND raw TIS direction AND attained gear AND attained gear	intermediate speed sensor 1 or 2 # predicted direction # FORWARD > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds	2.50 seconds	
			intermediate speed sensor 2 direction raw AND TIS direction AND attained gear	intermediate speed sensor 1 or 2 # predicted direction # FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM >	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds		
			intermediate speed sensor 2 direction raw AND raw TIS direction AND attained gear AND attained gear	intermediate speed sensor 1 or 2 # predicted direction # FORWARD > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					range shift state (auto trans shift complete) enable time	> 1.00 seconds		
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND TIS direction AND attained gear	intermediate speed sensor 1 or 2 # predicted direction intermediate speed sensor 1 or 2 # predicted direction # FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds	2.50 seconds	
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) ■AND	intermediate speed sensor 1 or 2 # predicted direction intermediate speed sensor 1 or 2 # predicted direction	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM ≥	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			raw TIS direction AND attained gear AND attained gear	# FORWARD > 1st gear < 10th gear	engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Intermediate Speed Sensor 1 Direction Not Plausible - Forward	P178F	The intermediate speed sensor 1 is a directional sensor, and raw intermediate speed sensor 1 direction is rationalized based on attained gear. Attained gear is a true indication of gear based on measured gear ratio, TISS/TOSS. Intermediate speed sensor 1 direction can be predicted, based on a function of the attained gear. When the raw intermediate speed sensor 1 direction does not correlate to the predicted direction and does not correlate to the attained gear, the intermediate speed sensor 1 directional is in error.	intermediate speed sensor 1 direction raw AND attained gear	intermediate speed sensor 1 or 2 # predicted direction = REVERSE	when the following conditions are met update the enable time: diagnosic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds	2.50 seconds	Type A, 1 Trips
			intermediate speed sensor 1 direction raw AND attained gear AND attained gear	intermediate speed sensor 1 or 2 # predicted direction > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnosic monitor enable TOSS sensor type must be directional engine speed engine speed time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	>9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds		
			intermediate speed sensor 1 direction raw AND TIS direction AND attained gear	intermediate speed sensor 1 or 2 # predicted direction # FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete)	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					enable time			
			intermediate speed sensor 1 direction raw AND raw TIS direction AND attained gear AND attained gear	intermediate speed sensor 1 or 2 # predicted direction # FORWARD > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds	2.50 seconds	
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear	intermediate speed sensor 1 or 2 # predicted direction intermediate speed sensor 1 or 2 # predicted direction = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM >	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds		
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw) AND attained gear AND attained gear	intermediate speed sensor 1 or 2 # predicted direction intermediate speed sensor 1 or 2 # predicted direction > 1st gear < 10th gear	when the following conditions are met update the enable time: diagnotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					range shift state (auto trans shift complete) enable time	> 1.00 seconds		
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw OR TIS direction) AND attained gear	intermediate speed sensor 1 or 2 # predicted direction intermediate speed sensor 1 or 2 # predicted direction # FORWARD = REVERSE	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM > engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds	2.50 seconds	
			(intermediate speed sensor 1 direction raw OR intermediate speed sensor 2 direction raw OR TIS direction) AND	intermediate speed sensor 1 or 2 # predicted direction intermediate speed sensor 1 or 2 # predicted direction / forward	when the following conditions are met update the enable time: diagnsotic monitor enable TOSS sensor type must be directional	speed sensor directional rationality = enable calibration = CeTOSR_e_Directional > 500.0 RPM ≥	2.50 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			attained gear AND attained gear	> 1st gear < 10th gear	engine speed engine speed time battery voltage for time service fast learn active run/crank voltage for time attained gear P0721 Fault Active range shift state (auto trans shift complete) enable time	engine speed time for transmission hydraulic pressure available seconds >9.00 volts > 0.100 seconds = FALSE >9.00 volt > 0.100 seconds = REVERSE = FALSE = range shift complete > 1.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Input Speed Sensor Direction Error	P17CE	The diagnostic monitor determines if the direction transmission input shaft 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.	input shaft speed sesnor raw direction when transitional period = FALSE AND input shaft speed sesnor raw direction when transitional period = FALSE OR input shaft speed sesnor raw when transitional period = TRUE update fail and sample time, update rate defined in Secondary Parameters	# FORWARD # REVERSE > 225.0 RPM	determine update rate: 6.26 millisecond update rate calibration, TRUE, update rate = 6.25 millisecond FALSE, update rate = 25 millisecond service mode \$04 active diagnostic monitor enable input shaft speed sesnor count sample period senor type calibration (senor type is directional) P17CE fault active OR P17CE test fail this key on 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	= 1 Boolean = FALSE = 1 Boolean # 0 counts = CeTISR_e_Directional = 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	fail time > 3.500 seconds out of sample time > 5.000 seconds update rate defined in Secondary Parameters	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 senor raw direction when transitional period = FALSE AND intermediate speed senor raw direction when transitional period = FALSE OR intermediate speed senor 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 senor count sample period P17D3 fault active OR P17D3 test fail this key on senor type calibration (senor type 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_Singl eSpdSnsr > 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

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Run/ Start Position Circuit Low	P2534	Detects a low ignition switch run/start position circuit. This diagnostic reports the DTC when this circuit 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	280 failures out of 280 samples 25 ms /sample	Type A, 1 Trips

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Ignition Switch Run/ Start Position Circuit High	P2535	Detects a high ignition switch run/start position circuit. This diagnostic reports the DTC when this circuit 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 of 280 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 Illum.
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 or an open circuit.	< 0.5 Q impedance between signal and controller ground OR > 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail count and increment sample count, otherwise increment only sample count	(ground short diagnostic monitor enable calibration OR open circuit diagnostic monitor enable calibration) high side drive 2 ON service mode \$04 active	= 1 Boolean = 1 Boolean = TRUE = FALSE	ground short fail count > 6 counts within sample count of 2,400 counts OR open circuit fail count > 6 counts within sample count of 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 Illum.
Pressure Control (PC) Solenoid D Stuck Off (GRW and 8SPD)	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 or at zero RPM. 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 millisecond update	> 200.0 RPM	<p>*****</p> <p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage)</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)</p> <p>TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled</p> <p>TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled</p> <p>service fast learn active</p> <p>service solenoid cleaning</p>	<p>*****</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= FALSE Boolean</p>	<p>fail time > 1.00 seconds, update fail count, fail count > 2 counts 6.25 millisecond update</p> <p>battery voltage time > 0.100 seconds</p> <p>run crank voltage time > 0.100 seconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 > 100.0 RPM > 2.00 % > 1,500.0 RPM = TRUE (all speed sensors are functional for lever node clutch slip speed calculation)	> 0.450 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 (GR10 C23467810R or 8SPD C23468) clutch pressure control solenoid.			C4 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ***** DTCs not fault pending DTCs not fault active	= mapped to line pressure, C4 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 = 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 P17D3 P17C5 P0721		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not test fail this key on</p> <p>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</p>	<p>AcceleratorPedalFailure CrankSensor_FA</p> <p>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</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 millisecond update	< 150.00 RPM < 100.00 RPM < 150.00 RPM			Base fail time: shift type is power down shift: fail time > 0.60 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 Illum.
		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			<p>*****</p> <p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage)</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)</p>	<p>*****</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p>	<p>Clutch Stuck On Fail Offset Time CD Shifts</p> <p>negative torque upshift: Clutch Clip Press NU Shifts</p> <p>clutch staging shift: Clutch Stuck On Fail Offset Time STGR Shifts</p> <p>update fail count, fail count > 3 counts 6.25 millisecond update</p> <p>battery voltage time > 0.100 seconds</p> <p>run crank voltage time > 0.100 seconds</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to the GF9 C4 C4, GR10C4 C23467810R, or 8 Speed C4 C23468 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 ((C4 off going clutch pressure control ramp time out complete AND off going clutch pressure ramp control ramp time out enable) OR C4 off going clutch command pressure)	= TRUE Boolean = TRUE Boolean = FALSE Boolean = FALSE Boolean = TRUE ***** # range shift complete = OFF GOING CLUTCH TEST > 100.0 RPM = TRUE = 0 (1 to enable, 0 to disable) < 350 kPa	all delay times exhaust delay by shift type: 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:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	> 135 Nm = 0 (0 is enable, 1 is enable) = TRUE # clutch fill phase > pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: C1 Torque-Based Pressure Clip OR C2 Torque-Based Pressure Clip OR C3 Torque-Based Pressure Clip OR C5 Torque-Based Pressure Clip OR C6 Torque-Based Pressure Clip clip thresholds for all other shift types:	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 Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: C1 Oncoming Post-Torque Phase Delay + wheel slip delay OR C2 Oncoming Post-Torque Phase Delay + wheel slip delay OR	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>garage shifts: Clutch Clip Press GS Shifts closed throttle downshift: C1 Clutch Clip Press CD Shifts C2 Clutch Clip Press CD Shifts C3 Clutch Clip Press CD Shifts C5 Clutch Clip Press CD Shifts C6 Clutch Clip Press CD Shifts negative torque upshift: Clutch Clip Press NU Shifts open throttle downshift: Clutch Clip Press PD Shifts</p> <p>C4 clutch slip speed valid, all speed sensors are functional for lever node clutch slip speed calculation</p> <p>*****</p> <p>conditions needed to trigger test:</p> <p>(current shift type AND shift type enable cal for current shift type)</p> <p>OR</p> <p>(Intrusive shift active AND shift type enable cal for aaraae shift</p>	<p>= TRUE</p> <p>*****</p> <p># Garage shift</p> <p>Clutch Stuck On Shift = Type Enable (0 table value will disable, 1 will enable)</p> <p>= FALSE</p> <p>= 0 (0 will enable, 1 will enable)</p>	<p>C3 Oncoming Post-Torque Phase Delay + wheel slip delay OR C5 Oncoming Post-Torque Phase Delay + wheel slip delay OR C6 Oncoming Post-Torque Phase Delay + wheel slip delay</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ***** DTCs not fault pending	= 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 = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ***** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not fault active</p> <p>DTCs not test fail this key on</p> <p>*****</p> <p>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</p>	<p>P0723 P0722 P077D P077C P176C P176D P176B P17D6</p> <p>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</p> <p>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 *****</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>automatic transmission shift due to two conditions:</p> <p>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.</p> <p>AND</p> <p>That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold.</p> <p>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:</p> <p>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.</p> <p>OR</p>			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>The automatic transmission shift completes, range shift state = range shift complete.</p> <p>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 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</p>			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
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	> 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 > 0.10 seconds out of sample time > 0.50 seconds 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 > 0.10 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 Illum.
Pressure Control (PC) Solenoid E Stuck Off (8SPD)	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 or at zero RPM. 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 Closest attained gear	> 200.0 RPM # 3rd gear	***** 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	***** = 0 Boolean = 0 Boolean >9.00 volts = 0 Boolean = 0 Boolean >9.00 volts = TRUE Boolean = TRUE Boolean	fail time > 1.00 seconds, update fail count, fail count > 2 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 Illum.
		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			service fast learn active service solenoid cleaning procedure active hydraulic pressure available ***** enable C5 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)	= FALSE Boolean = FALSE Boolean = TRUE ***** = FALSE = TRUE # initial startle mitigation gear = FALSE = 0 (0 to enable, 1 to disable) = FALSE > 100.0 RPM > 2.00 % > 1,500.0 RPM = TRUE (all speed	> 0.450 seconds	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		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 (8SPD C45678R) clutch pressure control solenoid.			C5 clutch slip speed valid C5 clutch pressured map (enable forward gear cal AND driver direction request AND Attained Gear) OR (enable reverse gear cal AND driver direction request AND Attained Gear) range shift state ***** DTCs not fault pending DTCs not fault active	sensors are functional for lever node clutch slip speed calculation) = mapped to line pressure, C5 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 = 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		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not test fail this key on</p> <p>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</p>	<p>P2739 P0960 P0964 P0968 P2718 P2727 P2736 P17CE P1783 P17D3 P17C5 P0721 AcceleratorPedalFailure CrankSensor_FA</p> <p>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</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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 millisecond update	< 50.00 RPM < 100.00 RPM < 50.00 RPM			Base fail time: shift type is power down shift: fail time > 0.60 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 Illum.
		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			<p>*****</p> <p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage)</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage)</p>	<p>*****</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts</p>	<p>Clutch Stuck On Fail Offset Time CD Shifts</p> <p>negative torque upshift: Clutch Clip Press NU Shifts</p> <p>clutch staging shift: Clutch Stuck On Fail Offset Time STGR Shifts</p> <p>update fail count, fail count > 3 counts 6.25 millisecond update</p> <p>battery voltage time > 0.100 seconds</p> <p>run crank voltage time > 0.100 seconds</p>	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
		is disabled. This diagnostic monitor is relative to the GF9 C5 C57R, GR10C5 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 > 100.0 RPM = TRUE = 0 (1 to enable, 0 to disable) < 350 kPa	all time delays exhaust delay by shift type: 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:	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(engine torque AND Primary oncoming stuck on torque enable cal) OR (primary oncoming clutch active primary on coming control state primary on coming commanded pressure)	> 120 Nm = 0 (0 is enable, 1 is enable) = TRUE # clutch fill phase > pressure clip threshold according to shift type: closed and open throttle upshifts: pressure clip threshold is dependent on the oncoming clutch: C1 Torque-Based Pressure Clip OR C2 Torque-Based Pressure Clip OR C3 Torque-Based Pressure Clip OR C4 Torque-Based Pressure Clip OR C6 Torque-Based Pressure Clip clip thresholds for all other shift types: aaraae 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 Post-torque phase delay for powered upshifts is dependent on the oncoming clutch: C1 Oncoming Post-Torque Phase Delay + wheel slip delay OR C2 Oncoming Post-Torque Phase Delay + wheel slip delay OR	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>Clutch Clip Press GS Shifts closed throttle downshift: C1 Clutch Clip Press CD Shifts C2 Clutch Clip Press CD Shifts C3 Clutch Clip Press CD Shifts C4 Clutch Clip Press CD Shifts C6 Clutch Clip Press CD Shifts negative torque upshift: Clutch Clip Press NU Shifts open throttle downshift: Clutch Clip Press PD Shifts</p> <p>C5 clutch slip speed valid, all speed sensors are functional for lever node clutch slip speed calculation</p> <p>*****</p> <p>conditions needed to trigger test:</p> <p>(current shift type AND shift type enable cal for current shift type) OR (Intrusive shift active AND shift type enable cal for current shift type)</p>	<p>C3 Oncoming Post-Torque Phase Delay + wheel slip delay OR C4 Oncoming Post-Torque Phase Delay + wheel slip delay OR C6 Oncoming Post-Torque Phase Delay + wheel slip delay</p> <p>= TRUE</p> <p>*****</p> <p># Garage shift</p> <p>Clutch Stuck On Shift = Type Enable (0 table value will disable, 1 will enable)</p> <p>= FALSE</p> <p>= 0 (0 will enable, 1 will enable)</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 been initalized OR transitioning to a different clutch controller) current clutch solenoid test state ***** DTCs not fault pending	= 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 = TRUE = TRUE transitions to TestState or TUT_HOLD (see note below about state transitions) ***** P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>DTCs not fault active</p> <p>DTCs not test fail this key on</p> <p>*****</p> <p>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 durina an</p>	<p>P0723 P0722 P077D P077C P176C P176D P176B P17D6</p> <p>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</p> <p>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 *****</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>automatic transmission shift due to two conditions:</p> <p>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.</p> <p>AND</p> <p>That off going clutch pressure control solenoid stuck on diagnostic monitor currently executing passes, the corresponding clutch slip speed > clutch slip speed fail threshold.</p> <p>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:</p> <p>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.</p> <p>OR</p>			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>The automatic transmission shift completes, range shift state = range shift complete.</p> <p>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 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</p>			

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Pressure Control (PC) Solenoid E Control Circuit Open	P2727	Controller specific circuit diagnoses 9 speed C57R, 10 speed C1356789, 8 speed C45678R clutch solenoid, orCVTTCC 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	> 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 > 0.10 seconds out of sample time > 0.50 seconds 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 > 0.10 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 Illum.
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	> 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
Auxiliary Transmission Fluid Pump Control Circuit Open	P2796	Controller specific auxiliary transmission fluid pump motor control circuit diagnoses the pump motor and wiring for an open circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range indicates an open circuit</p> <p>Controller specific circuit voltage thresholds are set to meet the following controller specification for an open circuit</p> <p>update fail and sample count</p>	> 200 K Q impedance between signal and controller ground	<p>diagnostic report enable diagnostic monitor enable</p> <p>run crank voltage battery voltage battery voltage</p> <p>(pump is fed by high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)</p> <p>OR</p> <p>(pump is fed by high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)</p> <p>OR</p> <p>(pump is fed by high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)</p> <p>OR</p> <p>pump is not fed by any HSD</p>	<p>= 1 Boolean = 1 Boolean</p> <p>> 5.00 volts > 9.00 volts < 15.0 volts</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will enable)</p>	<p>> 20 fail counts out of > 25 sample counts update rate 100 milliseconds</p> <p>> 25 milliseconds</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Performance	P2797	Detects when the transmission auxiliary pump 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 or transmission auxiliary pump system.	Transmission turbine speed is greater than predicted turbine speed during autostart event, update initial fail count	P2797 predicted > turbine speed error Refer to "Transmission Supporting Tables" for details	<p>diagnosis enable cal</p> <p>PRNDL state defaulted</p> <p>Transmission shift lever position</p> <p>Propulsion system active</p> <p>Ignition voltage Ignition voltage</p> <p>Transmission fluid temp Transmission fluid temp</p>	<p>= 1 (1 to enable, 0 to disable) = False</p> <p>= Forward range A</p> <p>= True</p> <p>> 9.00 volts < 31.99 volts</p> <p>> 0.00 °C < 110.00 °C</p>	<p>> 12 counts (initial fail count) Frequency = 12.5ms</p> <p>Once the above counts are achieved then increment the final fail counter once. The final fail counter can only increment once per autostart event</p> <p>> 3 counts (final fail counter)</p> <p>If above counter is greater than threshold then report DTC failed.</p> <p>Frequency = 12.5ms</p> <p>propulsion system active for > 0.00 sec</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					engine 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 counter must achieve the fail threshold in less than the time-out time. ***** If vehicle is launched then: Transmission gear ratio	= Engine off > 1.200 seconds < 5.0 RPM > 13.0 RPM > 450.0 RPM P2797 hydraulic > pressure delay Refer to "Transmission Supporting Tables" for details < 0.38 seconds = 4.560 1st gear ratio = 2.970 2nd gear ratio = 2.070 3rd gear ratio = 1.680 4th gear ratio = 1.270 5th gear ratio = 1.000 6th gear ratio		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Trans 1st gear ratio Trans 1st gear ratio Trans gear ratio not 1st gear Trans gear ratio not 1st gear Valid transmission gear ratio achieved time OR If vehicle is not launched but autostart occurs then: Turbine speed Turbine speed less then above threshold for Note: During an autostart event the lack of hydraulic pressure will result in momentary clutch slip in 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	< 1.120 % of 1st gear ratio > 0.880 % of 1st gear ratio < 1.070 % of gear ratio > 0.930 % of gear ratio > 0.500 seconds < 5.00 RPM > 0.500 seconds		

[illegible]

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Circuit Low	P2798	Controller specific auxiliary transmission fluid pump motor control circuit diagnoses the pump motor and wiring for a ground short circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range indicates a ground short</p> <p>Controller specific circuit voltage thresholds are set to meet the following controller specification for a ground short</p> <p>update fail and sample count</p>	< 0.5 Q impedance between signal and controller ground	<p>diagnostic report enable diagnostic monitor enable</p> <p>run crank voltage battery voltage battery voltage</p> <p>(pump is fed by high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)</p> <p>OR</p> <p>(pump is fed by high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)</p> <p>OR</p> <p>(pump is fed by high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)</p> <p>OR</p> <p>pump is not fed by any HSD</p>	<p>= 1 Boolean = 1 Boolean</p> <p>>5.00 volts > 9.00 volts < 15.0 volts</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will enable)</p>	<p>> 20 fail counts out of > 25 sample counts update rate 100 milliseconds</p> <p>> 25 milliseconds</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Auxiliary Transmission Fluid Pump Control Circuit High	P2799	Controller specific auxiliary transmission fluid pump motor control circuit diagnoses the pump motor and wiring for a short to power circuit fault by comparing a voltage measurement to controller specific voltage thresholds.	<p>Voltage measurement outside of controller specific acceptable range indicates a voltage short</p> <p>Controller specific circuit voltage thresholds are set to meet the following controller specification for a voltage short</p> <p>Increment fail and sample count</p>	< 0.5 Q impedance between signal and controller voltage source	<p>diagnostic report enable diagnostic monitor enable</p> <p>run crank voltage battery voltage battery voltage</p> <p>(pump is fed by high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)</p> <p>OR</p> <p>(pump is fed by high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)</p> <p>OR</p> <p>(pump is fed by high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)</p> <p>OR</p> <p>pump is not fed by any HSD</p>	<p>= 1 Boolean = 1 Boolean</p> <p>>5.00 volts > 9.00 volts < 15.0 volts</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will disable) = ON</p> <p>= CeEHPR_e_HSD1 (CeTSCR_e_NoHSD will enable)</p>	<p>> 20 fail counts out of > 25 sample counts update rate 100 milliseconds</p> <p>> 25 milliseconds</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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.	<p>pressure control solenoid characterization data programming complete</p> <p>Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry.</p> <p>pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present:</p> <p>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</p>	= FALSE	<p>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.</p> <p>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.</p>		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 Illum.
			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 Illum.
Pressure Control (PC) Solenoid B Calibration Incorrect	P27A8	The diagnostic monitor verifies that the pressure control solenoid B (GF9 TCC or GR10 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.	<p>pressure control solenoid characterization data programming complete</p> <p>Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry.</p> <p>pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present:</p> <p>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</p>	= FALSE	<p>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.</p> <p>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.</p>		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 Illum.
			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 Illum.
Pressure Control (PC) Solenoid C Calibration Incorrect	P27A9	The diagnostic monitor verifies that the pressure control solenoid C (GF9 C1 CB123456 clutch or GR10C3 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.	<p>pressure control solenoid characterization data programming complete</p> <p>Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry.</p> <p>pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present:</p> <p>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</p>	= FALSE	<p>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.</p> <p>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.</p>		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 Illum.
			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 Illum.
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.	<p>pressure control solenoid characterization data programming complete</p> <p>Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry.</p> <p>pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present:</p> <p>Solenoid data is not programmed or incomplete data fault - occurs when a new or service TCM is installed.</p> <p>OR</p> <p>Solenoid class programming fault - the characterization data indicates a different type of device than the TCM calibration data</p> <p>OR</p> <p>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.</p> <p>OR</p> <p>Axis data fault - pressure</p>	= FALSE	<p>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.</p> <p>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.</p>		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 Illum.
			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 Illum.
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.	<p>pressure control solenoid characterization data programming complete</p> <p>Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry.</p> <p>pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present:</p> <p>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</p>	= FALSE	<p>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.</p> <p>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.</p>		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 Illum.
			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 Illum.
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.	<p>pressure control solenoid characterization data programming complete</p> <p>Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry.</p> <p>pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present:</p> <p>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</p>	= FALSE	<p>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.</p> <p>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.</p>		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 Illum.
			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 Illum.
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.	<p>pressure control solenoid characterization data programming complete</p> <p>Matching is defined as pressure control solenoid characterization data corresponding to the transmission valve body assembly componentry.</p> <p>pressure control solenoid characterization data programming complete is set to FALSE when any of the following is present:</p> <p>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</p>	= FALSE	<p>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.</p> <p>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.</p>		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 Illum.
			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 Illum.
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	> 4.999 % 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 stability 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 stability 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 < 4.999 % duty cycle < 4.999 % duty cycle = ABS(ECM internal range sesnor B raw -	PWM fail time > 1.000 seconds out of sample time > 1.500 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 Illum.
					high or low time Vehicle is in a mode that enables accessory power	0.000 %) = TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid G Performance /Stuck Off - RWD 8 speed specific	P2808	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 command 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) > P2808 TCC stuck off fail TCC slip speed see supporting table = LOCK > 130.0 RPM	diagnostic monitor enable TCC command capacity TCC command capacity time TCC command pressure TCC command pressure time (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 engine speed time service fast learn active battery voltage battery voltage time run crank voltage run crank voltage time	= 1 Boolean > 0.00 % > 0.00 seconds > 600.0 kPa > 2.00 seconds # TCC control mode current # ON mode (controlled slip mode) # LOCK = ON mode (controlled slip mode) = LOCK = 1 Boolean = 1 Boolean > 500.0 RPM > engine speed time for transmission hydraulic pressure available see supporting table = FALSE >9.00 volts > 0.100 seconds >9.00 volts > 0.100 seconds	fail time > 2.500 seconds increment fail count fail count > 3 counts 25 millisecond update rate	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					(PTO active OR PTO disable calibration) accelerator pedal position accelerator pedal position range shift state transmission fluid temperature transmission fluid temperature engine torque engine torque P2817 test fail this key on (TCC control mode OR TCC control mode) attained gear attained gear slip P2808 test fail this key on DTCs not fault active DTCs not fault pending	= FALSE = 1 Boolean > 8.0 % < 100.0 % = range shift complete > -6.66 °C < 130.0 °C > 50.0 Nm < 8,191.8 Nm = FALSE = ON mode (controlled slip mode) = LOCK > CeCGSR_e_CR_Second < 25.00 RPM = FALSE AcceleratorPedalFailure EngineTorqueEstInaccura te P281B, P281D, P281E, P0716, P0717, P07BF, P07C0 P0722, P0723, P077C, P077D P0722, P0723, P0716, P0717, P07BF, P07C0		

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid G Stuck On - RWD 8 speed specific	P2809	The diagnostic monitor detects the transmission torque converter control valve solenoid failed hydraulically on. 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 Default Valve has transitioned low to high, causing a severe derivative engine speed and TCC slip change (crash).	<p>TCC Slip (during TCC crash, extreme rate of change derivative)</p> <p>When Stuck on crash detected monitor TCC Slip - torque convert slip speed = ABS(engine speed - transmission input shaft speed)</p> <p>WHILE TCC Slip AND TCC Slip THEN Increment TCC Stuck On fail timer</p> <p>25 millisecond update rate</p>	<p>< 85 ROM</p> <p>< P2809 TCC Stuck On Crash Decel RPM/second see supporting tables</p> <p>> -50.0 RPM < 30.0 RPM</p>	<p>Diagnostic monitor enable</p> <p>accelerator pedal position signal available</p> <p>hydraulic pressure available: Engine speed</p> <p>service fast learn active battery voltage run crank voltage</p> <p>P281B fault active P281D fault active P281E fault active</p> <p>P0716 fault active P0717 fault active P07BF fault active P07C0 fault active P0722 fault active P0723 fault active P077C fault active P077D fault active</p> <p>P0722 fault pending P0723 fault pending P0716 fault pending P0717 fault pending P07BF fault pending P07C0 fault pending *****</p> <p>PRNDL PRNDL Commanded gear Commanded gear</p> <p>(PTO active OR PTO disable calibration)</p>	<p>= 1 (1 enable, 0 disable)</p> <p>= TRUE</p> <p>= TRUE</p> <p>> 500.0 RPM</p> <p>= FALSE >9.00 volts >9.00 volts</p> <p>= FALSE = FALSE = FALSE</p> <p>= FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE</p> <p>= FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE</p> <p># NEUTRAL # REVERSE # NEUTRAL # REVERSE</p> <p>= FALSE = 1 Boolean</p>	<p>fail time > 1.500 seconds increment fail count fail count > 3 counts</p> <p>25 millisecond update rate</p>	Type A, 1 Trips

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					transmission fluid temperature transmission fluid temperature engine torque engine torque P2809 test fail this key on vehicle speed engine speed engine speed accelerator pedal position 4WD low state (driver shift mode active OR driver shift mode calibration) (clutch control solenoid stuck on OR stuck OFF intrusive shift active) 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	> -6.66 °C < 130.00 °C > 55.0 Nm < 800.0 Nm = FALSE < 45.0 KPH > 400.0 RPM < 5,500.0 RPM < 95.0 % = FALSE = FALSE = 0 Boolean = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE = FALSE < 8.0 KPH > 4.0 %		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					accelerator pedal position hysteresis ***** When: Default valve state AND Previous default valve state set count down time Otherwise: Decrement count down time Default valve state OR count down time OR P2809 fault time	> 1.0 % ***** = HIGH = LOW to HIGH transition P2809 Default Valve = Transition Window = LOW to HIGH transition > 0.0 seconds > 0.0 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	> 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 Illum.
Pressure Control (PC) Solenoid H Stuck Off (8 SPD)	P2817	<p>Each pressure control solenoid stuck off diagnostic monitor detects a clutch pressure control solenoid failed hydraulically off, while the solenoid is electrically functional. This diagnostic monitor detects the default valve control solenoid failed hydraulically off.</p> <p>When the default disable valve is hydraulically off in drive, hydraulic fluid will be routed to C2, C3, and C4, while pressure is drained from C5. This can be detected as a C5 stuck off condition, and a shift to 6th is performed to differential between the two faults by monitoring ratio.</p>	<p>command gear AND (hydraulic delay time to attain 6th gear OR attained gear) AND 6th gear attained gear slip clutch slip valid (no speed sensor faults with node/ lever calculation)</p> <p>update fail time</p>	<p>= 6th gear > 0.400 seconds</p> <p>= 6th gear</p> <p>< 20.0 RPM = TRUE</p>	<p>system-level enables:</p> <p>use battery voltage calibration is FALSE OR (use battery voltage calibration is TRUE AND battery voltage) battery voltage time</p> <p>use run crank voltage calibration is FALSE OR (use run crank voltage calibration is TRUE AND run crank voltage) run crank voltage time</p> <p>TCM output driver high side driver 1, clutch pressure control solenoid driver circuit enabled</p> <p>TCM output driver high side driver 2, clutch pressure control solenoid driver circuit enabled</p> <p>service fast learn active</p> <p>service solenoid cleaning procedure active</p> <p>hydraulic pressure available</p>	<p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts > 0.100 seconds</p> <p>= 0 Boolean</p> <p>= 0 Boolean</p> <p>>9.00 volts 0.100 seconds</p> <p>= TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= FALSE Boolean</p> <p>= FALSE Boolean</p> <p>= TRUE</p>	<p>fail time > 0.200 seconds and update fail count when fail count > 2 counts</p> <p>6.25 millisecond update</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>*****</p> <p>diagnostic monitor specific conditions</p> <p>attained gear command gear 3rd gear ratio 4th gear ratio update ratio time ratio time</p> <p>when the above conditions are met command 6th gear to verify default disable valve is hydraulically stuck off</p> <p>*****</p> <p>DTCs not fault pending</p> <p>*****</p> <p>DTCs not fault active</p>	<p>*****</p> <p>= 3rd gear = 4th gear < 2.189 unitless > 1.758</p> <p>> 0.000 seconds</p> <p>*****</p> <p>P17CE P1783 P178F P17C6 P17C4 P17C7 P17D3 P17C5 P0721 P172AP172B P0716 P0717 P07C0 P07BF P0723 P0722 P077D P077C P176C P176D P176B P17D6</p> <p>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</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					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 Illum.
Pressure Control Solenoid H Stuck On (8 Speed)	P2818	<p>Each pressure control solenoid stuck on diagnostic monitor detects a clutch pressure control solenoid failed hydraulically on, while the solenoid is electrically functional. This diagnostic monitor detects the default valve control solenoid failed hydraulically on.</p> <p>When the default disable valve is hydraulically on, hydraulic fluid will be routed to the Torque Converter Clutch (TCC) control solenoid. The failure can be detected by commanding the TCC solenoid on while in park, or not in park at very low vehicle speeds, and monitoring torque converter slip speed. If the torque converter slip drops at the torque converter gains opacity, the Default Valve is stuck on.</p>	when TCC average slip speed update DefaultVlaveStuckOnFailTime	< 30.00 RPM	<p>(Intrusive Default Valve TCC pressure request AND TCC command pressure Set Default Valve TCC pressure request)</p> <p>(Vehicle speed set DriveStuckOnTest)</p> <p>BEGIN DVParkEnable: (ParkTest calibration AND transmission range) OR ParkTest calibration engine torque engine torque attained gear slip transmission range (command gear AND attained gear) OR (command gear AND attained gear AND 2nd gear enable calibration vehicle speed (vehicle speed OR DefaultVlaveStuckOnFailTime (DVStuckOnTestRun OR DVStuckOnIntrusiveTestActive) when all of the above conditions are met set DVParkEnable else set DVParkEnable END DVParkEnable</p> <p>DVStuckOnTestTimeOut</p> <p>hydraulic pressure</p>	<p>= TRUE Boolean</p> <p><</p> <p>Default Valve Stuck On TCC Pressure Request</p> <p>=</p> <p>Default Valve Stuck On TCC Pressure Request</p> <p>< 5.0 KPH</p> <p>= FALSE Boolean</p> <p>= 1 Boolean</p> <p>= PARK</p> <p>= 1 Boolean</p> <p>> 50.0 Nm</p> <p>< 250.0 Nm</p> <p>< 50 RPM</p> <p>< Drive10</p> <p>= 1st gear</p> <p>= 1st gear</p> <p>= 2nd gear</p> <p>= 2nd gear</p> <p>= 1 Boolean</p> <p>> 5.0 KPH</p> <p>< 16.0 KPH</p> <p>> 0 seconds</p> <p>= FALSE Boolean</p> <p>= TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= FALSE Boolean</p> <p>< 5 counts</p>	<p>DefaultVlaveStuckOnFailTime > 0.20 seconds, update fail count, fail count > 3 counts</p> <p>6.25 milliseconds update</p>	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					available battery voltage battery voltage time run crank voltage run crank voltage time DVParkEnable DefaultValveState engine speed engine speed transmission fluid temperature transmission fluid temperature P2818 test fail this key on P2818 test pass this key on when the above conditions are met set DVStuckOnTestInitDelay (count down time) when: ABS(TCC diagnosis slip speed) OR DVStuckOnIntrusiveTestA ctive) DVStuckOnTestInitDelay (when: DVStuckOnIntrusiveTestA ctive set DVStuckOnIntrusiveTCC PressReq) set DVStuckOnIntrusiveTestA ctive set DVStuckOnTestRun	= TRUE Boolean >9.00 volts > 0.100 seconds >9.00 volts > 0.100 seconds = TRUE Boolean = LOW (DV solenoid command is OFF) > 400 RPM < 3,000 RPM > -7.00 °C < 100.00 °C = FALSE Boolean = FALSE Boolean = 0.000 seconds < Default Valve Stuck On TCC Slip Speed for intrusive = TRUE Boolean = 0.0 seconds = FALSE Boolean = Default Valve Stuck On TCC Pressure Request = TRUE Boolean		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>when TCC pressure AND TCC PCS pressure (HWIO interface), update TCC response delay time TCC response delay time</p> <p>TCC average slip samples</p> <p>*****</p> <p>DTCs not Fault Active:</p> <p>DTCs not Fault Pending:</p> <p>DTCs notTFTKO:</p>	<p>= TRUE</p> <p>> Default Valve Stuck On TCC Pressure Request > 0.0 kPa</p> <p>> Default Valve Stuck On Test Pressure Response Delay > 10 counts (time = counts * 6.25 msec)</p> <p>*****</p> <p>P2808, P2809, P2812, P2814, P2815, P0716, P0717, P07C0, P07BF</p> <p>P0716, P0717, P07C0, P07BF</p> <p>P0716, P0717, P07C0, P07BF</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
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	> 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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.	<p>Voltage measurement outside of controller specific acceptable range indicates a short to voltage</p> <p>Controller specific circuit voltage thresholds are set to meet the following controller specification for a short to voltage</p>	<p>< 0.5 Q impedance between signal and controller voltage source</p> <p>When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time</p>	<p>battery voltage</p> <p>(run crank voltage OR accessory voltage active OR Power Mode)</p> <p>diagnostic monitor enable calibration</p> <p>(solenoid is mapped to high side driver 1 (CeTSCR_e_HSD1) AND high side driver 1)</p> <p>OR</p> <p>(solenoid is mapped to high side driver 2 (CeTSCR_e_HSD2) AND high side driver 2)</p> <p>OR</p> <p>(solenoid is mapped to high side driver 3 (CeTSCR_e_HSD3) AND high side driver 3)</p>	<p>> 8.00 volts and < 32.00 volts</p> <p>>5.00 volts</p> <p>= TRUE</p> <p>= ACCESSORY</p> <p>= 1 (1 is enable, 0 is disable)</p> <p>= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable)</p> <p>= ON</p> <p>= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable)</p> <p>= ON</p> <p>= CeTSCR_e_HSD1 (CeTSCR_e_NoHSD will disable)</p> <p>= ON</p>	<p>fail time > 0.30 seconds out of sample time > 0.50 seconds</p> <p>> 1.00 seconds</p> <p>> 25 milliseconds</p> <p>> 12.5 milliseconds</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid J Stuck On (8 speed)	P2821	The diagnostic monitor detects the Park Clutch Prime (PCP) Valve failed in the hydraulic on state. The diagnostic monitor executes during an engine crank event to monitor C3 (C13567) clutch slip to determine the hydraulic state of the PCP Valve. If C3 clutch slip is low during the engine crank the PCP Valve is stuck on hydraulically since transmission fluid is applied inappropriately through the PCP Valve to C3 in the failure mode. The C2 (CB12345R) on/off pressure control solenoid is multiplexed to the C2 (CB12345R) boost valve and the PCP Valve so the state of the C2 (CB12345R) on/off pressure control solenoid must be known for the monitor to execute.	ABS(C3 (C13567) clutch slip) update fail time	< 40.0 RPM	<p>when Propulsion System State update CrankTime</p> <p>when High Side Drive OR High Side Driver 2 OR P0968 C3 (C13567) open circuit fault active OR P0970 C3 (C13567) circuit ground short fault active OR P0971 C3 (C13567) circuit ground short fault active OR P2738 Line Pressure circuit ground short fault active set ElecFault else set ElecFault</p> <p>when transmission fluid temperature P2821 test fail this key on P2821 test pass this key on command range command gear ElecFault C3 (C13567) clutch slip valid set PCPValveStuckOnEnable else set PCPValveStuckOnEnable</p> <p>when PCPValveStuckOnTest</p>	<p>= Engine Crank</p> <p>= FALSE Boolean = FALSE Boolean = TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= TRUE Boolean</p> <p>= FALSE Boolean</p> <p>> -20.000 °C</p> <p>= FALSE Boolean = FALSE Boolean</p> <p>= PARK = PARK = FALSE Boolean = TRUE Boolean</p> <p>= TRUE Boolean = FALSE Boolean</p> <p>= FALSE Boolean</p>	<p>fail time > 0.250 seconds, update fail count fail count > 2 counts</p> <p>6.25 millisecond update</p>	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					PCPVlaveStuckOnEnable Propulsion System State CrankTime transmission input speed set PCPValveStuckOnTest begin C3 (C13567) capacity possible: when C3 (C13567) Clutch Pressure DigitalCommand of ON/ OFF Default Valve Default Valve State set PCPC3TstPressCmnd next 03(013567) CapacityPossible PCPC3TstPressCmnd (EngineSpeed OR TransInputSpeed) OR Trans_AuxPumpAvail) when all of the above conditions are met update C3(C13567) CapPosTransTime when C3(C13567) CapPosTransTime set C3(C13567) CapacityPossible end C3 (C13567) capacity possible C2 (CB12345R) on/off pressure control solenoid state C3(C13567) CaoacitvPossible	= TRUE Boolean = Engine Crank < 0.100 seconds < 5.0 RPM = TRUE Boolean = MaxClutchPress (full clutch torque capaicty) = TRUE Boolean (Default Valve command ON) = HIGH (Default Valve command ON) = TRUE Boolean = FALSE Boolean = TRUE Boolean > 300 RPM = TRUE Boolean C3 (C13567) Cap Poss > Trans Time Thres = TRUE = FALSE (hydraulic command state = OFF) = TRUE Boolean		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					transmission input speed	> 160.0 RPM		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Pressure Control Solenoid J Control Circuit Open (T93 Controller only)	P2824	Controller specific circuit diagnoses 10 speed Default Disable 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	> 200 K Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller ground When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 6.25 millisecond update rate > 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 Illum.
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	< 0.5 Q impedance between signal and controller voltage source When malfunction criteria threshold is met, increment fail time and increment sample time, otherwise increment only sample time	battery voltage (run crank voltage OR accessory voltage active OR Power Mode) 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)	> 8.00 volts and < 32.00 volts >5.00 volts = TRUE = ACCESSORY = 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 Illum.
Control Module Serial Peripheral Interface Bus 1	P30D6	This DTC detects intermittent 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	>=8.00 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the TCM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Serial Peripheral Interface Bus 2	P30D7	This DTC detects intermittent 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	>=8.00 Volts, else the failure will be reported for all conditions	In the primary processor, 8 / 16 counts intermittent 12.5 ms /count in the TCM main processor	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
P3186 (Internal Control Module Security Peripheral Performance)	P3186	This DTC indicates the security peripheral has experienced an internal fault indicating that MAC verification results are unreliable.	MAC verification has falsely passed a configurable number of times.	2.00	Calibration enable	= 1.00 Boolean		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Communicati on Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures	>= 10.00 counts in a sliding window of 50 samples	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: Run/Crank ignition voltage If power mode = Accessory: Off key cycle diagnostics are enabled	> 15,000.00 milliseconds >11.00 Volts => 5,000.00 milliseconds >11.00 Volts <=18.00 Volts >=11.00 Volts Disabled	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 Illum.
					Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	>=11.00 Volts		

24OBDG03D Part 1 TCM Summary Tables

[illegible]

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If calibratable low voltage disable mode is not Never Disabled</p> <p>If OBDII: Run/Crank ignition voltage</p> <p>If Secure: Starter motor engaged for Or Run/Crank ignition voltage</p> <p>If Hybrid Secure: Run/Crank ignition voltage</p> <p>If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/crank</p> <p>Battery voltage</p>	<p>>=11.00 Volts</p> <p>> 15,000.00 milliseconds</p> <p>> 11.00 Volts</p> <p>>=8.00 Volts</p> <p>Disabled</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Body Control Module	U0140	This DTC monitors for a loss of communication with the Body Control Module.	<p>Message is not received from controller for Message \$010:</p> <p>Message \$205:</p> <p>Message \$284:</p> <p>Message \$404:</p> <p>Message \$409:</p> <p>Message \$40C:</p> <p>Message \$413:</p> <p>Message \$460:</p> <p>Message \$461:</p>	<p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>> 9,325.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p>	<p>General Enable Criteria: All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Conroller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					If calibratable low voltage disable mode is not Never Disabled If OBDII: 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 > 15,000.00 milliseconds > 11.00 Volts >=8.00 Volts Disabled >=11.00 Volts		

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With Restraints Control Module	U0151	This DTC monitors for a loss of communication with the Restraints Control Module. Emissions neutral default zero (0) lateral acceleration and zero (0) longitudinal acceleration	Message is not received from controller for Message \$024:	>10,000.00 milliseconds	General Enable Criteria: All below criteria have been met for	>= 5,000.00 milliseconds	Diagnostic runs in 12.5 ms loop	Emissions Neutral Diagnostics - Type C
			Message \$025:	>10,000.00 milliseconds	If message is on Bus A: U0073 not active			
			Message \$0D1:	>10,000.00 milliseconds	If message is on Bus B: U0074 not active			
			Message \$0D2:	>10,000.00 milliseconds	If message is on Bus S: U0076 not active			
			Message \$441:	> 9,825.00 milliseconds	CAN channel is requesting full communications			
				>10,000.00 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	>11.00 Volts		
					Battery voltage			
			Controller 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 Illum.
					<p>If calibratable low voltage disable mode is not Never Disabled</p> <p>If OBDII: Run/Crank ignition voltage</p> <p>If Secure: Starter motor engaged for Or Run/Crank ignition voltage</p> <p>If Hybrid Secure: Run/Crank ignition voltage</p> <p>If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/crank</p> <p>Battery voltage</p>	<p>>=11.00 Volts</p> <p>> 15,000.00 milliseconds</p> <p>> 11.00 Volts</p> <p>>=8.00 Volts</p> <p>Disabled</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From ECM/ PCM	U0401	This DTC monitors for an error in communication with the ECM/PCM.	<p>The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSLIM) of the following signals received over serial data is incorrect for:</p> <p>SD19P_ARC:</p> <p>SrlDat19_Prtctd:</p> <p>SD18P_ARC:</p> <p>SrlDat18_Prtctd:</p> <p>SD20P_ARC:</p> <p>SrlDat20_Prtctd:</p> <p>SD71_ARC:</p> <p>SD71_CS:</p> <p>VSADP_ARC:</p>	<p>8.00 fail counts out of 10.00 sample counts</p> <p>2.00 fail counts out of 18.00 sample counts</p> <p>8.00 fail counts out of 10.00 sample counts</p> <p>2.00 fail counts out of 18.00 sample counts</p> <p>8.00 fail counts out of 10.00 sample counts</p> <p>2.00 fail counts out of 18.00 sample counts</p> <p>8.00 fail counts out of 10.00 sample counts</p> <p>2.00 fail counts out of 18.00 sample counts</p> <p>8.00 fail counts out of</p>	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSLIM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type A, 1 Trips

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				10.00 sample counts				
			VehSpdAvgDrvn_Prtctd:	2.00 fail counts out of 18.00 sample counts				
			SD26P_ARC:	8.00 fail counts out of 10.00 sample counts				
			SrlDat26_Prtctd:	2.00 fail counts out of 18.00 sample counts				
			SD22P_ARC:	8.00 fail counts out of 10.00 sample counts				
			SrlDat22_Prtctd:	2.00 fail counts out of 18.00 sample counts				
			EVMESS2_ARC:	8.00 fail counts out of 10.00 sample counts				
			WDP-ARC:	8.00 fail counts out of 10.00 sample counts				
			WhlDist_Prtctd:	2.00 fail counts out of 18.00 sample counts				
			CHCG_ARC:	8.00 fail counts out of 10.00 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Brake System Control Module	U0418	This DTC monitors for an error in communication with the Brake System Control Module.	The signal value of the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSLIM) of the following signals received over serial data is incorrect for:		Message frame containing the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSLIM) is available on the bus.		Executes in 12.5ms loop.	Type B, 2 Trips
			SD16P_ARC:	8.00 fail counts out of 10.00 sample counts	All the following conditions are met for:	>= 5,000.00 milliseconds >= 11.00 volts		
			SrlDat16_Prtctd:	2.00 fail counts out of 18.00 sample counts	Battery voltage			
			RATVCP_ARC:	8.00 fail counts out of 10.00 sample counts	Accessory mode to off mode transition not pending			
			RrAxTrqValCmd_Prtctd:	2.00 fail counts out of 18.00 sample counts	If controller is a non-OBD controller then battery voltage	<= 18.00 volts		
			BSIS2P_ARC:	8.00 fail counts out of 10.00 sample counts	Controller type: OBD Controller			
			BrkSysInfoSts2_Prtctd:	2.00 fail counts out of 18.00 sample counts				
			SWIP_ARC:	8.00 fail counts out of 10.00 sample counts				
			StrgWhlInfo_Prtctd:	2.00 fail counts out of 18.00 sample counts				
			SD15P_ARC:	8.00 fail counts out of				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			SrlDat15_Prtctd: SD17P_ARC: SrlDat17_Prtctd:	10.00 sample counts 2.00 fail counts out of 18.00 sample counts 8.00 fail counts out of 10.00 sample counts 2.00 fail counts out of 18.00 sample counts				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Power Steering Control Module	U0420	This DTC monitors for an error in communication with the Power Steering Control Module. Emissions neutral default zero (0) steering angle	The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSLIM) of the following signals received over serial data is incorrect for: SWIP_ARC: StrgWhlInfo_Prtctd:	8.00 fail counts out of 10.00 sample counts 2.00 fail counts out of 18.00 sample counts	Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSLIM) 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	>= 5,000.00 milliseconds >= 11.00 volts <= 18.00 volts	Executes in 12.5ms loop.	Emissio ns Neutral Diagnost ics - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Body Control Module	U0422	This DTC monitors for an error in communication with the Body Control Module.	<p>The signal value of the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSLIM) of the following signals received over serial data is incorrect for:</p> <p>SPMP_ARC:</p> <p>SysPwrMode_Prtctd:</p> <p>PltfTrnsTUDSwStARC:</p>	<p>8.00 fail counts out of 10.00 sample counts</p> <p>2.00 fail counts out of 18.00 sample counts</p> <p>8.00 fail counts out of 10.00 sample counts</p>	<p>Message frame containing the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSLIM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>$\geq 5,000.00$ milliseconds</p> <p>≥ 11.00 volts</p> <p>≤ 18.00 volts</p>	Executes in 12.5ms loop.	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Gateway A	U0447	This DTC monitors for an error in communication with the Gateway A.	<p>The signal value of the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSLIM) of the following signals received over serial data is incorrect for:</p> <p>BSPMP_ARC:</p> <p>BkupSysPwrMode_Prtctd:</p>	<p>8.00 fail counts out of 10.00 sample counts</p> <p>2.00 fail counts out of 18.00 sample counts</p>	<p>Message frame containing the Alive Rolling Count (ARC),Protection Value (PV), or Checksum (CSLIM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Invalid Data Received From Restraints Control Module	U0452	<p>This DTC monitors for an error in communication with the Restraints Control Module.</p> <p>Emissions neutral default zero (0) lateral acceleration and zero (0) longitudinal acceleration</p>	<p>The signal value of the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSLIM) of the following signals received over serial data is incorrect for:</p> <p>SD47P_ARC:</p> <p>SrlDat47_Prtctd:</p>	<p>8.00 fail counts out of 10.00 sample counts</p> <p>2.00 fail counts out of 18.00 sample counts</p>	<p>Message frame containing the Alive Rolling Count (ARC), Protection Value (PV), or Checksum (CSLIM) is available on the bus.</p> <p>All the following conditions are met for:</p> <p>Battery voltage</p> <p>Accessory mode to off mode transition not pending</p> <p>If controller is a non-OBD controller then battery voltage</p> <p>Controller type: OBD Controller</p>	<p>>= 5,000.00 milliseconds</p> <p>>= 11.00 volts</p> <p><= 18.00 volts</p>	Executes in 12.5ms loop.	Emissions Neutral Diagnostics - Type C

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on With Gateway A on CAN 2	U1608	This DTC monitors for a loss of communication with the Gateway A on CAN 2.	<p>Message is not received from controller for Message \$209:</p> <p>Message \$20D:</p> <p>Message \$427:</p> <p>Message \$561:</p> <p>Message \$562:</p>	<p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Conroller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					<p>If calibratable low voltage disable mode is not Never Disabled</p> <p>If OBDII: Run/Crank ignition voltage</p> <p>If Secure: Starter motor engaged for Or Run/Crank ignition voltage</p> <p>If Hybrid Secure: Run/Crank ignition voltage</p> <p>If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller</p> <p>Controller shutdown is not impending</p> <p>Power Mode is not run/crank</p> <p>Battery voltage</p>	<p>>=11.00 Volts</p> <p>> 15,000.00 milliseconds</p> <p>> 11.00 Volts</p> <p>>=8.00 Volts</p> <p>Disabled</p> <p>>=11.00 Volts</p>		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Brake System Control Module 1 on CAN Bus 2	U1610	This DTC monitors for a loss of communication with the Brake System Control Module 1 on CAN Bus 2.	<p>Message is not received from controller for Message \$012:</p> <p>Message \$014:</p> <p>Message \$015:</p> <p>Message \$017:</p> <p>Message \$01A:</p> <p>Message \$081:</p> <p>Message \$082:</p> <p>Message \$210:</p> <p>Message \$211:</p> <p>Message \$219:</p> <p>Message \$415:</p> <p>Message \$42A:</p> <p>Message \$4B2:</p>	<p>>10,000.00 milliseconds</p> <p>> 9,925.00 milliseconds</p> <p>> 9,925.00 milliseconds</p> <p>> 9,925.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Conroller is an OBD controller</p> <p>Or</p> <p>Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Message \$4B4: Message \$4B5:	>10,000.00 milliseconds >10,000.00 milliseconds >10,000.00 milliseconds >10,000.00 milliseconds	If calibratable low voltage disable mode is not Never Disabled If OBDII: 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 > 15,000.00 milliseconds > 11.00 Volts >=8.00 Volts Disabled >=11.00 Volts		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communicati on with Engine Control Module on CAN Bus 2	U1611	This DTC monitors for a loss of communication with the Engine Control Module on CAN Bus 2.	<p>Message is not received from controller for Message \$011:</p> <p>Message \$016:</p> <p>Message \$01C:</p> <p>Message \$01D:</p> <p>Message \$02A:</p> <p>Message \$084:</p> <p>Message \$086:</p> <p>Message \$087:</p> <p>Message \$097:</p> <p>Message \$213:</p> <p>Message \$214:</p> <p>Message \$21D:</p> <p>Message \$227:</p>	<p>>10,000.00 milliseconds</p> <p>>9,918.75 milliseconds</p> <p>>9,918.75 milliseconds</p> <p>>418.75 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>387.50 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>10,000.00 milliseconds</p> <p>>9,325.00 milliseconds</p>	<p>General Enable Criteria:</p> <p>All below criteria have been met for</p> <p>If message is on Bus A: U0073 not active</p> <p>If message is on Bus B: U0074 not active</p> <p>If message is on Bus S: U0076 not active</p> <p>CAN channel is requesting full communications</p> <p>Normal CAN transmission on Bus is enabled</p> <p>If bus type is Sensor Bus, sensor bus relay is on</p> <p>Accessory mode to off mode not pending</p> <p>Battery voltage</p> <p>Conroller is an OBD controller Or Battery Voltage</p> <p>Controller type: OBD Controller</p> <p>If power mode = Run/ Crank:</p> <p>Power Mode is run</p>	<p>>= 5,000.00 milliseconds</p> <p>>11.00 Volts</p> <p><=18.00 Volts</p>	Diagnostic runs in 12.5 ms loop	Type A, 1 Trips

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Message \$229:	>10,000.00 milliseconds	If calibratable low voltage disable mode is not Never Disabled			
			Message \$22A:	> 9,325.00 milliseconds				
			Message \$254:	>10,000.00 milliseconds	If OBDII: Run/Crank ignition voltage	>=11.00 Volts		
			Message \$41D:	>10,000.00 milliseconds	If Secure: Starter motor engaged for Or	> 15,000.00 milliseconds		
			Message \$41F:	>10,000.00 milliseconds	Run/Crank ignition voltage	> 11.00 Volts		
			Message \$429:	>10,000.00 milliseconds	If Hybrid Secure: Run/Crank ignition voltage	>=8.00 Volts		
			Message \$499:	>10,000.00 milliseconds	If power mode = Accessory:	Disabled		
			Message \$4BB:	>10,000.00 milliseconds	Off key cycle diagnostics are enabled Or			
			Message \$4BC:	>10,000.00 milliseconds	Controller is an OBD controller			
			Message \$4BD:	>10,000.00 milliseconds	Controller shutdown is not impending			
			Message \$4C1:	>10,000.00 milliseconds	Power Mode is not run/ crank	>=11.00 Volts		
				>10,000.00 milliseconds	Battery voltage			
				>10,000.00 milliseconds				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				>10,000.00 milliseconds >10,000.00 milliseconds				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Key Table Not Provisioned / Authoritative Counter At Maximum	U1960	This DTC indicates that the ECU security peripheral key slots are not provisioned OR ECU message authentication Authoritative Counters are at MAX value	<p>During controller initialization:</p> <p>IF (Any Security Peripheral Key Slot reports as Empty) -OR- (Any Authoritative Counter is at MAX value)</p> <p>During controller operation:</p> <p>IF (A Security Peripheral Key Slot reports as Empty) -OR- (An Authoritative Counter is at MAX value)</p>		Calibration enable	= 1.00 Boolean		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
U1961 (Security Peripheral Performance)	U1961	This DTC indicates that the ECU security peripheral has reported that it has failed.	The ECU security peripheral reports that the security peripheral hardware has failed.		Calibration enable	= 1.00 Boolean		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
U1962 (Unable to Authenticate Serial Data Message)	U1962	This DTC indicates that serial data message authentication on any key slot has failed a configurable number of times this key cycle.	Message authentication on a single key slot has failed a configurable number of times.	KeSSAR_Cnt_SecKey SlotFailLimit	Calibration enable	= 1.00 Boolean		Type A, 1 Trips

24OBDG03D Part 1 TCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Control Module Input Power Circuit A - Ignition Input On/Start Circuit Correlation	U3023	Detect a Power A vs RunCrank correlation error	Power A - RunCrank - Voltage	> 3.00	PowerA- RunCrank Correlation monitoring enable = TRUE Battey Present RunCrank Active Starter Motor NOT Engaged	Diagnostic is 1.00 Battey Present = TRUE RunCrank Active = TRUE Starter Motor Engaged = FALSE	40.00 failures out of 50.00	Type A, 1 Trips

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	4.000	2.000	0.500	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description:

Value Units: predicted direction: forward, reverse, unknown

X Unit: attained gear

Y Units: intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1

y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionReverse
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 2

y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 3

y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 4

y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR_Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 5

y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	

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	0.500	0.500

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	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	0	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	0	1
CeCGSR_e_CR_Ninth	1	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	3	3

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	1.500	1.500

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	160.0	192.0

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	160.0	192.0

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_C2 C_ClchSpdSnsr 1	1.0000	1.0000	2.9762	1.6863	1.3736	1.0000	0.8104	0.6515	1.0000	1.0000
CeTSRR_e_C2 C_ClchSpdSnsr 2	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	CeTNSR_e_InternalSpdSnsr1	CeTNSR_e_InternalSpdSnsr2	CeTNSR_e_InternalSpdSnsr3
1	225	0	0

Initial Supporting table - P2797 hydraulic pressure delay

Description: Time to delay the initial x of y counter due to hydraulic transients. Thresholds are a function of transmission fluid temperature. Horizontal axis is transmission fluid temperature (DegC) and table output is delay time (seconds).

Value Units: delay time seconds

X Unit: transmission fluid temperature DegC

y/x	-40	0	20	30	40	50	60
1	0.090	0.090	0.080	0.075	0.075	0.075	0.075

Initial Supporting table - P2797 predicted turbine speed error

Description: Predicted turbine speed vs actual turbine speed error. Thresholds are a function of engine speed and transmission fluid temperature. Diagnostic is considered failing above these values. Table vertical axis is engine speed (RPM), horizontal axis is transmission fluid temperature (DegC) and table output is predicted turbine speed error (RPM).

Value Units: turbine speed RPM error

X Unit: transmission fluid temperature DegC

Y Units: engine speed RPM

y/x	-40	0	10	20	40
0	350	350	350	350	350
500	350	350	350	350	350
1,100	350	350	350	350	350
1,500	350	350	350	350	350
2,500	350	350	350	350	350

Initial Supporting table - transmission fluid temperature warm up time**Description:****Value Units:** transmission fluid temperature normal warm 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 - 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	1.600	1.100	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	0.250	0.250	0.250	0.250	0.250

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C1 Torque-Based Pressure Clip

Description: Pressure clip values for C1 based on clutch torque. Clutch torque calculated from engine torque using torque lever ratios, which are hardware and shift specific.

Value Units: Clutch Pressure (kPa)

X Unit: C1 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	360	410	460	560	710

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	0.850	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	0.250	0.250	0.250	0.250	0.250

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 - C2 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	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C2 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C2 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	800	800	800	800	800

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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C3 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	0.250	0.250	0.250	0.250	0.250

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 - C3 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	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C3 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C3 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	335	385	435	535	685

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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C4 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	0.250	0.250	0.250	0.250	0.250

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 - C4 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	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C4 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C4 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	399	449	499	599	749

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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C5 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	0	0	0	0	0

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 - C5 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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C5 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C5 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	265	425	525	625	725

Initial Supporting table - C6 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C6 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	350	450	575	700	800

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	450	750	850	400	400	400

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	350	750	450	350	450	450

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	325	250	250	350	350	500

Initial Supporting 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	0	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	1	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**XUnit:** 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 - Default Valve Stuck On Test Pressure Response Delay

Description: Delay after TOO commanded pressure reaches test threshold value before incrementing default valve solenoid stuck on fail timer. This delay is based on transmission fluid temperature

Value Units: time (seconds)

X Unit: transmission fluid temperature °C

y/x	-40	-20	0	30	110
1	2	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	4.000	2.000	0.500	0.250	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	4.000	2.000	0.500	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction**Value Units:** predicted direction: forward, reverse, unknown**X Unit:** attained gear**Y Units:** intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1

y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionReverse
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 2

y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 3

y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 4

y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR_Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 5

y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	

Initial Supporting table - P0606 PFM Sequence Fail f(Loop Time)

Description: Fail threshold for PFM per operating loop.

Value Units: Fail threshold for PFM (count)

X Unit: Operating Loop (enum)

P0606 PFM Sequence Fail f(Loop Time) - Part 1

y/x	CePISR_e_2p5msFlow	CePISR_e_3p125msFlow	CePISR_e_5msFlow	CePISR_e_6p25msFlow
1	8	8	8	8

P0606 PFM Sequence Fail f(Loop Time) - Part 2

y/x	CePISR_e_10msFlow	CePISR_e_12p5msFlow	CePISR_e_20msFlow	CePISR_e_25msFlow
1	8	8	8	8

P0606 PFM Sequence Fail f(Loop Time) - Part 3

y/x	CePISR_e_40msFlow	CePISR_e_50msFlow	CePISR_e_80msFlow	CePISR_e_100msFlow
1	4	4	2	2

P0606 PFM Sequence Fail f(Loop Time) - Part 4

y/x	CePISR_e_250msFlow			
1	2			

Initial Supporting table - P0606 PFM Sequence Sample f(Loop Time)

Description: Sample threshold for PFM per operating loop.

Value Units: Sample threshold for PFM (count)

X Unit: Operating Loop (enum)

P0606 PFM Sequence Sample f(Loop Time) - Part 1

y/x	CePISR_e_2p5msFlow	CePISR_e_3p125msFlow	CePISR_e_5msFlow	CePISR_e_6p25msFlow
1	10	10	10	10

P0606 PFM Sequence Sample f(Loop Time) - Part 2

y/x	CePISR_e_10msFlow	CePISR_e_12p5msFlow	CePISR_e_20msFlow	CePISR_e_25msFlow
1	10	10	10	10

P0606 PFM Sequence Sample f(Loop Time) - Part 3

y/x	CePISR_e_40msFlow	CePISR_e_50msFlow	CePISR_e_80msFlow	CePISR_e_100msFlow
1	5	5	3	3

P0606 PFM Sequence Sample f(Loop Time) - Part 4

y/x	CePISR_e_250msFlow			
1	3			

Initial Supporting table - P0606 PFM Enable f(Loop Time)

Description: PFM Enable**Value Units:** PFM enable flag (boolean)**X Unit:** Operating Loop Time Sequence (enum)**P0606 PFM_Enable f(Loop Time) - Part 1**

y/x	CePISR_e_2p5msFlow	CePISR_e_3p125msFlow	CePISR_e_5msFlow	CePISR_e_6p25msFlow
1	0	0	0	0

P0606 PFM_Enable f(Loop Time) - Part 2

y/x	CePISR_e_10msFlow	CePISR_e_12p5msFlow	CePISR_e_20msFlow	CePISR_e_25msFlow
1	0	0	0	0

P0606 PFM_Enable f(Loop Time) - Part 3

y/x	CePISR_e_40msFlow	CePISR_e_50msFlow	CePISR_e_80msFlow	CePISR_e_100msFlow
1	0	0	0	0

P0606 PFM_Enable f(Loop Time) - Part 4

y/x	CePISR_e_250msFlow			
1	0			

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	0.500	0.500

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	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	0	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	0	1
CeCGSR_e_CR_Ninth	1	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	3	3

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	1.500	1.500

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	160.0	192.0

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	160.0	192.0

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_C2 C_ClchSpdSnsr 1	1.0000	1.0000	2.9762	1.6863	1.3736	1.0000	0.8104	0.6515	1.0000	1.0000
CeTSRR_e_C2 C_ClchSpdSnsr 2	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	CeTNSR_e_InternalSpdSnsr1	CeTNSR_e_InternalSpdSnsr2	CeTNSR_e_InternalSpdSnsr3
1	225	0	0

Initial Supporting table - P2797 hydraulic pressure delay

Description: Time to delay the initial x of y counter due to hydraulic transients. Thresholds are a function of transmission fluid temperature. Horizontal axis is transmission fluid temperature (DegC) and table output is delay time (seconds).

Value Units: delay time seconds

X Unit: transmission fluid temperature DegC

y/x	-40	0	20	30	40	50	60
1	0.090	0.090	0.080	0.075	0.075	0.075	0.075

Initial Supporting table - P2797 predicted turbine speed error

Description: Predicted turbine speed vs actual turbine speed error. Thresholds are a function of engine speed and transmission fluid temperature. Diagnostic is considered failing above these values. Table vertical axis is engine speed (RPM), horizontal axis is transmission fluid temperature (DegC) and table output is predicted turbine speed error (RPM).

Value Units: turbine speed RPM error

X Unit: transmission fluid temperature DegC

Y Units: engine speed RPM

y/x	-40	0	10	20	40
0	350	350	350	350	350
500	350	350	350	350	350
1,100	350	350	350	350	350
1,500	350	350	350	350	350
2,500	350	350	350	350	350

Initial Supporting table - speed sensor directional rationality enable calibration**Description:** speed sensor directional rationality enable calibration**Value Units:** Boolean**X Unit:** scheduled gear**Y Units:** unitless

y/x	CeCGSR_FwdCmdd	CeCGSR-NeutCmdd	CeCGSR_RvrsCmdd	CeCGSR-ParkCmdd
1	1	1	0	1

Initial Supporting table - transmission fluid temperature warm up time**Description:****Value Units:** transmission fluid temperature normal warm 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 - 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	4.000	2.000	0.500	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction**Value Units:** predicted direction: forward, reverse, unknown**X Unit:** attained gear**Y Units:** intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1

y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionReverse
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 2

y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 3

y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 4

y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR_Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 5

y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	

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	0.500	0.500

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	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	0	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	0	1
CeCGSR_e_CR_Ninth	1	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	3	3

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	1.500	1.500

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	160.0	192.0

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	160.0	192.0

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_C2 C_ClchSpdSnsr 1	1.0000	1.0000	2.9762	1.6863	1.3736	1.0000	0.8104	0.6515	1.0000	1.0000
CeTSRR_e_C2 C_ClchSpdSnsr 2	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	CeTNSR_e_InternalSpdSnsr1	CeTNSR_e_InternalSpdSnsr2	CeTNSR_e_InternalSpdSnsr3
1	225	0	0

Initial Supporting table - speed sensor directional rationality enable calibration**Description:** speed sensor directional rationality enable calibration**Value Units:** Boolean**X Unit:** scheduled gear**Y Units:** unitless

y/x	CeCGSR_FwdCmdd	CeCGSR-NeutCmdd	CeCGSR_RvrsCmdd	CeCGSR-ParkCmdd
1	1	1	0	1

Initial Supporting table - transmission fluid temperature warm up time**Description:****Value Units:** transmission fluid temperature normal warm 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 - C1 Clutch Clip Press CD Shifts**Description:** C1 oncoming clutch clip pressure for closed throttle down shifts**Value Units:** kPa**X Unit:** clutch torque Nm**Y Units:** unitless

y/x	0.0	50.0	100.0	200.0	300.0
1	400.0	400.0	400.0	400.0	400.0

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	1.600	1.100	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	0.250	0.250	0.250	0.250	0.250

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C1 Oncoming Post-Torque Phase Delay**Description:** Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C1 is the oncoming clutch**Value Units:** time (seconds)**X Unit:** transmission fluid temperature °C**Y Units:** unitless

y/x	-40.0	-20.0	0.0	30.0	110.0
1	-0.250	-0.250	-0.250	-0.250	-0.250

Initial Supporting table - C1 Torque-Based Pressure Clip

Description: Pressure clip values for C1 based on clutch torque. Clutch torque calculated from engine torque using torque lever ratios, which are hardware and shift specific.

Value Units: Clutch Pressure (kPa)

X Unit: C1 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	360	410	460	560	710

Initial Supporting table - C2 Clutch Clip Press CD Shifts**Description:** C2 oncoming clutch clip pressure for closed throttle down shifts**Value Units:** kPa**X Unit:** clutch torque Nm**Y Units:** unitless

y/x	0.0	50.0	100.0	200.0	300.0
1	800.0	800.0	800.0	800.0	800.0

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	0.850	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	0.250	0.250	0.250	0.250	0.250

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 - C2 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	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C2 Oncoming Post-Torque Phase Delay**Description:** Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C2 is the oncoming clutch**Value Units:** time (seconds)**X Unit:** transmission fluid temperature °C

y/x	-40.0	-20.0	0.0	30.0	110.0
1	-0.250	-0.250	-0.250	-0.250	-0.250

Initial Supporting table - C2 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C2 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	800	800	800	800	800

Initial Supporting table - C3 (C13567) Cap Poss Trans Time Thres**Description:** C3 (C13567) Capacity Possible Transition Time Threshold**Value Units:** seconds**X Unit:** transmission fluid temperature °C**Y Units:** unitless

y/x	-40.0	-20.0	0.0	20.0	130.0
1	0.800	0.700	0.400	0.200	0.150

Initial Supporting table - C3 Clutch Clip Press CD Shifts**Description:** C3 oncoming clutch clip pressure for closed throttle down shifts**Value Units:** kPa**X Unit:** clutch torque Nm**Y Units:** unitless

y/x	0.0	50.0	100.0	200.0	300.0
1	500.0	500.0	500.0	500.0	500.0

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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C3 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	0.250	0.250	0.250	0.250	0.250

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 - C3 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	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C3 Oncoming Post-Torque Phase Delay**Description:** Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C3 is the oncoming clutch**Value Units:** time (seconds)**X Unit:** transmission fluid temperature °C

y/x	-40.0	-20.0	0.0	30.0	110.0
1	-0.250	-0.250	-0.250	-0.250	-0.250

Initial Supporting table - C3 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C3 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	335	385	435	535	685

Initial Supporting table - C4 Clutch Clip Press CD Shifts**Description:** C4 oncoming clutch clip pressure for closed throttle down shifts**Value Units:** kPa**X Unit:** clutch torque Nm**Y Units:** unitless

y/x	0.0	50.0	100.0	200.0	300.0
1	850.0	850.0	850.0	850.0	850.0

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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C4 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	0.250	0.250	0.250	0.250	0.250

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 - C4 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	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C4 Oncoming Post-Torque Phase Delay**Description:** Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C4 is the oncoming clutch**Value Units:** time (seconds)**X Unit:** transmission fluid temperature °C

y/x	-40.0	-20.0	0.0	30.0	110.0
1	-0.250	-0.250	-0.250	-0.250	-0.250

Initial Supporting table - C4 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C4 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	399	449	499	599	749

Initial Supporting table - C5 Clutch Clip Press CD Shifts**Description:** C5 oncoming clutch clip pressure for closed throttle down shifts**Value Units:** kPa**X Unit:** clutch torque Nm**Y Units:** unitless

y/x	0.0	50.0	100.0	200.0	300.0
1	703.0	703.0	703.0	703.0	703.0

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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C5 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	0	0	0	0	0

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 - C5 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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C5 Oncoming Post-Torque Phase Delay**Description:** Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C5 is the oncoming clutch**Value Units:** time (seconds)**X Unit:** transmission fluid temperature °C

y/x	-40.0	-20.0	0.0	30.0	110.0
1	-0.250	-0.250	-0.250	-0.250	-0.250

Initial Supporting table - C5 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C5 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	265	425	525	625	725

Initial Supporting table - C6 Clutch Clip Press CD Shifts**Description:** C6 oncoming clutch clip pressure for closed throttle down shifts**Value Units:** kPa**X Unit:** clutch torque Nm**Y Units:** unitless

y/x	0.0	50.0	100.0	200.0	300.0
1	655.0	655.0	655.0	655.0	655.0

Initial Supporting table - C6 Oncoming Post-Torque Phase Delay**Description:** Post torque phase delay before calculating oncoming clutch clip pressure for powered upshifts when C6 is the oncoming clutch**Value Units:** time (seconds)**X Unit:** transmission fluid temperature °C

y/x	-40.0	-20.0	0.0	30.0	110.0
1	-0.250	-0.250	-0.250	-0.250	-0.250

Initial Supporting table - C6 Torque-Based Pressure Clip**Description:****Value Units:** Clutch Pressure (kPa)**X Unit:** C6 Oncoming Clutch Torque (Nm)

y/x	0	50	100	200	350
1	350	450	575	700	800

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	450	750	850	400	400	400

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	350	750	450	350	450	450

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	325	250	250	350	350	500

Initial Supporting table - Clutch Connectivity C1 On Threshold**Description:** Pressure command above which C1 will be considered commanded on**Value Units:** kPa**X Unit:** transmission fluid temperature °C**Y Units:** C1 clutch

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C2 On Threshold**Description:** Pressure command above which C2 will be considered commanded on**Value Units:** kPa**X Unit:** transmission fluid temperature °C**Y Units:** C2 clutch

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C3 On Threshold**Description:** Pressure command above which C3 will be considered commanded on**Value Units:** kPa**X Unit:** transmission fluid temperature °C**Y Units:** C3 clutch

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C4 On Threshold**Description:** Pressure command above which C4 will be considered commanded on**Value Units:** kPa**X Unit:** transmission fluid temperature °C**Y Units:** C4 clutch

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C5 On Threshold**Description:** Pressure command above which C5 will be considered commanded on**Value Units:** kPa**X Unit:** transmission fluid temperature °C**Y Units:** C5 clutch

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C6 On Threshold**Description:** Pressure command above which C6 will be considered commanded on**Value Units:** kPa**X Unit:** transmission fluid temperature °C**Y Units:** C6 clutch

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C7 On Threshold**Description:** Pressure command above which C7 will be considered commanded on**Value Units:** kPa**X Unit:** transmission fluid temperature °C**Y Units:** C7 clutch

y/x	-40	-20	0	20	120
1	300	300	300	300	300

Initial Supporting table - Clutch Connectivity Wrong Direction FP**Description:** Fault pending time for clutch connectivity detecting wrong direction**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	1	1	1	1	1

Initial Supporting table - Clutch PCS Pressure Gain**Description:** Gain value to convert clutch pressure command to regulator valve command**Value Units:** Gain (unitless)**X Unit:** 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	1	1	1	1	1	0

Initial Supporting table - Clutch PCS Pressure Offset**Description:** Offset value to convert clutch pressure command to regulator valve command**Value Units:** offset (kPa)**X Unit:** 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	67	67	67	67	67	0

Initial Supporting 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	0	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	1	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**XUnit:** 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 - Cmnd Tie Up Monitor Multi-Clutch Thresh

Description: Maximum pressure command allowed for each combination of clutches which can lead to a multi-clutch tie up**Value Units:** Pressure (kPa)**X Unit:** Commanded Gear**Y Units:** Clutch

Cmnd Tie Up Monitor Multi-Clutch Thresh - 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
CeTRMR_e_C1_Clutch	249	249	4,096	249	266	249	249
CeTRMR_e_C2_Clutch	250	250	250	4,096	250	260	250
CeTRMR_e_C3_Clutch	132	132	132	132	4,096	654	132
CeTRMR_e_C4_Clutch	81	81	81	81	365	4,096	81
CeTRMR_e_C5_Clutch	168	168	168	168	168	184	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - 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
CeTRMR_e_C1_Clutch	249	249	4,096	4,096	4,096	4,096	266
CeTRMR_e_C2_Clutch	250	250	4,096	250	260	250	4,096
CeTRMR_e_C3_Clutch	132	132	132	4,096	654	132	4,096
CeTRMR_e_C4_Clutch	81	81	81	365	4,096	81	365
CeTRMR_e_C5_Clutch	168	168	168	168	184	4,096	168
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 3

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

y/x	CeCGSR_e_NeutralC 2C4	CeCGSR_e_NeutralC 2C5	CeCGSR_e_NeutralC 2C6	CeCGSR_e_NeutralC 3C4	CeCGSR_e_NeutralC 3C5	CeCGSR_e_NeutralC 3C6	CeCGSR_e_NeutralC 4C5
CeTRMR_e_C1_Clutch	249	249	249	364	266	266	249
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	395	250	250	260
CeTRMR_e_C3_Clutch	654	132	132	4,096	4,096	4,096	1,382
CeTRMR_e_C4_Clutch	4,096	81	81	4,096	851	365	4,096
CeTRMR_e_C5_Clutch	184	4,096	168	568	4,096	168	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 4

y/x	CeCGSR_e_NeutralC 4C6	CeCGSR_e_NeutralC 1C2C3C6	CeCGSR_e_Park_wN C	CeCGSR_e_Park_wN C1	CeCGSR_e_Park_wN C2	CeCGSR_e_Park_wN C3	CeCGSR_e_Park_wN C4
CeTRMR_e_C1_Clutch	249	249	249	4,096	249	266	249
CeTRMR_e_C2_Clutch	260	250	250	250	4,096	250	260
CeTRMR_e_C3_Clutch	654	132	132	132	132	4,096	654
CeTRMR_e_C4_Clutch	4,096	81	81	81	81	365	4,096
CeTRMR_e_C5_Clutch	184	168	168	168	168	168	184
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 5

y/x	CeCGSR_e_Park_wN C5	CeCGSR_e_Park_wN C6	CeCGSR_e_Park_wN C7	CeCGSR_e_Park_wN C1C2	CeCGSR_e_Park_wN C2C3	CeCGSR_e_Park_wN C2C4	CeCGSR_e_Park_wN C2C5
CeTRMR_e_C1_Clutch	249	249	249	4,096	266	249	249
CeTRMR_e_C2_Clutch	250	250	250	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	132	132	132	132	4,096	654	132

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

CeTRMR_e_C4_Clutch	81	81	81	81	365	4,096	81
CeTRMR_e_C5_Clutch	4,096	168	168	168	168	184	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 6

y/x	CeCGSR_e_Park_wN C2C6	CeCGSR_e_Park_wN C3C4	CeCGSR_e_Park_wN C3C5	CeCGSR_e_Park_wN C3C6	CeCGSR_e_Park_wN C4C5	CeCGSR_e_Park_wN C4C6	CeCGSR_e_Park_wN C1C2C3C6
CeTRMR_e_C1_Clutch	249	364	266	266	249	249	249
CeTRMR_e_C2_Clutch	4,096	395	250	250	260	260	250
CeTRMR_e_C3_Clutch	132	4,096	4,096	4,096	1,382	654	132
CeTRMR_e_C4_Clutch	81	4,096	851	365	4,096	4,096	81
CeTRMR_e_C5_Clutch	168	568	4,096	168	4,096	184	168
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 7

y/x	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW	CeCGSR_e_SecondL ckd	CeCGSR_e_SecondF W	CeCGSR_e_Third	CeCGSR_e_Fourth
CeTRMR_e_C1_Clutch	4,096	4,096	4,096	4,096	4,096	364	249
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	132	4,096	4,096	654	654	4,096	1,382
CeTRMR_e_C4_Clutch	81	365	365	4,096	4,096	4,096	4,096
CeTRMR_e_C5_Clutch	4,096	168	168	184	184	568	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 8							
y/x	CeCGSR_e_Fifth	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth	
CeTRMR_e_C1_Clutch	266	725	4,096	4,096	4,096	4,096	
CeTRMR_e_C2_Clutch	4,096	395	250	260	4,096	4,096	
CeTRMR_e_C3_Clutch	4,096	4,096	4,096	1,897	4,096	4,096	
CeTRMR_e_C4_Clutch	851	4,096	851	4,096	4,096	4,096	
CeTRMR_e_C5_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	

Initial Supporting table - Ccmd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

Description: Maximum pressure command allowed for each combination of clutches which can lead to a multi-clutch tie up when transfer case is in 4WD low range

Value Units: Pressure (kPa)

X Unit: Commanded Gear

Y Units: Clutch

Ccmd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - 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
CeTRMR_e_C1_Clutch	92	92	4,096	92	99	92	92
CeTRMR_e_C2_Clutch	93	93	93	4,096	93	96	93
CeTRMR_e_C3_Clutch	49	49	49	49	4,096	242	49
CeTRMR_e_C4_Clutch	30	30	30	30	135	4,096	30
CeTRMR_e_C5_Clutch	62	62	62	62	62	68	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Ccmd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - 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
CeTRMR_e_C1_Clutch	92	92	4,096	4,096	4,096	4,096	99
CeTRMR_e_C2_Clutch	93	93	4,096	93	96	93	4,096
CeTRMR_e_C3_Clutch	49	49	49	4,096	242	49	4,096
CeTRMR_e_C4_Clutch	30	30	30	135	4,096	30	135
CeTRMR_e_C5_Clutch	62	62	62	62	68	4,096	62
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Ccmd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 3

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

y/x	CeCGSR_e_NeutralC 2C4	CeCGSR_e_NeutralC 2C5	CeCGSR_e_NeutralC 2C6	CeCGSR_e_NeutralC 3C4	CeCGSR_e_NeutralC 3C5	CeCGSR_e_NeutralC 3C6	CeCGSR_e_NeutralC 4C5
CeTRMR_e_C1_Clutch	92	92	92	135	99	99	92
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	146	93	93	96
CeTRMR_e_C3_Clutch	242	49	49	4,096	4,096	4,096	512
CeTRMR_e_C4_Clutch	4,096	30	30	4,096	315	135	4,096
CeTRMR_e_C5_Clutch	68	4,096	62	210	4,096	62	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 4

y/x	CeCGSR_e_NeutralC 4C6	CeCGSR_e_NeutralC 1C2C3C6	CeCGSR_e_Park_wN C	CeCGSR_e_Park_wN C1	CeCGSR_e_Park_wN C2	CeCGSR_e_Park_wN C3	CeCGSR_e_Park_wN C4
CeTRMR_e_C1_Clutch	92	92	92	4,096	92	99	92
CeTRMR_e_C2_Clutch	96	93	93	93	4,096	93	96
CeTRMR_e_C3_Clutch	242	49	49	49	49	4,096	242
CeTRMR_e_C4_Clutch	4,096	30	30	30	30	135	4,096
CeTRMR_e_C5_Clutch	68	62	62	62	62	62	68
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 5

y/x	CeCGSR_e_Park_wN C5	CeCGSR_e_Park_wN C6	CeCGSR_e_Park_wN C7	CeCGSR_e_Park_wN C1C2	CeCGSR_e_Park_wN C2C3	CeCGSR_e_Park_wN C2C4	CeCGSR_e_Park_wN C2C5
CeTRMR_e_C1_Clutch	92	92	92	4,096	99	92	92
CeTRMR_e_C2_Clutch	93	93	93	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	49	49	49	49	4,096	242	49

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

CeTRMR_e_C4_Clutch	30	30	30	30	135	4,096	30
CeTRMR_e_C5_Clutch	4,096	62	62	62	62	68	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 6

y/x	CeCGSR_e_Park_wN C2C6	CeCGSR_e_Park_wN C3C4	CeCGSR_e_Park_wN C3C5	CeCGSR_e_Park_wN C3C6	CeCGSR_e_Park_wN C4C5	CeCGSR_e_Park_wN C4C6	CeCGSR_e_Park_wN C1C2C3C6
CeTRMR_e_C1_Clutch	92	135	99	99	92	92	92
CeTRMR_e_C2_Clutch	4,096	146	93	93	96	96	93
CeTRMR_e_C3_Clutch	49	4,096	4,096	4,096	512	242	49
CeTRMR_e_C4_Clutch	30	4,096	315	135	4,096	4,096	30
CeTRMR_e_C5_Clutch	62	210	4,096	62	4,096	68	62
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 7

y/x	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW	CeCGSR_e_SecondL ckd	CeCGSR_e_SecondF W	CeCGSR_e_Third	CeCGSR_e_Fourth
CeTRMR_e_C1_Clutch	4,096	4,096	4,096	4,096	4,096	135	92
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	49	4,096	4,096	242	242	4,096	512
CeTRMR_e_C4_Clutch	30	135	135	4,096	4,096	4,096	4,096
CeTRMR_e_C5_Clutch	4,096	62	62	68	68	210	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 8							
y/x	CeCGSR_e_Fifth	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth	
CeTRMR_e_C1_Clutch	99	268	4,096	4,096	4,096	4,096	
CeTRMR_e_C2_Clutch	4,096	146	93	96	4,096	4,096	
CeTRMR_e_C3_Clutch	4,096	4,096	4,096	703	4,096	4,096	
CeTRMR_e_C4_Clutch	315	4,096	315	4,096	4,096	4,096	
CeTRMR_e_C5_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	

Initial Supporting table - Cmnd Tie Up Monitor Output Lock Thresh

Description: Maximum pressure command allowed for each invalid combination of clutches which can lead to an output tie-up

Value Units: Pressure (kPa)

X Unit: Possible Output Tie-up Combination (unitless)

Y Units: Clutch

y/x	CeTCLR_e_TUM_Out Lock1	CeTCLR_e_TUM_Out Lock2	CeTCLR_e_TUM_Out Lock3	CeTCLR_e_TUM_Out Lock4	CeTCLR_e_TUM_Out Lock5	CeTCLR_e_TUM_Out Lock6	CeTCLR_e_TUM_Out Lock7
CeTRMR_e_C1_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C2_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C3_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C4_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C5_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C6_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C7_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096

Initial Supporting table - Default Valve Stuck On TCC Pressure Request**Description:** Default Valve Stuck On Intrusive TCC Pressure Request**Value Units:** kPa**X Unit:** engine torque Nm**Y Units:** unitless

y/x	-40.0	100.0	200.0	300.0	500.0
1	500.0	500.0	500.0	500.0	500.0

Initial Supporting table - Default Valve Stuck On TCC Slip Speed for intrusive**Description:** Default Valve Stuck On TCC Slip Speed for intrusive TCC pressure request**Value Units:** TCC slip speed**X Unit:** transmission fluid temperature °C**Y Units:** unitless

y/x	-40.00	-20.00	0.00	30.00	110.00
1	175	175	175	175	175

Initial Supporting table - Default Valve Stuck On Test Pressure Response Delay

Description: Delay after TOO commanded pressure reaches test threshold value before incrementing default valve solenoid stuck on fail timer. This delay is based on transmission fluid temperature

Value Units: time (seconds)

X Unit: transmission fluid temperature °C

y/x	-40.0	-20.0	0.0	30.0	110.0
1	1.500	1.200	0.900	0.600	0.250

Initial Supporting table - Illegal Drive Clutch Combinations

Description: All combinations of clutch commands which can lead to reverse when the driver is requesting drive (1 indicates clutch on, 0 indicates clutch off)

Value Units: Boolean (1 for on, 0 for off)

X Unit: Illegal Clutch Combination

Y Units: Clutch

y/x	CeTRMR_e_IllegalDrv_Rev1	CeTRMR_e_IllegalDrv_Rev2
CeTRMR_e_C1_Clutch	1	1
CeTRMR_e_C2_Clutch	1	1
CeTRMR_e_C3_Clutch	1	1
CeTRMR_e_C4_Clutch	1	1
CeTRMR_e_C5_Clutch	1	1
CeTRMR_e_C6_Clutch	1	1
CeTRMR_e_C7_Clutch	1	1

Initial Supporting table - Illegal Park-Neutral Clutch Combinations

Description: All combinations of clutch commands which can lead to drive or reverse when the driver is requesting park or neutral (1 indicates clutch on, 0 indicates clutch off)

Value Units: Boolean (1 for on, 0 for off)

X Unit: Illegal Clutch Combination

Y Units: Clutch

Illegal Park-Neutral Clutch Combinations - Part 1

y/x	CeTRMR_e_IllegalPN.Rev	CeTRMR.e_IllegalPN.1A	CeTRMR.e_IllegalPN.I Ac	CeTRMR_e_IllegalPN_1Ad	CeTRMR_e_IllegalPN_1Af
CeTRMR_e_C1.Clutch	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	1	1	1	1
CeTRMR_e_C3_Clutch	1	1	1	1	1
CeTRMR_e_C4_Clutch	1	1	1	1	1
CeTRMR_e_C5_Clutch	1	1	1	1	1
CeTRMR_e_C6_Clutch	1	1	1	1	1
CeTRMR_e_C7_Clutch	1	1	1	1	1

Illegal Park-Neutral Clutch Combinations - Part 2

y/x	CeTRMR.e_IllegalPN.I M	CeTRMR.e_IllegalPN.I Me	CeTRMR.e_IllegalPN.I Md	CeTRMR_e_IllegalPN_1Mf	CeTRMR_e_IllegalPN_2A
CeTRMR_e_C1.Clutch	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	1	1	1	1
CeTRMR_e_C3_Clutch	1	1	1	1	1
CeTRMR_e_C4_Clutch	1	1	1	1	1
CeTRMR_e_C5_Clutch	1	1	1	1	1
CeTRMR_e_C6_Clutch	1	1	1	1	1
CeTRMR_e_C7_Clutch	1	1	1	1	1

Illegal Park-Neutral Clutch Combinations - Part 3

y/x	CeTRMR_e_IllegalPN_2M	CeTRMR_e_IllegalPN_3	CeTRMR_e_IllegalPN_4	CeTRMR_e_IllegalPN_5	CeTRMR_e_IllegalPN_6
CeTRMR.e.Cl .Clutch	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	1	1	1	1
CeTRMR_e_C3_Clutch	1	1	1	1	1
CeTRMR_e_C4_Clutch	1	1	1	1	1
CeTRMR_e_C5_Clutch	1	1	1	1	1
CeTRMR_e_C6_Clutch	1	1	1	1	1
CeTRMR_e_C7_Clutch	1	1	1	1	1

Illegal Park-Neutral Clutch Combinations - Part 4

y/x	CeTRMR_e_IllegalPN_7	CeTRMR_e_IllegalPN_8	CeTRMR_e_IllegalPN_9	CeTRMR_e_IllegalPN_10	
CeTRMR.e.Cl .Clutch	1	1	1	1	
CeTRMR_e_C2_Clutch	1	1	1	1	

Initial Supporting table - Illegal Park-Neutral Clutch Combinations

CeTRMR_e_C3_Clutch	1	1	1	1	
CeTRMR_e_C4_Clutch	1	1	1	1	
CeTRMR_e_C5_Clutch	1	1	1	1	
CeTRMR_e_C6_Clutch	1	1	1	1	
CeTRMR_e_C7_Clutch	1	1	1	1	

Initial Supporting table - Illegal Reverse Clutch Combinations

Description: All combinations of clutch commands which can lead to drive when the driver is requesting reverse (1 indicates clutch on, 0 indicates clutch off)

Value Units: Boolean (1 for on, 0 for off)

X Unit: Illegal Clutch Combination

Y Units: Clutch

Illegal Reverse Clutch Combinations - Part 1

y/x	CeTRMR_e_IllegalRev_1 A	CeTRMR_e_IllegalRev_1 Ac	CeTRMR_e_IllegalRev_1 Ad	CeTRMR_e_IllegalRev_1 Af	CeTRMR_e_IllegalRev_1 M	CeTRMR_e_IllegalRev_1 Me
CeTRMR_e_C1.Clutch	1	1	1	1	1	1
CeTRMR_e_C2.Clutch	1	1	1	1	1	1
CeTRMR_e_C3.Clutch	1	1	1	1	1	1
CeTRMR_e_C4.Clutch	1	1	1	1	1	1
CeTRMR_e_C5.Clutch	1	1	1	1	1	1
CeTRMR_e_C6.Clutch	1	1	1	1	1	1
CeTRMR_e_C7.Clutch	1	1	1	1	1	1

Illegal Reverse Clutch Combinations - Part 2

y/x	CeTRMR_e_IllegalRev_1 Md	CeTRMR_e_IllegalRev_1 Mf	CeTRMR_e_IllegalRev_2 A	CeTRMR_e_IllegalRev_2 M	CeTRMR_e_IllegalRev_3	CeTRMR_e_IllegalRev_4
CeTRMR_e_C1.Clutch	1	1	1	1	1	1
CeTRMR_e_C2.Clutch	1	1	1	1	1	1
CeTRMR_e_C3.Clutch	1	1	1	1	1	1
CeTRMR_e_C4.Clutch	1	1	1	1	1	1
CeTRMR_e_C5.Clutch	1	1	1	1	1	1
CeTRMR_e_C6.Clutch	1	1	1	1	1	1
CeTRMR_e_C7.Clutch	1	1	1	1	1	1

Illegal Reverse Clutch Combinations - Part 3

y/x	CeTRMR_e_IllegalRev_5	CeTRMR_e_IllegalRev_6	CeTRMR_e_IllegalRev_7	CeTRMR_e_IllegalRev_8	CeTRMR_e_IllegalRev_9	CeTRMR_e_IllegalRev_10
CeTRMR_e_C1.Clutch	1	1	1	1	1	1
CeTRMR_e_C2.Clutch	1	1	1	1	1	1
CeTRMR_e_C3.Clutch	1	1	1	1	1	1
CeTRMR_e_C4.Clutch	1	1	1	1	1	1
CeTRMR_e_C5.Clutch	1	1	1	1	1	1
CeTRMR_e_C6.Clutch	1	1	1	1	1	1
CeTRMR_e_C7.Clutch	1	1	1	1	1	1

Initial Supporting table - Incorrect Direction Range Change Delay Time**Description:** Time delay after PRNDL change before incorrect direction monitor will be enabled**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	1	1	1	1	1

Initial Supporting table - Incorrect Drive Fail Time**Description:** Fail Time as a function of temperature for incorrectly commanded drive condition**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Incorrect Neutral Fail Time**Description:** Fail Time as a function of temperature for incorrectly commanded neutral condition**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Incorrect Park Fail Time**Description:** Fail Time as a function of temperature for incorrectly commanded park condition**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Incorrect Reverse Fail Time**Description:** Fail Time as a function of temperature for incorrectly commanded reverse condition**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - lube pressure sensor engine crank delay time**Description:** 8 speed P0841 engine crank delay time**Value Units:** seconds**X Unit:** °C**Y Units:** unitless

y/x	-40.00	-20.00	0.00	20.00	130.00
1	60.000	60.000	60.000	60.000	60.000

Initial Supporting table - lube pressure sensor engine shutdown delay time**Description:** 8 speed P0841 engine shutdown delay time**Value Units:** seconds**X Unit:** °C**Y Units:** unitless

y/x	-40.0	-20.0	0.0	20.0	130.0
1	20.000	8.000	2.000	1.000	1.000

Initial Supporting table - lube pressure sensor post engine crank final fail time**Description:** 8 speed P0841 fail time**Value Units:** seconds**X Unit:** °C**Y Units:** unitless

y/x	-40.00	-20.00	0.00	20.00	130.00
1	0.400	0.400	0.400	0.400	0.400

Initial Supporting table - Ratio Monitor Clutch States

Description: Array of valid combinations of clutch held/off which constitutes a valid gear (1 = clutch held, 0 = clutch off)

Value Units: Clutch Held Boolean

X Unit: Gear

Y Units: Clutch

Ratio Monitor Clutch States - Part 1

y/x	CeTRMR_e_GRX_GearR	CeTRMR_e_GRX_Gear1A	CeTRMR_e_GRX_Gear1Ac	CeTRMR_e_GRX_Gear1Ad	CeTRMR_e_GRX_Gear1Af
CeTSER_e_C1_Clutch	1	1	1	1	1
CeTSER_e_C2_Clutch	1	1	1	1	1
CeTSER_e_C3_Clutch	1	1	1	1	1
CeTSER_e_C4_Clutch	1	1	1	1	1
CeTSER_e_C5_Clutch	1	1	1	1	1
CeTSER_e_C6_Clutch	1	1	1	1	1

Ratio Monitor Clutch States - Part 2

y/x	CeTRMR_e_GRX_Gear1M	CeTRMR_e_GRX_Gear1Me	CeTRMR_e_GRX_Gear1Md	CeTRMR_e_GRX_Gear1Mf	CeTRMR_e_GRX_Gear2A
CeTSER_e_C1_Clutch	1	1	1	1	1
CeTSER_e_C2_Clutch	1	1	1	1	1
CeTSER_e_C3_Clutch	1	1	1	1	1
CeTSER_e_C4_Clutch	1	1	1	1	1
CeTSER_e_C5_Clutch	1	1	1	1	1
CeTSER_e_C6_Clutch	1	1	1	1	1

Ratio Monitor Clutch States - Part 3

y/x	CeTRMR_e_GRX_Gear2M	CeTRMR_e_GRX_Gear3	CeTRMR_e_GRX_Gear4	CeTRMR_e_GRX_Gear5	CeTRMR_e_GRX_Gear6
CeTSER_e_C1_Clutch	1	1	1	1	1
CeTSER_e_C2_Clutch	1	1	1	1	1
CeTSER_e_C3_Clutch	1	1	1	1	1
CeTSER_e_C4_Clutch	1	1	1	1	1
CeTSER_e_C5_Clutch	1	1	1	1	1
CeTSER_e_C6_Clutch	1	1	1	1	1

Ratio Monitor Clutch States - Part 4

y/x	CeTRMR_e_GRX_Gear7	CeTRMR_e_GRX_Gear8	CeTRMR_e_GRX_Gear9	CeTRMR_e_GRX_Gear10	
CeTSER_e_C1_Clutch	1	1	1	1	
CeTSER_e_C2_Clutch	1	1	1	1	
CeTSER_e_C3_Clutch	1	1	1	1	
CeTSER_e_C4_Clutch	1	1	1	1	
CeTSER_e_C5_Clutch	1	1	1	1	

Initial Supporting table - Ratio Monitor Clutch States

CeTSER_e_C6_Clutch

h

h

h

h

1

Initial Supporting table - Ratio Monitor Fail Increment Rate (Percent per Loop)**Description:** Ratio Monitor Fail Increment Rate**Value Units:** Percent Increment Per Loop**X Unit:** Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Ratio Monitor Slip Threshold

Description: Threshold slip value below which the clutch is considered holding

Value Units: clutch slip (RPM)

X Unit: Clutch

y/x	CeTRMR_e_ClchSlipC1	CeTRMR_e_ClchSlipC2	CeTRMR_e_ClchSlipC5	CeTRMR_e_ClchSlipC3C 4	CeTRMR_e_ClchSlipC3C 6	CeTRMR_e_ClchSlipC4C 6
1	30	30	30	25	25	25

Initial Supporting table - Shift Monitor Lowest Allowed Gear

Description: Y axis shows lowest allowed gear for the current vehicle speed and transfer case range

Value Units: Vehicle Speed (kph)

X Unit: Transfer Case Range

Y Units: Lowest Allowed Gear

y/x	CeTCLR_e_4WD_Hi	CeTCLR_e_4WD_Lo
CeTGRR_e_Gear1	62	23
CeTGRR_e_Gear2	95	35
CeTGRR_e_Gear3	135	50
CeTGRR_e_Gear4	166	62
CeTGRR_e_Gear5	221	82
CeTGRR_e_Gear6	281	104
CeTGRR_e_Gear7	332	123
CeTGRR_e_Gear8	431	160
CeTGRR_e_Gear9	431	160
CeTGRR_e_Gear10	431	160

Initial Supporting table - wheel slip delay**Description:**

y/x

1

1

-0.199

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	1.600	1.100	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	0.250	0.250	0.250	0.250	0.250

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	1.600	1.100	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	0.850	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	0.250	0.250	0.250	0.250	0.250

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 - C2 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	0.850	0.850

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	1.600	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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C3 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	0.250	0.250	0.250	0.250	0.250

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 - C3 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	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C4 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	0.250	0.250	0.250	0.250	0.250

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 - C4 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	0.850	0.850

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	1.600	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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

Initial Supporting table - C5 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	0	0	0	0	0

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 - C5 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	1.600	1.100	0.950	0.850	0.850

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	1.600	1.100	0.950	0.850	0.850

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	450	750	850	400	400	400

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	350	750	450	350	450	450

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	325	250	250	350	350	500

Initial Supporting 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	0	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	1	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**XUnit:** 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	4.000	2.000	0.500	0.250	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	4.000	2.000	0.500	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction**Value Units:** predicted direction: forward, reverse, unknown**X Unit:** attained gear**Y Units:** intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1

y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionReverse
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 2

y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 3

y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 4

y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR-Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 5

y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	

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	0.500	0.500

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	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	0	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	0	1
CeCGSR_e_CR_Ninth	1	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	3	3

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	1.500	1.500

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	160.0	192.0

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	160.0	192.0

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_C2 C_ClchSpdSnsr 1	1.0000	1.0000	2.9762	1.6863	1.3736	1.0000	0.8104	0.6515	1.0000	1.0000
CeTSRR_e_C2 C_ClchSpdSnsr 2	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	CeTNSR_e_InternalSpdSnsr1	CeTNSR_e_InternalSpdSnsr2	CeTNSR_e_InternalSpdSnsr3
1	225	0	0

Initial Supporting table - P2797 hydraulic pressure delay

Description: Time to delay the initial x of y counter due to hydraulic transients. Thresholds are a function of transmission fluid temperature. Horizontal axis is transmission fluid temperature (DegC) and table output is delay time (seconds).

Value Units: delay time seconds

X Unit: transmission fluid temperature DegC

y/x	-40	0	20	30	40	50	60
1	0.090	0.090	0.080	0.075	0.075	0.075	0.075

Initial Supporting table - P2797 predicted turbine speed error

Description: Predicted turbine speed vs actual turbine speed error. Thresholds are a function of engine speed and transmission fluid temperature. Diagnostic is considered failing above these values. Table vertical axis is engine speed (RPM), horizontal axis is transmission fluid temperature (DegC) and table output is predicted turbine speed error (RPM).

Value Units: turbine speed RPM error

X Unit: transmission fluid temperature DegC

Y Units: engine speed RPM

y/x	-40	0	10	20	40
0	350	350	350	350	350
500	350	350	350	350	350
1,100	350	350	350	350	350
1,500	350	350	350	350	350
2,500	350	350	350	350	350

Initial Supporting table - transmission fluid temperature warm up time**Description:****Value Units:** transmission fluid temperature normal warm 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 - 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	4.000	2.000	0.500	0.250	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	4.000	2.000	0.500	0.250	0.200

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction**Value Units:** predicted direction: forward, reverse, unknown**X Unit:** attained gear**Y Units:** intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1

y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionReverse
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown

intermediate speed sensor 1 or 2 predicted direction - Part 2

y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown

intermediate speed sensor 1 or 2 predicted direction - Part 3

y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown

intermediate speed sensor 1 or 2 predicted direction - Part 4

y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR-Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown

intermediate speed sensor 1 or 2 predicted direction - Part 5

y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionInknown	CeTNSR_e_DirectionInknown	

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	0.500	0.500

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	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	0	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	0	1
CeCGSR_e_CR_Ninth	1	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	3	3

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	1.500	1.500

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	160.0	192.0

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	160.0	192.0

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_C2 C_ClchSpdSnsr 1	1.0000	1.0000	2.9762	1.6863	1.3736	1.0000	0.8104	0.6515	1.0000	1.0000
CeTSRR_e_C2 C_ClchSpdSnsr 2	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	CeTNSR_e_InternalSpdSnsr1	CeTNSR_e_InternalSpdSnsr2	CeTNSR_e_InternalSpdSnsr3
1	225	0	0

Initial Supporting table - transmission fluid temperature warm up time**Description:****Value Units:** transmission fluid temperature normal warm 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 - Clutch Connectivity C1 On Threshold**Description:** Pressure command above which C1 will be considered commanded on**Value Units:** Commanded Pressure (kPa)**X Unit:** Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C2 On Threshold**Description:** Pressure command above which C2 will be considered commanded on**Value Units:** Commanded Pressure (kPa)**X Unit:** Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C3 On Threshold**Description:** Pressure command above which C3 will be considered commanded on**Value Units:** Commanded Pressure (kPa)**X Unit:** Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C4 On Threshold**Description:** Pressure command above which C4 will be considered commanded on**Value Units:** Commanded Pressure (kPa)**X Unit:** Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C5 On Threshold**Description:** Pressure command above which C5 will be considered commanded on**Value Units:** Commanded Pressure (kPa)**X Unit:** Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C6 On Threshold**Description:** Pressure command above which C6 will be considered commanded on**Value Units:** Commanded Pressure (kPa)**X Unit:** Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	175	175	175	175	175

Initial Supporting table - Clutch Connectivity C7 On Threshold**Description:** Pressure command above which SOWC will be considered commanded on**Value Units:** Commanded Pressure (kPa)**X Unit:** Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	300	300	300	300	300

Initial Supporting table - Clutch Connectivity Wrong Direction FP**Description:** Fault pending time for clutch connectivity detecting wrong direction**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	1	1	1	1	1

Initial Supporting table - Clutch PCS Pressure Gain**Description:** Gain value to convert clutch pressure command to regulator valve command**Value Units:** Gain (unitless)**X Unit:** 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	1	1	1	1	1	0

Initial Supporting table - Clutch PCS Pressure Offset**Description:** Offset value to convert clutch pressure command to regulator valve command**Value Units:** offset (kPa)**X Unit:** 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	67	67	67	67	67	0

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

Description: Maximum pressure command allowed for each combination of clutches which can lead to a multi-clutch tie up

Value Units: Pressure (kPa)

X Unit: Commanded Gear

Y Units: Clutch

Cmnd Tie Up Monitor Multi-Clutch Thresh - 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
CeTRMR_e_C1_Clutch	249	249	4,096	249	266	249	249
CeTRMR_e_C2_Clutch	250	250	250	4,096	250	260	250
CeTRMR_e_C3_Clutch	132	132	132	132	4,096	654	132
CeTRMR_e_C4_Clutch	81	81	81	81	365	4,096	81
CeTRMR_e_C5_Clutch	168	168	168	168	168	184	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - 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
CeTRMR_e_C1_Clutch	249	249	4,096	4,096	4,096	4,096	266
CeTRMR_e_C2_Clutch	250	250	4,096	250	260	250	4,096
CeTRMR_e_C3_Clutch	132	132	132	4,096	654	132	4,096
CeTRMR_e_C4_Clutch	81	81	81	365	4,096	81	365
CeTRMR_e_C5_Clutch	168	168	168	168	184	4,096	168
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 3

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

y/x	CeCGSR_e_NeutralC 2C4	CeCGSR_e_NeutralC 2C5	CeCGSR_e_NeutralC 2C6	CeCGSR_e_NeutralC 3C4	CeCGSR_e_NeutralC 3C5	CeCGSR_e_NeutralC 3C6	CeCGSR_e_NeutralC 4C5
CeTRMR_e_C1_Clutch	249	249	249	364	266	266	249
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	395	250	250	260
CeTRMR_e_C3_Clutch	654	132	132	4,096	4,096	4,096	1,382
CeTRMR_e_C4_Clutch	4,096	81	81	4,096	851	365	4,096
CeTRMR_e_C5_Clutch	184	4,096	168	568	4,096	168	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 4

y/x	CeCGSR_e_NeutralC 4C6	CeCGSR_e_NeutralC 1C2C3C6	CeCGSR_e_Park_wN C	CeCGSR_e_Park_wN C1	CeCGSR_e_Park_wN C2	CeCGSR_e_Park_wN C3	CeCGSR_e_Park_wN C4
CeTRMR_e_C1_Clutch	249	249	249	4,096	249	266	249
CeTRMR_e_C2_Clutch	260	250	250	250	4,096	250	260
CeTRMR_e_C3_Clutch	654	132	132	132	132	4,096	654
CeTRMR_e_C4_Clutch	4,096	81	81	81	81	365	4,096
CeTRMR_e_C5_Clutch	184	168	168	168	168	168	184
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 5

y/x	CeCGSR_e_Park_wN C5	CeCGSR_e_Park_wN C6	CeCGSR_e_Park_wN C7	CeCGSR_e_Park_wN C1C2	CeCGSR_e_Park_wN C2C3	CeCGSR_e_Park_wN C2C4	CeCGSR_e_Park_wN C2C5
CeTRMR_e_C1_Clutch	249	249	249	4,096	266	249	249
CeTRMR_e_C2_Clutch	250	250	250	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	132	132	132	132	4,096	654	132

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

CeTRMR_e_C4_Clutch	81	81	81	81	365	4,096	81
CeTRMR_e_C5_Clutch	4,096	168	168	168	168	184	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 6

y/x	CeCGSR_e_Park_wN C2C6	CeCGSR_e_Park_wN C3C4	CeCGSR_e_Park_wN C3C5	CeCGSR_e_Park_wN C3C6	CeCGSR_e_Park_wN C4C5	CeCGSR_e_Park_wN C4C6	CeCGSR_e_Park_wN C1C2C3C6
CeTRMR_e_C1_Clutch	249	364	266	266	249	249	249
CeTRMR_e_C2_Clutch	4,096	395	250	250	260	260	250
CeTRMR_e_C3_Clutch	132	4,096	4,096	4,096	1,382	654	132
CeTRMR_e_C4_Clutch	81	4,096	851	365	4,096	4,096	81
CeTRMR_e_C5_Clutch	168	568	4,096	168	4,096	184	168
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 7

y/x	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW	CeCGSR_e_SecondL ckd	CeCGSR_e_SecondF W	CeCGSR_e_Third	CeCGSR_e_Fourth
CeTRMR_e_C1_Clutch	4,096	4,096	4,096	4,096	4,096	364	249
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	132	4,096	4,096	654	654	4,096	1,382
CeTRMR_e_C4_Clutch	81	365	365	4,096	4,096	4,096	4,096
CeTRMR_e_C5_Clutch	4,096	168	168	184	184	568	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh

Cmnd Tie Up Monitor Multi-Clutch Thresh - Part 8							
y/x	CeCGSR_e_Fifth	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth	
CeTRMR_e_C1_Clutch	266	725	4,096	4,096	4,096	4,096	
CeTRMR_e_C2_Clutch	4,096	395	250	260	4,096	4,096	
CeTRMR_e_C3_Clutch	4,096	4,096	4,096	1,897	4,096	4,096	
CeTRMR_e_C4_Clutch	851	4,096	851	4,096	4,096	4,096	
CeTRMR_e_C5_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	

Initial Supporting table - Ccmd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

Description: Maximum pressure command allowed for each combination of clutches which can lead to a multi-clutch tie up when transfer case is in 4WD low range

Value Units: Pressure (kPa)

X Unit: Commanded Gear

Y Units: Clutch

Ccmd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - 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
CeTRMR_e_C1_Clutch	92	92	4,096	92	99	92	92
CeTRMR_e_C2_Clutch	93	93	93	4,096	93	96	93
CeTRMR_e_C3_Clutch	49	49	49	49	4,096	242	49
CeTRMR_e_C4_Clutch	30	30	30	30	135	4,096	30
CeTRMR_e_C5_Clutch	62	62	62	62	62	68	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Ccmd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - 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
CeTRMR_e_C1_Clutch	92	92	4,096	4,096	4,096	4,096	99
CeTRMR_e_C2_Clutch	93	93	4,096	93	96	93	4,096
CeTRMR_e_C3_Clutch	49	49	49	4,096	242	49	4,096
CeTRMR_e_C4_Clutch	30	30	30	135	4,096	30	135
CeTRMR_e_C5_Clutch	62	62	62	62	68	4,096	62
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Ccmd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 3

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

y/x	CeCGSR_e_NeutralC 2C4	CeCGSR_e_NeutralC 2C5	CeCGSR_e_NeutralC 2C6	CeCGSR_e_NeutralC 3C4	CeCGSR_e_NeutralC 3C5	CeCGSR_e_NeutralC 3C6	CeCGSR_e_NeutralC 4C5
CeTRMR_e_C1_Clutch	92	92	92	135	99	99	92
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	146	93	93	96
CeTRMR_e_C3_Clutch	242	49	49	4,096	4,096	4,096	512
CeTRMR_e_C4_Clutch	4,096	30	30	4,096	315	135	4,096
CeTRMR_e_C5_Clutch	68	4,096	62	210	4,096	62	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 4

y/x	CeCGSR_e_NeutralC 4C6	CeCGSR_e_NeutralC 1C2C3C6	CeCGSR_e_Park_wN C	CeCGSR_e_Park_wN C1	CeCGSR_e_Park_wN C2	CeCGSR_e_Park_wN C3	CeCGSR_e_Park_wN C4
CeTRMR_e_C1_Clutch	92	92	92	4,096	92	99	92
CeTRMR_e_C2_Clutch	96	93	93	93	4,096	93	96
CeTRMR_e_C3_Clutch	242	49	49	49	49	4,096	242
CeTRMR_e_C4_Clutch	4,096	30	30	30	30	135	4,096
CeTRMR_e_C5_Clutch	68	62	62	62	62	62	68
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 5

y/x	CeCGSR_e_Park_wN C5	CeCGSR_e_Park_wN C6	CeCGSR_e_Park_wN C7	CeCGSR_e_Park_wN C1C2	CeCGSR_e_Park_wN C2C3	CeCGSR_e_Park_wN C2C4	CeCGSR_e_Park_wN C2C5
CeTRMR_e_C1_Clutch	92	92	92	4,096	99	92	92
CeTRMR_e_C2_Clutch	93	93	93	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	49	49	49	49	4,096	242	49

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

CeTRMR_e_C4_Clutch	30	30	30	30	135	4,096	30
CeTRMR_e_C5_Clutch	4,096	62	62	62	62	68	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 6

y/x	CeCGSR_e_Park_wN C2C6	CeCGSR_e_Park_wN C3C4	CeCGSR_e_Park_wN C3C5	CeCGSR_e_Park_wN C3C6	CeCGSR_e_Park_wN C4C5	CeCGSR_e_Park_wN C4C6	CeCGSR_e_Park_wN C1C2C3C6
CeTRMR_e_C1_Clutch	92	135	99	99	92	92	92
CeTRMR_e_C2_Clutch	4,096	146	93	93	96	96	93
CeTRMR_e_C3_Clutch	49	4,096	4,096	4,096	512	242	49
CeTRMR_e_C4_Clutch	30	4,096	315	135	4,096	4,096	30
CeTRMR_e_C5_Clutch	62	210	4,096	62	4,096	68	62
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 7

y/x	CeCGSR_e_Reverse	CeCGSR_e_FirstLckd	CeCGSR_e_FirstFW	CeCGSR_e_SecondL ckd	CeCGSR_e_SecondF W	CeCGSR_e_Third	CeCGSR_e_Fourth
CeTRMR_e_C1_Clutch	4,096	4,096	4,096	4,096	4,096	135	92
CeTRMR_e_C2_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C3_Clutch	49	4,096	4,096	242	242	4,096	512
CeTRMR_e_C4_Clutch	30	135	135	4,096	4,096	4,096	4,096
CeTRMR_e_C5_Clutch	4,096	62	62	68	68	210	4,096
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	4,096

Initial Supporting table - Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo

Cmnd Tie Up Monitor Multi-Clutch Thresh 4WD Lo - Part 8							
y/x	CeCGSR_e_Fifth	CeCGSR_e_Sixth	CeCGSR_e_Seventh	CeCGSR_e_Eighth	CeCGSR_e_Ninth	CeCGSR_e_Tenth	
CeTRMR_e_C1_Clutch	99	268	4,096	4,096	4,096	4,096	
CeTRMR_e_C2_Clutch	4,096	146	93	96	4,096	4,096	
CeTRMR_e_C3_Clutch	4,096	4,096	4,096	703	4,096	4,096	
CeTRMR_e_C4_Clutch	315	4,096	315	4,096	4,096	4,096	
CeTRMR_e_C5_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C6_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	
CeTRMR_e_C7_Clutch	4,096	4,096	4,096	4,096	4,096	4,096	

Initial Supporting table - Cmnd Tie Up Monitor Output Lock Thresh

Description: Maximum pressure command allowed for each invalid combination of clutches which can lead to an output tie-up

Value Units: Pressure (kPa)

X Unit: Possible Output Tie-up Combination (unitless)

Y Units: Clutch

y/x	CeTCLR_e_TUM_Out Lock1	CeTCLR_e_TUM_Out Lock2	CeTCLR_e_TUM_Out Lock3	CeTCLR_e_TUM_Out Lock4	CeTCLR_e_TUM_Out Lock5	CeTCLR_e_TUM_Out Lock6	CeTCLR_e_TUM_Out Lock7
CeTRMR_e_C1_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C2_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C3_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C4_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C5_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C6_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096
CeTRMR_e_C7_Clutch	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096	-4,096

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	4.000	2.000	0.500	0.250	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	4.000	2.000	0.500	0.250	0.200

Initial Supporting table - Illegal Drive Clutch Combinations

Description: All combinations of clutch commands which can lead to reverse when the driver is requesting drive (1 indicates clutch on, 0 indicates clutch off)

Value Units: Boolean (1 for on, 0 for off)

X Unit: Illegal Clutch Combination

Y Units: Clutch

y/x	CeTRMR_e_IllegalDrv_Rev1	CeTRMR_e_IllegalDrv_Rev2
CeTRMR_e_C1_Clutch	1	1
CeTRMR_e_C2_Clutch	1	1
CeTRMR_e_C3_Clutch	1	1
CeTRMR_e_C4_Clutch	1	1
CeTRMR_e_C5_Clutch	1	1
CeTRMR_e_C6_Clutch	1	1
CeTRMR_e_C7_Clutch	1	1

Initial Supporting table - Illegal Park-Neutral Clutch Combinations

Description: All combinations of clutch commands which can lead to drive or reverse when the driver is requesting park or neutral (1 indicates clutch on, 0 indicates clutch off)

Value Units: Boolean (1 for on, 0 for off)

X Unit: Illegal Clutch Combination

Y Units: Clutch

Illegal Park-Neutral Clutch Combinations - Part 1

y/x	CeTRMR_e_IllegalPN.Rev	CeTRMR.e_IllegalPN.1A	CeTRMR.e_IllegalPN.I Ac	CeTRMR_e_IllegalPN_1Ad	CeTRMR_e_IllegalPN_1Af
CeTRMR_e_C1.Clutch	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	1	1	1	1
CeTRMR_e_C3_Clutch	1	1	1	1	1
CeTRMR_e_C4_Clutch	1	1	1	1	1
CeTRMR_e_C5_Clutch	1	1	1	1	1
CeTRMR_e_C6_Clutch	1	1	1	1	1
CeTRMR_e_C7_Clutch	1	1	1	1	1

Illegal Park-Neutral Clutch Combinations - Part 2

y/x	CeTRMR.e_IllegalPN.I M	CeTRMR.e_IllegalPN.I Me	CeTRMR.e_IllegalPN.I Md	CeTRMR_e_IllegalPN_1Mf	CeTRMR_e_IllegalPN_2A
CeTRMR_e_C1.Clutch	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	1	1	1	1
CeTRMR_e_C3_Clutch	1	1	1	1	1
CeTRMR_e_C4_Clutch	1	1	1	1	1
CeTRMR_e_C5_Clutch	1	1	1	1	1
CeTRMR_e_C6_Clutch	1	1	1	1	1
CeTRMR_e_C7_Clutch	1	1	1	1	1

Illegal Park-Neutral Clutch Combinations - Part 3

y/x	CeTRMR_e_IllegalPN_2M	CeTRMR_e_IllegalPN_3	CeTRMR_e_IllegalPN_4	CeTRMR_e_IllegalPN_5	CeTRMR_e_IllegalPN_6
CeTRMR.e.Cl .Clutch	1	1	1	1	1
CeTRMR_e_C2_Clutch	1	1	1	1	1
CeTRMR_e_C3_Clutch	1	1	1	1	1
CeTRMR_e_C4_Clutch	1	1	1	1	1
CeTRMR_e_C5_Clutch	1	1	1	1	1
CeTRMR_e_C6_Clutch	1	1	1	1	1
CeTRMR_e_C7_Clutch	1	1	1	1	1

Illegal Park-Neutral Clutch Combinations - Part 4

y/x	CeTRMR_e_IllegalPN_7	CeTRMR_e_IllegalPN_8	CeTRMR_e_IllegalPN_9	CeTRMR_e_IllegalPN_10	
CeTRMR.e.Cl .Clutch	1	1	1	1	
CeTRMR_e_C2_Clutch	1	1	1	1	

Initial Supporting table - Illegal Park-Neutral Clutch Combinations

CeTRMR_e_C3_Clutch	1	1	1	1	
CeTRMR_e_C4_Clutch	1	1	1	1	
CeTRMR_e_C5_Clutch	1	1	1	1	
CeTRMR_e_C6_Clutch	1	1	1	1	
CeTRMR_e_C7_Clutch	1	1	1	1	

Initial Supporting table - Illegal Reverse Clutch Combinations

Description: All combinations of clutch commands which can lead to drive when the driver is requesting reverse (1 indicates clutch on, 0 indicates clutch off)

Value Units: Boolean (1 for on, 0 for off)

X Unit: Illegal Clutch Combination

Y Units: Clutch

Illegal Reverse Clutch Combinations - Part 1

y/x	CeTRMR_e_IllegalRev_1 A	CeTRMR_e_IllegalRev_1 Ac	CeTRMR_e_IllegalRev_1 Ad	CeTRMR_e_IllegalRev_1 Af	CeTRMR_e_IllegalRev_1 M	CeTRMR_e_IllegalRev_1 Me
CeTRMR_e_C1.Clutch	1	1	1	1	1	1
CeTRMR_e_C2.Clutch	1	1	1	1	1	1
CeTRMR_e_C3.Clutch	1	1	1	1	1	1
CeTRMR_e_C4.Clutch	1	1	1	1	1	1
CeTRMR_e_C5.Clutch	1	1	1	1	1	1
CeTRMR_e_C6.Clutch	1	1	1	1	1	1
CeTRMR_e_C7.Clutch	1	1	1	1	1	1

Illegal Reverse Clutch Combinations - Part 2

y/x	CeTRMR_e_IllegalRev_1 Md	CeTRMR_e_IllegalRev_1 Mf	CeTRMR_e_IllegalRev_2 A	CeTRMR_e_IllegalRev_2 M	CeTRMR_e_IllegalRev_3	CeTRMR_e_IllegalRev_4
CeTRMR_e_C1.Clutch	1	1	1	1	1	1
CeTRMR_e_C2.Clutch	1	1	1	1	1	1
CeTRMR_e_C3.Clutch	1	1	1	1	1	1
CeTRMR_e_C4.Clutch	1	1	1	1	1	1
CeTRMR_e_C5.Clutch	1	1	1	1	1	1
CeTRMR_e_C6.Clutch	1	1	1	1	1	1
CeTRMR_e_C7.Clutch	1	1	1	1	1	1

Illegal Reverse Clutch Combinations - Part 3

y/x	CeTRMR_e_IllegalRev_5	CeTRMR_e_IllegalRev_6	CeTRMR_e_IllegalRev_7	CeTRMR_e_IllegalRev_8	CeTRMR_e_IllegalRev_9	CeTRMR_e_IllegalRev_10
CeTRMR_e_C1.Clutch	1	1	1	1	1	1
CeTRMR_e_C2.Clutch	1	1	1	1	1	1
CeTRMR_e_C3.Clutch	1	1	1	1	1	1
CeTRMR_e_C4.Clutch	1	1	1	1	1	1
CeTRMR_e_C5.Clutch	1	1	1	1	1	1
CeTRMR_e_C6.Clutch	1	1	1	1	1	1
CeTRMR_e_C7.Clutch	1	1	1	1	1	1

Initial Supporting table - Incorrect Direction Range Change Delay Time**Description:** Time delay after PRNDL change before incorrect direction monitor will be enabled**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	1	1	1	1	1

Initial Supporting table - Incorrect Drive Fail Time**Description:** Fail Time as a function of temperature for incorrectly commanded drive condition**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Incorrect Neutral Fail Time**Description:** Fail Time as a function of temperature for incorrectly commanded neutral condition**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Incorrect Park Fail Time**Description:** Fail Time as a function of temperature for incorrectly commanded park condition**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Incorrect Reverse Fail Time**Description:** Fail Time as a function of temperature for incorrectly commanded reverse condition**Value Units:** time (sec)**X Unit:** transmission oil temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - intermediate speed sensor 1 or 2 predicted direction

Description: intermediate speed sensor 1 or 2 predicted direction

Value Units: predicted direction: forward, reverse, unknown

X Unit: attained gear

Y Units: intermediate speed sensor 1 or 2

intermediate speed sensor 1 or 2 predicted direction - Part 1

y/x	CeCGSR_e_CR_NullForSched	CeCGSR_e_CR_Neutral	CeCGSR_e_CR_Park
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionReverse
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 2

y/x	CeCGSR_e_CR_Reverse	CeCGSR_e_CR_First	CeCGSR_e_CR_Second
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 3

y/x	CeCGSR_e_CR_Third	CeCGSR_e_CR_Fourth	CeCGSR_e_CR_Fifth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 4

y/x	CeCGSR_e_CR_Sixth	CeCGSR_e_CR-Seventh	CeCGSR_e_CR_Eighth
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward	CeTNSR_e_DirectionForward
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown

intermediate speed sensor 1 or 2 predicted direction - Part 5

y/x	CeCGSR_e_CR_Ninth	CeCGSR_e_CR_Tenth	
CeTSRR_e_C2C_ClchSpdSnsr1	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	
CeTSRR_e_C2C_ClchSpdSnsr2	CeTNSR_e_DirectionUnknown	CeTNSR_e_DirectionUnknown	

Initial Supporting table - P0723 (MY21) transmission engaged state time threshold**Description:** time necessary after transmission engaged state indicates transmsision engaged to allow P0723 enable**Value Units:** seconds
seconds

y/x	-40	0	40
1	5	3	1

Initial Supporting table - P0723 Wheel Speed Calc**Description:**

y/x	200	300	400	500	600
1	190	200	200	250	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	0.500	0.500

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	1	1
CeCGSR_e_CR_First	1	1
CeCGSR_e_CR_Second	1	1
CeCGSR_e_CR_Third	0	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	0	1
CeCGSR_e_CR_Ninth	1	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	3	3

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	1.500	1.500

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	160.0	192.0

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	160.0	192.0

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_C2 C_ClchSpdSnsr 1	1.0000	1.0000	2.9762	1.6863	1.3736	1.0000	0.8104	0.6515	1.0000	1.0000
CeTSRR_e_C2 C_ClchSpdSnsr 2	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	CeTNSR_e_InternalSpdSnsr1	CeTNSR_e_InternalSpdSnsr2	CeTNSR_e_InternalSpdSnsr3
1	225	0	0

Initial Supporting table - Ratio Monitor Clutch States

Description: Array of valid combinations of clutch held/off which constitutes a valid gear (1 = clutch held, 0 = clutch off)

Value Units: Clutch Held Boolean

X Unit: Gear

Y Units: Clutch

Ratio Monitor Clutch States - Part 1

y/x	CeTRMR_e_GRX_GearR	CeTRMR_e_GRX_Gear1A	CeTRMR_e_GRX_Gear1Ac	CeTRMR_e_GRX_Gear1Ad	CeTRMR_e_GRX_Gear1Af
CeTSER_e_C1_Clutch	1	1	1	1	1
CeTSER_e_C2_Clutch	1	1	1	1	1
CeTSER_e_C3_Clutch	1	1	1	1	1
CeTSER_e_C4_Clutch	1	1	1	1	1
CeTSER_e_C5_Clutch	1	1	1	1	1
CeTSER_e_C6_Clutch	1	1	1	1	1

Ratio Monitor Clutch States - Part 2

y/x	CeTRMR_e_GRX_Gear1M	CeTRMR_e_GRX_Gear1Me	CeTRMR_e_GRX_Gear1Md	CeTRMR_e_GRX_Gear1Mf	CeTRMR_e_GRX_Gear2A
CeTSER_e_C1_Clutch	1	1	1	1	1
CeTSER_e_C2_Clutch	1	1	1	1	1
CeTSER_e_C3_Clutch	1	1	1	1	1
CeTSER_e_C4_Clutch	1	1	1	1	1
CeTSER_e_C5_Clutch	1	1	1	1	1
CeTSER_e_C6_Clutch	1	1	1	1	1

Ratio Monitor Clutch States - Part 3

y/x	CeTRMR_e_GRX_Gear2M	CeTRMR_e_GRX_Gear3	CeTRMR_e_GRX_Gear4	CeTRMR_e_GRX_Gear5	CeTRMR_e_GRX_Gear6
CeTSER_e_C1_Clutch	1	1	1	1	1
CeTSER_e_C2_Clutch	1	1	1	1	1
CeTSER_e_C3_Clutch	1	1	1	1	1
CeTSER_e_C4_Clutch	1	1	1	1	1
CeTSER_e_C5_Clutch	1	1	1	1	1
CeTSER_e_C6_Clutch	1	1	1	1	1

Ratio Monitor Clutch States - Part 4

y/x	CeTRMR_e_GRX_Gear7	CeTRMR_e_GRX_Gear8	CeTRMR_e_GRX_Gear9	CeTRMR_e_GRX_Gear10	
CeTSER_e_C1_Clutch	1	1	1	1	
CeTSER_e_C2_Clutch	1	1	1	1	
CeTSER_e_C3_Clutch	1	1	1	1	
CeTSER_e_C4_Clutch	1	1	1	1	
CeTSER_e_C5_Clutch	1	1	1	1	

Initial Supporting table - Ratio Monitor Clutch States

CeTSER_e_C6_Clutch

h

h

h

h

1

Initial Supporting table - Ratio Monitor Fail Increment Rate (Percent per Loop)**Description:** Ratio Monitor Fail Increment Rate**Value Units:** Percent Increment Per Loop**X Unit:** Transmission Oil Temperature (deg C)

y/x	-40	-20	0	20	120
1	0	0	0	0	0

Initial Supporting table - Ratio Monitor Slip Threshold**Description:** Threshold slip value below which the clutch is considered holding**Value Units:** clutch slip (RPM)**X Unit:** Clutch

y/x	CeTRMR_e_ClchSlipC1	CeTRMR_e_ClchSlipC2	CeTRMR_e_ClchSlipC5	CeTRMR_e_ClchSlipC3C 4	CeTRMR_e_ClchSlipC3C 6	CeTRMR_e_ClchSlipC4C 6
1	30	30	30	25	25	25

Initial Supporting table - Shift Monitor Lowest Allowed Gear

Description: Y axis shows lowest allowed gear for the current vehicle speed and transfer case range

Value Units: Vehicle Speed (kph)

X Unit: Transfer Case Range

Y Units: Lowest Allowed Gear

y/x	CeTCLR_e_4WD_Hi	CeTCLR_e_4WD_Lo
CeTGRR_e_Gear1	62	23
CeTGRR_e_Gear2	95	35
CeTGRR_e_Gear3	135	50
CeTGRR_e_Gear4	166	62
CeTGRR_e_Gear5	221	82
CeTGRR_e_Gear6	281	104
CeTGRR_e_Gear7	332	123
CeTGRR_e_Gear8	431	160
CeTGRR_e_Gear9	431	160
CeTGRR_e_Gear10	431	160

Initial Supporting table - speed sensor directional rationality enable calibration**Description:** speed sensor directional rationality enable calibration**Value Units:** Boolean**X Unit:** scheduled gear**Y Units:** unitless

y/x	CeCGSR_FwdCmdd	CeCGSR-NeutCmdd	CeCGSR_RvrsCmdd	CeCGSR-ParkCmdd
1	1	1	0	1

Initial Supporting table - transmission fluid temperature warm up time**Description:****Value Units:** transmission fluid temperature normal warm 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 - 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	4.000	2.000	0.500	0.250	0.200

Initial Supporting table - P2808 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 - P2809 Default Valve Transition Window**Description:** P2809 default valve transition window**Value Units:** seconds**X Unit:** transmission fluid temperature °C**Y Units:** unitless

y/x	-7	10	40
1	2	1	1

Initial Supporting table - P2809 TCC Stuck On Crash Decel**Description:** TCC slip decel limit to establish slip crashed when TCC oil became available for TCC Stuck On diagnostic**Value Units:** RPM per Second**X Unit:** transmission fluid temperature °C**Y Units:** unitless

y/x	-7	10	40
1	-600	-600	-600

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	4.000	2.000	0.500	0.250	0.200

Initial Supporting table - P2808 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 - P2809 Default Valve Transition Window**Description:** P2809 default valve transition window**Value Units:** seconds**X Unit:** transmission fluid temperature °C**Y Units:** unitless

y/x	-7	10	40
1	2	1	1

Initial Supporting table - P2809 TCC Stuck On Crash Decel**Description:** TCC slip decel limit to establish slip crashed when TCC oil became available for TCC Stuck On diagnostic**Value Units:** RPM per Second**X Unit:** transmission fluid temperature °C**Y Units:** unitless

y/x	-7	10	40
1	-600	-600	-600