

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 calibration 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 = CbTRUE = U01B000 = U04B100	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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B00</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</p> <p>> 0 AMn</p>	8 seconds out of a 10 seconds window	

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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>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</p> <p>> 0 AND <= 24</p>		

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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	< 1.0030 V	VehicleSwitchBank1 Diagnostic Enable calibration is TRUE VehicleSwitchBank1 Circuit Diagnostic Enable calibration is TRUE VehicleSwitchBank1 Circuit Out-Of-Range Low Diagnostic Enable calibration is TRUE	= CbTRUE = CbTRUE = CbTRUE	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	> 4.7410 V	VehicleSwitchBank1 Diagnostic Enable calibration is TRUE VehicleSwitchBank1 Circuit Diagnostic Enable calibration is TRUE VehicleSwitchBank1 Circuit Out-Of-Range High Diagnostic Enable calibration is TRUE If Smart VSB Present is TRUE , then foollowing conditions are included RunCrankRelay is TRUE for IGN ON Delay Time	= CbTRUE = CbTRUE = CbTRUE = CbFALSE = 100.00 (ms)	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	1.0030 < sensed voltage < 1.1030 2.7390 < sensed voltage < 2.7960 3.8800 < sensed voltage < 3.9370 4.6410 < sensed voltage < 6.00 7.00 < sensed voltage < 6.00 7.00 < sensed voltage < 6.00 7.00 < sensed voltage < 6.00 7.00 < sensed voltage < 6.00 7.00 < sensed voltage < 4.74	VehicleSwitchBankI Diagnostic Enable calibration is TRUE VehicleSwitchBankI Circuit Diagnostic Enable calibration is TRUE VehicleSwitchBankI Circuit Performance Diagnostic Enable calibration is TRUE	= CbTRUE = CbTRUE = CbTRUE	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 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			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 a Static NVM, Perserved NVM, ECC ROM in NVM Flash Region, and Perserved NVM during shut down.	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			Will finish first memory scan within 30 seconds at all engine conditions - 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			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 >=	3 counts			Will finish first memory scan within 30 seconds at all engine conditions - diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL 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			Test is Enabled: CbTRUE (If CbFALSE, this test is disabled)	25 ms	Type B, 2 Trips
			2 fails in a row in the MAIN processor's configuration register masks versus known good data			Test is Enabled: CbTRUE (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: CbTRUE (If 0, this test is disabled)	variable, depends on length of time to corrupt stack	
			Test 1 Voltage	> 0.09 V < -0.09 V	Arbitrated Battery Voltage	Test is Enabled: CbTRUE (If 0, this test is disabled) > 7.00 V	16 / 20 counts or 822 milliseconds continuous; 50 ms/count in the ECM main processor	
			Test 2 Voltage	> 1.97V < 1.79V				
Test 3 Voltage	> 3.22 V < 3.04 V							
Test 4 Voltage	> 5.09 V < 4.91V							

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 control module 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 >=	3 (results in MIL), 5 (results in MIL and remedial action)		Test is enabled: CbTRUE . (If 0, this test is disabled)	variable, depends on length of time to access flash with corrupted 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), 5 (results in MIL and remedial action)		Test is enabled: CbTRUE . (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	
			Safety critical software is not executed in proper order OR Monitor Task counter exceeds max count threshold (See Enable Conditions for which tasks rates are enabled) 2.5ms: 3.125ms: 5ms:	>=5 incorrect task counts OR > 60 max task count >=4 incorrect task counts OR > 48 max task count >=3 incorrect task		Test is Enabled: (If CbFALSE, this test is disabled) 2.5ms: CbFALSE 3.125ms: CbFALSE 5ms: CbTRUE 6.25ms: CbFALSE 10ms: CbTRUE 12.5ms: CbFALSE 20ms: CbFALSE 25ms: CbTRUE 40ms: CbFALSE 50ms: CbTRUE 80ms: CbFALSE 100ms: CbTRUE 250ms: CbFALSE	Counts: 2.5ms: 8/10 3.125ms: 8/10 5ms: 8/10 6.25ms: 8/10 10ms: 8/10 12.5ms: 8/10 20ms: 8/10 25ms: 8/10 40ms: 4/5 50ms: 4/5 80ms: 2/3 100ms: 2/3 250ms: 2/3 50 ms/count in the main	

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Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
				counts OR > 30 max task count			processor	
			6.25ms:	>=2 incorrect task counts OR > 24 max task count				
			10ms:	>=2 incorrect task counts OR > 15 max task count				
			12.5ms:	>= 1 incorrect task counts OR > 12 max task count				
			20ms:	>= 1 incorrect task counts OR > 9 max task count				
			25ms:	>= 1 incorrect task counts OR > 6 max task count				
			40ms:	>= 1 incorrect task counts OR > 9 max task count				
			50ms:	>= 1 incorrect task counts OR > 6 max task count				
			80ms:	>= 1 incorrect task counts OR > 12 max task count				
			100ms:	>=2 incorrect task counts OR > 9 max task count				
			250ms:	>= 1 incorrect task counts OR > 6 max task count				

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.	

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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 #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 89.49 % 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>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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 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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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.
					IBS NormalCommEnable is TRUE Battery Voltage Out of Range Low Diagnostic Enable is TRUE Battery Voltage Out of Range Low 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 = CbTRUE = CbTRUE = U01B000 = U04B100		

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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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 = CbTRUE = CbTRUE = U01B000 = U04B100		

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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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>= CbTRUE</p> <p>= CbTRUE</p> <p>= U01B000</p> <p>= U04B100</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 = CbTRUE = U01B000 = U04B100	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.	IBS Sensor Internal ROM 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 NormalCommEnable is TRUE Battery Monitor Module ROM 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 = CbTRUE = U01B000 = U04B100	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_FLOODED >5.00 >0.50 >0.50 = CbTRUE >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 = CbTRUE = FALSE = U01B000 = U04B100	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_FLOODED >5.00 >0.50 >0.50 = CbTRUE >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 = CbTRUE = U01B000 = U04B100		

24OBDG07 BCM Summary Tables

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

24OBDG07 BCM Summary Tables

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.	3.00	Calibration enable	= CbTRUE 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 CAN 9 Off	U0078	This DTC monitors for a CAN 9 bus off condition	Bus off failures equals or exceeds	≥ 6.00 counts in a sliding window of 50 samples	General Enable Criteria: Time since power-up reset, running reset, recovery from under/over voltage condition 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 Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller If power mode = Run/Propulsion/Start: Power Mode is run If power mode = Accessory: Off key cycle diagnostics are enabled Or	$\geq 5,000$ milliseconds $\geq 3,000$ milliseconds > 11.00 Volts ≤ 18.00 Volts CbFALSE (CbTRUE indicates enabled)	Diagnostic runs in 10 ms loop	Type B, 2 Trips

24OBDG07 BCM Summary Tables

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 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>IB8AmpHrDisChrg_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>IBSMasuredTemp_Rsp_PDU</p> <p>IBSMinCrnkData_Rsp_PDU</p> <p>IBSMVISOFData_Rsp_PDU</p> <p>IBSSOCData_Rsp_PDU</p> <p>IBSVoltageFOMData_Rsp</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>>=10,700.00 milliseconds</p> <p>>=12,500.00 milliseconds</p> <p>>=10,700.00 milliseconds</p> <p>>=12,500.00 milliseconds</p> <p>>=12,500.00 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

24OBDG07 BCM Summary Tables

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		

24OBDG07 BCM 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 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: SD19P_ARC: SriDat19_Prtctd: SD18P_ARC: SriDat18_Prtctd: VSANDP_ARC: Veh SpdAvg NDrvn_P rtctd: VSADP_ARC: Veh SpdAvg Drvn_P rtctd: SD21P_ARC: SriDat21_Prtctd: SriDat26_Prtctd:	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 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 8 fail counts out of 10 sample counts 14 fail counts out of 18 sample counts 15 fail counts out of 16 sample counts 8 fail counts out of	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

24OBDG07 BCM Summary Tables

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24OBDG07 BCM 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 TCM.	Any of the Alive Rolling Counts, Protection Values, Checksum Values, or Cyclic Redundancy Check signal values listed below are incorrect for: TEGP_ARC: TrnsEstGr_Prtctd:	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

24OBDG07 BCM 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 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: SD14P_ARC: SrlDat14_Prtctd: SD15P_ARC: SrlDat15_Prtctd: SD16P_ARC: SrlDat16_Prtctd:	15 fail counts out of 16 sample counts 15 fail counts out of 16 sample counts 15 fail counts out of 16 sample counts 15 fail counts out of 16 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 B, 2 Trips

24OBDG07 BCM 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 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: BkupSysPwrMode_Prtctd:	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 Battery Monitor Module	U04B1	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.
Body Control Module Local Interconnect Network 9	U152D	This DTC monitors for a loss of communication on the LIN bus.	All Slaves calibrated as present on this LIN bus are reporting Loss of Communication.		General Enable Criteria: Diagnostic is enabled LIN channel is enabled LIN module is initialized 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: Off key cycle diagnostics are enabled	CbTRUE (CbTRUE indicates enabled) CbTRUE (CbTRUE indicates enabled) >=5,000 milliseconds >=3,000 milliseconds >11.00 Volts <=18.00 Volts CbFALSE (CbTRUE	LIN bus communication executes in 250ms loop.	Type B, 2 Trips

24OBDG07 BCM Summary Tables

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		

24OBDG07 BCM 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 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 \$03B</p> <p>Message \$27B</p> <p>Message \$369</p> <p>Message \$3A8</p> <p>Message \$5CD</p>	<p>>10,025.00 milliseconds</p> <p>>10,250.00 milliseconds</p> <p>>10,625.00 milliseconds</p> <p>>10,625.00 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>If message is on Bus 9: U0078 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>>=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

24OBDG07 BCM Summary Tables

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24OBDG07 BCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication 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 \$514</p> <p>Message \$0E2</p> <p>Message \$516</p> <p>Message \$268</p> <p>Message \$02F</p> <p>Message \$064</p> <p>Message \$262</p> <p>Message \$266</p> <p>Message \$267</p> <p>Message \$2D1</p> <p>Message \$2D3</p> <p>Message \$36F</p> <p>Message \$521</p>	<p>>12,500.00 milliseconds</p> <p>>10,062.50 milliseconds</p> <p>>12,500.00 milliseconds</p> <p>>10,250.00 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>>10,250.00 milliseconds</p> <p>>10,250.00 milliseconds</p> <p>>10,250.00 milliseconds</p> <p>>10,250.00 milliseconds</p> <p>>10,625.00 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>If message is on Bus 9: U0078 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 Battery Voltage</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

24OBDG07 BCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
			Message \$5CE Message \$2DA Message \$5EB	>12,500.00 milliseconds >10,250.00 milliseconds >12,500.00 milliseconds	Controller type: OBD Controller 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		

24OBDG07 BCM 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 Central Gateway Module on CAN Bus 9	U1627	This DTC monitors for a loss of communication with Central Gateway Module.	<p>Message is not received from controller for</p> <p>Message \$2D0</p> <p>Message \$370</p> <p>Message \$5CC</p> <p>Message \$5D7</p> <p>Message \$04B</p> <p>Message \$700</p> <p>Message \$585</p> <p>Message \$4F3</p> <p>Message \$5F8</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>> 10,025.00 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>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>If message is on Bus 9: U0078 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>>=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

24OBDG07 BCM Summary Tables

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

24OBDG07 BCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with Transmission Control Module on CAN Bus 2	U1643	This DTC monitors for a loss of communication with the Transmission Control Module.	<p>Message is not received from controller for</p> <p>Message \$032</p> <p>Message \$049</p>	<p>>10,031.25 milliseconds</p> <p>>10,031.25 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>If message is on Bus 9: U0078 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>>=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

24OBDG07 BCM Summary Tables

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24OBDG07 BCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication With ECM/PCM A on Bus B	U1818	This DTC monitors for a Lost Communication with Engine Control Module on CAN Bus B error as determined by the BCM.	<p>Message is not received from controller for</p> <p>Message \$2C3</p>	> 10,250 milliseconds	<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>If message is on Bus 9: U0078 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>>=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

24OBDG07 BCM Summary Tables

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
					Controller type: OBD Controller 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 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	= CbTRUE Boolean		Type A, 1 Trips

24OBDG07 BCM Summary Tables

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.	60	Calibration enable	= CbTRUE Boolean		Type A, 1 Trips

24OBDG07 BCM 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/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	> 4.00	PowerA - Power B Correlation monitoring enable = TRUE Battery Present is CbTRUE Starter Motor NOT Engaged	CbTRUE 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(s)	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Bus-Off detected on Communication CAN Bus 1	U007500	This fault is set if Communication CAN Bus 1 enters the Bus-Off state	Bus Off Event on CAN Bus 1 FOR	= TRUE >= 5.0 seconds	U007500_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Control Module Communication Bus Off Power Mode Time	2.0 sec for pass 5.0 sec for fail	Type B 2 Trips
Bus-Off detected on Communication CAN Bus 2	U007300	This fault is set if Communication CAN Bus 2 enters the Bus-Off state	Bus Off Event on CAN Bus 2 FOR	= TRUE >= 5.0 seconds	U007300_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Control Module Communication Bus Off Power Mode Time	2.0 sec for pass 5.0 sec for fail	Type B 2 Trips
Bus-Off detected on Communication CAN Bus 3	U007400	This fault is set if Communication CAN Bus 3 enters the Bus-Off state	Bus Off Event on CAN Bus 3 FOR	= TRUE >= 5.0 seconds	U007400_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Control Module Communication Bus Off Power Mode Time	2.0 sec for pass 5.0 sec for fail	Type B 2 Trips
Bus-Off detected on Communication CAN Bus 5	U007B00	This fault is set if Communication CAN Bus 5 enters the Bus-Off state	Bus Off Event on CAN Bus 5 FOR	= TRUE >= 5.0 seconds	U007B00_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Control Module Communication Bus Off Power Mode Time	2.0 sec for pass 5.0 sec for fail	Type B 2 Trips
Bus-Off detected on Communication CAN Bus 9	U007800	This fault is set if Communication CAN Bus 9 enters the Bus-Off state	Bus Off Event on CAN Bus 9 FOR	= TRUE >= 5.0 seconds	U007800_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Control Module Communication Bus Off Power Mode Time	2.0 sec for pass 5.0 sec for fail	Type B 2 Trips
Lost Communication with DEFC Detected	U010E00	This monitoring shall check a supervised message from the DEFC for communication status. If the CGM has not received the message per the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, 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	U010E00_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with ECP_MCDetected	U011000	This monitoring shall check a supervised message from the ECP_MC for communication status. If the CGM has not received the message per the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, 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	U011000_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = 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(s)	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with BSM_MH Detected	U011100	This monitoring shall check a supervised message from the BSM_MH for communication status. If the CGM has not received the message per the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, 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	U011100_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with BCM Detected	U014000	This monitoring shall check a supervised message from the BCM for communication status. If the CGM has not received the message per the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, 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	U014000_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with HVAC_? Detected	U016400	This monitoring shall check a supervised message from the HVAC_? for communication status. If the CGM has not received the message per the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, 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	U016400_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with LIBI Detected	U01BF00	This monitoring shall check a supervised message from the LIBI for communication status. If the CGM has not received the message per the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, 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	U01BF00_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with VICM Detected on CAN2	U160D00	This monitoring shall check a supervised message from the VICM for communication status on CAN channel 2. If the CGM has not received the message per the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, 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	U160D00_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with BSM Detected on CAN3	U160E00	This monitoring shall check a supervised message from the BSM for communication status on CAN channel 3. If the CGM has not received the message per the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, 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	U160E00_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with EBCM Detected on CAN2	U161000	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 per the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, 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	U161000_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = 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(s)	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with ECM Detected on CAN2	U161100	This monitoring shall check a supervised message from the ECMfor communication status on CAN channel 2. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U161100_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with ECP_X1Detected on CAN2	U161200	This monitoring shall check a supervised message from the ECP_X1for communication status on CANchannel 2. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U161200_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with ECP_X1Detected on CAN3	U161300	This monitoring shall check a supervised message from the ECP_X1for communication status on CANchannel 3. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U161300_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with VICM Detected on CAN9	U163500	This monitoring shall check a supervised message from the VICMfor communication status on CAN channel 9. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U163500_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with EBCM Detected on CAN3	U163900	This monitoring shall check a supervised message from the EBCMfor communication status on CAN channel 3. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U163900_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with SIB Detected on CAN1	U163C00	This monitoring shall check a supervised message from the SIBfor communication status on CAN channel 1. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U163C00_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with TCM Detected on CAN2	U164300	This monitoring shall check a supervised message from the TCMfor communication status on CAN channel 2. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U164300_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = 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(s)	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Lost Communication with CSM Detected on CAN5	U164E00	This monitoring shall check a supervised message from the CSMfor communication status on CAN channel 5. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U164E00_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with VECM Detected on CAN2	U165B00	This monitoring shall check a supervised message from the VECMfor communication status on CAN channel 2. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U165B00_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with VECM Detected on CAN9	U165C00	This monitoring shall check a supervised message from the VECMfor communication status on CAN channel 9. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U165C00_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Lost Communication with ECM Detected on CAN3	U181800	This monitoring shall check a supervised message from the ICCMfor communication status. If the CGMhas not received the messageper the malfunction criteria and threshold values and subject to the secondary parameters and enable conditions, then this fault shall be set.	Supervisedmessagenot received FOR WHERE nominal periodic rate with an additional delay	= TRUE >= 2.5 x nominal periodic rate = 1 second = 4 seconds	U181800_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= k_Lost Communication Power Mode Time	6.5 sec	Type B 2 Trips
Key Table Not Provisioned	U196000	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.	All key slots are provisioned OR Receipt of ERC_KEY_EMPTYfrom security peripheral	= False	In Vehicle Message Authentication Supported Vehicle Supply Voltage	= True >= k_Battery Voltage Low Threshold (7V)	250 msec	Type B 2 Trips
Security Peripheral Performance	U196100	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 internal fault	= True	Vehicle Supply Voltage Any participating Partial Network FOR	>= k_Battery Voltage Low Threshold (7V) = Active >= 5 seconds	Immediate upon fault. 50 msec task interval.	Type B 2 Trips
Serial Data Message Authentication Failure	U196200	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	>= K_ERRH_C_FailedAuthentication Counter for the slot	In Vehicle Message Authentication Supported Vehicle Supply Voltage U196100 is set Any participating Partial Network FOR	= True >= k_Battery Voltage Low Threshold (7V) = False = Active >= 5 seconds	Depends on calibration setting (count of authentication errors).	Type B 2 Trips
BCMInvalid Data	U042200	This diagnostic monitors for serial data messages from the BCM with safety, security, protection or continuous operation failures. An adjustable debounce strategy (ex. X of Y) is used.	BCMserial data - MAC or ARC - failure instances	>=X of Y	U042200_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= 5 seconds	Depends on calibration setting (count of invalid messages).	Type B 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value(s)	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
ECM Invalid Data	U040100	This diagnostic monitors for serial data messages from the ECM with safety, security, protection or continuous operation failures. An adjustable debounce strategy (ex. X of Y) is used.	ECM serial data - MAC or ARC- failure instances	>= X of Y	U040100_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= 5 seconds	Depends on calibration setting (count of invalid messages).	Type B 2 Trips
TCM Invalid Data	U040200	This diagnostic monitors for serial data messages from the TCM with safety, security, protection or continuous operation failures. An adjustable debounce strategy (ex. X of Y) is used.	TCM serial data - MAC or ARC- failure instances	>= X of Y	U040200_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= 5 seconds	Depends on calibration setting (count of invalid messages).	Type B 2 Trips
BSCM Invalid Data	U041800	This diagnostic monitors for serial data messages from the BSCM with safety, security, protection or continuous operation failures. An adjustable debounce strategy (ex. X of Y) is used.	BSCM serial data - MAC or ARC- failure instances	>= X of Y	U041800_ENABLE Vehicle Supply Voltage Any participating Partial Network FOR	= "enabled" >= k_Battery Voltage Low Threshold (7V) = Active >= 5 seconds	Depends on calibration setting (count of invalid messages).	Type B 2 Trips
ECU Identification Self Learn Not Completed	U197700	This diagnostic indicates when the self learn execution has not completed.	Self learn execution not completed	= TRUE	k_CGM Self Learn Did Not Execute Diagnostic Enable Vehicle Supply Voltage Any participating Partial Network FOR	= True >= k_Battery Voltage Low Threshold (7V) = Active >= k_CGM Self Learn Did Not Execute Power Mode Time	Monitored at task interval of 50 msec.	Type B 2 Trips
ECU Identification Self Learn Invalid	U198B00	This diagnostic indicates when the ECU Identification List has become corrupted or the VIN does not match.	ECU Identification List NVM Corruption Diagnostic Fault OR VIN Mismatch Fault	= Active = Active	k_CGM Self Learn Invalid Diagnostic Enable Vehicle Supply Voltage Any participating Partial Network FOR	= True >= k_Battery Voltage Low Threshold (7V) = Active >= k_CGM Self Learn Invalid Power Mode Time	Monitored at task interval of 100 msec.	Type B 2 Trips
Control Module General Memory Failure	U35B900	The CGM shall mature this DTC when Self-Learn has completed but the diagnostic address list cannot be restored from NVM.	Diagnostic address list cannot be restored from NVM	= TRUE	U35B900_ENABLE Vehicle Supply Voltage	= "enabled" >= k_Battery Voltage Low Threshold (7V)	At start-up (ignition off to run or propulsion)	Type B 2 Trips
Internal Control Module Random Access Memory (RAM)	P060400	This DTC is set when a RAM ECC failure is detected. This is run upon start-up.	RAM ECC failure detected	= TRUE	None.		Immediately upon start-up when fault detected.	Type B 2 Trips
Internal Control Module Read Only Memory (ROM)	P060500	This DTC is set when a ROM ECC failure is detected. This is run upon start-up.	ROM ECC failure detected	= TRUE	None.		Immediately upon start-up when fault detected.	Type B 2 Trips
Vehicle Identification Number - Not Programmed	U2C9100	At the beginning of each ignition cycle, confirm that the VIN contains valid characters.	Any character in the VIN	= {0x00 - 0x29, 0x40, 0x49, 0x4F, 0x51, 0x5B - 0xFF}	U2C9100_ENABLE	= "enabled"	Immediately upon start-up when fault detected.	Type B 2 Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value(s)	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Vehicle Identification Number - Invalid, Incompatible or Mismatches Published VIN	C054600	At the beginning of each ignition cycle, confirm that the VIN has been programmed and matches what is sent on CAN9.	All characters in the VIN	= VIN signal sent via CAN9	C054600_ENABLE	= "enabled"	Immediately upon start-up when fault detected.	Type B 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Brake Booster Internal Power Driver										
Brake Booster Internal Power Driver Range/Performance	C0595	All	This monitoring checks if the B6 Bridge Driver ASIC does not answer properly to the uC test during initialization.	B6 Bridge Driver ASIC is not fault free during the initial test	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks the operation mode of the B6 bridge driver ASIC.	B6 bridge driver ASIC is not fault free during the operation mode OR ASIC is not in valid operation mode OR MOSFET Short circuit failure bit is set	= True = True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if the voltage drops at actuated MOSFET is too high.	Voltage across the unactuated MOSFET	> -0.21 [V]	Ignition state ON AND During initialization	= True = True	Immediately	Once	Type A, 1 Trip
Brake Booster Motor "A" Phase U-V-W Circuit Range/Performance	C0582	All	This monitoring checks if the measured voltage on an idle MOSFET is not in mid-level.	Measured voltage at idle	<> 1.65 [V]	Ignition state ON AND During initialization	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if MOSFETs of Bridge Driver can be controlled and actuated properly.	Ratio between BMS_MON to UBB when BMS switched on OR Ratio between BMS_MON to UB6 when BMS_RVP is switched on OR BMS_MON voltage when BMS is switched off OR BMS_MON voltage when BMS_RVP is switched off OR Ratio between BRS_MON to UB_RD_INT when BRS switched on OR Ratio between BRS_MON to UB6 when BRS_RVP is switched on OR BRS_MON voltage when BRS is switched off OR BRS_MON voltage when BRS_RVP is switched off	< 80 [%] < 80 [%] > 3.5 [V] > True [V] < 80 [%] < 80 [%] > 3.5 [V] ≥3.5 [V]	Ignition state ON AND Failsafe logic test is finished	= True = True	5[s]	Once	Type A, 1 Trip
Brake Booster Temperature Sensor A										
Brake Booster Temperature Sensor "A" Circuit High	P25C7	All	This monitoring checks if the BLM Temperature Signal 1 is shorted to Supply.	Temperature Sensor 1 signal voltage value AND For a consecutive number of times	> 3.27 [V] = 5	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips
Brake Booster Temperature Sensor "A" Circuit Low	P25C6	r	This monitoring checks if the BLM Temperature Signal 1 is shorted to Ground.	Temperature Sensor 1 signal voltage value AND For a consecutive number of times	r	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips
Brake Booster Temperature Sensor B										
Brake Booster Temperature Sensor "B" Circuit High	C057A	All	This monitoring checks if the BLM Temperature Signal 2 is shorted to Supply.	Temperature Sensor 2 signal voltage value AND For a consecutive number of times	> 3.14 [V] = 5	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips
Brake Booster Temperature Sensor "B" Circuit Low	C0579	All	This monitoring checks if the BLM Temperature Signal 2 is shorted to Ground.	Temperature Sensor 2 signal voltage value AND For a consecutive number of times	< 0.03 [V] = 5	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Brake Master Cylinder Pressure Sensor										
Brake Master Cylinder Pressure Sensor Communication Failure	C2A16	All	This monitoring checks if the DS 10 pressure sensor SENT line is shorted to supply or SENT line is open.	No valid SENT messages received for time AND Digital level of SENT line is high	> 0.1 [s] = True	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the DS 10 pressure sensor SENT line is shorted to ground or the sensor supply is interrupted.	No valid SENT messages received for time AND Digital level of SENT line is low	> 0.1 [s] = True	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is transmission error on SENT line.	Transmission error on SENT line	= True	Ignition state ON	= True	0-1 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Pressure Sensor Out of Range High	C0572	All	This monitoring checks if pressure value measured by DS 10 pressure sensor is at its maximum value.	Pressure value	= 30000 [kPa]	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Pressure Sensor Out of Range Low	C0571	All	This monitoring checks if pressure value measured by DS 10 pressure sensor is at its minimum value.	Pressure value	= -1480 [kPa]	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Pressure Sensor Performance	C0574	All	This monitoring checks if the offset value of pressure sensor 1 is correct.	Offset value	> 12 [bar]	Ignition state ON AND Brake Pedal is released AND Acceleration AND Vehicle speed AND No active pressure build up by IPB-system	= True = True = True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if the DS 10 pressure sensor sends an error code on line 2 via SENT protocol.	Pressure sensor detects a failure	= True	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip
Brake Pedal Position Sensor A										
Brake Master Cylinder Piston Position Sensor "A" Circuit Range/Performance	C05CC	All	This monitoring checks if the offset of channel 1 of the Pedal Travel Sensor is out of defined range.	Push rod stroke offset OR Push rod stroke offset	> 1.1 [mm] < -1.5 [mm]	Ignition state ON AND PTS AND Brake Pedal AND Hydraulic Intervention EPS ACC AND Vehicle velocity AND Acceleration	= True = fault free = completely released = No intervention > Standstill (4.47 mph) > 0 [m/s²]	0.1 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is transmission error on the SENT line.	LiPS detects a failure	= True	Ignition state ON	= True	0-1 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor 1 Circuit High Voltage	C05CA	All	This monitoring checks if the LiPS sends an out of range high failure information via the slow channel of the SENT protocol.	Slow channel error code shows an out-of-range high	= True	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor 1 Circuit Low Voltage	C05CB	All	This monitoring checks if the LiPS sends an out of range low failure information via the slow channel of the SENT protocol.	Slow channel error code shows an out-of-range low	= True	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip

24OBDG07 EBCM Summary Tables

System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Internal Communication Fault with Brake Master Cylinder Piston Position Sensor 1	C2A13	All	This monitoring checks if the ID of the Linear position sensor is received in time.	ID of the Linear position sensor is not received on time	> 1.5 [s]	Ignition state ON	= True	0.500 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the SENT line is shorted to supply.	No valid SENT messages received for time AND Digital level of SENT line is high	> 0.1 [s] = True	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the SENT line is shorted to ground.	No valid SENT messages received for time AND Digital level of SENT line is low	> 0.1 [s] = True	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is transmission error on SENT line.	Transmission error on SENT line	= True	Ignition state ON	= True	0-1 [s]	Continuous	Type A, 1 Trip
Brake Pedal Position Sensor B										
Brake Master Cylinder Piston Position Sensor "A/B" Correlation	C05D0	All	This monitoring checks whether the difference between PTS1 and PTS2 signal is too high.	IPTS1 signal - PTS2 signal	> 1.5 [mm]	Ignition state ON AND Sensor Channel 1 and Channel 2 AND Sensor Channel 1 and Channel 2	= True = initialized = fault free	0.120 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the brake pedal and the gas throttle are pressed at the same time by the driver for a defined input and time.	Brake input rod stroke AND Gas throttle	> 3 [mm] > 20 [%]	Ignition state ON AND Vehicle speed AND Accelerator pedal applied (accelerator pedal status) signal is available and valid	= True > 4.47 [mph] = True	240 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor "B" Circuit Range/Performance	C05CF	All	This monitoring checks if the offset of channel 2 of the Pedal Travel Sensor is out of defined range.	Push rod stroke offset OR Push rod stroke offset	> 1.1 [mm] < -1.5 [mm]	Ignition state ON AND PTS AND Brake Pedal AND Hydraulic Intervention EPS ACC AND Vehicle velocity AND Acceleration	= True = fault free = completely released = No intervention > Standstill (4.47 mph) > 0 [m/s ⁴ 2]	0.1 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor "B" Circuit Voltage High	C05CD	All	This monitoring checks if the PWM line is shorted to supply.	Permanent line high value detected on LiPS PWM signal line	= True	Ignition state ON	= True	0-2 [s]	Continuous	Type A, 1 Trip
Brake Master Cylinder Piston Position Sensor "B" Circuit Voltage Low	C05CE	All	This monitoring checks if the PWM line is shorted to ground.	Permanent line low value detected on LiPS PWM signal line	= True	Ignition state ON	= True	0-2 [s]	Continuous	Type A, 1 Trip
Internal Communication Fault with Brake Master Cylinder Piston Position Sensor 2	C2A14	All	This monitoring checks if there is transmission error at PWM line.	PWM frequency OR PWMfrequency OR PWM duty OR PWM duty	<900 [Hz] >1120 [Hz] < 8.5 [%] > 92 [%]	Ignition state ON	= True	0.2 [s]	Continuous	Type A, 1 Trip
Brake Pressure Sensor										

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Brake Pressure Sensor Communication Failure	C2A15	All	This monitoring checks if the DS 10 pressure sensor SENT line is shorted to supply or SENT line is open.	No valid SENT messages received for time AND Digital level of SENT line is high	> 0.1 [s] = True	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the DS 10 pressure sensor SENT line is shorted to ground or the sensor supply is interrupted.	No valid SENT messages received for time AND Digital level of SENT line is low	> 0.1 [s] = True	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is transmission error on SENT line.	Transmission error on SENT line	= True	Ignition state ON	= True	0-1 [s]	Continuous	Type A, 1 Trip
Brake Pressure Sensor Out of Range High	C053F	All	This monitoring checks difference between the measured pressure from the plunger pressure sensor and the calculated pressure based on motor torque, angular acceleration and best-case gear efficiency.	Difference between the measured pressure and the calculated pressure	> calculated max pressure + 25 [%] from measured pressure. At least 20 [bar] robustness margin.	Ignition state ON AND Motor speed	= True > 3 [rad/s]	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if pressure value measured by DS 10 pressure sensor is at its maximum value.	Pressure value	= 30000 [kPa]	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Pressure Sensor Out of Range Low	C053E	All	This monitoring checks if pressure value measured by DS 10 pressure sensor is at its minimum value.	Pressure value	= -1480 [kPa]	Ignition state ON	= True	0.960 [s]	Continuous	Type A, 1 Trip
Brake Pressure Sensor Performance	C053D	All	This monitoring checks if the offset value of pressure sensor 2 is correct.	Offset value	> 12 [bar]	Ignition state ON AND Brake Pedal is released	= True = True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if the DS 10 pressure sensor sends an error code on line 1 via SENT protocol.	Pressure sensor detects a failure	= True	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip
Brake System Plunger Motor										
Brake Booster Motor "A" Over Temperature	C05C2	All	This monitoring checks if Brake System plunger motor temperature is overheated.	Motor torque is limited because of torque limitation (high temperature, or low voltage / current limitation) AND Replenishment cannot finish successfully	= True = True	Ignition state ON AND Torque limitation AND Replenishment Actual Pressure is less than Target Pressure	= True = True = True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if the rotor or ECU temperature is higher than a defined level.	ECU temperature	> 120 [°C]	Ignition state ON AND Brake Booster Temperature Sensors	= True = fault free	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if the rotor or ECU temperature is higher than a defined level.	ECU temperature	> 142 [°C]	Ignition state ON AND Brake Booster Temperature Sensors	= True = fault free	Immediately	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Performance	C0594	All	This monitoring checks if the plunger can reach the mechanical backward bound.	Plunger travel	> Plunger length	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if motor test detects hardware failure.	Motor test detects HW failure	= True	Ignition state ON AND Motor is actuated	= True = False	0.01 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if the motor movement is sufficient according to the expected pressure value.	Pressure sensor 2 value AND Calculated pressure - Pressure sensor 2 value	> 10 [bar] > 40 [bar]	Ignition state ON	= True	0.015 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the motor	Calculated pressure - Pressure sensor 2 value	> 40 [bar]	Ignition state ON	= True	0.2 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			movement is sufficient according to the expected pressure value.	OR Pressure sensor 2 value - Calculated pressure	> 108 [bar]					
Brake Booster Motor "A" Phase U-V-W Circuit/Open	C057F	All	This monitoring checks the motor coil resistance value.	Measured motor coil resistance	> 0.20358 [Ohm]	Ignition state ON	= True	0.120 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks the motor coil resistance value.	Measured motor coil resistance	< 0.01258 [Ohm]	Ignition state ON	= True	0.120 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the voltage vector is plausible.	Actual voltage vector - Calculated voltage vector	>1.5[V]	Ignition state ON	= True	0.02 [s]	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Phase U-V-W Current High	C0590	All	This monitoring checks if there is a Current Measurement 1 offset high failure at ADC internal shunt 1.	Measured current offset derived from ADC internal shunt	> 38 [A]	Ignition state ON AND Electric motor is not actuated	= True = True	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is a Current Measurement 2 offset high failure at ADC internal shunt 2.	Measured current offset derived from ADC internal shunt	> 38 [A]	Ignition state ON AND Electric motor is not actuated	= True = True	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Current Measurement 1 value at B6 bridge at ADC internal shunt is too high.	Measured current derived from ADC internal shunt	> 200 [A]	Ignition state ON	= True	0.3 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Current Measurement 2 value at B6 bridge at ADC internal shunt is too high.	Measured current derived from ADC internal shunt	> 200 [A]	Ignition state ON	= True	0.3 [s]	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Phase U-V-W Current Low	C0591	All	This monitoring checks if there is a Current Measurement 1 offset low failure at ADC internal shunt 1.	Measured current offset derived from ADC internal shunt	< -38 [A]	Ignition state ON AND Electric motor is not actuated	= True = True	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is a Current Measurement 2 offset low failure at ADC internal shunt 2.	Measured current offset derived from ADC internal shunt	< -38 [A]	Ignition state ON AND Electric motor is not actuated	= True = True	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Current Measurement 1 value at B6 bridge at ADC internal shunt is too low.	Measured current derived from ADC internal shunt	< -200 [A]	Ignition state ON	= True	0.3 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Current Measurement 2 value at B6 bridge at ADC internal shunt is too low.	Measured current derived from ADC internal shunt	< -200 [A]	Ignition state ON	= True	0.3 [s]	Continuous	Type A, 1 Trip
Brake System Plunger Motor Position Sensor										
Brake Booster Motor "A" Position Sensor Circuit High	C0589	All	This monitoring checks if the RPS cosine signal is out of range high.	Raw Cos ADC Value (Cos+ or Cos-)	>4075	Ignition state ON	= True	0.150 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the RPS Sine signal is out of range high.	Raw voltage value at the ADC in case of Sin plus line monitoring OR Raw voltage value at the ADC in case of Sin minus line monitoring OR Calculated sum derived from transmitted bit pattern signal of Sin plus and Sin minus ADC voltage value Calculated vector length sqrt(sin^2+cos^2)	> 2.252 [V]	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip
					> 2.252 [V]					
					> 4327 [Digit]					
All	This monitoring checks if the vector length value of RPS is out of range high.		> 1.14	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip		
Brake Booster Motor "A" Position Sensor Circuit Low	C0588	All	This monitoring checks if the RPS cosine signal is out of range low.	Raw Cos ADC Value (Cos+ or Cos-)	< 10	Ignition state ON	= True	0.150 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the RPS Sine signal is out of range low.	Raw voltage value at the ADC in case of Sin plus line monitoring OR	< 1.047 [V]	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				Raw voltage value at the ADC in case of Sin minus line monitoring OR Calculated sum derived from transmitted bit pattern signal of Sin plus and Sin minus ADC voltage value Calculated vector length $\sqrt{\sin^2 + \cos^2}$	< 1.047 [V] < 3876 [Digit] < 0.25					
		All	This monitoring checks if the vector length value of RPS is out of range low.			Ignition state ON	= True	0.0025 [s]	Continuous	Type A, 1 Trip
Brake Booster Motor "A" Position Sensor Circuit Range/Performance	C058A	All	This monitoring checks if there are implausible angle lumps.	Absolute difference of filtered and unfiltered motor speed	> 711.2 [rad/s]	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if the ratio of the RPS vector length and sums signals is plausible.	Ratio of the RPS vector length and sums signals*	> 0.1	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks whether one single sensor signal line deviates from the other three sensor signal lines.	Sensor signal line deviation*	> defined formula based on dynamic threshold	Ignition state ON	= True	0.0025 [s]	Continuous	Type A, 1 Trip
CAN Bus 2										
Control Module Communication CAN Bus 2 Off	U0073	All	This monitoring checks if the CAN controller is in a Bus Off state.	BusOff status has been detected	= True	Ignition state ON	= True	0.250 [s]	Continuous	Type B, 2 Trips
Invalid Data Received from Communication with Hybrid/EV Powertrain Control Module 1 - Alive/ Sequence Counter Incorrect / Not Updated	U0594	All	This monitoring checks if the Message Authentication Code of the message 'SriDat31_Prtctd_MSG' (Serial Data 31 Protected) signal group from Hybrid/EV Powertrain Control Module is received with the expected value.	Consecutively detected wrong Message Authentication Code values	>= 20 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.2 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Alive Rolling Count of the message 'SriDat31_Prtctd_MSG' (Serial Data 31 Protected) signal group from Hybrid/EV Powertrain Control Module is received with the expected value.	Number of consecutive occasions when the current value of the Alive Rolling Count is the same as the previous value	>= 20 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.2 [s]	Continuous	Type B, 2 Trips
Invalid Data Received From Engine Control Module - Alive / Sequence Counter Incorrect / Not Updated	U0401	All	This monitoring checks if the Message Authentication Code of the message 'SriDat19_Prtctd_MSG' (Serial Data 19 Protected) signal group from Engine Control Module is received with the expected value.	Consecutively detected wrong Message Authentication Code values	>= 20 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.2 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Alive Rolling Count of the message 'TmsEstGr_Prtctd_MSG' (Transmission Estimated Gear Protected) signal group from Engine Control Module is received with the expected value.	Number of consecutive occasions when the current value of the Alive Rolling Count is the same as the previous value	>= 20 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.2 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Message Authentication Code of the message 'ActAxITrq_Prtctd_MSG' (Actual Axle Torque Protected) from Engine Control Module is received with the expected value.	Consecutively detected wrong Message Authentication Code values	>= 10 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Message Authentication Code of the message 'TmsEstGr_Prtctd_MSG' (Transmission	Consecutively detected wrong Message Authentication Code values	>= 20 (+2/step)	Ignition state ON AND	= True	0.2 [s]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Estimated Gear Protected) signal group from Engine Control Module is received with the expected value.			Communication related conditions fulfilled (No error passive, no undervoltage)	= True			
		All	This monitoring checks if the Message Authentication Code of the message 'ActAxTrq_Prtctd_MSG' (Actual Axle Torque Protected) from Engine Control Module is received with the expected value.	Consecutively detected wrong Message Authentication Code values	>= 3 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.3 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Alive Rolling Count of the message 'SriDat19_Prtctd_MSG' (Serial Data 19 Protected) from Engine Control Module is received with the expected value.	Number of consecutive occasions when the current value of the Alive Rolling Count is the same as the previous value	>= 20 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.2 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Alive Rolling Count of the message 'SriDat20_Prtctd_MSG' (Serial Data 20 Protected) from Engine Control Module is received with the expected value.	Number of consecutive occasions when the current value of the Alive Rolling Count is the same as the previous value	>= 10 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Alive Rolling Count of the message 'SriDat26_Prtctd_MSG' (Serial Data 26 Protected) signal group from Engine Control Module is received with the expected value.	Number of consecutive occasions when the current value of the Alive Rolling Count is the same as the previous value	>= 5 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.5 [s]	Continuous	Type B, 2 Trips
Invalid Data Received From Transmission Control Module - Alive / Sequence Counter Incorrect / Not Updated	U0402	All	This monitoring checks if the Alive Rolling Count of the message 'ChsSysBrkAxTrqInfo1_Prtctd_MSG' (Chassis System Brake Axle Torque Information 1 Protected) signal group from Transmission Control Module is received with the expected value.	Number of consecutive occasions when the current value of the Alive Rolling Count is the same as the previous value	>= 10 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.1 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Message Authentication Code of the message 'ChsSysBrkAxTrqInfo1_Prtctd_MSG_CAN 2' signal group from Transmission Control Module is received with the expected value.	Consecutively detected wrong Message Authentication Code values	>= 10 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.1 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Alive Rolling Count of the message 'ELSDInfo_Prtctd_MSG' (Electronic Limited Slip Differential Information Protected) signal group from Transmission Control Module is received with the expected value.	Number of consecutive occasions when the current value of the Alive Rolling Count is the same as the previous value	>= 12 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.12 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Alive Rolling Count of the message 'TrmsEstGr_Prtctd_MSG' (Transmission Estimated Gear Protected) signal group from Transmission Control Module is received with the expected value.	Number of consecutive occasions when the current value of the Alive Rolling Count is the same as the previous value	>= 20 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.2 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the Message Authentication Code of the message	Consecutively detected wrong Message Authentication Code values	>= 20 (+2/step)	Ignition state ON	= True	0.2 [s]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			'TrmsEstGr_Prtctd_MSG' (Transmission Estimated Gear Protected) signal group from Transmission Control Module is received with the expected value.			AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True			
		All	This monitoring checks if the Message Authentication Code of the message 'ELSDInfo_Prtctd_MSG' (Electronic Limited Slip Differential Information Protected) from Transmission Control Module is received with the expected value.	Consecutively detected wrong Message Authentication Code values	>= 12 (+2/step)	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.12 [s]	Continuous	Type B, 2 Trips
Lost Communication with Body Control Module	U0140	All	This monitoring checks if the message 'BdyGenInfo3_Prtctd_MSG' (Body General Information 3 Protected) signal group from Body Control Module is received within the specified cycle time.	Message is not received for time	>= 0.1 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.1 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'ExtLgtWshWprinfo_Prtctd_MSG' signal group from Body Control Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SysPwrMode_Prtctd_MSG' signal group from Body Control Module is received within the specified cycle time.	Message is not received for time	>= 1.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	1.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'VehOdoDispVal_Prtctd_MSG' signal group from Body Control Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_9092' PDU from Body Control Module is received within the specified cycle time.	Message is not received for time	>= 1.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	1.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_9089' PDU from Body Control Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_9094' PDU from Body Control Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat6_Prtctd_MSG' signal group from Body Control Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
Lost Communication with Central Gateway Module on CAN Bus 2	U1608	All	This monitoring checks if the message 'MSG_2018' PDU from Central Gateway Module is received within the specified cycle time.	Message is not received for time	>= 0.75 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.75 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2019' PDU from Central Gateway	Message is not received for time	>= 0.3 [s]	Ignition state ON AND	= True	0.3 [s]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Module is received within the specified cycle time.			Communication related conditions fulfilled (No error passive, no undervoltage)	= True			
		All	This monitoring checks if the message 'MSG_2022' PDU from Central Gateway Module is received within the specified cycle time.	Message is not received for time	>= 3 fsl	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2023' PDU from Central Gateway Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2024' PDU from Central Gateway Module is received within the specified cycle time.	Message is not received for time	>= 3 fsl	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
Lost Communication with Engine 12v Starter	U1818	All	This monitoring checks if the message 'EB_MSG_2002_CAN2' PDU from EGI5(Engine 12v Starter) is received within the specified cycle time.	Message is not received for time	>= 0.3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.3 [s]	Continuous	Type B, 2 Trips
Lost Communication with Engine Control Module	U1611	All	This monitoring checks if the message 'TrmsEstGr_Prctcd_MSG' signal group from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2027' PDU from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.12 fsl	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.12 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2105' PDU from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2106' PDU from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.25 fsl	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2110' PDU from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 1.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	1.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2041' PDU from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.75 fsl	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.75 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2042' PDU from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.3 [s]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks if the message 'MSG_2104' PDU from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.3 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2107' PDU from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2108' PDU from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat18_Prtctd_MSG' signal group from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat19_Prtctd_MSG' signal group from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat20_Prtctd_MSG' signal group from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat21_Prtctd_MSG' signal group from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.3 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat22_Prtctd_MSG' signal group from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.75 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.75 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat25_Prtctd_MSG' signal group from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat26_Prtctd_MSG' signal group from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.3 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat29_MSG' signal group from Engine Control Module is received within the specified cycle time.	Message is not received for time	>= 0.5 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.5	Continuous	Type B, 2 Trips
Lost Communication with Hybrid Powertrain Control	U1612	I**	This monitoring checks if the message 'MSG_2246' PDU from Hybrid Powertrain	Message is not received for time	>= 0.25 [s]	Ignition state ON AND	= True	0.25 [s]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Module 1			Control Module 1 is received within the specified cycle time.			Communication related conditions fulfilled (No error passive, no undervoltage)	= True			
		All	This monitoring checks if the message 'SriDat31_Prtctd_MSG' signal group from Hybrid Powertrain Control Module is received within the specified cycle time.	Message is not received for time	>= 0.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
Lost Communication with Transmission Control Module	U1643	All	This monitoring checks if the message 'ELSDInfo_Prtctd_MSG_CAN2' signal group from Transmission Control Module is received within the specified cycle time.	Message is not received for time	>= 0.12 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.12 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'TrnsEstGr_Prtctd_MSG' signal group from Transmission Control Module is received within the specified cycle time.	Message is not received for time	>= 0.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'ChsSysBrkAxITrqInfo1_Prtctd_MSG_CAN2' signal group from Transmission Control Module is received within the specified cycle time.	Message is not received for time	>= 0.1 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.1 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2027' PDU from Transmission Control Module is received within the specified cycle time.	Message is not received for time	>= 0.12 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.12 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_2091' PDU from Transmission Control Module is received within the specified cycle time.	Message is not received for time	>= 0.75 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.75 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'SriDat48_Prtctd_MSG' signal group from Transmission Control Module is received within the specified cycle time.	Message is not received for time	>= 0.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.25 [s]	Continuous	Type B, 2 Trips
CAN Bus 3										
Control Module Communication CAN Bus 1 Off	U0074	All	This monitoring checks if the CAN controller is in a Bus Off state.	BusOff status has been detected	= True	Ignition state ON	= True	0.250 [s]	Continuous	Type B, 2 Trips
Lost Communication with Body Control Module	U0140	All	This monitoring checks if the message 'SriDat9_MSG' signal group from Body Control Module is received within the specified cycle time.	Message is not received for time	>= 1.25 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	1.25 [s]	Continuous	Type B, 2 Trips
Lost Communication with Central Gateway Module on CAN Bus 2	U1609	All	This monitoring checks if the message 'BkupSysPwrMode_Prtctd_MSG_CAN3' signal group from Central Gateway Module is received within the specified cycle time.	Message is not received for time	>= 0.75 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.75 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message 'MSG_3016' PDU from Central Gateway Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the message	Message is not received for time	>= 3 [s]	Ignition state ON	= True	3[s]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			'MSG_3017' PDU from Central Gateway Module is received within the specified cycle time.			AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True			Trips
		All	This monitoring checks if the message 'MSG_3018' PDU from Central Gateway Module is received within the specified cycle time.	Message is not received for time	>= 3 [s]	Ignition state ON AND Communication related conditions fulfilled (No error passive no undervoltage)	= True = True	3[s]	Continuous	Type B, 2 Trips
		Controller								
ABS Valves Supply Voltage Circuit/Open	C053B	All	This monitoring checks if the VLV Supply line is able to drive an actuation (valve path 1).	Resistivity of valve path supply line	> 3 [Ohm]	No brake pedal is pushed AND Vehicle speed	= True > 9.32 [mph]	20 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the voltage is high enough for initial valve relay switch-on test.	UVR (Valve path supply voltage)	<4.6 [V]	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the voltage is high enough for initial valve relay switch-on test.	UVR (Valve path supply voltage)	<4.6 [V]	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
Antilock Brake System Active Too Long	C15D5	A *	This monitoring checks if the ABS is correctly triaged.	ABS intervention for time	>=60[s]	Ignition state ON	= True	60 [s]	Continuous	Type A, 1 Trip
Brake Bleed Not Complete	C15C7	All	This monitoring checks if the IPB is in assembly mode during initialization or diagnosis.	NVM item for 'IPB Assembly Mode' is set	= True	Ignition state ON AND Once during init	= True = True	Immediately	Once	Type A, 1 Trip
Brake Booster Motor "A" Phase U-V-W Circuit Range/Performance	C0582	All	This monitoring checks if the two sensor voltages have plausible values.	(Sum of Temperature Sensor 1 and 2 signal line voltages OR Sum of Temperature Sensor 1 and 2 signal line voltages) AND Number of times when implausible difference is detected	> 3.4 [V] < 3.16 [V] = 5	Ignition state ON	= True	0.600 [s]	Continuous	Type A, 1 Trip
Brake System Plunger Motor Position Sensor Not Learned	C2A1C	All	This monitoring checks the consistency between the version of the RPS calibration data and the version in SW.	Inconsistency between RPS calibration data version and SW version	= True	IPB State	= Init phase	Immediately	Once	Type A, 1 Trip
Control Module	U3000	All	This monitoring checks the CAN Controller's response during initialization.	Time duration with no response from CAN controller	>= 0.080 [s]	Ignition state ON AND During initialization	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if there is a hardware, which is not allowed to be used in series ECU.	Hardware component step ID indicates development state AND ECU TTNR (Part Number) indicates series ready ECU	= True = True	Ignition state ON AND During initialization	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the test of the charge pump has detected a failure.	Capacity of charge pump is restricted OR Performance of charge pump is insufficient OR Output voltage of charge pump is out of range	= True = True = True	Ignition state ON	= True	Immediately	Cyclically every 19 [s]	Type A, 1 Trip
		All	This monitoring checks if there is DMA transfer error due to timeouts.	Transfer error occurred during DMA transfer	= True	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the reference voltage of the ADC is in a proper range.	ADC reference voltage deviation is detected by comparator	= True	Ignition state ON	= True	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if MRG path is working.	(Motor Relay Actuation path is pulled low OR	= True	Ignition state ON AND	= True	0.08 [s]	Once	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				Hydraulic Enable is pulled low) AND MRG is switched on	= True = True	Failsafe logic test is running	= True			
		All	This monitoring checks if the system chip internal decouple bits are reset within the expected time.	Internal electrical and hydraulic decouple bits are not reset according to failsafe logic test	= True	Ignition state ON AND Failsafe logic test is running	= True = True	0.08 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if erroneous safety logic is detected.	Erroneous safety logic of system IC is detected	= True	Ignition state ON AND Failsafe logic test is running	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if Clockin monitor works properly (test of test).	Erroneous safety logic of clock-in monitor is detected	= True	Ignition state ON AND Failsafe logic test is running	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the ECU electrical enable line can be switched ON by the software.	ECU electrical enable line is shorted to ground OR ECU electrical enable line cannot be switched on by the software	= True = True	Ignition state ON AND Failsafe logic test is running	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the ECU electrical enable line can be switched OFF by the software.	ECU electrical enable line is shorted to supply voltage OR ECU electrical enable line cannot be switched off by the software	= True = True	Ignition state ON AND Failsafe logic test is running	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the ECU internal hydraulic enable line can be switched ON by the software.	ECU hydraulic enable line is shorted to ground OR ECU hydraulic enable line cannot be switched on by the software	= True = True	Ignition state ON AND Failsafe logic test is running	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the ECU internal hydraulic enable line can be switched OFF by the software.	ECU hydraulic enable line is shorted to supply voltage OR ECU hydraulic enable line cannot be switched off by the software	= True = True	Ignition state ON AND Failsafe logic test is running	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the enable line is set properly.	Missing low level enable signal of ECU internal hydraulic line is detected for time OR Missing low level enable signal of ECU internal electrical line is detected for time	> 0.05 [s] > 0.05 [s]	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the enable line is set properly (second ASIC).	Missing low level enable signal of ECU internal hydraulic line is detected for time OR Missing low level enable signal of ECU internal electrical line is detected for time	> 0.05 [s] > 0.05 [s]	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Errorpin event counter works properly.	Error pin event counter does not increment on error pin event OR Safety logic of the ASIC is not reset properly	= True = True	Ignition state ON AND Failsafe logic test is running	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if a missing watchdog trigger causes hydraulic/electric shutdown.	Missing BIST trigger does not switch off hydraulic/electrical path	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks whether the system chip switches off the gate actuation when it detects a missing watchdog trigger.	Valve relay gate is not switched off due to missing watchdog trigger	= True	Ignition state ON AND Failsafe logic test is running	= True = True	1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the valve relay gate actuation is properly switched off via a Serial Peripheral Interface (SPI) command	Valve relay gate is not switched off via SPI	= True	Ignition state ON AND Failsafe logic test is running	= True = True	1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks the status of the watchdog at initialization state.	Watchdog status differs from the expected status	= True	Ignition state ON AND Failsafe logic test is running	= True = True	1 [s]	Once	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks the status of the watchdog.	Watchdog status differs from the expected status	= True	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks the status of the watchdog (second ASIC).	Watchdog status differs from the expected status	= True	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the watchdog BIST state machine can detect a wrong BIST command value.	Watchdog of ASIC is triggered by wrong BIST command value	= True	Ignition state ON AND Failsafe logic test is running	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if a switched on valve relay is reported as off (system chip internal status).	Hydraulic enable state is low OR Feedback of valve relay status is wrong	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the GTM time base which is used for e.g. WSS works properly.	Reference frequency detected by GTM OR Reference frequency detected by GTM	<3.8 [kHz] >4.2 [kHz]	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the time passed in the system timer is equal to the time elapsed in Generic Timer Module (GTM) peripheral.	Deviation between time passed in the system timer and in the GTM peripheral	> 0.005 [ms]	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if system ASIC clock input frequency deviation is detected.	ASIC internal clock input frequency deviation detected	= True	Ignition state ON	= True	0.08 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if system ASIC clock input frequency deviation is detected (second ASIC).	ASIC internal clock input frequency deviation detected	= True	Ignition state ON	= True	0.08 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the ASIC can detect the failure test frames and therefore set corresponding failure flags.	ASIC could not detect the failure frames	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the 2nd ASIC can detect the failure test frames and therefore set corresponding failure flags.	Second ASIC could not detect the failure frames	= True	Ignition state ON AND During initialization	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the internal ASIC oscillator works properly.	Erroneous ASIC oscillator frequency detected	= True	Ignition state ON	= True	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the internal 2nd ASIC oscillator works properly.	Erroneous ASIC oscillator frequency detected	= True	Ignition state ON	= True	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks the SPI communication with B6 Bridge Driver ASIC.	Wrong data is sent to ASIC OR Wrong data is received from ASIC OR Defect in SPI line OR Incorrect SPI communication because of a defect in ASIC	= True = True = True = True	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is short circuit between Qx pin and MRAuC pin.	MRG (Motor Relay Gate) feedback bit	= 0	Ignition state ON AND Valve relay is not yet switched on AND Hydraulic enable line is switched on AND During initialization	= True = True = True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks the SPI communication between ASIC and the microcontroller.	Wrong data is sent to ASIC OR Wrong data is received from ASIC OR Defect in SPI line OR Defect in ASIC	= True = True = True = True	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks the SPI communication between 2nd ASIC and the	Wrong data is sent to ASIC OR	= True	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			microcontroller.	Wrong data is received from ASIC OR Defect in SPI line OR Defect in ASIC	= True = True = True					
		All	This monitoring checks if U5V is out of range.	U5V undervoltage bit is set OR U5V overvoltage bit is set	= True = True	Ignition state ON	= True	0.06 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks the ASIC internal test of the U5V voltage regulator.	U5V voltage regulator test failed OR (U5V voltage regulator test finished AND Time passed since the test started)	= True = False >= 0.1 [s]	Ignition state ON	= True	0.1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the voltage regulator configuration of the ASIC matches the software configuration.	Voltage regulator configuration of the ASIC does not match configuration in SW	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the ASIC internal current reference is out of range.	System ASIC reference current (used by monitorings and test) deviation is detected by internal comparator	= True	Ignition state ON	= True	0.06 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks the UB6 to UBB ratio together with the UBB Voltage.	UBB voltage AND Deviation between UB6 and UBB voltage	> 4[V] > 25 f%	Ignition state ON AND Electric motor is not actuated	= True = True	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is a hard undervoltage measured at UBB main supply line.	UB6 voltage AND Difference between UB6 and UB Motor voltage	< 3.22 [V] > 1.04 fV	Ignition state ON AND Electric motor is actuated AND Voltage across BMS (B6 Bridge Main Supply Switch)	= True = True = True	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is a voltage divider drift failure (UB_RD_INT voltage).	UB_RD_INT voltage AND Difference between UBVR and UB_RD_INT voltage	< 6.2 [V] > 3[V]	Ignition state ON	= True	0.180 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the NMI mechanism is running properly.	uC safety logic detects a failure	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if tests of the safety logic of uC works as expected.	Microcontroller safety logic tests fail	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the supply voltage of the microcontroller is out of range.	uC core voltage deviation is detected by voltage monitor of microcontroller	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if the valve driver configuration was successful.	Valve driver configuration data read back from ASIC does not match the written data	= True	Ignition state ON	= True	0.015 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the valve driver configuration was successful.	Valve driver configuration data read back from ASIC does not match the written data	= True	Ignition state ON	= True	0.015 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if all Watchdog commands have been scheduled.	At least one command number missing during monitoring interval	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is too many wrong watchdog trigger pattern are received by system ASIC.	System ASIC watchdog error counter detects a fixed number of wrong watchdog trigger pattern	= 4	Ignition state ON	= True	0.04 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the system ASIC watchdog error counter is stuck.	System ASIC watchdog error counter is stuck	= True	Ignition state ON	= True	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks line issues between ASIC and uC.	Output signal of the multiplexer and the corresponding wheel speed signal are not identical	= True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND	= True	0.1 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
						Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Vehicle speed	= True = True = True >12.42 [mph]			
		All	This monitoring checks if System IC test does not work due to hardware malfunction.	WSS HW Test in System IC failed	= True	Ignition state ON	= True	0.015 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if there is an overcurrent event which cannot be resolved by switching the affected GPIO.	Overcurrent detected on a SW configured GPIO after switching it off	= True	Ignition state ON AND Initialization finished	= True = True	0.14 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is a hardware configured GPIO overcurrent event which requires a hydraulic shutdown.	Overcurrent detected on a HW configured GPIO AND Overcurrent bit of the ASIC gets set	= True = True	Ignition state ON AND Initialization finished	= True = True	0.12 [s]	Continuous	Type A, 1 Trip
Control Module Processor	P0606	All	This monitoring checks if the hardware components are supported by the software.	Device ID of ASIC is in the list of supported device IDs OR Software version ID of ASIC is in the list of supported software version IDs OR Microcontroller device ID is in the list of supported device IDs OR Microcontroller software version ID is in the list of supported SW version IDs	= False = False = False = False	Ignition state ON	= True	0.03 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if there is a microcontroller exception.	A CPU exception occurred	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks that each task is activated and executed within its designated timeslot.	A task is not running within the expected timeslot	= True	Ignition state ON	= True	It depends on the cycle time of the faulty task.	Continuous	Type A, 1 Trip
		All	This monitoring checks the error hooks (exceptions) occurring in the Operating System.	A task was started before it has finished its previous run	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if the microcontroller stack is not changed by other tasks.	Checkword at the beginning or end of stack has been overwritten	= True	Ignition state ON	= True	0.08 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if an internal interrupt based system error occurred.	Interrupt based fault occurred (e.g. too long interrupt lock)	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is a task runtime overload.	Jitter limit of IO (input/output) sensitive part is not held	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is an overload situation.	Task did not finish within its cycle time	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks if cyclically test execution of SVDT in hardware is not stopped.	Stop response from hardware does not work or the test is not stopped	= True	Silent valve driver test is running	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks that the task system of the microcontroller and the one of the ASIC stay synchronized or at least get resynchronized again.	Resynchronization between task system of microcontroller and ASIC fails	= True	Ignition state ON	= True	0.06 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if cyclically test execution of SVDT in hardware is not stopped.	Stop response from hardware does not work or the test is not stopped	= True	Silent valve driver test is running	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks that the task system of the microcontroller and the one of the ASIC stay synchronized or at least get resynchronized again.	Resynchronization between task system of microcontroller and ASIC fails	= True	Ignition state ON	= True	0.06 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks for UVR leakage current due to ohmic side circuit by Valve-Coil-Resistance-Measurement (VCRM) inside the HSW.	Leakage current (UVR leakage current comparator bit is set) OR UVR goes from 0 [V] to over 1.26 [V] within time	> 0.0063 [A] >= 0.06 [s]	Ignition state ON AND Execution of the valve coil resistance measurement	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks the valve-coil resistance measurement path by Valve-Coil-Resistance-Measurement (VCRM) inside the HSW.	Driver ASIC internal current source for valve coil resistance measurement path	> 0.04 [A] +/- 5% (required source current)	Ignition state ON AND Execution of the valve coil resistance measurement	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is short between VR and GND.	Leakage current between valve relay and ground path (High ohmic short to ground bit in ASIC is set)	> 0.0063 [A]	Ignition state ON AND Valve relay is switched off	= True = True	0.185 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is short between VR and GND.	Leakage current between valve relay and ground path (Short to ground bit in ASIC is set)	> 0.0198 [A]	Ignition state ON AND Valve relay is switched off	= True = True	0.025 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the feedback of VRG actuation is plausible.	Valve relay control bit in ASIC does not match the desired actuation state	= True	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched OFF.	Valve Relay can be switched OFF	= False	Ignition state ON	= True	0.065 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched OFF during the initial test.	Valve Relay can be switched OFF	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched ON.	Valve relay cannot be switched on	= True	Ignition state ON AND Valve relay is switched on	= True = True	0.015 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched ON during the initial test.	Valve relay cannot be switched on	= True	Ignition state ON AND Valve relay is switched on	= True = True	1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched OFF by redundant safety switch.	Valve Relay can be switched OFF by redundant safety switch	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks for UVR leakage current due to ohmic side circuit by Valve-Coil-Resistance-Measurement (VCRM) inside the HSW.	Leakage current (UVR leakage current comparator bit is set) OR UVR goes from 0 [V] to over 1.26 [V] within time	> 0.0063 [A] >= 0.06 [s]	Ignition state ON AND Execution of the valve coil resistance measurement	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks the valve-coil resistance measurement path by Valve-Coil-Resistance-Measurement (VCRM) inside the HSW.	Driver ASIC internal current source for valve coil resistance measurement path	> 0.04 [A] +/- 5% (required source current)	Ignition state ON AND Execution of the valve coil resistance measurement	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is short between VR and GND.	Leakage current between valve relay and ground path (High ohmic short to ground bit in ASIC is set)	> 0.0063 [A]	Ignition state ON AND Valve relay is switched off	= True = True	0.185 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks if there is short between VR and GND.	Leakage current between valve relay and ground path (Short to ground bit in ASIC is set)	> 0.0198 [A]	Ignition state ON AND Valve relay is switched off	= True = True	0.025 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the feedback of VRG actuation is plausible.	Valve relay control bit in ASIC does not match the desired actuation state	= True	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched OFF.	Valve Relay can be switched OFF	= False	Ignition state ON	= True	0.065 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched OFF during the initial test.	Valve Relay can be switched OFF	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched ON.	Valve relay cannot be switched on	= True	Ignition state ON AND Valve relay is switched on	= True = True	0.015 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched ON during the initial test.	Valve relay cannot be switched on	= True	Ignition state ON AND Valve relay is switched on	= True = True	1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the Valve Relay can be switched OFF by redundant safety switch.	Valve Relay can be switched OFF by redundant safety switch	= False	Ignition state ON	= True	1 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if Core 1 and Core 2 SW-BIST signatures are different.	Core 1 and Core 2 SW BIST signatures are different	= True	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the task scheme is proper.	Task scheme error detected	= True	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the current wheel speed sensor configuration is correct via Serial Peripheral Interface (SPI).	Mismatch between current WSS mode software configuration (stored in a register) and the hardware configuration	= True	Ignition state ON	= True	0.2 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the current wheel speed sensor configuration is correct via Serial Peripheral Interface (SPI).	Mismatch between current WSS mode software configuration (stored in a register) and the hardware configuration	= True	Ignition state ON	= True	0.2 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the current wheel speed sensor configuration is correct via Serial Peripheral Interface (SPI).	Mismatch between current WSS mode software configuration (stored in a register) and the hardware configuration	= True	Ignition state ON	= True	0.2 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if the current wheel speed sensor configuration is correct via Serial Peripheral Interface (SPI).	Mismatch between current WSS mode software configuration (stored in a register) and the hardware configuration	= True	Ignition state ON	= True	0.2 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if ASW configuration takes too long.	ASW current states stay in initialized state	= True	Ignition state ON	= True	5[s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if a third party software access into restricted RAM area is detected.	Restricted area was tried to be accessed by TTM	= True	Ignition state ON	= True	Immediately	Continuous	Type A, 1 Trip
Control Module Programming Error	P0602	All	This monitoring checks if the ECU exchange was not proper.	Mismatch between the stored and the real LIPS ID	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the IPB has not been programmed with calibration data set.	5th Byte in internal customer data from any of the 5 pieces of calibration block	= ASCII D	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		Brembo	This monitoring checks if the EPB has the valid parameter set.	The version of parameters saved in FLASH OR The version of parameters saved in FLASH is different from the PBC SW version	= 0xFF = True	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip
		TRW	This monitoring checks if the EPB has the valid parameter set.	EPB system has no parameter record or no valid parameter record received	= True	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip
		TRW	This monitoring checks if the EPB's parameter has the correct checksum value.	PBC parameter checksum is incorrect	= True	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks if the configuration of the wheel speed sensor type is possible.	Wheel speed sensor type value (ODR comment: When a new sensor type is added to the software, this number grows. Check this value with the customer team.) OR Wheel speed sensor type value OR NvM access failure	> 35 < 0 = True	Ignition state ON AND During initialization	= True = True	Immediately	Once	Type A, 1 Trip
EBCM Overtemperature	C127E	All	This monitoring checks if there is an over temperature at the external power supply line in the direction of LiPS.	Over temperature situation has been detected by system ASIC at external LiPS power supply line	= True	Ignition state ON	= True	0.06 [s]	Continuous	Type A, 1 Trip
Internal Control Module A/D Processing Performance	P060B	All	This monitoring checks if there are general ADC errors of the operational conversion.	ADC operational conversion error detected OR ID error registered OR Operational scan group has not completed its conversion in time OR Not all operational results have been written before they are read	= True = True = True = False	Ignition state ON	= True	0.08 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there are open bonds or pins.	ADC open bond failure sampling detects failure for a cumulative number of times	>= 3	Ignition state ON	= True	0.08 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the converted internal test voltages are in a defined range.	Five-point ADC self-test detects failure for a cumulative number of times	>= 3	Ignition state ON	= True	0.07 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if ADC register bits are set to the expected values.	An ADC register bit is flipped OR An ADC register bit is stuck	= True = True	Ignition state ON	= True	0.08 [s]	Continuous	Type A, 1 Trip
Internal Control Module EEPROM Error	P062F	All	This monitoring checks if LiPS-related NvM item can be written.	LiPS-related NvM item cannot be written	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the motor configuration in NvM is valid during the initial test.	Wrong configuration is read by the software from NvM OR Unsupported configuration is read by the software from NvM	= True = True	Ignition state ON	= True	0.01 [s]	Once	Type A, 1 Trip
		All	This monitoring checks if there are too many read/write requests.	Number of write/erase requests at NvM exceeds a defined number (in case of the total number of the configured memory blocks) AND Too much write/erase task requested in a defined time frame	= True > 0.25 [s]	Ignition state ON	= True	0.250 [s]	Continuous	Type A, 1 Trip
Internal Control Module Keep Alive Memory (KAM) Error	P0603	All	This monitoring checks if HW Parameter(s) can be read from EEPROM correctly.	Reading the HW Parameters from EEPROM is not successful	= True	Ignition state ON AND ECU Startup	= True = True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the NVM item for the front axle can be read or valid.	NVM item can be read OR NVM item is valid	= False = False	Ignition state ON AND Battery voltage	= True = 9..16 [V]	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the NVM item for the rear axle can be read or valid.	NVM item can be read OR NVM item is valid	= False = False	Ignition state ON AND Battery voltage	= True = 9..16 [V]	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the Linear position sensor related NVM item can be read, or the item is valid.	LiPS-related NvM item is empty OR LiPS-related NvM item is invalid	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks the write result at the end of the EEPROM write procedure.	Invalid cell result received during read back after writing to the EEPROM	= True	Ignition state ON	= True	0.02 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks if the gear ratio information can be read out from the non-volatile memory.	Gear ratio information can be read out from the NVM OR Gear ratio information is correct	= False = False	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the motor size information can be read out from the non-volatile memory.	Motor Size information can be read out from the NVM OR Motor Size information is correct	= False = False	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks if the NvM items: RPS_Offset, RPS_Rescalling, RPS_CorrAmplitudes and the RPS_Version are readable.	Offset read failure occurred OR Rescaling read failure occurred OR Correction Amplitudes read failure occurred OR Version read failure occurred OR Orthogonality read failure occurred	= True = True = True = True = True	IPB State	= Init phase	Immediately	Once	Type A, 1 Trip
Internal Control Module Memory Checksum Error	P0601	All	This monitoring checks proper functionality of Flash.	Uncorrectable flash ECC fault occurred OR Multiple flash ECC faults occurred OR Number of flash ECC single bit faults is too high OR Flash checksum verification failed	= True = True = True = True	Ignition state ON	= True	0.08 [s]	Continuous	Type A, 1 Trip
Internal Control Module Random Access Memory (RAM) Error	P0604	All	This monitoring checks if the LBIST and MBIST are working properly.	Test result bits set do no match reference register value OR Signature register values do no match reference register value	= True = True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip
		All	This monitoring checks proper functionality of RAM.	Coupling fault occurred between neighboring RAM cells OR RAM addressing fault occurred OR RAM ECC correctable bit transient fault occurred OR RAM ECC correctable bit permanent fault occurred OR Uncorrectable RAM ECC fault occurred	= True = True = True = True = True	Ignition state ON AND During initialization	= True = True	Immediately	Continuous	Type A, 1 Trip
Key Table Not Provisioned	U1960	All	This monitoring checks if the Authoritative Counter has reached its maximum value.	Authoritative Counter value reached its maximum	= True	Ignition state ON	= True	0.02 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the key provisioning has been done at all.	HSM (hardware security module) returns a fault code referring to a key empty error	= True	Ignition state ON AND Communication related conditions fulfilled (No error passive, no undervoltage)	= True = True	0.01 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the key provisioning has been done in OEM's plant.	Key table provisioned NVM item value	= True	Ignition state ON AND ECU is in initialization state	= True = True	0.02 [s]	Once	Type B, 2 Trips
Security Peripheral Performance - Performance or Incorrect Operation	U1961	All	This monitoring checks the integrity of the security peripheral's ROM memory.	HSM returns a fault code referring to ROM memory error	= True	Ignition state ON	= True	0.01 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the security peripheral is able to generate/verify a Message Authentication Code.	The security peripheral is not responding for time	> 0.005 [s]	Ignition state ON	= True	0.02 [s]	Continuous	Type B, 2 Trips
System Voltage High	P0563	All	This monitoring checks if there is an	ECU Supply voltage	> 16 [V]	Cranking	= False	Immediately	Continuous	Type B, 2

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		Brembo	existing overvoltage situation while other LIN failure is present.	AND Another LIN failure has been detected	= True					Trips
			This monitoring checks if the supply voltage is too high for the actuation.	Power supply voltage AND Voltage above threshold for time AND De-Mature condition not met Actuation stopped twice due to recurring Mature conditions, leading to final actuation abort. De-Mature condition: - Supply voltage less than 16.1 [V] for 50 [ms]. The mature method described is applicable in case of: - Static apply, - Static release, - Hot brake re-clamp, - Open brake rear, - Close brake rear, - Brake pad adjustment.	> 16.1 [V] > 0.050 [s] >= 2 [s] = True	Actuation has been requested Actuation has been requested	= True = True	2[s]	Continuous	Type B, 2 Trips
		TRW	This monitoring checks if the supply voltage is too high for the actuation.	Power supply voltage	> 16.5 [V]	Actuation (apply or release) has been requested	= True	2[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if there is an overvoltage measured at UBB supply line.	Measured UBB voltage	> 16 [V]	Ignition state ON	= True	0.2 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if there is an overvoltage measured at UBB supply line.	Measured UBB voltage	> 20 [V]	Ignition state ON	= True	0.2 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if there is an overvoltage measured at UBB supply line.	Measured UBB voltage	> 27 [V]	Ignition state ON	= True	0.2 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if there is an existing overvoltage situation and this is only a replacement failure instead of other.	Network voltage AND Another NET failure has been detected	> 16 [V] = True	Ignition state ON	= True	Immediately	Continuous	Type B, 2 Trips
		All	This monitoring checks if the power supply at valve path is too high.	UB_VR	> 16.5 [V]	Ignition state ON	= True	1.02 [s]	Continuous	Type B, 2 Trips
Wheel Speed Sensor Frequency	C10EE	All	This monitoring checks if there is an overflow in the Direct Memory Access Transfer Unit.	(DMA buffer state OR Buffer transfer error occurred (DMA TU is receiving time stamps too frequently)) AND DMA buffer failure for specific wheel speed signal is not set (the signal which is on the output of the multiplexer channel)	= Overflow = True = True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	0.03 [s]	Continuous	Type A, 1 Trip
Hydraulic Valves										
Brake Booster Performance	C0021	All	This monitoring checks if the pressure in plunger circuit is too low.	Target pressure AND Pressure sensor 2 value	> 60 [bar] < 30 [bar]	Ignition state ON AND Braking is requested (either by driver or by external)	= True = True	0.3 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks with goodcheck if the pressure in plunger circuit is too low.	Target pressure AND Pressure sensor 2 value	> 60 [bar] < 30 [bar]	BBF System state Ignition state ON AND Braking is requested (either by driver or by external)	= Full = True = True	0.3 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Brake Fluid	C0049	A *	This monitoring checks if the brake fluid reservoir is empty.	Brake fluid level sensor value is set to logical value *1*	= True	Ignition state ON	= True	10 [s]	Continuous	Type A, 1 Trip
Brake Hydraulic Circuit "C" Leak	C05B0	All	This monitoring checks if there is air in the plunger. It checks the system during three situation: - during replenishment (Replenishment air detection, RAD) - during TAD (Transition to idle air Detection, TAD) - active test after power on (Fluid level indicator Plausibility air detection, FAD).	RAD - Calculated volume deviation (based on Pressure sensor 2 value and plunger position) AND For time	> 2 [cm ³] > 1 [s]	BBF System state AND Replenishment is active AND Pressure sensor 1 value AND Ignition state ON	= Circuit separation OR One circuit = True > 10 [bar] = True	0.02 [s]	RAD: At each slow replenishment in degraded state. TAD: At each pressure based TTI in degraded state. FAD: At least once per power cycle.	Type A, 1 Trip
				TAD - Calculated volume deviation (based on Pressure sensor 2 value and plunger position) AND For time	> 1.5 [cm ³] > 5 [s]	BBF System state AND TTI (Transition to Idle) is active for the plunger AND Pressure sensor 1 value AND Ignition state ON	= Full system OR Degraded pedal feel OR Circuit separation OR One circuit = True > 10 [bar] = True			
				FAD - Calculated volume deviation (based on Pressure sensor 2 value and plunger position) AND For time	> 1.5 [cm ³] > 10 [s]	BBF System state AND Braking is requested (either by driver or by external) AND Vehicle speed AND Pressure sensor 1 value AND Ignition state ON	= Full system OR Degraded pedal feel OR Hydraulic backup with actuators = False = 9.32..43.5 [mph] > 10 [bar] = True			
Brake Hydraulic Circuit Excessive Compliance - Level 2	C2A20	All	This monitoring checks if there is a leakage in Circuit 1.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm ³ /s]	BBF System state AND Braking is requested (either by driver or by external)	= Circuit separation = True	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is a leakage in Circuit 1.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm ³ /s]	BBF System state AND Braking is requested (either by driver or by external)	= Circuit separation = True			
		All	This monitoring checks if there is a leakage in Circuit 2.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm ³ /s]	BBF System state AND Braking is requested (either by driver or by external)	= Circuit separation = True			
		All	This monitoring checks if there is a leakage in Circuit 2.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm ³ /s]	BBF System state AND	= Circuit separation			

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
						Braking is requested (either by driver or by external)	= True			
		All	This monitoring checks if there is a leak in the remaining single circuit.	Calculated leakage based on pressure sensor 2 value and plunger position	> 500 [mm ³ /s]	BBF System state	= One circuit	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
						AND Braking is requested (either by driver or by external)	= True			
		All	This monitoring checks if there is a leak in the plunger circuit.	Calculated leakage based on pressure sensor 2 value and plunger position	> 2000 [mm ³ /s]	BBF System state	= Full	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
						AND Braking is requested (either by driver or by external)	= True			
Brake Master Cylinder Cut Off Valve	C05D5	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s] Cyclically every 20 [s]	Type A, 1 Trip	
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation	Measured valve resistance	> 13.7 [Ohm]	Ignition state ON	= True	20 [s]	Cyclically every	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			between the measured valve resistance and the defined valve resistance in the software.	OR Measured valve resistance	< 4.8 [Ohm]	AND Outside of valve control AND Hydraulic request is set	= True = False		20 [s]	
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Brake Pedal Feedback Pressure Solenoid Circuit	C0024	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 5 - 8 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A] > 5 - 8 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	= True > 20 [%]	Ignition state ON AND Valve relay supply voltage	= True > 6.9 [V]	0.03 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True = True	AND Any valve test is activated	= False			
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 6.9 [Ohm] < 2.2 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC- Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
BSCM/EBBC Hydraulic Unit Performance	C055F	All	This monitoring checks if there is a leakage in the Master Cylinder.	Calculated leakage	> 200 [mm ³ /s]	BBF System state AND Brake Pedal AND Pressure sensor 1 value	= Full = applied > 3 [bar]	Immediately	Continuous	Type A, 1 Trip
		All	This monitoring checks for signs of an inoperable or blocked Test Separation, Circuit Separation or Plunger Separation valve.	Active System Test (component STS) detects an unexpected pressure build-up	= True	System State AND BBF System state AND Braking is requested (either by driver or by external)	= Postrun = Full OR Degraded pedal feel = False	8[s]	Once in Postrun	Type A, 1 Trip
		All	This monitoring checks if brake boosting capability is lost.	Calculated air volume (based on pressure sensor AC value and plunger position) AND Calculated leakage	>= 8 [cm ³] > 800 [mm ³ /s]	BBF System state AND Braking is requested (either by driver or by external) AND Vehicle speed	= Full OR Degraded pedal feel = False < 156.6 [mph]	4[s]	Once immediately after start of a new Power Cycle	Type A, 1 Trip
		All	This monitoring checks if the pressure build capability is reduced.	Calculated air in plunger	> 5 [cm ³]	BBF System state AND	= Full OR Degraded pedal feel	4[s]	Once immediately after start of a new Power Cycle	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
						Braking is requested (either by driver or by external) AND Vehicle speed	= False < 156.6 [mph]			
		All	This monitoring checks if the pressure build up during replenishment is possible.	Pressure sensor 2 value gradient AND Plunger volume	< 300 [bar] > plunger volume at start of replenishment + 1 cm³	Ignition state ON AND Replenishment is active	= True = True	0.2 [s]	Continuous	Type A, 1 Trip
Driver Applied Pressure Higher Than Expected	C05D3	All	This monitoring checks if the current pressure sensor value is too high for the current Pedal Travel Sensor value.	Pressure sensor value* OR Pedal Travel Sensor value	> too high < too low	Ignition state ON AND ESP or ABS intervention	= True = No intervention	0.2 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the current pressure sensor value is too high for the current Pedal Travel Sensor value.	Pressure sensor value* OR Pedal Travel Sensor value	> too high < too low	Ignition state ON AND ESP or ABS intervention	= True = No intervention	0.2 [s]	Continuous	Type A, 1 Trip
Left Front Inlet Control	C0010	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4 - 6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] < 0.075 - 0.125 [A] > 4 - 6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s] Cyclically every 20 [s]	Type A, 1 Trip	
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set)	< 2-2.5 [V]	Ignition state ON	= True	0.03 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				OR Current through valve coil (Under Current feedback bit is set)	<0.075 -0.125 [A]	AND Any valve test is activated	= False			
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Left Front Outlet Control	C0011	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4-6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A] > 4-6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks continuously if	PWM failure feedback bit is set	= True	Ignition state ON	= True	0.03 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	> 20 [%] = True = True	AND Valve relay supply voltage AND Any valve test is activated	> 6.9 [V] = False			
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Left Rear Inlet Control	C0018	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4-6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR	< 2-2.5 [V] <0.075 -0.125 [A] > 4-6.5 [A] > 195-220 [°C]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND	= True = True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	> 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	Hydraulic request is set	= False			
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Left Rear Outlet Control	C0019	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4-6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent	Voltage at low-side in off-state (Open Load feedback bit is set)	< 2-2.5 [V]	SVDT is running	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Valve Driver Test due to defective coil low side and high side paths.	OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	<0.075 -0.125 [A] > 4-6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False			
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Low Brake Fluid Indicated - Short to battery or open	C0676	All	This monitoring checks if the fluid level sensor is shorted to battery.	UADC/UZP voltage ratio	> 86 [%]	Ignition state ON	= True	1 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Low Brake Fluid Indicated - Short to ground	C0677	All	This monitoring checks if the fluid level sensor is shorted to ground.	UADC/UZP voltage ratio	< 16 [%]	Ignition state ON	= True	1 [s]	Continuous	Type A, 1 Trip
Right Front Inlet Control	C0014	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set)	> 4-6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V] < 2-2.5 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] < 0.075-0.125 [A] > 4-6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR	= True = True	Ignition state ON AND Outside of valve control AND	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True	Hydraulic request is set	= False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
				ASIC valve driver failure crosstalk	= True	Ignition state ON AND Valve relay supply voltage	= True > 6.9 [V]			
				Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True	AND Outside of valve control	= True			
						AND Hydraulic request is set	= False			
Right Front Outlet Control	C0015	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4-6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] < 0.075 - 0.125 [A] > 4-6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] < 0.075 - 0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Right Rear Inlet Control	C001C	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4-6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] < 0.075 - 0.125 [A] > 4-6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare	PWM failure feedback bit is set OR	= True	Ignition state ON AND	= True	0.03 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			failure or wrong GateQx(ONZOFF) failure.	Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	> 20 [%] = True = True	Valve relay supply voltage AND Any valve test is activated	> 6.9 [V] = False			
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
Right Rear Outlet Control	C001D	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4-6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR	< 2-2.5 [V] <0.075 -0.125 [A] > 4-6.5 [A] > 195-220 [°C]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND	= True = True > 6.9 [V] = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	> 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	Hydraulic request is set	= False			
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
TCS Control Channel "A" Valve 1	C0001	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	>4-6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent	Voltage at low-side in off-state (Open Load feedback bit is set)	< 2-2.5 [V]	SVDT is running	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Valve Driver Test due to defective coil low side and high side paths.	OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	<0.075 -0.125 [A] > 4-6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False			
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
TCS Control Channel "A" Valve 2	C0002	1"	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free	Current through valve coil (Over Current feedback bit is set) OR	>5- 8 [A]	Ignition state ON AND	= True	0.03 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Wheeling Lost failure.	Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Any valve test is activated	= False			
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A] > 5 - 8 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s] Cyclically every 20 [s]	Type A, 1 Trip	
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 6.9 [Ohm] < 2.2 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1)	= True = True	Ignition state ON AND Valve relay supply voltage	= True > 6.9 [V]	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True	AND Outside of valve control AND Hydraulic request is set	= True = False			
TCS Control Channel "B" Valve 1	C0003	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 4-6.5 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A] > 4-6.5 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 13.7 [Ohm] < 4.8 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and	Failure in actuation logic and actuation compare logic	= True	Ignition state ON	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			actuation monitoring unit as well as inside valve driver ADC unit.	OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True	AND Outside of valve control AND Hydraulic request is set	= True = False			
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
TCS Control Channel "B" Valve 2	C0004	All	This monitoring checks continuously if the valve coil has Over Current, Over Temperature, Power Ground Lost, Free Wheeling Lost failure.	Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Free Wheeling Lost feedback bit is set)	> 5 - 8 [A] > 195-220 [°C] > 0.4-0.9 [V] > 32.8-39.4 [V]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks cyclically if there is shortcut between valves during Silent Valve Driver Test due to defective coil low side and high side paths.	Voltage at low-side in off-state (Open Load feedback bit is set) OR Current through valve coil (Under Current feedback bit is set) OR Current through valve coil (Over Current feedback bit is set) OR Temperature in ASIC output stage (Over Temperature feedback bit is set) OR Voltage drop between PGND at low-side driver and ECU-GND (PGND-Lost feedback bit is set) OR Voltage at Qx (Freewheeling Lost feedback bit is set) OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	< 2-2.5 [V] <0.075 -0.125 [A] > 5 - 8 [A] > 195-220 [°C] > 0.4 - 0.9 [V] > Clamping voltage 32.8...39.4 [V] > 20 [%]	SVDT is running AND Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True = True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks continuously if there is PWM failure or HsLs-Compare failure or wrong GateQx(ONZOFF) failure.	PWM failure feedback bit is set OR Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set) OR Wrong GateQx ON feedback bit is set OR Wrong GateQx OFF feedback bit is set	= True > 20 [%] = True = True	Ignition state ON AND Valve relay supply voltage AND Any valve test is activated	= True > 6.9 [V] = False	0.03 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks continuously if the valve-coil path has interruption.	Voltage at low-side in off-state (Open Load feedback bit is set)	< 2-2.5 [V]	Ignition state ON	= True	0.03 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				OR Current through valve coil (Under Current feedback bit is set)	<0.075 -0.125 [A]	AND Any valve test is activated	= False			
		All	This monitoring checks if there is deviation between the measured valve resistance and the defined valve resistance in the software.	Measured valve resistance OR Measured valve resistance	> 6.9 [Ohm] < 2.2 [Ohm]	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks if there is failure inside valve driver actuation logic and actuation monitoring unit as well as inside valve driver ADC unit.	Failure in actuation logic and actuation compare logic OR Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True = True	Ignition state ON AND Outside of valve control AND Hydraulic request is set	= True = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		All	This monitoring checks cyclically the ASIC-Valve-Driver internal output-driver actuation register.	ASIC valve driver failure crosstalk OR Bit failure in ASIC valve driver actuation registers (stuck at 0 or 1) OR Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True = True = True	Ignition state ON AND Valve relay supply voltage AND Outside of valve control AND Hydraulic request is set	= True > 6.9 [V] = True = False	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip
		Ignition Switch Run Crank Line								
Ignition On/Start Switch Circuit High Voltage	P2535	All	This monitoring checks if the Ignition Switch Circuit is short to Battery.	Hardwired ignition switch circuit AND Engine controller run crank terminal status from CAN	>4.5 [V] = Low	None	= None	2.5 [s]	Continuous	Type B, 2 Trips
Ignition On/Start Switch Circuit Low Voltage	P2534	r"	This monitoring checks if the Ignition Switch Circuit is interrupted or short to gnd.	Hardwired ignition switch circuit AND Engine controller run crank terminal status from CAN	< 2 [V] = High	None	= None	2.5 [s]	Continuous	Type B, 2 Trips
Wheel Speed Sensors										
Left Front Wheel Speed Sensor Circuit High	C0503	All	This monitoring checks if there is a short circuit of the WSS Front Left signal line to the battery.	Sensor current at the signal line	> 0.05 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip
Left Front Wheel Speed	C0502	All	This monitoring checks for implausible errorCurrent value monitoring does not detect failure		= True	Ignition state ON	= True	0.120[s]	Continuous	TypeA, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Sensor Circuit Low			patterns of the signal which cannot be classified either as an electrical fault (such as supply to ground which are covered by other monitorings) or valid signal.	AND Supply line monitoring does not detect failure	= True	AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501)	= True			
				AND Voltage value monitoring does not detect failure	= True	AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)	= True			
				AND Signal is not valid	= False	AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D)	= True			
						AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True			
		All	This monitoring checks if there is supply line short to ground failure in case of front left WSS.	Current at sensor supply line AND Current at sensor supply line	> 0.055 [A] < 0.16 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501)	= True	0.120 [s]	Continuous	Type A, 1 Trip
						AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)	= True			
						AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D)	= True			
						AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True			
Left Front Wheel Speed Sensor Circuit/Open	C0500	All	This monitoring checks if there is a short to ground or interruption based on current measurement in case of WSS Front Left line.	Sensor current at the signal line	< 0.0038 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501)	= True	0.120 [s]	Continuous	Type A, 1 Trip
						AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)	= True			
						AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D)	= True			
						AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True			

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Left Front Wheel Speed Sensor Direction (Incorrect Mounting)	C0056	All	This monitoring checks if the measured rotation direction of FL wheel is correct.	Rotation direction of monitored wheel differs from at least two other wheels rotation direction	= True	Ignition state ON AND Vehicle speed AND At least two WSS direction information is available	= True > 3.13 [mph] = True	20 [s]	Continuous	Type B, 2 Trips
Left Front Wheel Speed Sensor Incorrect Component Installed	C0555	BoschVDA ContiVdaR	This monitoring checks if a wrong wheel speed sensor type is mounted.	VDA protocol bits received	<> 9	Ignition state ON AND Sensor supply voltage AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True > 6 nV = True = True = True = True	3[s]	Continuous	Type A, 1 Trip
		DF11i	This monitoring checks if a wrong wheel speed sensor type is mounted.	Stop pulse according to WSS protocol is detected	= False	Ignition state ON AND Sensor supply voltage AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True > 6 nV = True = True = True = True	3[s]	Continuous	Type A, 1 Trip
		DF11s	This monitoring checks if a wrong wheel speed sensor type is mounted.	Stop pulse according to WSS protocol is detected	= True	Ignition state ON AND Sensor supply voltage AND	= True > 6[V]	3[s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
						Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True			
Left Front Wheel Speed Sensor Intermittent/Erratic	C0504	All	This monitoring checks if there is an overflow in the Direct Memory Access Transfer Unit.	DMA buffer state OR Buffer transfer error occurred (DMA TU is receiving time stamps too frequently)	= Overflow = True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.03 [s]	Continuous	Type A, 1 Trip
		BoshVDA ContiVdaR	This monitoring checks if a wrong parity bit is received from WSS Front Left.	Parity information in ASIC differs from Parity information from WSS	= True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	1 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Left Front Wheel Speed Sensor Range/Performance	C0501	DF11i	This monitoring checks if there is an incorrect air gap between the impulse wheel and the front left sensor.	Magnetic flux density	< 0.0022 [T]	Ignition state ON	= True	8 [s] if Veh. Speed is 3.1 [mph] 22 [s] if Veh. Speed is 1.24 [mph]	Continuous	Type B, 2 Trips
		BoschVDA ContiVdaR		AND For a number of wheel rotations	>= 5	AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501)	= True			
						AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)	= True			
						AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D)	= True			
						AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True			
						AND Vehicle speed	> 1.24 [mph]			
		BoschVDA ContiVdaR	This monitoring checks if stop pulses are not received from front left WSS.	Speed pulses are not received (standstill condition)	= True	Ignition state ON	= True	3.6 [s]	Continuous	Type B, 2 Trips
				AND VDA standstill protocol is not received	= True	AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501)	= True			
						AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)	= True			
						AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D)	= True			
						AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True			
						AND Sensor supply voltage	> 6 [V]			
		DF11i	This monitoring checks if stop pulses are not received from front left WSS.	Sensor is not sending speed/stop pulses	= True	Ignition state ON	= True	3.6 [s]	Continuous	Type B, 2 Trips
						AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501)	= True			
						AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)	= True			
						AND				

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		BoschVDA	This monitoring checks if there is an undervoltage on the WSS Front Left Supply Line.			Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Sensor supply voltage	= True = True > 6 [V]			
				ECU supply line	< 9 [V]	Ignition state ON AND During initialization	= True = True	1.2 [s]	Initial and Continuous	Type B, 2 Trips
				Supply voltage across the WSS	< 5.15 [V]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.06 [s]		
		ContiVdaR	This monitoring checks if there is an undervoltage on the WSS Front Left Supply Line.	ECU supply line	< 9.3 [V]	Ignition state ON AND During initialization	= True = True	1.2 [s]	Initial and Continuous	Type B, 2 Trips
				Supply voltage across the WSS	< 5.65 [V]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.06 [s]		
		DF11s DF11i	This monitoring checks if there is an undervoltage on the WSS Front Left Supply Line.	ECU supply line	< 7.2 [V]	Ignition state ON AND During initialization	= True = True	1.2 [s]	Initial and Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				Supply voltage across the WSS	< 5.15 [V]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	0.06 [s]		
			All This monitoring checks if the system can recognize a WSS FL line failure.	Hardware check failed according to the ASIC internal register data	= True	Ignition state ON	= True	0.05 [s]	Once	Type B, 2 Trips
			All This monitoring checks the amount of the magnetic poles of the WSS FL tone wheel for one rotation.	A gap in the raw WSS signal is consequently detected for a defined number of times	>= 10	Ignition state ON AND Vehicle speed AND ESP or ABS intervention AND Rough road is detected	= True = 6.21..37.28 [mph] = False = False	Immediately after recognizing the 10th gap	Continuous	Type B, 2 Trips
			All This monitoring checks for a discontinuous WSS Signal.	(Wheel acceleration AND For a calibrated number of counts AND For time) OR (Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle) OR (Number of detected increasing edges AND Within time)	> 981 [m/s ²] = 2 <1.2 fsl > 500 [m/s ²] > 4 >= 3 = 0.005 [s]	Ignition state ON	= True	20 [s]	Continuous	Type B, 2 Trips
			All This monitoring checks WSS for implausibly high wheel speed value.	Measured wheel speed	> 183.95 [mph]	Ignition state ON	= True	5[s]	Continuous	Type B, 2 Trips
			All This monitoring checks if the difference between the wheel speed sensor signals and WSS FL is within a valid range.	[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON AND Vehicle speed AND Curve driving	= True <12.43 [mph] < 20 [deg/s]	9-18 [s]	Continuous	Type B, 2 Trips
				[Difference between maximum and minimum wheel speed]	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed AND Curve driving	= True >12.43 [mph] < 20 [deg/s]	9-18 [s]		

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				|Difference between maximum and minimum wheel speed|	> 3.73 [mph]	Ignition state ON AND Vehicle speed AND Curve driving	= True <62.13 [mph] > 20 [deg/s]	9-18 [s]		
				|Difference between maximum and minimum wheel speed|	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed	= True ≥ 62.13 [mph]	9-18 [s]		
				|Difference between maximum and minimum wheel speed|	> 3.73 [mph]	(Spinning wheel is detected OR Number of defective WSS OR ABS is not available OR Number of wheel velocities below 3.1 mph) AND Ignition state ON	= True > 2 = True > 3 = True	72 [s]		
		All	This monitoring checks if there is a lost wheel speed sensor signal.	(Speed of one wheel AND Vehicle speed increase) OR (Speed of two wheels AND Vehicle speed increase)	= 0 [mph] > 7.38 [mph] = 0 [mph] > 12.97 (all wheel drive) or 7.38 (two wheel drive) [mph]	Ignition state ON AND ABS TCS EBD control AND Drive off from standstill	= True = False = True	0.500 [s]	Continuous	Type B, 2 Trips
				Speed of one wheel AND Vehicle speed increase	= 0 [mph] > 11.18 [mph]	Ignition state ON AND ABS TCS EBD control	= True = False	Immediately		
				Wheel acceleration	< -300 [m/s ²]	Ignition state ON AND Vehicle speed AND Aquaplaning	= True > 34.67 [mph] = False	0.08 [s]		
Left Rear Wheel Speed Sensor Circuit High	C050F	All	This monitoring checks if there is a short circuit of the WSS Rear Left signal line to the battery.	Sensor current at the signal line	> 0.05 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Left Rear Wheel Speed Sensor Circuit Low	C050E	All	This monitoring checks for implausible error patterns of the signal which cannot be classified either as an electrical fault (such as supply to ground which are covered by other monitorings) or valid signal.	Current value monitoring does not detect failure AND Supply line monitoring does not detect failure AND Voltage value monitoring does not detect failure AND Signal is not valid	= True = True = True = False	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is supply line short to ground failure in case of front right WSS.	Current at sensor supply line AND Current at sensor supply line	> 0.055 [A] < 0.16 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip
Left Rear Wheel Speed Sensor Circuit/Open	C050C	All	This monitoring checks if there is a short to ground or interruption based on current measurement in case of WSS Rear Left line.	Sensor current at the signal line	< 0.0038 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND	= True = True = True	0.120 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
						Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True			
Left Rear Wheel Speed Sensor Direction (Incorrect Mounting)	C0058	All	This monitoring checks if the measured rotation direction of RL wheel is correct.	Rotation direction of monitored wheel differs from at least two other wheels rotation direction	= True	Ignition state ON AND Vehicle speed AND At least two WSS direction information is available	= True > 3.13 [mph] = True	20 [s]	Continuous	Type B, 2 Trips
Left Rear Wheel Speed Sensor Incorrect Component Installed	C0557	BoschVDA ContiVdaR	This monitoring checks if a wrong wheel speed sensor type is mounted.	VDA protocol bits received	<> 9	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	3[s]	Continuous	Type A, 1 Trip
		DF11i	This monitoring checks if a wrong wheel speed sensor type is mounted.	Stop pulse is not detected	= True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	3[s]	Continuous	Type A, 1 Trip
Left Rear Wheel Speed Sensor Intermittent/Erratic	C0510	"	This monitoring checks if there is an overflow in the Direct Memory Access	DMA buffer state OR	= Overflow 	Ignition state ON AND	= True	0.03 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Transfer Unit.	Buffer transfer error occurred (DMA TU is receiving time stamps too frequently)	= True	Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True			
		BoshVDA ContiVdaR	This monitoring checks if a wrong parity bit is received from WSS Rear Left.	Parity information in ASIC differs from Parity information from WSS	= True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	1 [s]	Continuous	Type A, 1 Trip
Left Rear Wheel Speed Sensor Range/Performance	C050D	DF11i BoschVDA ContiVdaR	This monitoring checks if there is an incorrect air gap between the impulse wheel and the rear left sensor.	Magnetic flux density AND For a number of wheel rotations	< 0.0022 [T] >= 5	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND	= True = True = True = True	8 [s] if Veh. Speed is 3.1 [mph] 22 [s] if Veh. Speed is 1.24 [mph]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		BoschVDA ContiVdaR	This monitoring checks if stop pulses are not received from rear left WSS.	Speed pulses are not received (standstill condition) AND VDA standstill protocol is not received	= True 					

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination			
						AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)	= True						
						AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D)	= True						
						AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True						
		ContiVdaR	This monitoring checks if there is an undervoltage on the WSS Rear Left Supply Line.	ECU supply line	< 9.3 [V]	Ignition state ON AND During initialization	= True = True	1.2 [s]	Initial and Continuous	Type B, 2 Trips			
					Supply voltage across the WSS	< 5.65 [V]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501)	= True			0.06 [s]		
								AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)			= True		
								AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D)			= True		
								AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)			= True		
								Ignition state ON AND During initialization			= True = True		
								Supply voltage across the WSS			< 5.15 [V]			Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501)	= True	0.06 [s]
DF11i	This monitoring checks if there is an undervoltage on the WSS Rear Left Supply Line.	ECU supply line	< 7.2 [V]	Ignition state ON AND During initialization	= True = True	1.2 [s]	Continuous	Type B, 2 Trips					
			Supply voltage across the WSS		AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)	= True							
					AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True							

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks if the system can recognize a WSS RL line failure.	Hardware check failed according to the ASIC internal register data	= True	Ignition state ON	= True	0.05 [s]	Once	Type B, 2 Trips
		All	This monitoring checks the amount of the magnetic poles of the WSS RL tone wheel for one rotation.	A gap in the raw WSS signal is consequently detected for a defined number of times	>= 10	Ignition state ON AND Vehicle speed AND ESP or ABS intervention AND Rough road is detected	= True = 6.21..37.28 [mph] = False = False	Immediately after recognizing the 10th gap	Continuous	Type B, 2 Trips
		All	This monitoring checks for a discontinuous WSS Signal.	(Wheel acceleration AND For a calibrated number of counts AND For time) OR (Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle) OR (Number of detected increasing edges AND Within time)	> 981 [m/s ²] = 2 < 1.2 [s] > 500 [m/s ²] > 4 >= 3	Ignition state ON	= True	20 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks WSS for implausibly high wheel speed value.	Measured wheel speed	= 0.005 [s] > 183.95 [mph]	Ignition state ON	= True	5[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the difference between the wheel speed sensor signals and WSS RL is within a valid range.	[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON AND Vehicle speed AND Curve driving	= True <12.43 [mph] < 20 [deg/s]	9-18 [s]	Continuous	Type B, 2 Trips
				[Difference between maximum and minimum wheel speed]	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed AND Curve driving	= True <12.43 [mph] < 20 [deg/s]	9-18 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON AND Vehicle speed AND Curve driving	= True <62.13 [mph] > 20 [deg/s]	9-18 [s]		
				[Difference between maximum and minimum wheel speed]	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed	= True >= 62.13 [mph]	9-18 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	(Spinning wheel is detected OR Number of defective WSS OR ABS is not available OR Number of wheel velocities below 3.1 mph) AND Ignition state ON	= True > 2 = True > 3 = True	72 [s]		
		All	This monitoring checks if the difference between the wheel speed sensor signals and WSS RL is within a valid range.	[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON	= True	72 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON	= True	72 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON	= True	72 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON	= True	72 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON	= True	72 [s]		

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks if there is a lost wheel speed sensor signal.	(Speed of one wheel AND Vehicle speed increase) OR (Speed of two wheels AND Vehicle speed increase)	= 0 [mph] > 7.38 [mph] = 0 [mph] > 12.97 (all wheel drive) or 7.38 (two wheel drive) [mph]	Ignition state ON AND ABS TCS EBD control AND Drive off from standstill	= True = False = True	0.500 [s]	Continuous	Type B, 2 Trips
				Speed of one wheel AND Vehicle speed increase Wheel acceleration	= 0 [mph] > 11.18 [mph] < -300 [m/s ²]	Ignition state ON AND ABS TCS EBD control AND Ignition state ON AND Vehicle speed AND Aquaplaning	= True = False = True > 34.67 [mph] = False	Immediately 0.08 [s]		
Right Front Wheel Speed Sensor Circuit High	C0509	All	This monitoring checks if there is a short circuit of the WSS Front Right signal line to the battery.	Sensor current at the signal line	> 0.05 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Front Wheel Speed Sensor Circuit Low	C0508	All	This monitoring checks for implausible error patterns of the signal which cannot be classified either as an electrical fault (such as supply to ground which are covered by other monitorings) or valid signal.	Current value monitoring does not detect failure AND Supply line monitoring does not detect failure AND Voltage value monitoring does not detect failure AND Signal is not valid	= True = True = True = False	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if there is supply	Current at sensor supply line	> 0.055 [A]	Ignition state ON	= True	0.120 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			line short to ground failure in case of rear left WSS.	AND Current at sensor supply line	< 0.16 [A]	AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True			
Right Front Wheel Speed Sensor Circuit/Open	C0506	All	This monitoring checks if there is a short to ground or interruption based on current measurement in case of WSS Front Right line.	Sensor current at the signal line	< 0.0038 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Front Wheel Speed Sensor Direction (Incorrect Mounting)	C0507	All	This monitoring checks if the measured rotation direction of FR wheel is correct.	Rotation direction of monitored wheel differs from at least two other wheels rotation direction	= True	Ignition state ON AND Vehicle speed AND At least two WSS direction information is available	= True > 3.13 [mph] = True	20 [s]	Continuous	Type B, 2 Trips
Right Front Wheel Speed Sensor Incorrect Component Installed	C0556	BoschVDA ContiVdaR	This monitoring checks if a wrong wheel speed sensor type is mounted.	VDA protocol bits received	<> 9	Ignition state ON AND Sensor supply voltage AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND	= True > 6 [V] = True	3[s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
						Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True			
		DF11i	This monitoring checks if a wrong wheel speed sensor type is mounted.	Stop pulse according to WSS protocol is detected	= False	Ignition state ON AND Sensor supply voltage AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True > 6 [V] = True = True = True = True	3[s]	Continuous	Type A, 1 Trip
		DF11s	This monitoring checks if a wrong wheel speed sensor type is mounted.	Stop pulse according to WSS protocol is detected	= True	Ignition state ON AND Sensor supply voltage AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True > 6 [V] = True = True = True = True	3[s]	Continuous	Type A, 1 Trip
Right Front Wheel Speed Sensor Intermittent/Erratic	C050A	Am	This monitoring checks if there is an overflow in the Direct Memory Access	DMA buffer state OR	= Overflow	Ignition state ON AND	= True	0.03 [s]	Continuous	Type A, 1 Trip

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
			Transfer Unit.	Buffer transfer error occurred (DMA TU is receiving time stamps too frequently)	= True	Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True			
		BoshVDA ContiVdaR	This monitoring checks if a wrong parity bit is received from WSS Front Right.	Parity information in ASIC differs from Parity information from WSS	= True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	1 [s]	Continuous	Type A, 1 Trip
Right Front Wheel Speed Sensor Range/Performance	C0507	DF11i BoschVDA ContiVdaR	This monitoring checks if there is an incorrect air gap between the impulse wheel and the front right sensor.	Magnetic flux density AND For a number of wheel rotations	< 0.0022 [T] >= 5	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND	= True = True = True = True	8 [s] if Veh. Speed is 3.1 [mph] 22 [s] if Veh. Speed is 1.24 [mph]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		BoschVDA ContiVdaR	This monitoring checks if stop pulses are not received from front right WSS.	Speed pulses are not received (standstill condition) AND VDA standstill protocol is not received	= True 					

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		ContiVdaR	This monitoring checks if there is an undervoltage on the WSS Front Right Supply Line.			AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True			
				ECU supply line	<9.3 [V]	Ignition state ON AND During initialization	= True = True	1.2 [s]	Initial and Continuous	Type B, 2 Trips
				Supply voltage across the WSS	< 5.65 [V]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.06 [s]		
		DF11s DF11i	This monitoring checks if there is an undervoltage on the WSS Front Right Supply Line.	ECU supply line	< 7.2 [V]	Ignition state ON AND During initialization	= True = True	1.2 [s]	Initial and Continuous	Type B, 2 Trips
				Supply voltage across the WSS	< 5.15 [V]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND	= True = True = True = True = True	0.06 [s]		

24OBDG07 EBCM Summary Tables

System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
						Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True			
		All	This monitoring checks if the system can recognize a WSS FR line failure.	Hardware check failed according to the ASIC internal register data	= True	Ignition state ON	= True	0.05 [s]	Once	Type B, 2 Trips
		All	This monitoring checks the amount of the magnetic poles of the WSS FR tone wheel for one rotation.	A gap in the raw WSS signal is consequently detected for a defined number of times	>= 10	Ignition state ON AND Vehicle speed AND ESP or ABS intervention AND Rough road is detected	= True = 6.21..37.28 [mph] = False = False	Immediately after recognizing the 10th gap	Continuous	Type B, 2 Trips
		All	This monitoring checks for a discontinuous WSS Signal.	(Wheel acceleration AND For a calibrated number of counts AND For time) OR (Wheel acceleration AND Accumulation of the weighted noise amplitude in current driving cycle) OR (Number of detected increasing edges AND Within time)	> 981 [m/s ²] = 2 < 1.2 [s] > 500 [m/s ²] > 4 >= 3 = 0.005 [s] > 183.95 [mph]	Ignition state ON	= True	20 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks WSS for implausibly high wheel speed value.	Measured wheel speed	> 183.95 [mph]	Ignition state ON	= True	5[s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the difference between the wheel speed sensor signals and WSS FR is within a valid range.	[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON AND Vehicle speed AND Curve driving	= True <12.43 [mph] < 20 [deg/s]	9 - 18 [s]	Continuous	Type B, 2 Trips
				[Difference between maximum and minimum wheel speed]	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed AND Curve driving	= True >12.43 [mph] < 20 [deg/s]	9 - 18 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON AND Vehicle speed AND Curve driving	= True <62.13 [mph] > 20 [deg/s]	9 - 18 [s]		
				[Difference between maximum and minimum wheel speed]	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed	= True >= 62.13 [mph]	9 - 18 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	(Spinning wheel is detected OR Number of defective WSS OR ABS is not available OR	= True > 2 = True	72 [s]		

24OBDG07 EBCM Summary Tables

System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
						Number of wheel velocities below 3.1 mph) AND Ignition state ON	> 3 = True			
		All	This monitoring checks if there is a lost wheel speed sensor signal.	(Speed of one wheel AND Vehicle speed increase) OR (Speed of two wheels AND Vehicle speed increase)	= 0 [mph] > 7.38 [mph] = 0 [mph] > 12.97 (all wheel drive) or 7.38 (two wheel drive) [mph]	Ignition state ON AND ABS TCS EBD control AND Drive off from standstill	= True = False = True	0.500 [s]	Continuous	Type B, 2 Trips
				Speed of one wheel AND Vehicle speed increase	= 0 [mph] > 11.18 [mph]	Ignition state ON AND ABS TCS EBD control	= True = False	Immediately		
				Wheel acceleration	< -300 [m/s ²]	Ignition state ON AND Vehicle speed AND Aquaplaning	= True > 34.67 [mph] = False	0.08 [s]		
Right Rear Wheel Speed Sensor Circuit High	C0515	All	This monitoring checks if there is a short circuit of the WSS Rear Right signal line to the battery.	Sensor current at the signal line	> 0.05 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Circuit Low	C0514	All	This monitoring checks for implausible error patterns of the signal which cannot be classified either as an electrical fault (such as supply to ground which are covered by other monitorings) or valid signal.	Current value monitoring does not detect failure AND Supply line monitoring does not detect failure AND Voltage value monitoring does not detect failure AND Signal is not valid	= True = True = True = False	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND	= True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip

24OBDG07 EBCM Summary Tables

System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		All	This monitoring checks if there is supply line short to ground failure in case of rear right WSS.	Current at sensor supply line AND Current at sensor supply line	> 0.055 [A] < 0.16 [A]	Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Circuit/Open	C0512	All	This monitoring checks if there is a short to ground or interruption based on current measurement in case of WSS Rear Right line.	Sensor current at the signal line	< 0.0038 [A]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Direction (Incorrect Mounting)	C0059	All	This monitoring checks if the measured rotation direction of RR wheel is correct.	Rotation direction of monitored wheel differs from at least two other wheels rotation direction	= True	Ignition state ON AND Vehicle speed AND At least two WSS direction information is available	= True > 3.13 [mph] = True	20 [s]	Continuous	Type B, 2 Trips
Right Rear Wheel Speed Sensor Incorrect Component Installed	C0558	BoschVDA ContiVdaR	This monitoring checks if a wrong wheel speed sensor type is mounted.	VDA protocol bits received	-	Ignition state ON AND	= True	3[s]	Continuous	Type A, 1 Trip

24OBDG07 EBCM Summary Tables

System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
						Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True			
		DF11i	This monitoring checks if a wrong wheel speed sensor type is mounted.	Stop pulse is not detected	= True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	3[s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Intermittent/Erratic	C0516	All	This monitoring checks if there is an overflow in the Direct Memory Access Transfer Unit.	DMA buffer state OR Buffer transfer error occurred (DMA TU is receiving time stamps too frequently)	= Overflow = True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	0.03 [s]	Continuous	Type A, 1 Trip

24OBDG07 EBCM Summary Tables

System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		BoshVDA ContiVdaR	This monitoring checks if a wrong parity bit is received from WSS Rear Right.	Parity information in ASIC differs from Parity information from WSS	= True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True	1 [s]	Continuous	Type A, 1 Trip
Right Rear Wheel Speed Sensor Range/Performance	C0513	DF11i BoschVDA ContiVdaR	This monitoring checks if there is an incorrect air gap between the impulse wheel and the rear right sensor.	Magnetic flux density AND For a number of wheel rotations	< 0.0022 [T] >= 5	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Vehicle speed	= True = True = True = True = True	8 [s] if Veh. Speed is 3.1 [mph] 22 [s] if Veh. Speed is 1.24 [mph]	Continuous	Type B, 2 Trips
		BoschVDA ContiVdaR	This monitoring checks if stop pulses are not received from rear right WSS.	Speed pulses are not received (standstill condition) AND VDA standstill protocol is not received	= True = True	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND	= True = True	3.6 [s]	Continuous	Type B, 2 Trips

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System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
		DF11i	This monitoring checks if stop pulses are not received from rear right WSS.	Sensor is not sending speed/stop pulses	= True	Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Sensor supply voltage _____	= True = True > 6 [V]	3.6 [s]	Continuous	Type B, 2 Trips
						Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Sensor supply voltage _____	= True = True = True = True = True > 6 [V]			
						Ignition state ON AND During initialization _____	= True = True			
						Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Sensor supply voltage _____	= True = True = True = True = True > 6 [V]			
		BoschVDA	This monitoring checks if there is an undervoltage on the WSS Rear Right Supply Line.	ECU supply line	< 9 [V]	Ignition state ON AND During initialization _____	= True = True	1.2 [s]	Continuous	Type B, 2 Trips
				Supply voltage across the WSS	< 5.15 [V]	Ignition state ON AND Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Sensor supply voltage _____	= True = True = True = True = True > 6 [V]	0.06 [s]		
		ContiVdaR	This monitoring checks if there is an undervoltage on the WSS Rear Right Supply Line.	ECU supply line	< 9.3 [V]	Ignition state ON AND During initialization _____	= True = True	1.2 [s]	Initial and Continuous	Type B, 2 Trips
				Supply voltage across the WSS	< 5.65 [V]	Ignition state ON AND	= True = True	0.06 [s]		

24OBDG07 EBCM Summary Tables

[illegible]

24OBDG07 EBCM Summary Tables

System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
				Accumulation of the weighted noise amplitude in current driving cycle) OR (Number of detected increasing edges AND Within time)	> 4 ≥ 3 = 0.005 [s]					
		All	This monitoring checks WSS for implausibly high wheel speed value.	Measured wheel speed	> 183.95 [mph]	Ignition state ON	= True	5 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the difference between the wheel speed sensor signals and WSS RR is within a valid range.	[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON AND Vehicle speed AND Curve driving	= True < 12.43 [mph] < 20 [deg/s]	9-18 [s]	Continuous	Type B, 2 Trips
				[Difference between maximum and minimum wheel speed]	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed AND Curve driving	= True < 12.43 [mph] < 20 [deg/s]	9-18 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	Ignition state ON AND Vehicle speed AND Curve driving	= True < 62.13 [mph] > 20 [deg/s]	9-18 [s]		
				[Difference between maximum and minimum wheel speed]	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed	= True ≥ 62.13 [mph]	9-18 [s]		
				[Difference between maximum and minimum wheel speed]	> 3.73 [mph]	(Spinning wheel is detected OR Number of defective WSS OR ABS is not available OR Number of wheel velocities below 3.1 mph) AND Ignition state ON	= True > 2 = True > 3 = True	72 [s]		
		All		(Speed of one wheel AND Vehicle speed increase) OR (Speed of two wheels AND Vehicle speed increase)	= 0 [mph] > 7.38 [mph] = 0 [mph] > 12.97 (all wheel drive) or 7.38 (two wheel drive) [mph]	Ignition state ON AND ABS TCS EBD control AND Drive off from standstill	= True = False = True	0.500 [s]	Continuous	Type B, 2 Trips
				Speed of one wheel AND Vehicle speed increase	= 0 [mph] > 11.18 [mph]	Ignition state ON AND ABS TCS EBD control	= True = False	Immediately		
				Wheel acceleration	< -300 [m/s ²]	Ignition state ON AND Vehicle speed AND Aguaplaning	= True > 34.67 [mph] = False	0.08 [s]		

24OBDG07 EBCM Summary Tables

System/ Component	Fault Code	Variant	Monitoring Strategy Description	Malfunction Criteria	Malfunction Criteria Threshold Value	Secondary Parameters	Enable Condition	Time Required	Frequency of Checks	MIL Illumination
Vehicle Speed - Wheel Speed Correlation	P215A	All	This monitoring checks if sensor signals seem to be affected by temporary failure suspicion at the same time to ensure the proper working of ABS functionality.	Number of sensor signal monitoring fault suspicions detected	> 2	Ignition state ON	= True	0.500 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if the source of the invalid signal can be found.	[Difference between maximum and minimum wheel speed]	> 52.12 [mph]	Ignition state ON AND Vehicle speed	= True > 3.1 [mph]	9 - 72 [s]	Continuous	Type B, 2 Trips
		All	This monitoring checks if sensor signals seem to be affected by temporary failure suspicion at the same time to ensure the proper working of Vehicle Dynamic Control functionality.	Number of sensor signal monitoring fault suspicions detected	> 1	Ignition state ON	= True	0.1 [s]	Continuous	Type B, 2 Trips
Wheel Speed Sensor Signal Cross Coupled	C2A23	All	This monitoring checks if the wheel speed sensors at the Front Axle are mounted incorrectly or if the wheel speed sensors at the Front axle are swapped.	Integrated model yaw rate out of Front Axle Wheel Speed Sensors	< -90 [deg]	Ignition state ON	= True	30 [s]	Continuous	Type A, 1 Trip
				AND Integrated model yaw rate out of Steering Angle Sensor	< -90 [deg]	AND Vehicle speed	> 4.47 [mph]			
				AND Integrated model yaw rate out of Steering Angle Sensor	> 90 [deg]	AND Curve driving	> 3 [deg/s]			
		All	This monitoring checks if the wheel speed sensors at the Rear Axle are mounted incorrectly or if the wheel speed sensors at the Rear axle are swapped.	Integrated model yaw rate out of Rear Axle Wheel Speed Sensors	< -90 [deg]	Ignition state ON	= True	30 [s]	Continuous	Type A, 1 Trip
Wheel Speed Sensors Direction Correlation	C003F	All	This monitoring checks the rotation direction of wheel speed sensors.	Rotation direction of monitored wheel differs from at least two other wheels rotation direction	= True	Ignition state ON	= True	20 [s]	Continuous	Type B, 2 Trips
						AND Vehicle speed	> 3.13 [mph]			
						AND Number of WSS direction information is available	>= 3			

Component/ System	SAE J2012 Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Values	Secondary Parameters	Enable Values	Time Required	MIL Illum.
1. CATALYST DIAGNOSIS	P0420	Catalyst System Efficiency Below Threshold Bank 1	Ewma filtered normalized corrected Oxygen Storage Capacity (OSC) of catalyst, bank 1	<1	primary A/F commanded lambda	=1	Fast Init. Response / Response to Step Change modes: 3 samples over 2 trips Stabilized mode: 1 sample per trip	1Trip EWMA
					engine runs	=True		
					(Deceleration Fuel Cut-Off (DFCO)	=False		
					for time	≥10(s)		
					Vehicle speed	>6.25(mph)		
					engine speed	<4000(rpm)		
					engine speed	>1000(rpm)		
					engine load (see Look-Up-Table #20)	≥ 13.00 to 1536(%)		
					Integrated air mass flow	≥60(°C)		
					measured ambient temperature	≥-48(°C)		
					measured ambient pressure	>0(kPa)		
					measured engine coolant temperature	>57.96(°C)		
					no transmission gear change	=True		
					for time	≥2(s)		
)			
					(

24OBDG07 ECM Summary Tables

integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 1	>60(g)
(
Change of exhaust gas mass flow bank 1:	<1.11(g/s)
(a) - (b)	
Change of exhaust gas mass flow bank 1:	>-1.11(g/s)
(a) - (b)	
(a) exhaust gas mass flow bank 1	
(b) filtered exhaust gas mass flow bank 1	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 1	<1.11(g/s)
Low window exhaust gas mass flow bank 1	>0.56(g/s)
Low window exhaust gas mass flow bank 1	>(a) - (b)
(a) minimum exhaust gas mass flow bank 1	<0.56(g/s)
(b) offset exhaust gas mass flow bank 1 at tip-out	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 1	<0(g/s)
High window exhaust gas mass flow bank 1	>1820(g/s)
)	
(
Modeled catalyst temperature gradient bank 1:	<40(°C)
(a) - (b)	
Modeled catalyst temperature gradient bank 1:	>-40(°C)
(a) - (b)	
(a) Modeled catalyst temperature bank 1	
(b) filtered modeled catalyst temperature bank 1	=5(s)
PT1 time constant	=0.2(s)
Low window modeled catalyst	<1000(°C)
Low window Modeled catalyst	>475(°C)

High window modeled catalyst temperature bank 1	<-273(°C)
High window Modeled catalyst temperature bank 1	>1263(°C)
Modeled catalyst temperature bank 1 after the first engine start and driving	>345(°C)
for time)	>60(s)
((Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in charcoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control	
(b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or	
canister purge control mass flow into the manifold	<7.11(g/s)
((integrated exhaust gas mass flow bank 1 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 1 after the following sensors's readiness	>100(g)
(Secondary 02 sensor readiness bank 1	=True
Primary A/F sensor readiness bank 1	=True
)	
exhaust gas temperature at oxygen sensor 2, bank 1	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 1: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control	<600(°C)
(b) measured primary A/F sensor temperature for heater control	

```

)

statemachine = sm
statemachine (sm=0) : inactive
a commanded lambda active
primary A/F commanded lambda           =1
if the following conditions are met,
sm moves to sm =2

Secondary 02 sensor voltage bank1      >0(V)

if the following conditions are met,
sm moves to sm =1

Secondary 02 sensor voltage bank1      <0(V)

Secondary 02 sensor voltage bank1      >0.45(V)

statemachine (sm=1) - rich mixture
in catalyst                               = True

a commanded lambda active               =True
primary A/F commanded lambda           =0.87
bank1
for time                               >3(s)

for time                               >0.1(s)
if the following conditions are met,
sm moves to sm =2
((
Secondary 02 sensor voltage             >0.1 (V/s)
gradient over 0.05s
Secondary 02 sensor voltage bank1      >0.68(V)

)
Or
Secondary 02 sensor voltage bank1      >0(V)

)
Integrated exhaust mass flow bank 1     -0(g)

if the following conditions are met,
sm moves to sm =3

(
Secondary 02 sensor voltage bank 1      >0.86(V)

Or

(
Secondary 02 sensor voltage bank 1      >0.76(V)

Secondary 02 sensor voltage             <66.5(V/s)
gradient over 0.05s

```


24OBDG07 ECM Summary Tables

Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(g)
)	
{	
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	<0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	>0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 1	≥>(g)
)	
And	
{	
Secondary 02 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02 sensor	=0.02(V)
)	
statemachine (sm=2) - Lean mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1 (s)
if the following conditions are met, sm moves to sm =4	
((
Secondary 02 sensor voltage	<0.1(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.2(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.1(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.1(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)

))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	<0.05
Primary A/F sensor lambda	>(a) - (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	>5(g)
)	
statemachine (sm=3) -	= True
Lean mixture in catalyst	
a commanded lambda active bank 1	=True
primary A/F commanded lambda bank 1	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 1	<0.1(V)
for time	>0.1(s)
Or	
(
Secondary 02 sensor voltage bank 1	<0.2(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.1(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.1(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a) - (b)
(a) Primary lambda control set point	

(b) maximum lambda deviation of rich mixture	>0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	≥5(g)
)	
Measurement Oxygen Storage Capacity bank 1 with Secondary 02 sensor voltage bank 1 done	<0.45(V)
statemachine (sm=4) - Rich mixture in catalyst	=True
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =3	
Measurement Oxygen Storage Capacity bank 1 starts	
(
Secondary 02 sensor voltage bank 1	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0-2(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	<0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 1	- ⁵ (g)
)	

EWMA filter strategy

Fast initialization mode (FIR)

EWMA filter initial value for FIR mode =8
 EWMA filter constant =0.2
 Maximum number of samples per trip =2(counts)

Total number of samples for FIR mode =3(counts)

Response to Step Change mode (RSC)

Response to Step Change mode inactive
 absolute difference : $ABS((a) - (b)) > (b) * (c)$
 (a) measured Oxygen Storage Capacity
 (b) EWMA filtered normalized monitoring result
 (c) Step change detection factor =0.3

EWMA filter constant =0.2
 Maximum number of samples per trip =2(counts)

Total number of samples for RSC mode =3(counts)

EWMA filter constant =0.2
 Total number of samples for stabilized mode =1(counts)

No pending or confirmed DTCs =see sheet inhibit table

Basic enable conditions met =see sheet enable tables

P0430	Catalyst System Efficiency Below Threshold Bank 2	Ewma filtered normalized corrected Oxygen Storage Capacity (OSC) of catalyst, bank 2	<1	primary A/F commanded lambda	=1	Fast Init. Response / Response to Step Change modes: 3 samples over 2 trips Stabilized mode: 1 sample per trip	1Trip EWMA
				engine runs	=True		
		Borderline OSC	=0.1(g)	(Deceleration Fuel Cut-Off (DFCO)	=False		
				for times	>10(s)		

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Corrected OSC: $((a) - (b)) * (c) / (d)$	Vehicle speed	>6.25(mph)
(a) Measured OSC bank 2	engine speed	<4000(rpm)
(b) 02 mass for OSC correction using Sec. 02 performance diag. results	engine speed	>1000(rpm)
(c) Correction map for transition and delayed response time	engine load (see Look-Up-Table #20)	> 13.00 to 1536(%)
	Integrated air mass flow	>600(g)
	measured ambient temperature	>-48(°C)
	measured ambient pressure	>0(kPa)
	measured engine coolant temperature	>58(°C)
	no transmission gear change for time	>2(s)
)	
	(integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 2	>600(g)
	(
	Change of exhaust gas mass flow bank 2:	<1.11(g/s)
	(a) - (b)	
	Change of exhaust gas mass flow bank 2:	s-1.11(g/s)
	(a) - (b)	
	(a) exhaust gas mass flow bank 2	
	(b) filtered exhaust gas mass flow bank 2	
	PT1 time constant	=0.2(s)
	Low window exhaust gas mass flow bank 2	<111.1(g/s)
	Low window exhaust gas mass flow bank 2	>5.56(g/s)
	Low window exhaust gas mass flow bank 2	>(a) - (b)
	(a) minimum exhaust gas mass flow bank 2	<5.56(g/s)
	(b) offset exhaust gas mass flow bank 2 at tip-out	=5(g/s)
	for time	>3(s)

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High window exhaust gas mass flow bank 2	<0(g/s)
High window exhaust gas mass flow bank 2	>1820.4(g/s)
)	
(
Modeled catalyst temperature gradient bank 2:	<40(°C)
(a) - (b)	
Modeled catalyst temperature gradient bank 2:	>-40(°C)
(a) - (b)	
(a) Modeled catalyst temperature bank 2	
(b) filtered modeled catalyst temperature bank 2	=5(s)
PT1 time constant	
Low window modeled catalyst temperature bank 2	<1000(°C)
Low window Modeled catalyst temperature bank 2	>475(°C)
High window modeled catalyst temperature bank 2	<-273(°C)
High window Modeled catalyst temperature bank 2	>1263(°C)
Modeled catalyst temperature bank 2 after the first engine start and driving	>350(°C)
for time	>60(s)
))	
((
Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control	
(b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or	
canister purge control mass flow into the manifold	S7.11(g/s)
((

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integrated exhaust gas mass flow bank 2 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 2 after the following sensors's readiness (Secondary 02 sensor readiness bank 2 Primary A/F sensor readiness bank 2)	>100(g)
exhaust gas temperature at oxygen sensor 2, bank 1	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 2: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control (b) measured primary A/F sensor temperature for heater control)	<800(°C)
statemachine = sm statemachine (sm =0) : inactive a commanded lambda active primary A/F commanded lambda if the following conditions are met, sm moves to sm =2	=False
Secondary 02 sensor voltage bank 2	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage bank 2	<0(V)
Secondary 02 sensor voltage bank 2	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	
a commanded lambda active primary A/F commanded lambda bank 2 for time	=0.87 >3(s)
for time if the following conditions are met, sm moves to sm =2 (	>0.1(s)
Secondary 02 sensor voltage gradient over 0.05s	>0.1 (V/s)

Secondary 02 sensor voltage bank 2 >0.68(V)

)
Or

Secondary 02 sensor voltage bank 2 >0(V)

)

Integrated exhaust mass flow bank 2 >0(g)

**if the following conditions are met,
sm moves to sm =3**

(

Secondary 02 sensor voltage bank 2 >0.86(V)

Or

(

Secondary 02 sensor voltage bank 2 >0.76(V)

Secondary 02 sensor voltage gradient over 0.05s <66.5(V/s)

Secondary 02 sensor voltage gradient over 0.05s >-66.5(V/s)

Integrated Oxygen mass flow bank 2 >0.2(g)

Integrated Oxygen mass flow bank 2 >0.2(g)

))

(

Primary A/F sensor lambda bank 2 <(a) + (b)

(a) Primary lambda control set point bank 2

(b) maximum lambda deviation of lean mixture <0.05

Primary A/F sensor lambda bank 2 >(a) - (b)

(a) Primary lambda control set point

(b) maximum lambda deviation of rich mixture <0.05

for time >0.1 (s)

Integrated rich exhaust gas mass flow bank 2 *5(g)

)

And

(

Secondary 02 sensor voltage bank 2 >(a) + (b)

(a) minimum secondary 02 voltage

(b) Offset voltage of Secondary 02 sensor =0.02(V)

)

**statemachine (sm=2) -
Lean mixture in catalyst**

primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
((
Secondary 02 sensor voltage	<0.1(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage bank 2	<0.2(V)
Secondary 02 sensor voltage	<0.1 (V/s)
gradient over 0.05s	
Secondary 02 sensor voltage	>-0.1(V/s)
gradient over 0.05s	
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of	<0.05
lean mixture	
Primary A/F sensor lambda	>(a) - (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich	<0.05
mixture	
for time	>0.1(s)
Integrated lean exhaust gas mass	>5(g)
flow bank 2	
)	
statemachine (sm=3) - Lean mixture in catalyst	
a commanded lambda active bank 2	
primary A/F commanded lambda	=1.07()
bank 2	
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 2	<0.1(V)
for time	>0.1(s)
Or	

(
Secondary 02 sensor voltage bank 2	<0.2(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.1 (V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.1(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	<0.05
Primary A/F sensor lambda bank 2	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	- ⁵ (g)
)	
Measurement Oxygen Storage Capacity bank 2 with Secondary 02 sensor voltage bank 2 done	<0.45(V)
statemachine (sm=4) -	=True
Rich mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =3	
Measurement Oxygen Storage Capacity bank 2 starts	
(
Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 2	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0-2(g)
))	

(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point bank 2	
(b) maximum lambda deviation of lean mixture	<0.05
Primary A/F sensor lambda bank 2	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 2	- ⁵ (g)
/	
EWMA filter strategy	
Fast initialization mode (FIR)	
EWMA filter initial value for FIR mode	=8
EWMA filter constant	=0.2
Maximum number of samples per trip	=2(counts)
Total number of samples for FIR mode	=3(counts)
Response to Step Change mode (RSC)	
Response to Step Change mode inactive	
absolute difference : ABS((a) - (b))	>(b)*(c)
(a) measured Oxygen Storage Capacity	
(b) EWMA filtered normalized monitoring result	
(c) Step change detection factor	=0.3
EWMA filter constant	=0.2
Maximum number of samples per trip	=2(counts)
Total number of samples for RSC mode	=3(counts)
EWMA filter constant	=0.2
Total number of samples for stabilized mode	=1(counts)
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable tables

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2. MONITORING OF MISFIRE DETECTION	P0300	Indicates that the engine has experienced multiple cylinders misfiring, detected by a crankshaft angle delay that is too great, caused by a drop in the engine speed;	Method 1: Angular acceleration >195 to 1400(deg/s ²) of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #71)	Engine speed >600(rpm)	see Fault Paths 1-3 below	2 Trip
			or Method 1: Angular acceleration >195 to 1400(deg/s ²) of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #77)	Engine speed <8600(rpm)		
			or Method 1: Angular acceleration >195 to 1400(rad/s ²) of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #74)	Engine coolant temperature at engine start >-12.04(°C)		
			or Method 1: Angular acceleration >170 to 800(deg/s ²) of crankshaft in idle state, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #67)	[Engine coolant temperature at engine start then monitoring enabled <-12.04(°C)		
				Engine coolant temperature] >-12.04(°C) Zero torque detection is not active =TRUE		
			or			

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Method 1: Angular acceleration of crankshaft in catalyst heating, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #68)	>240 to 800(deg/s ²) [Normalized inner engine torque	>[A] + [B] + [C](%)
or Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #73)	or >260 to 2048(deg/s ²) Normalized inner engine torque	>[D] + [B] + [C](%)
or Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #79)	where [A] Threshold zero torque, driving state (see Look-Up-Table #80)	=5.3 to 27.0(%)
or	[B] Map for zero torque correction, engine speed and altitude dependant (see Look-Up-Table #82)	=-1.66 to 0(%)

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Method 2: Angular acceleration >260 to 2048(deg/s²) [C] Map for zero torque correction, =0(%)
of crankshaft corrected for engine speed and engine
cylinders sharing same sensor temperature dependant
wheel segments in
transmission open state (clutch
is disengaged), compared to
threshold primarily used to
detect single cylinder
continuous and select paired
cylinder continuous misfires in
a non-adapted system
(see Look-Up-Table #76)

or [D] Threshold zero torque, idle state] =4.26 to 6.52(%)
(see Look-Up-Table #81)

Method 2: Angular acceleration >2048(deg/s²)
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in idle state,
compared to threshold
primarily used to detect single
cylinder continuous and select
paired cylinder continuous
misfires in a non-adapted
system

Method 2: Angular acceleration >2048(deg/s²)
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in catalyst
heating, compared to threshold
primarily used to detect single
cylinder continuous and select
paired cylinder continuous
misfires in a non-adapted
system

or

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Method 3: Filtered angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires		Overrun/fuel cut-off is not active	=TRUE
where		(Combustion delay after engine start has completed	=TRUE
[A] Base continuous misfire threshold in the transmission grip state (see Look-Up-Table #72)	=240 to 1400(deg/s ²) means		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	[Engine speed	>650(rpm)
or Method 3: Filtered angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires		for Number of combustions]	>8(counts)
where			
[A] Base continuous misfire threshold in the transmission slip state (see Look-Up-Table #78)	=240 to 1400(deg/s ²)		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)		
or Method 3: Filtered angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	Calculated EPM segment time is valid	=TRUE

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where	No pending or confirmed DTCs	=see sheet inhibit tables
[A] Base continuous misfire threshold in the transmission open state (see Look-Up-Table #75)	=240 to 1420(deg/s ²) Basic enable conditions met	=see sheet enable tables
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
or		
Method 3: Filtered angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	
where		
[A] Base continuous misfire threshold in the transmission idle state (see Look-Up-Table #70)	=160 to 180(deg/s ²)	
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
or		
Method 3: Filtered angular acceleration of crankshaft in catalyst heating state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	
where		
[A] Base continuous misfire threshold in catalyst heating state (see Look-Up-Table #69)	=240 to 335(deg/s ²)	
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
where		

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Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	Total misfire counts across all cylinders within first test frame outside of catalyst heating	>80(counts)
	or	
	Total misfire counts across all cylinders within first test frame during catalyst heating	>80(counts)
	and/or	
	Total misfire counts for cylinder 1 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for multiple cylinder fault code	=10(%)
	and/or	
	Total misfire counts for cylinder 2 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for multiple cylinder fault code	=10(%)
	and/or	
	Total misfire counts for cylinder 3 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for multiple cylinder fault code	=10(%)
	and/or	
	Total misfire counts for cylinder 4 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for multiple cylinder fault code	=10(%)
	and/or	
	Total misfire counts for cylinder 5 within test frame	>[A] x [B]
	where	

Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions	[A] Total misfire counts across all cylinders within test frame =measured parameter	
	[B] Minimum ratio of misfire sum for multiple cylinder fault code and/or	
	Total misfire counts for cylinder 6 within test frame	$>[A] \times [B]$
	where	
	[A] Total misfire counts across all cylinders within test frame =measured parameter	
	[B] Minimum ratio of misfire sum for multiple cylinder fault code and/or	
	Total misfire counts for cylinder 7 within test frame	$>[A] \times [B]$
	where	
	[A] Total misfire counts across all cylinders within test frame =measured parameter	
	[B] Minimum ratio of misfire sum for multiple cylinder fault code and/or	
	Total misfire counts for cylinder 8 within test frame	$>[A] \times [B]$
	where	
	[A] Total misfire counts across all cylinders within test frame =measured parameter	
	[B] Minimum ratio of misfire sum for multiple cylinder fault code with	
	[One test frame defined by: Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at engine start or	
	Total misfire counts across all cylinders within test frame	$>80(\text{counts})$
	and/or	
	Total misfire counts for cylinder 1 within test frame	$>[A] \times [B]$
	where	
	[A] Total misfire counts across all cylinders within test frame =measured parameter	

[B] Minimum ratio of misfire sum for multiple cylinder fault code
and/or
Total misfire counts for cylinder 2 within test frame
where
[A] Total misfire counts across all cylinders within test frame =measured parameter

=10(%)

>[A] x [B]

[B] Minimum ratio of misfire sum for multiple cylinder fault code
and/or
Total misfire counts for cylinder 3 within test frame
where
[A] Total misfire counts across all cylinders within test frame =measured parameter

=10(%)

>[A] x [B]

[B] Minimum ratio of misfire sum for multiple cylinder fault code
and/or
Total misfire counts for cylinder 4 within test frame
where
[A] Total misfire counts across all cylinders within test frame =measured parameter

=10(%)

>[A] x [B]

[B] Minimum ratio of misfire sum for multiple cylinder fault code
and/or
Total misfire counts for cylinder 5 within test frame
where
[A] Total misfire counts across all cylinders within test frame =measured parameter

=10(%)

>[A] x [B]

[B] Minimum ratio of misfire sum for multiple cylinder fault code
and/or
Total misfire counts for cylinder 6 within test frame
where
[A] Total misfire counts across all cylinders within test frame =measured parameter

=10(%)

>[A] x [B]

[B] Minimum ratio of misfire sum for multiple cylinder fault code

=10(%)

Fault Path 3: Catalyst
damaging misfire rate

Total misfire counts for cylinder 7 within test frame
 where
 [A] Total misfire counts across all cylinders within test frame =measured parameter

[B] Minimum ratio of misfire sum for multiple cylinder fault code
 and/or
 Total misfire counts for cylinder 8 within test frame
 where
 [A] Total misfire counts across all cylinders within test frame =measured parameter

[B] Minimum ratio of misfire sum for multiple cylinder fault code
 with
 [One test frame defined by:
 Total number of crankshaft revolutions in test frame for emission relevant misfire rate
 and
 Misfire test frame counter] =1000(counts)
 or
 Weighted misfire counter for exhaust bank =4(counts)
 or
 Weighted misfire counter for exhaust bank during first interval after engine start
 and/or
 Total weighted misfire counts for cylinder 1 within test frame >[A] x [B]

where
 [A] Total weighted misfire counts per exhaust bank within test frame =measured parameter

[B] Minimum ratio of weighted misfire sum for multiple cylinder fault code
 and/or
 Total weighted misfire counts for cylinder 2 within test frame >[A] x [B]

where
 [A] Total weighted misfire counts per exhaust bank within test frame =measured parameter

[B] Minimum ratio of weighted misfire sum for multiple cylinder fault code and/or
Total weighted misfire counts for cylinder 3 within test frame $>[A] \times [B]$

where

[A] Total weighted misfire counts per exhaust bank within test frame =measured parameter

[B] Minimum ratio of weighted misfire sum for multiple cylinder fault code and/or
Total weighted misfire counts for cylinder 4 within test frame $>[A] \times [B]$

where

[A] Total weighted misfire counts per exhaust bank within test frame =measured parameter

[B] Minimum ratio of weighted misfire sum for multiple cylinder fault code and/or
Total weighted misfire counts for cylinder 5 within test frame $>[A] \times [B]$

where

[A] Total weighted misfire counts per exhaust bank within test frame =measured parameter

[B] Minimum ratio of weighted misfire sum for multiple cylinder fault code and/or
Total weighted misfire counts for cylinder 6 within test frame $>[A] \times [B]$

where

[A] Total weighted misfire counts per exhaust bank within test frame =measured parameter

[B] Minimum ratio of weighted misfire sum for multiple cylinder fault code and/or
Total weighted misfire counts for cylinder 7 within test frame $>[A] \times [B]$

where

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[A] Total weighted misfire counts per exhaust bank within test frame =measured parameter

[B] Minimum ratio of weighted misfire sum for multiple cylinder fault code and/or =10(%)

Total weighted misfire counts for cylinder 8 within test frame >[A] x [B]

where

[A] Total weighted misfire counts per exhaust bank within test frame =measured parameter

[B] Minimum ratio of weighted misfire sum for multiple cylinder fault code with =10(%)

[One test frame defined by:
Total number of crankshaft revolutions in test frame for catalyst damaging misfire =200(counts)

or
Total number of crankshaft revolutions in first test frame after engine start for catalyst damaging misfire =[A] x [B](revolutions)

[A] Total number of crankshaft revolutions in test frame for catalyst damaging misfire

[B] Test frame extension factor for first interval after engine start] =1

P0301	Indicates that the engine has experienced cylinder 1 misfiring, detected by a crankshaft angle delay that is too great, caused by a drop in the engine speed	Method 1: Angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #71)	>195 to 1400(deg/s ²)	Engine speed	>600(rpm)	see Fault Paths 1-3 below	2 Trip
		or		Engine speed	<8600(rpm)		

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Method 1: Angular acceleration >195 to $1400(\text{deg/s}^2)$
of crankshaft in transmission
slip state (clutch is slipping),
compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire

(see Look-Up-Table #77)

or

Engine coolant temperature at engine start $>-12.04(^{\circ}\text{C})$

Method 1: Angular acceleration >195 to $1400(\text{deg/s}^2)$ or
of crankshaft in transmission
open state (clutch is
disengaged), compared to
threshold primarily used to
detect single random misfire as
well as single cylinder
continuous misfire

(see Look-Up-Table #74)

or

[Engine coolant temperature at engine start $<-12.04(^{\circ}\text{C})$
then monitoring enabled

Method 1: Angular acceleration >170 to $800(\text{deg/s}^2)$
of crankshaft in idle state,
compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire

(see Look-Up-Table #67)

Engine coolant temperature] $>-12.04(^{\circ}\text{C})$
Zero torque detection is not active
means

or

Method 1: Angular acceleration >240 to $800(\text{deg/s}^2)$
of crankshaft in catalyst
heating, compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire

(see Look-Up-Table #68)

[Normalized inner engine torque $>[A] + [B] + [C](\%)$

or

or

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Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #73)	>260 to 2047.938(deg/s ²)	Normalized inner engine torque	>[D] + [B] + [C](%)
or Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #79)	>260 to 2047.938(deg/s ²)	where [A] Threshold zero torque, driving state (see Look-Up-Table #80)	=5.32 to 27.0(%)
or		[B] Map for zero torque correction, engine speed and altitude dependant (see Look-Up-Table #82)	=-1.66 to 0(%)
Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #76)	>260 to 2048(deg/s ²)	[C] Map for zero torque correction, engine speed and engine temperature dependant	=0(%)
or		[D] Threshold zero torque, idle state] (see Look-Up-Table #81)	=4.26 to 6.52(%)

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Method 2: Angular acceleration $>2047.938(\text{deg/s}^2)$
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in idle state,
compared to threshold
primarily used to detect single
cylinder continuous and select
paired cylinder continuous
misfires in a non-adapted
system

Method 2: Angular acceleration $>2047.938(\text{deg/s}^2)$
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in catalyst
heating, compared to threshold
primarily used to detect single
cylinder continuous and select
paired cylinder continuous
misfires in a non-adapted
system

or

Method 3: Filtered angular $>[A]+[B](\text{deg/s}^2)$ Overrun/fuel cut-off is not active
acceleration of crankshaft in
transmission grip state (clutch
is engaged), compared to
threshold primarily used to
detect various forms of single
cylinder and multiple cylinder
continuous misfires

where

(Combustion delay after engine start
has completed

[A] Base continuous misfire $=240 \text{ to } 1400(\text{deg/s}^2)$ means
threshold in the transmission
grip state
(see Look-Up-Table #72)

[B] Smallest (negative) angular
acceleration value from a non-
misfiring cylinder; limited
depending on operating point

=measured
parameter(deg/s^2)

[Engine speed

$>650(\text{rpm})$

or

for

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Method 3: Filtered angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	>measured parameter(deg/s ²)	Number of combustions]	>8(counts)
[A] Base continuous misfire threshold in the transmission slip state (see Look-Up-Table #78)	=240 to 1400(deg/s ²)		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)		
or Method 3: Filtered angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	Calculated EPM segment time is valid	=TRUE
where		No pending or confirmed DTCs	=see sheet inhibit tables
[A] Base continuous misfire threshold in the transmission open state (see Look-Up-Table #75)	=240 to 1420(deg/s ²)	Basic enable conditions met	=see sheet enable tables
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)		
or Method 3: Filtered angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	>[A]+[B](deg/s ²)		

		[A] Base continuous misfire threshold in the transmission idle state (see Look-Up-Table #70)	=160 to 180(deg/s ²)
		[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)
		Method 3: Filtered angular acceleration of crankshaft in catalyst heating state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	>[A]+[B](deg/s ²)
		[A] Base continuous misfire threshold in catalyst heating state (see Look-Up-Table #69)	=240 to 335(deg/s ²)
		[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)
		where	
	Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	Total misfire counts across all cylinders within first test frame outside of catalyst heating	>80(counts)
		or	
		Total misfire counts across all cylinders within first test frame during catalyst heating and/or	>80(counts)
		Total misfire counts for cylinder 1 within test frame	>[A] x [B]
		where	
		[A] Total misfire counts across all cylinders within test frame	=measured parameter
		[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
		[One test frame defined by: Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at engine start	=1000(counts)

Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions	or	
	Total misfire counts across all cylinders within test frame	>80(counts)
Fault Path 3: Catalyst damaging misfire rate	and/or	
	Total misfire counts for cylinder 1 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
	[One test frame defined by:	
	Total number of crankshaft revolutions in test frame for emission relevant misfire rate and	=1000(counts)
	Misfire test frame counter]	=4(counts)
	or	
	Weighted misfire counter for exhaust bank	>3000(counts)
	or	
	Weighted misfire counter for exhaust bank during first interval after engine start and/or	>3000(counts)
	Total weighted misfire counts for cylinder 1 within test frame	>[A] x [B]
	where	
	[A] Total weighted misfire counts per exhaust bank within test frame	=measured parameter
	[B] Minimum ratio of weighted misfire sum for cylinder-individual fault code with	=20(%)
	[One test frame defined by:	
	Total number of crankshaft revolutions in test frame for catalyst damaging misfire or	=200(revolutions)
	Total number of crankshaft revolutions in first test frame after engine start for catalyst damaging misfire	=[A] x [B](revolutions)
	[A] Total number of crankshaft revolutions in test frame for catalyst damaging misfire	=200(revolutions)

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		[B] Test frame extension factor for first interval after engine start]		=1			
P0302	Indicates that the engine has experienced cylinder 2 misfiring, detected by a crankshaft angle delay that is too great, caused by a drop in the engine speed	Method 1: Angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #71)	>195 to 1400(deg/s ²)	Engine speed	>600(rpm)	see Fault Paths 1-3 below	2 Trip
		or Method 1: Angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #77)	>195 to 1400(deg/s ²)	Engine speed	<8600(rpm)		
		or Method 1: Angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #74)	>195 to 1400(deg/s ²)	Engine coolant temperature at engine start	>-12.04(°C)		
		or Method 1: Angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #67)	>170 to 800(deg/s ²)	[Engine coolant temperature at engine start then monitoring enabled	<-12.04(°C)		
		or		Engine coolant temperature] Zero torque detection is not active means	>-12.04(°C)		

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Method 1: Angular acceleration of crankshaft in catalyst heating, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #68)	>240 to 800(deg/s ^{^2})	[Normalized inner engine torque	>[A] + [B] + [C](%)
or Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #73)	>260 to 2047.938(deg/s ^{^2})	or Normalized inner engine torque	>[D] + [B] + [C](%)
or Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #79)	>260 to 2047.938(deg/s ^{^2})	where [A] Threshold zero torque, driving state (see Look-Up-Table #80)	=5.32 to 27.0(%)
or		[B] Map for zero torque correction, engine speed and altitude dependant (see Look-Up-Table #82)	=-1.66 to 0(%)

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Method 2: Angular acceleration >260 to $2048(\text{deg/s}^2)$ [C] Map for zero torque correction, $=0(\%)$
 of crankshaft corrected for engine speed and engine
 cylinders sharing same sensor temperature dependant
 wheel segments in
 transmission open state (clutch
 is disengaged), compared to
 threshold primarily used to
 detect single cylinder
 continuous and select paired
 cylinder continuous misfires in
 a non-adapted system
 (see Look-Up-Table #76)

or [D] Threshold zero torque, idle state] $=4.26$ to $6.52(\%)$
 (see Look-Up-Table #81)

Method 2: Angular acceleration $>2047.938(\text{deg/s}^2)$
 of crankshaft corrected for
 cylinders sharing same sensor
 wheel segments in idle state,
 compared to threshold
 primarily used to detect single
 cylinder continuous and select
 paired cylinder continuous
 misfires in a non-adapted
 system

Method 2: Angular acceleration $>2047.938(\text{deg/s}^2)$
 of crankshaft corrected for
 cylinders sharing same sensor
 wheel segments in catalyst
 heating, compared to threshold
 primarily used to detect single
 cylinder continuous and select
 paired cylinder continuous
 misfires in a non-adapted
 system

or

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Method 3: Filtered angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires

$>[A]+[B](\text{deg/s}^2)$ Overrun/fuel cut-off is not active

where (Combustion delay after engine start has completed

[A] Base continuous misfire threshold in the transmission grip state (see Look-Up-Table #72) $=240$ to $1400(\text{deg/s}^2)$ means

[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point $=\text{measured parameter}(\text{deg/s}^2)$ [Engine speed $>650(\text{rpm})$

or Method 3: Filtered angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires $>[A]+[B](\text{deg/s}^2)$ for Number of combustions] $>8(\text{counts})$

where or
[A] Base continuous misfire threshold in the transmission slip state (see Look-Up-Table #78) $=240$ to $1400(\text{deg/s}^2)$

[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point $=\text{measured parameter}(\text{deg/s}^2)$

or Method 3: Filtered angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires $>[A]+[B](\text{deg/s}^2)$ Calculated EPM segment time is valid $=\text{TRUE}$

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	where	No pending or confirmed DTCs	=see sheet inhibit tables =see sheet enable tables
	[A] Base continuous misfire threshold in the transmission open state (see Look-Up-Table #75)	=240 to 1420(deg/s ²) Basic enable conditions met	
	[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
	or Method 3: Filtered angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	
	where [A] Base continuous misfire threshold in the transmission idle state (see Look-Up-Table #70)	=160 to 180(deg/s ²)	
	[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
	or Method 3: Filtered angular acceleration of crankshaft in catalyst heating state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	
	where [A] Base continuous misfire threshold in catalyst heating state (see Look-Up-Table #69)	=240 to 335(deg/s ²)	
	[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
Fault Path 1: Emission relevant misfire rate within first test frame	Total misfire counts across all cylinders within first test frame	>80(counts)	
	or Total misfire counts across all cylinders within first test frame during catalyst heating	>80(counts)	

		and/or	
		Total misfire counts for cylinder 2 within test frame	$>[A] \times [B]$
		where	
		[A] Total misfire counts across all cylinders within test frame	=measured parameter
		[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
		[One test frame defined by: Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at engine start or	
		Total misfire counts across all cylinders within test frame	=1000(counts)
Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions		Total misfire counts across all cylinders within test frame	$>80(\text{counts})$
		and/or	
		Total misfire counts for cylinder 2 within test frame	$>[A] \times [B]$
		where	
		[A] Total misfire counts across all cylinders within test frame	=measured parameter
		[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
		[One test frame defined by: Total number of crankshaft revolutions in test frame for emission relevant misfire rate and	
		Misfire test frame counter]	=1000(counts)
		or	
		Weighted misfire counter for exhaust bank	=4(counts)
Fault Path 3: Catalyst damaging misfire rate		or	
		Weighted misfire counter for exhaust bank during first interval after engine start	$>3000(\text{counts})$
		and/or	
		Total weighted misfire counts for cylinder 2 within test frame	$>3000(\text{counts})$
		where	
		[A] Total weighted misfire counts per exhaust bank within test frame	$>[A] \times [B]$

[B] Minimum ratio of weighted misfire sum for cylinder-individual fault code with	=20(%)
[One test frame defined by:	
Total number of crankshaft revolutions in test frame for catalyst damaging misfire or	=200(revolutions)
Total number of crankshaft revolutions in first test frame after engine start for catalyst damaging misfire	=[A] x [B](revolutions)
[A] Total number of crankshaft revolutions in test frame for catalyst damaging misfire	=200(revolutions)
[B] Test frame extension factor for first interval after engine start]	=1

P0303	Indicates that the engine has experienced cylinder 3 misfiring, detected by a crankshaft angle delay that is too great, caused by a drop in the engine speed	<p>Method 1: Angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #71)</p> <p>or</p> <p>Method 1: Angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #77)</p> <p>or</p> <p>Method 1: Angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #74)</p>	>195 to 1400(deg/s ²)	Engine speed	>600(rpm)	see Fault Paths 1-3 below	2 Trip
				Engine speed	<8600(rpm)		
				Engine coolant temperature at engine start	>-12.04(°C)		

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or		[Engine coolant temperature at engine start	<-12.04(°C)
Method 1: Angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #67)	>170 to 800(deg/s ^{^2})	then monitoring enabled	
		Engine coolant temperature]	>-12.04(°C)
or		Zero torque detection is not active means	
Method 1: Angular acceleration of crankshaft in catalyst heating, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #68)	>240 to 800(deg/s ^{^2})	[Normalized inner engine torque	>[A] + [B] + [C](%)
or		or	
Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #73)	>260 to 2047.938(deg/s ^{^2})	Normalized inner engine torque	>[D] + [B] + [C](%>
or		where	
Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #79)	>260 to 2047.938(deg/s ^{^2})	[A] Threshold zero torque, driving state (see Look-Up-Table #80)	=5.32 to 27.0(%)

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or [B] Map for zero torque correction, engine speed and altitude dependant (see Look-Up-Table #82) =-1.66 to 0(%)

Method 2: Angular acceleration >260 to 2048(deg/s²) of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #76) [C] Map for zero torque correction, engine speed and engine temperature dependant =0(%)

or [D] Threshold zero torque, idle state] (see Look-Up-Table #81) =4.26 to 6.52(%)

Method 2: Angular acceleration >2047.938(deg/s²) of crankshaft corrected for cylinders sharing same sensor wheel segments in idle state, compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system

Method 2: Angular acceleration >2047.938(deg/s²) of crankshaft corrected for cylinders sharing same sensor wheel segments in catalyst heating, compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system

or

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Method 3: Filtered angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$	Overrun/fuel cut-off is not active	
where		(Combustion delay after engine start has completed	
[A] Base continuous misfire threshold in the transmission grip state (see Look-Up-Table #72)	$=240 \text{ to } 1400(\text{deg/s}^2)$	means	
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$	[Engine speed	$>650(\text{rpm})$
or Method 3: Filtered angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$	for Number of combustions]	$>8(\text{counts})$
where			
[A] Base continuous misfire threshold in the transmission slip state (see Look-Up-Table #78)	$=240 \text{ to } 1400(\text{deg/s}^2)$		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$		
or Method 3: Filtered angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$	Calculated EPM segment time is valid	$=\text{TRUE}$
where		No pending or confirmed DTCs	$=\text{see sheet inhibit tables}$

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[A] Base continuous misfire threshold in the transmission open state (see Look-Up-Table #75)	=240 to 1420(deg/s ²) Basic enable conditions met	=see sheet enable tables
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
or Method 3: Filtered angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	>[A]+[B](deg/s ²)	
[A] Base continuous misfire threshold in the transmission idle state (see Look-Up-Table #70)	=160 to 180(deg/s ²)	
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
Method 3: Filtered angular acceleration of crankshaft in catalyst heating state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	>[A]+[B](deg/s ²)	
[A] Base continuous misfire threshold in catalyst heating state (see Look-Up-Table #69)	=240 to 335(deg/s ²)	
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
where		

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Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	Total misfire counts across all cylinders within first test frame outside of catalyst heating	>80(counts)
	or	
	Total misfire counts across all cylinders within first test frame during catalyst heating	>80(counts)
	and/or	
	Total misfire counts for cylinder 3 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
	[One test frame defined by: Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at engine start	=1000(counts)
	or	
Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions	Total misfire counts across all cylinders within test frame	>80(counts)
	and/or	
	Total misfire counts for cylinder 3 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
	[One test frame defined by: Total number of crankshaft revolutions in test frame for emission relevant misfire rate and Misfire test frame counter]	=1000(counts)
	or	
	Weighted misfire counter for exhaust bank	=4(counts)
	or	
Fault Path 3: Catalyst damaging misfire rate	Weighted misfire counter for exhaust bank during first	>3000(counts)

and/or
 Total weighted misfire counts $>[A] \times [B]$
 for cylinder 3 within test frame

where

[A] Total weighted misfire counts per exhaust bank within test frame =measured parameter

[B] Minimum ratio of weighted misfire sum for cylinder-individual fault code with =20(%)

[One test frame defined by:
 Total number of crankshaft revolutions in test frame for catalyst damaging misfire =200(revolutions)

or
 Total number of crankshaft revolutions in first test frame after engine start for catalyst damaging misfire = $[A] \times [B]$ (revolutions)

[A] Total number of crankshaft revolutions in test frame for catalyst damaging misfire =200(revolutions)

[B] Test frame extension factor for first interval after engine start =1

P0304	Indicates that the engine has experienced cylinder 4 misfiring, detected by a crankshaft angle delay that is too great, caused by a drop in the engine speed	Method 1: Angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #71)	>195 to $1400(\text{deg/s}^2)$	Engine speed	$>600(\text{rpm})$	see Fault Paths 1-3 below	2 Trip
		or Method 1: Angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #77)	>195 to $1400(\text{deg/s}^2)$	Engine speed	$<8600(\text{rpm})$		
		or		Engine coolant temperature at engine start	$>-12.04(^{\circ}\text{C})$		

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Method 1: Angular acceleration >195 to $1400(\text{deg/s}^2)$ or
of crankshaft in transmission
open state (clutch is
disengaged), compared to
threshold primarily used to
detect single random misfire as
well as single cylinder
continuous misfire
(see Look-Up-Table #74)

or [Engine coolant temperature at engine start $<-12.04(^{\circ}\text{C})$

Method 1: Angular acceleration >170 to $800(\text{deg/s}^2)$ then monitoring enabled
of crankshaft in idle state,
compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire
(see Look-Up-Table #67)

Engine coolant temperature] $>-12.04(^{\circ}\text{C})$
Zero torque detection is not active
means

or Method 1: Angular acceleration >240 to $800(\text{deg/s}^2)$ [Normalized inner engine torque $>[A] + [B] + [C](\%)$
of crankshaft in catalyst
heating, compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire

(see Look-Up-Table #68)

or Method 2: Angular acceleration >260 to $2047.938(\text{deg/s}^2)$ or Normalized inner engine torque $>[D] + [B] + [C](\%)$
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in
transmission grip state (clutch
is engaged), compared to
threshold primarily used to
detect single cylinder
continuous and select paired
cylinder continuous misfires in
a non-adapted system
(see Look-Up-Table #73)

or where

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Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #79)	>260 to 2047.938(deg/s ²)	[A] Threshold zero torque, driving state (see Look-Up-Table #80)	=5.32 to 27.0(%)
or		[B] Map for zero torque correction, engine speed and altitude dependant (see Look-Up-Table #82)	=-1.66 to 0(%)
Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #76)	>260 to 2048(deg/s ²)	[C] Map for zero torque correction, engine speed and engine temperature dependant	=0(%)
or		[D] Threshold zero torque, idle state] (see Look-Up-Table #81)	=4.26 to 6.52(%)
Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in idle state, compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system	>2047.938(deg/s ²)		

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Method 2: Angular acceleration $>2047.938(\text{deg/s}^2)$
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in catalyst
heating, compared to threshold
primarily used to detect single
cylinder continuous and select
paired cylinder continuous
misfires in a non-adapted
system

or

Method 3: Filtered angular $>[A]+[B](\text{deg/s}^2)$ Overrun/fuel cut-off is not active
acceleration of crankshaft in
transmission grip state (clutch
is engaged), compared to
threshold primarily used to
detect various forms of single
cylinder and multiple cylinder
continuous misfires

where

(Combustion delay after engine start
has completed

[A] Base continuous misfire $=240 \text{ to } 1400(\text{deg/s}^2)$ means
threshold in the transmission
grip state
(see Look-Up-Table #72)

[B] Smallest (negative) angular
acceleration value from a non-
misfiring cylinder; limited
depending on operating point

=measured
parameter(deg/s^2)

[Engine speed

$>650(\text{rpm})$

or

Method 3: Filtered angular $>[A]+[B](\text{deg/s}^2)$
acceleration of crankshaft in
transmission slip state (clutch
is slipping), compared to
threshold primarily used to
detect various forms of single
cylinder and multiple cylinder
continuous misfires

$>[A]+[B](\text{deg/s}^2)$

for

Number of combustions]

$>8(\text{counts})$

where

[A] Base continuous misfire $=240 \text{ to } 1400(\text{deg/s}^2)$
threshold in the transmission
slip state

(see Look-Up-Table #78)

[B] Smallest (negative) angular
acceleration value from a non-
misfiring cylinder; limited
depending on operating point

=measured
parameter(deg/s^2)

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or Method 3: Filtered angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$	Calculated EPM segment time is valid	=TRUE
where	No pending or confirmed DTCs		=see sheet inhibit tables
[A] Base continuous misfire threshold in the transmission open state (see Look-Up-Table #75)	=240 to 1420(deg/s ²)	Basic enable conditions met	=see sheet enable tables
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)		
or Method 3: Filtered angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$		
where			
[A] Base continuous misfire threshold in the transmission idle state (see Look-Up-Table #70)	=160 to 180(deg/s ²)		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)		
Method 3: Filtered angular acceleration of crankshaft in catalyst heating state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$		
where			

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	[A] Base continuous misfire threshold in catalyst heating state (see Look-Up-Table #69)	240 to 335(deg/s ²)
	[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)
	where	
Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	Total misfire counts across all cylinders within first test frame outside of catalyst heating	>80(counts)
	or	
	Total misfire counts across all cylinders within first test frame during catalyst heating	>80(counts)
	and/or	
	Total misfire counts for cylinder 4 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
	[One test frame defined by: Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at engine start	=1000(counts)
	or	
Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions	Total misfire counts across all cylinders within test frame	>80(counts)
	and/or	
	Total misfire counts for cylinder 4 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
	[One test frame defined by:	

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Fault Path 3: Catalyst damaging misfire rate

Total number of crankshaft revolutions in test frame for emission relevant misfire rate and	=1000(counts)
Misfire test frame counter]	=4(counts)
or	
Weighted misfire counter for exhaust bank	>3000(counts)
or	
Weighted misfire counter for exhaust bank during first interval after engine start and/or	>3000(counts)
Total weighted misfire counts for cylinder 4 within test frame	>[A] x [B]
where	
[A] Total weighted misfire counts per exhaust bank within test frame	=measured parameter
[B] Minimum ratio of weighted misfire sum for cylinder-individual fault code with	=20(%)
[One test frame defined by:	
Total number of crankshaft revolutions in test frame for catalyst damaging misfire or	=200(revolutions)
Total number of crankshaft revolutions in first test frame after engine start for catalyst damaging misfire	=[A] x [B](revolutions)
[A] Total number of crankshaft revolutions in test frame for catalyst damaging misfire	=200(revolutions)
[B] Test frame extension factor for first interval after engine start]	=1

P0305	Indicates that the engine has experienced cylinder 5 misfiring, detected by a crankshaft angle delay that is too great, caused by a drop in the engine speed	Method 1: Angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #71)	>195 to 1400(deg/s ^A 2)	Engine speed	>600(rpm)	see Fault Paths 1-3 below	2 Trip
		or		Engine speed	<8600(rpm)		

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Method 1: Angular acceleration >195 to $1400(\text{deg/s}^2)$
of crankshaft in transmission
slip state (clutch is slipping),
compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire

(see Look-Up-Table #77)

or

Engine coolant temperature at engine start $>-12.04(^{\circ}\text{C})$

Method 1: Angular acceleration >195 to $1400(\text{deg/s}^2)$ or
of crankshaft in transmission
open state (clutch is
disengaged), compared to
threshold primarily used to
detect single random misfire as
well as single cylinder
continuous misfire
(see Look-Up-Table #74)

or

[Engine coolant temperature at engine start $<-12.04(^{\circ}\text{C})$

Method 1: Angular acceleration >170 to $800(\text{deg/s}^2)$ then monitoring enabled
of crankshaft in idle state,
compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire
(see Look-Up-Table #67)

Engine coolant temperature] $>-12.04(^{\circ}\text{C})$
Zero torque detection is not active
means

or

Method 1: Angular acceleration >240 to $800(\text{deg/s}^2)$ [Normalized inner engine torque
of crankshaft in catalyst
heating, compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire
(see Look-Up-Table #68)

$>[A] + [B] + [C](\%)$

or

or

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Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #73)	>260 to 2047.938(deg/s ²)	Normalized inner engine torque	>[D] + [B] + [C](%)
or Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #79)	>260 to 2047.938(deg/s ²)	where [A] Threshold zero torque, driving state (see Look-Up-Table #80)	=5.32 to 27.0(%)
or		[B] Map for zero torque correction, engine speed and altitude dependant (see Look-Up-Table #82)	=-1.66 to 0(%)
Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #76)	>260 to 2048(deg/s ²)	[C] Map for zero torque correction, engine speed and engine temperature dependant	=0(%)
or		[D] Threshold zero torque, idle state] (see Look-Up-Table #81)	=4.26 to 6.52(%)

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Method 2: Angular acceleration $>2047.938(\text{deg/s}^2)$
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in idle state,
compared to threshold
primarily used to detect single
cylinder continuous and select
paired cylinder continuous
misfires in a non-adapted
system

Method 2: Angular acceleration $>2047.938(\text{deg/s}^2)$
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in catalyst
heating, compared to threshold
primarily used to detect single
cylinder continuous and select
paired cylinder continuous
misfires in a non-adapted
system

or

Method 3: Filtered angular $>[A]+[B](\text{deg/s}^2)$ Overrun/fuel cut-off is not active
acceleration of crankshaft in
transmission grip state (clutch
is engaged), compared to
threshold primarily used to
detect various forms of single
cylinder and multiple cylinder
continuous misfires

where

(Combustion delay after engine start
has completed

[A] Base continuous misfire $=240 \text{ to } 1400(\text{deg/s}^2)$ means
threshold in the transmission
grip state
(see Look-Up-Table #72)

[B] Smallest (negative) angular
acceleration value from a non-
misfiring cylinder; limited
depending on operating point

=measured
parameter(deg/s^2)

[Engine speed

$>650(\text{rpm})$

or

for

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Method 3: Filtered angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	$>[A]+[B](\text{deg/s}^2)$	Number of combustions]	$>8(\text{counts})$
[A] Base continuous misfire threshold in the transmission slip state (see Look-Up-Table #78)	$=240 \text{ to } 1400(\text{deg/s}^2)$		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$		
or Method 3: Filtered angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$	Calculated EPM segment time is valid	$=\text{TRUE}$
where		No pending or confirmed DTCs	$=\text{see sheet inhibit tables}$
[A] Base continuous misfire threshold in the transmission open state (see Look-Up-Table #75)	$=240 \text{ to } 1420(\text{deg/s}^2)$	Basic enable conditions met	$=\text{see sheet enable tables}$
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$		
or Method 3: Filtered angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	$>[A]+[B](\text{deg/s}^2)$		

		[A] Base continuous misfire threshold in the transmission idle state (see Look-Up-Table #70)	=160 to 180(deg/s ²)
		[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)
		Method 3: Filtered angular acceleration of crankshaft in catalyst heating state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	>[A]+[B](deg/s ²)
		[A] Base continuous misfire threshold in catalyst heating state (see Look-Up-Table #69)	=240 to 335(deg/s ²)
		[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)
		where	
	Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	Total misfire counts across all cylinders within first test frame outside of catalyst heating	>80(counts)
		or	
		Total misfire counts across all cylinders within first test frame during catalyst heating	>80(counts)
		and/or	
		Total misfire counts for cylinder 5 within test frame	>[A] x [B]
		where	
		[A] Total misfire counts across all cylinders within test frame	=measured parameter
		[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
		[One test frame defined by: Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at onnino etart	=1000(counts)

Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions	or	
	Total misfire counts across all cylinders within test frame	>80(counts)
Fault Path 3: Catalyst damaging misfire rate	and/or	
	Total misfire counts for cylinder 5 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
	[One test frame defined by:	
	Total number of crankshaft revolutions in test frame for emission relevant misfire rate and	=1000(counts)
	Misfire test frame counter]	=4(counts)
	or	
	Weighted misfire counter for exhaust bank	>3000(counts)
	or	
	Weighted misfire counter for exhaust bank during first interval after engine start and/or	>3000(counts)
	Total weighted misfire counts for cylinder 5 within test frame	>[A] x [B]
	where	
	[A] Total weighted misfire counts per exhaust bank within test frame	=measured parameter
	[B] Minimum ratio of weighted misfire sum for cylinder-individual fault code with	=20(%)
	[One test frame defined by:	
	Total number of crankshaft revolutions in test frame for catalyst damaging misfire or	=200(revolutions)
	Total number of crankshaft revolutions in first test frame after engine start for catalyst damaging misfire	=[A] x [B](revolutions)
	[A] Total number of crankshaft revolutions in test frame for catalyst damaging misfire	=200(revolutions)

		[B] Test frame extension factor for first interval after engine start]	=1				
P0306	Indicates that the engine has experienced cylinder 6 misfiring, detected by a crankshaft angle delay that is too great, caused by a drop in the engine speed	Method 1: Angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #71)	>195 to 1400(deg/s ²)	Engine speed	>600(rpm)	see Fault Paths 1-3 below	2 Trip
		or Method 1: Angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #77)	>195 to 1400(deg/s ²)	Engine speed	<8600(rpm)		
		or Method 1: Angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #74)	>195 to 1400(deg/s ²)	Engine coolant temperature at engine start	>-12.04(°C)		
		or Method 1: Angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #67)	>170 to 800(deg/s ²)	[Engine coolant temperature at engine start then monitoring enabled	<-12.04(°C)		
		or		Engine coolant temperature] Zero torque detection is not active means	>-12.04(°C)		

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Method 1: Angular acceleration of crankshaft in catalyst heating, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #68)	>240 to 800(deg/s ²)	[Normalized inner engine torque	>[A] + [B] + [C](%)
or Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #73)	>260 to 2047.938(deg/s ²)	or Normalized inner engine torque	>[D] + [B] + [C](%)>
or Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #79)	>260 to 2047.938(deg/s ²)	where [A] Threshold zero torque, driving state (see Look-Up-Table #80)	=5.32 to 27.0(%)
or		[B] Map for zero torque correction, engine speed and altitude dependant (see Look-Up-Table #82)	-1.66 to 0(%)

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Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #76)	>260 to 2048(deg/s ²) [C] Map for zero torque correction, engine speed and engine temperature dependant	=0(%)
or	[D] Threshold zero torque, idle state] (see Look-Up-Table #81)	=4.26 to 6.52(%)
Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in idle state, compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system	>2047.938(deg/s ²)	
or		
Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in catalyst heating, compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system	>2047.938(deg/s ²)	
or		
Method 3: Filtered angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	Overrun/fuel cut-off is not active

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where		(Combustion delay after engine start has completed	
[A] Base continuous misfire threshold in the transmission grip state (see Look-Up-Table #72)	=240 to 1400(deg/s ²)	means	
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	[Engine speed	>650(rpm)
or Method 3: Filtered angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	>[A]+[B](deg/s ²)	for Number of combustions]	>8(counts)
[A] Base continuous misfire threshold in the transmission slip state (see Look-Up-Table #78)	=240 to 1400(deg/s ²)		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)		
or Method 3: Filtered angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	Calculated EPM segment time is valid	=TRUE
where		No pending or confirmed DTCs	=see sheet inhibit tables
[A] Base continuous misfire threshold in the transmission open state (see Look-Up-Table #75)	=240 to 1420(deg/s ²)	Basic enable conditions met	=see sheet enable tables
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)		

	or	
	Method 3: Filtered angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$
	where	
	[A] Base continuous misfire threshold in the transmission idle state (see Look-Up-Table #70)	$=160 \text{ to } 180(\text{deg/s}^2)$
	[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$
	Method 3: Filtered angular acceleration of crankshaft in catalyst heating state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$
	where	
	[A] Base continuous misfire threshold in catalyst heating state (see Look-Up-Table #69)	$=240 \text{ to } 335(\text{deg/s}^2)$
	[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$
	where	
	Total misfire counts across all cylinders within first test frame outside of catalyst heating	$>80(\text{counts})$
	or	
Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	Total misfire counts across all cylinders within first test frame during catalyst heating and/or	$>80(\text{counts})$
	Total misfire counts for cylinder 6 within test frame	$>[A] \times [B]$
	where	
	[A] Total misfire counts across all cylinders within test frame	$=\text{measured parameter}$

Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions	[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
	[One test frame defined by: Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at engine start or	=1000(counts)
	Total misfire counts across all cylinders within test frame	>80(counts)
	and/or	
	Total misfire counts for cylinder 6 within test frame where	>[A] x [B]
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
	[One test frame defined by: Total number of crankshaft revolutions in test frame for emission relevant misfire rate and	=1000(counts)
	Misfire test frame counter]	=4(counts)
	or	
Fault Path 3: Catalyst damaging misfire rate	Weighted misfire counter for exhaust bank	>3000(counts)
	or	
	Weighted misfire counter for exhaust bank during first interval after engine start and/or	>3000(counts)
	Total weighted misfire counts for cylinder 6 within test frame	>[A] x [B]
	where	
	[A] Total weighted misfire counts per exhaust bank within test frame	=measured parameter
	[B] Minimum ratio of weighted misfire sum for cylinder-individual fault code with	=20(%)
	[One test frame defined by: Total number of crankshaft revolutions in test frame for	=200(revolutions)

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		or					
		Total number of crankshaft revolutions in first test frame after engine start for catalyst damaging misfire	=[A] x [B](revolutions)				
		[A] Total number of crankshaft revolutions in test frame for catalyst damaging misfire	=200(revolutions)				
		[B] Test frame extension factor for first interval after engine start]	=1				
P0307	Indicates that the engine has experienced cylinder 7 misfiring, detected by a crankshaft angle delay that is too great, caused by a drop in the engine speed	Method 1: Angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #71)	>195 to 1400(deg/s^2)	Engine speed	>600(rpm)	see Fault Paths 1-3 below	2 Trip
		or					
		Method 1: Angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #77)	>195 to 1400(deg/s^2)	Engine speed	<8600(rpm)		
		or					
		Method 1: Angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #74)	>195 to 1400(deg/s^2)	Engine coolant temperature at engine start	>-12.04(°C)		
		or					
				[Engine coolant temperature at engine start	<-12.04(°C)		

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Method 1: Angular acceleration >170 to $800(\text{deg/s}^2)$ then monitoring enabled of crankshaft in idle state, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #67)

Engine coolant temperature] $>-12.04(^{\circ}\text{C})$

Zero torque detection is not active means

or

Method 1: Angular acceleration >240 to $800(\text{deg/s}^2)$ of crankshaft in catalyst heating, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #68)

[Normalized inner engine torque $>[A] + [B] + [C](\%)$

or

Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #73)

>260 to $2047.938(\text{deg/s}^2)$

or

Normalized inner engine torque $>[D] + [B] + [C](\%)>$

or

Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #79)

>260 to $2047.938(\text{deg/s}^2)$

where

[A] Threshold zero torque, driving state (see Look-Up-Table #80)

$=5.32$ to $27.0(\%)$

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or	[B] Map for zero torque correction, engine speed and altitude dependant (see Look-Up-Table #82)	-1 .66 to 0(%)
Method 2: Angular acceleration >260 to 2048(deg/s ^{^2}) of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #76)	[C] Map for zero torque correction, engine speed and engine temperature dependant	=0(%)
or	[D] Threshold zero torque, idle state] (see Look-Up-Table #81)	=4.26 to 6.52(%)
Method 2: Angular acceleration >2047.938(deg/s ^{^2}) of crankshaft corrected for cylinders sharing same sensor wheel segments in idle state, compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system		
Method 2: Angular acceleration >2047.938(deg/s ^{^2}) of crankshaft corrected for cylinders sharing same sensor wheel segments in catalyst heating, compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system		
or		

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Method 3: Filtered angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$	Overrun/fuel cut-off is not active	
where		(Combustion delay after engine start has completed	
[A] Base continuous misfire threshold in the transmission grip state (see Look-Up-Table #72)	$=240 \text{ to } 1400(\text{deg/s}^2)$	means	
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$	[Engine speed	$>650(\text{rpm})$
or Method 3: Filtered angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$	for Number of combustions]	$>8(\text{counts})$
where			
[A] Base continuous misfire threshold in the transmission slip state (see Look-Up-Table #78)	$=240 \text{ to } 1400(\text{deg/s}^2)$		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$		
or Method 3: Filtered angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$	Calculated EPM segment time is valid	$=\text{TRUE}$
where		No pending or confirmed DTCs	$=\text{see sheet inhibit tables}$

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[A] Base continuous misfire threshold in the transmission open state (see Look-Up-Table #75)	=240 to 1420(deg/s ²) Basic enable conditions met	=see sheet enable tables
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
or Method 3: Filtered angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	
where [A] Base continuous misfire threshold in the transmission idle state (see Look-Up-Table #70)	=160 to 180(deg/s ²)	
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)	
where		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder: limited depending on operating point	=measured parameter(deg/s ²)	
or Method 3: Filtered angular acceleration of crankshaft in catalyst heating state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	>[A]+[B](deg/s ²)	
where [A] Base continuous misfire threshold in catalyst heating state (see Look-Up-Table #69)	=240 to 335(deg/s ²)	

	[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)
	where	
Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	Total misfire counts across all cylinders within first test frame outside of catalyst heating	>80(counts)
	or	
	Total misfire counts across all cylinders within first test frame during catalyst heating	>80(counts)
	and/or	
	Total misfire counts for cylinder 7 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code	=10(%)
	with	
	[One test frame defined by: Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at engine start	=1000(counts)
	or	
Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions	Total misfire counts across all cylinders within test frame	>80(counts)
	and/or	
	Total misfire counts for cylinder 7 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code	=10(%)
	with	
	[One test frame defined by: Total number of crankshaft revolutions in test frame for emission relevant misfire rate	=1000(counts)
	and	
	Misfire test frame counter]	=4(counts)
	or	

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Fault Path 3: Catalyst damaging misfire rate

Weighted misfire counter for
exhaust bank
or
Weighted misfire counter for
exhaust bank during first
interval after engine start
and/or
Total weighted misfire counts
for cylinder 7 within test frame

>3000(counts)
or
>3000(counts)
or
>[A] x [B]

where
[A] Total weighted misfire
counts per exhaust bank within
test frame =measured parameter
[B] Minimum ratio of weighted
misfire sum for cylinder-
individual fault code
with
[One test frame defined by:
Total number of crankshaft
revolutions in test frame for
catalyst damaging misfire
or
Total number of crankshaft
revolutions in first test frame
after engine start for catalyst
damaging misfire
[A] Total number of crankshaft
revolutions in test frame for
catalyst damaging misfire
=200(revolutions)
or
=[A] x [B](revolutions)
[A] Total number of crankshaft
revolutions in test frame for
catalyst damaging misfire
=200(revolutions)
[B] Test frame extension factor
for first interval after engine
start] =1

P0308	Indicates that the engine has experienced cylinder 8 misfiring, detected by a crankshaft angle delay that is too great, caused by a drop in the engine speed	Method 1: Angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire (see Look-Up-Table #71) or	>195 to 1400(deg/s ²) Engine speed Engine speed	>600(rpm) <8600(rpm)	see Fault Paths 1-3 below	2 Trip
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Method 1: Angular acceleration >195 to $1400(\text{deg/s}^2)$
of crankshaft in transmission
slip state (clutch is slipping),
compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire

(see Look-Up-Table #77)

or

Engine coolant temperature at engine start $>-12.04(^{\circ}\text{C})$

Method 1: Angular acceleration >195 to $1400(\text{deg/s}^2)$ or
of crankshaft in transmission
open state (clutch is
disengaged), compared to
threshold primarily used to
detect single random misfire as
well as single cylinder
continuous misfire
(see Look-Up-Table #74)

or

[Engine coolant temperature at engine start $<-12.04(^{\circ}\text{C})$

Method 1: Angular acceleration >170 to $800(\text{deg/s}^2)$ then monitoring enabled
of crankshaft in idle state,
compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire
(see Look-Up-Table #67)

or

Engine coolant temperature] $>-12.04(^{\circ}\text{C})$
Zero torque detection is not active
means

Method 1: Angular acceleration >240 to $800(\text{deg/s}^2)$ [Normalized inner engine torque $>[A] + [B] + [C](\%)$
of crankshaft in catalyst
heating, compared to threshold
primarily used to detect single
random misfire as well as
single cylinder continuous
misfire
(see Look-Up-Table #68)

or

or

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Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #73)	>260 to 2047.938(deg/s ²)	Normalized inner engine torque	>[D] + [B] + [C](%)
or Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #79)	>260 to 2047.938(deg/s ²)	where [A] Threshold zero torque, driving state (see Look-Up-Table #80)	=5.32 to 27.0(%)
or		[B] Map for zero torque correction, engine speed and altitude dependant (see Look-Up-Table #82)	=-1.66 to 0(%)
Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system (see Look-Up-Table #76)	>260 to 2048(deg/s ²)	[C] Map for zero torque correction, engine speed and engine temperature dependant	=0(%)
or		[D] Threshold zero torque, idle state] (see Look-Up-Table #81)	=4.26 to 6.52(%)

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Method 2: Angular acceleration $>2047.938(\text{deg/s}^2)$
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in idle state,
compared to threshold
primarily used to detect single
cylinder continuous and select
paired cylinder continuous
misfires in a non-adapted
system

or

Method 2: Angular acceleration $>2047.938(\text{deg/s}^2)$
of crankshaft corrected for
cylinders sharing same sensor
wheel segments in catalyst
heating, compared to threshold
primarily used to detect single
cylinder continuous and select
paired cylinder continuous
misfires in a non-adapted
system

or

Method 3: Filtered angular $>[A]+[B](\text{deg/s}^2)$ Overrun/fuel cut-off is not active
acceleration of crankshaft in
transmission grip state (clutch
is engaged), compared to
threshold primarily used to
detect various forms of single
cylinder and multiple cylinder
continuous misfires

where

(Combustion delay after engine start
has completed

[A] Base continuous misfire $=240 \text{ to } 1400(\text{deg/s}^2)$ means
threshold in the transmission
grip state
(see Look-Up-Table #72)

[B] Smallest (negative) angular
acceleration value from a non-
misfiring cylinder; limited
depending on operating point

=measured
parameter(deg/s^2)

[Engine speed

$>650(\text{rpm})$

or

for

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Method 3: Filtered angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	$>[A]+[B](\text{deg/s}^2)$	Number of combustions]	$>8(\text{counts})$
[A] Base continuous misfire threshold in the transmission slip state (see Look-Up-Table #78)	$=240 \text{ to } 1400(\text{deg/s}^2)$		
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$		
or Method 3: Filtered angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires	$>[A]+[B](\text{deg/s}^2)$	Calculated EPM segment time is valid	$=\text{TRUE}$
where		No pending or confirmed DTCs	$=\text{see sheet inhibit tables}$
[A] Base continuous misfire threshold in the transmission open state (see Look-Up-Table #75)	$=240 \text{ to } 1420(\text{deg/s}^2)$	Basic enable conditions met	$=\text{see sheet enable tables}$
[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	$=\text{measured parameter}(\text{deg/s}^2)$		
or Method 3: Filtered angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where	$>[A]+[B](\text{deg/s}^2)$		

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		[A] Base continuous misfire threshold in the transmission idle state (see Look-Up-Table #70)	=160 to 180(deg/s ²)
		[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point	=measured parameter(deg/s ²)
		Method 3: Filtered angular acceleration of crankshaft in catalyst heating state, compared to threshold primarily used to detect various forms of single cylinder and multiple cylinder continuous misfires where [A] Base continuous misfire threshold in catalyst heating state (see Look-Up-Table #69)	>[A]+[B](deg/s ²)
		[B] Smallest (negative) angular acceleration value from a non-misfiring cylinder; limited depending on operating point where Total misfire counts across all cylinders within first test frame outside of catalyst heating or Total misfire counts across all cylinders within first test frame during catalyst heating and/or Total misfire counts for cylinder 8 within test frame where [A] Total misfire counts across all cylinders within test frame	=measured parameter(deg/s ²)
		[B] Minimum ratio of misfire sum for cylinder-individual fault code with [One test frame defined by: Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at engine start	=10(%)
		Total misfire counts across all cylinders within first test frame outside of catalyst heating or Total misfire counts across all cylinders within first test frame during catalyst heating and/or Total misfire counts for cylinder 8 within test frame where [A] Total misfire counts across all cylinders within test frame	>80(counts)
		Total misfire counts across all cylinders within first test frame during catalyst heating and/or Total misfire counts for cylinder 8 within test frame where [A] Total misfire counts across all cylinders within test frame	>80(counts)
		Total misfire counts across all cylinders within first test frame during catalyst heating and/or Total misfire counts for cylinder 8 within test frame where [A] Total misfire counts across all cylinders within test frame	>[A] x [B]
		Total misfire counts across all cylinders within first test frame during catalyst heating and/or Total misfire counts for cylinder 8 within test frame where [A] Total misfire counts across all cylinders within test frame	=measured parameter
		Total misfire counts across all cylinders within first test frame during catalyst heating and/or Total misfire counts for cylinder 8 within test frame where [A] Total misfire counts across all cylinders within test frame	=1000(counts)

Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions	or	
	Total misfire counts across all cylinders within test frame	>80(counts)
Fault Path 3: Catalyst damaging misfire rate	and/or	
	Total misfire counts for cylinder 8 within test frame	>[A] x [B]
	where	
	[A] Total misfire counts across all cylinders within test frame	=measured parameter
	[B] Minimum ratio of misfire sum for cylinder-individual fault code with	=10(%)
	[One test frame defined by:	
	Total number of crankshaft revolutions in test frame for emission relevant misfire rate and	=1000(counts)
	Misfire test frame counter]	=4(counts)
	or	
	Weighted misfire counter for exhaust bank	>3000(counts)
	or	
	Weighted misfire counter for exhaust bank during first interval after engine start	>3000(counts)
	and/or	
	Total weighted misfire counts for cylinder 8 within test frame	>[A] x [B]
	where	
	[A] Total weighted misfire counts per exhaust bank within test frame	=measured parameter
	[B] Minimum ratio of weighted misfire sum for cylinder-individual fault code with	=20(%)
	[One test frame defined by:	
	Total number of crankshaft revolutions in test frame for catalyst damaging misfire	=200(revolutions)
	or	
	Total number of crankshaft revolutions in first test frame after engine start for catalyst damaging misfire	=[A] x [B](revolutions)
	[A] Total number of crankshaft revolutions in test frame for catalyst damaging misfire	=200(revolutions)

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		[B] Test frame extension factor for first interval after engine start]		=1					
3. EVAPORATIVE SYSTEM - PURGE FLOW	P0497	Monitoring of fuel tank pressure while CVV is closed and CPV open (CPV stuck closed)	Difference between low pass filtered tank and start pressure for Tank leakage diagnosis	<0.008(kPa)	Basic Enable conditions are fulfilled as following conditions:	=TRUE	1(s)	2 Trip	
			or		Diagnosis of canister purge system is active means	=TRUE			
			Integrated CPV mass flow during vacuum build-up	>0.09(g)	(Battery Voltage Battery Voltage Fuel Tank Pressure Fuel Tank Pressure Pressure ratio of manifold pressure and ambient pressure)	>10.9(V) <25.6(V) >-3.5(kPa) <1.3(kPa) <0.8			
					Engine Coolant Temperature ambient air temperature vehicle speed engine speed engine speed at idle (Purge mass flow Canister close valve check (Lowpass filtered tank pressure OR Time for measurement (maximum)) Pressure Stabilization Check (Absolute reference value of differential tank pressure for time) Compensation Gradient Determination (Time for gradient measurements))	>69.8(°C) >-7.5(°C) <0.126(mph) >0(rpm) =TRUE <0.008(g/s) =TRUE >-0.9(kPa) =TRUE <0.04(kPa) >2(s) =TRUE >3(s)			
					Monitor has not completed this drive cycle (i.e. monitor runs once per trip)	=TRUE			
					Basic enable conditions met	=see sheet enable tables			
					No pending or confirmed DTCs	=see sheet inhibit tables			

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P0496	Monitoring of fuel tank pressure while CPV and CVV are closed (CPV stuck on/enl	Difference between low pass filtered tank and start pressure for Tank leakage diagnosis	<-0.06(kPa)	Basic Enable conditions are fulfilled as following conditions: Diagnosis of canister purge system is active means / Battery Voltage >10.9(V) Battery Voltage <25.6(V) Fuel Tank Pressure >-3.5(kPa) Fuel Tank Pressure <1.3(kPa) Pressure ratio of manifold pressure and ambient pressure <0.8 / Engine Coolant Temperature >69.8(°C) ambient air temperature >-7.5(°C) vehicle speed <0.13(mph) engine speed >0(rpm) engine speed at idle =TRUE { Purge mass flow <0.008(g/s) Canister close valve check =TRUE / Lowpass filtered tank pressure >-0.9(kPa) OR Time for measurement (maximum) >5(s)) Pressure Stabilization Check =TRUE { Absolute reference value of differential tank pressure <0.04(kPa) for time >2(s)) Compensation Gradient Determination =TRUE { Time for gradient measurements >3(s))) Monitor has not completed this drive cycle (i.e. monitor runs once per trip) =TRUE Basic enable conditions met =see sheet enable tables No pending or confirmed DTCs =see sheet inhibit tables	=TRUE	1(s)	2 Trip
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P04DF	Canister purge valve BankI is monitored for further pinpointing of a stuck open pruge valve. The diagnostic evaluates the impact on the MAP pressure bank 1 signal during an intrusively commanded purge valve opening	failing counter results during canister purge valve bank 1 diagnosis	>3(counts)	integrated purge mass flow bank 2	>0(g)	1(s)	2 Trip
		Counter is incremented if the following occurs (during intrusive purge valve command): difference in intake manifold pressure bankI (difference is between intake manifold pressure bank 1 at the beginning of intrusive canister purge valve activation and the end)	<0.5(kPa)	filtered difference of environmental pressure and intake manifold pressure Canister purge valve release conditions met:	<30(kPa) =TRUE		
				(engine coolant temperature ambient air pressure correction factor ambient air temperature)	>69.8(°C) >0.69 >-7.5(°C)		
				time in between diagnostic events has elapsed. Waiting time between events	=1(s)		
				Difference in filtered mixture correction	>0.1		
				Difference in filtered mixture correction	<-0.1		
				Monitor has not completed this drive cycle (i.e. monitor runs once per trip)	=TRUE		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		

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	P04AE	Canister purge valve Bank2 is monitored for further pinpointing of a stuck open purge valve. The diagnostic evaluates the impact on the MAP pressure bank 2 signal during an intrusively commanded purge valve opening	failing counter results during canister purge valve diagnosis	>3(counts)	integrated purge mass flow bank 2	>0(g)	1(s)	2 Trip
			Counter is incremented if the following occurs (during intrusive purge valve command): difference in intake manifold pressure bank2 (difference is between intake manifold pressure bank 2 at the beginning of intrusive canister purge valve activation and the end)	<0.5(kPa)	filtered difference of environmental pressure and intake manifold pressure Canister purge valve release conditions met:	<30(kPa) =TRUE		
					(engine coolant temperature ambient air pressure correction factor	>69.8(°C) >0.69		
					ambient air temperature / time in between diagnostic events has elapsed. Waiting time between events	>-7.5(°C) =1(s)		
					Difference in filtered mixture correction	>0.1		
					Difference in filtered mixture correction	<-0.1		
					Monitor has not completed this drive cycle (i.e. monitor runs once per trip)	=TRUE		
					Basic enable conditions met	=see sheet enable tables		
					No pending or confirmed DTCs	=see sheet inhibit tables		
4. EVAPORATIVE EMISSION SYSTEM DIAGNOSIS	P0446	Path 1 : Monitoring of Canister Ventilation Valve control - offset diagnosis	(		Error message for internal cycle Canister close valve error	=TRUE	1(s)	2 Trip
			Purge valve closed due to high vacuum	=TRUE	No pending or confirmed DTCs	=see sheet inhibit tables		

[illegible]

Unrestricted operation of Upstream closed loop lambda controller is active	=TRUE
{ Enleanment protection of lambda controller	=FALSE
{ Large deceleration enleanment protection of lambda controller for time	=FALSE
	<0.3 to 1(s)
(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	
)	
OR	
{ Large acceleration enrichment protection of lambda controller for time (see Look-Up-Table #96)	=FALSE
	<0.5to1(s)
)	
) and Upstream Lambda closed loop control for bank 1	=TRUE
{ Lambda control after injection cut off or fuel cut off is disabled	=FALSE
and Lambda swtiched ON after fuel cutoff	=TRUE
{ Fuel cut off is active	=FALSE
and	
{ time counter for after fuel cut off for enabling lambda control	>8(s)
OR	
{ Absolute value of diffence in lambda of bank 1	<0.2
and	
Difference of counter time and plant time constant	>0(s)
a-(b+c)	
where a is time counter for after fuel cut off for enabling lambda control	
b is plant time constant for continuous air/fuel control	

c is plant parameter for dead time for lambda control	
)	
)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
Level of lambda sensor 1 signal quality	<12
)	
and	
OBDII error flag, lambda control disabled	=FALSE
(
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
(
lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
(
for time	>2(s)
)	
)	
and	
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous for time	=TRUE >0.8(s)
)	
)	
and	
lambda value referred to sensor fitting location	>0.65
and	
Minimum injection time limitation for GDI mode is active	=FALSE
and	
(
Canister purge valve is active and open	=FALSE
OR	
Integral of canister purge mass flow	≥11.32(g)

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OR	
Condition for limit control	=TRUE
(
(
Canister purge rate reduction because of fuel rate controller deviations	>0
and	
Canister purge mass flow (see Look-Up-Table #61)	<0 to 0.83(g/s)
)	
for time	≤10(s)
)	
and	
Engine Coolant temperature	>0(°C)
and	
Number of injections for enabling fuel mixture adaptation diagnosis	>2000(counts)
and	
high amount fuel in the oil	=FALSE
(
Maximum proportion of evaporating fuel from the engine oil to the fuel demand where	<A-B
A is Threshold for significant evaporation of fuel from oil	=0.25
B is Delta hysteresis for significant evaporation from oil	=0.101563
)	
)	
for time	≤100(s)
)	
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P0172	Monitoring of minimum lambda controller deviation when the lambda controller mean value is lesser than the calibrated threshold	Deviation of fast lambda controller mean value from 1.0	<-0.23	(10(s)	2 Trip Sim Cond
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(
(
Unrestricted operation of Upstream closed loop lambda controller is active	=TRUE
(
Enleanment protection of lambda controller	=FALSE

(Large deceleration enrichment protection of lambda controller for time	=FALSE <0.3 to 1 (s)
(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	
)	
OR	
(Large acceleration enrichment protection of lambda controller for time (see Look-Up-Table #96)	=FALSE <0.5 to 1 (s)
)	
)	
and Upstream Lambda closed loop control for bank 1	=TRUE
(Lambda control after injection cut off or fuel cut off is disabled and Lambda switched ON after fuel cutoff	=FALSE =TRUE
(Fuel cut off is active and	=FALSE
(time counter for after fuel cut off for enabling lambda control	>8(s)
OR	
(Absolute value of difference in lambda of bank 1 and Difference of counter time and plant time constant	<0.2 >0(s)
a-(b+c) where a is time counter for after fuel cut off for enabling lambda control b is plant time constant for continuous air/fuel control c is plant parameter for dead time for lambda control	
)	
)	
)	
and	

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LSU sensor upstream to catalyst ready for operation	=TRUE
(Level of lambda sensor 1 signal quality	<12
) and	
OBDII error flag, lambda control disabled	=FALSE
(Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
) and	
(lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
(for time	>2(s)
) and	
Lambda control active due to GDI mode change	=TRUE
(GDI mode homogeneous for time	=TRUE >0.8(s)
) and	
lambda value referred to sensor fitting location	>0.65
and	
Minimum injection time limitation for GDI mode is active	=FALSE
and	
(Canister purge valve is active and open	=FALSE
OR	
Integral of canister purge mass flow after a longer purge stop	≥11.32(g)
OR	
Condition for limit control	=TRUE
(
(

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				Canister purge rate reduction because of fuel rate controller deviations and Canister purge mass flow (see Look-Up-Table #61)	>0 <0 to 0.83(g/s)		
				) for time	>10(s)		
				) and Engine Coolant temperature and Number of injections for enabling fuel mixture adaptation diagnosis and high amount fuel in the oil	>0(°C) >2000(counts) =FALSE		
				(Maximum proportion of evaporating fuel from the engine oil to the fuel demand where A is Threshold for significant evaporation of fuel from oil B is Delta hysteresis for significant evaporation from oil	<A-B =0.25 =0.1		
				) for time	>100(s)		
				/ No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0174	Monitoring of maximum lambda controller deviation when the lambda controller mean value is greater than the calibrated threshold	Deviation of fast lambda controller mean value from 1.0 of bank 2	>0.23	(		10(s)	2 Trip Sim Cond
				(
				(Unrestricted operation of Upstream closed loop lambda controller of bank 2 is active	=TRUE		
				(Enleanment protection of lambda controller of bank 2	=FALSE		
				(Large deceleration enleanment protection of lambda controller	=FALSE		

for time	<0.3 to 1(s)
(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	
)	
OR	
(Large acceleration enrichment protection of lambda controller	=FALSE
for time (see Look-Up-Table #96)	<0.5 to 1(s)
)	
)	
and Upstream Lambda closed loop control for bank 2	=TRUE
(Lambda control after injection cut off or fuel cut off of bank 2 is disabled	=FALSE
and Lambda switched ON after fuel cutoff of bank 2	=TRUE
(Fuel cut off is active and	=FALSE
(time counter for after fuel cut off for enabling lambda control	>8(s)
OR	
(Absolute value of diffence in lambda of bank 2	<0.2
and Difference of counter time and plant time constant	>0(s)
a-(b+c)	
where a is time counter for after fuel cut off for enabling lambda control	
b is plant time constant for continuous air/fuel control	
c is plant parameter for dead time for lambda control	
)	
)	
)	
and LSU sensor upstream to catalyst ready for operation in bank 2	=TRUE

Level of lambda sensor 1 signal quality of bank 2	<12
)	
and	
OBDII error flag, lambda control of bank 2 disabled	=FALSE
(
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
(
lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
for time	>2(s)
)	
)	
and	
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous for time	=TRUE >0.8(s)
)	
)	
and	
lambda value referred to sensor fitting location of bank 2	>0.65
and	
Minimum injection time limitation for GDI mode of bank 2 is active	=FALSE
and	
(
Canister purge valve is active and open	=FALSE
OR	
Integral of canister purge mass flow after a longer purge stop	≥11.32(g)
OR	
Condition for limit control	=TRUE
(
(
Canister purge rate reduction because of fuel rate controller deviations	>0
and	

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				Canister purge mass flow (see Look-Up-Table #61)	<0 to 0.83(g/s)		
) for time	>10(s)		
) and Engine Coolant temperature and Number of injections for enabling fuel mixture adaptation diagnosis and high amount fuel in the oil	>0(°C) >2000(counts) =FALSE		
				{ Maximum proportion of evaporating fuel from the engine oil to the fuel demand where A is Threshold for significant evaporation of fuel from oil B is Delta hysteresis for significant evaporation from oil	<A-B =0.25 =0.1		
				) ) for time			
				) No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0175	Monitoring of fast lambda controller mean value against Minimum rationality threshold	Deviation of fast lambda controller mean value from 1.0 corrected with P-part controller, bank 2	<-0.23	(		10(s)	2 Trip Sim Cond
				((Unrestricted operation of Upstream closed loop lambda controller of bank 2 is active	=TRUE		
				(Enleanment protection of lambda controller of bank 2	=FALSE		
				{ Large deceleration enleanment protection of lambda controller for time	=FALSE <0.3 to 1(s)		
				(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)			

)	
OR	
(
Large acceleration enrichment protection of lambda controller for time (see Look-Up-Table #96)	=FALSE <0.5 to 1(s)
)	
)	
and	
Upstream Lambda closed loop control for bank 2	=TRUE
(
Lambda control after injection cut off or fuel cut off of bank 2 is disabled	=FALSE
and	
Lambda switched ON after fuel cutoff of bank 2	=TRUE
(
Fuel cut off is active	=FALSE
and	
(
time counter for after fuel cut off for enabling lambda control	>8(s)
OR	
(
Absolute value of difference in lambda of bank 2	<0.2
and	
Difference of counter time and plant time constant	>0(s)
a-(b+c)	
where a is time counter for after fuel cut off for enabling lambda control	
b is plant time constant for continuous air/fuel control	
c is plant parameter for dead time for lambda control	
)	
)	
)	
and	
LSU sensor upstream to catalyst ready for operation in bank 2	=TRUE
(
Level of lambda sensor 1 signal quality of bank 2	<12
)	
and	

OBDII error flag, lambda control of bank 2 disabled	=FALSE
(Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
(lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
for time	>2(s)
)	
)	
and	
Lamda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
and	
lambda value referred to sensor fitting location of bank 2	>0.65
and	
Minimum injection time limitation for GDI mode of bank 2 is active	=FALSE
and	
(
Canister purge valve is active and open	=FALSE
OR	
Integral of canister purge mass flow after a longer purge stop	>11.32(g)
OR	
Condition for limit control	=TRUE
(
(
Canister purge rate reduction because of fuel rate controller deviations	>0
and	
Canister purge mass flow (see Look-Up-Table #61)	<0 to 0.83(g/s)
)	
)	

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						for time	>10(s)		
)			
						and			
						Engine Coolant temperature	>0(°C)		
						and			
						Number of injections for enabling	>2000(counts)		
						fuel mixture adaptation diagnosis			
						and			
						high amount fuel in the oil	=FALSE		
						(
						Maximum proportion of	<A-B		
						evaporating fuel from the engine oil			
						to the fuel demand			
						where			
						A is Threshold for significant	=0.25		
					evaporation of fuel from oil				
					B is Delta hysteresis for significant	=0.1			
					evaporation from oil				
)				
)				
					for time	>100(s)			
					/				
					No pending or confirmed DTCs	=see sheet inhibit tables			
					Basic enable conditions met	=see sheet enable tables			
7. FUEL SYSTEM ADAPTATION RATIONALITY CHECK	P2177	Multiplicative part of the Long Term Fuel Trim for Bank 1 in gasoline mode is greater than a calibrated threshold.	Multiplicative part of LTFT, Bank 1	>1.: 7	LTFT Multiplicative mixture	=TRUE	0.2(s)	2 Trip Sim Cond	
					adaptation bank 1 is active				
					(
					LTFT multiplicative part Bank 1	=TRUE			
					Integrator is stable which is of the				
					following conditions				
					(
					(
					Condition diagnostic thresholds of	=TRUE			
					multiplicative correction currently				
exceeded of bank 1 is stable									
\									
Multiplicative part of LTFT for bank 1	>1.27								
OR									
Multiplicative part of LTFT for bank 1	<0.77								
)									
OR									
Similar conditions for multiplicative	=TRUE								
fuel adaptation fulfilled									
(

Difference between Measured and reference Engine speed and	<375(rpm)
Difference between reference and measured Engine speed and	<375(rpm)
Difference between measured load value to reference load and	<20
Difference between reference load value to measured load	<20
)	
)	
and	
LTFT multiplicative part Bank 1 is stable, which is the following conditions for time	>10(s)
(
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE
(
Absolute change of LTFT multiplicative part, Bank 1	<2
)	
OR	
Absolute change of LTFT multiplicative part, Bank 1	<0.03
)	
and	
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE
OR	
Change in short term fuel trim, Bank 1	<0.03
)	
and	
Absolute difference between LTFT additive part, Bank 1 and its fixed value at beginning of multiplicative steady state phase	<0.75(%)
and	
Multiplicative mixture adaptation is active	=TRUE
(
(
Multiplicative mixture adaptation is active, which is the following conditions:	=TRUE
,	

Fra operational readiness independent of the operating mode is active, which is the following conditions for time	>2(s)
(Fundamental operating mode independent operation readiness of mixture adaption	=TRUE
(Condition error suspicion in mixture adaptation	=TRUE
(Coolant Engine Temperature where C - cut-in temperature adaptive precontrol for lambda closed-loop control where D - cut-in temperature fuel mixture adaptation in case of error suspicion	>Min(C, D)(°C) =59.3(°C)
) OR Coolant Engine Temperature	>59.3(°C)
) and Basic willingness of fuel mixture adaptation, except engine temperature	=TRUE
(Intake air temperature and Condition of Wide Open Throttle	<90(°C) =FALSE
(Propulsion torque after driving assistance coordination (see Look-Up-Table #5)	<900 to 1300(Nm)
) and Increased tolerances of air charge determination expected	=FALSE
) and Maximum proportion of evaporating fuel from the engine oil to the fuel demand (model based)	<1.99
) and Number of injections for enabling fuel mixture adaptation	>2000(counts)
) and	
ECM adaptation protection enabled	TRUE

(Torque commanded to charge control (see Look-Up-Table #60)	>13.00 to 99.998(%)
and Torque commanded to charge control (see Look-Up-Table #59)	<0 to 75(%)
)	
) and Operating mode dependent Readiness LRA	=TRUE
((Lambda closed loop control upstream catalyst, bank 1	=TRUE
(Enleanment protection of lambda controller	=FALSE
((Large deceleration enleanment protection of lambda controller	=FALSE
(Relative fuel mass transient component threshold for deceleration enleanment	>-100(%/seg)
and Relative fuel mass transient component threshold for deceleration enleanment in bank 2	>-100(%/seg)
) for time (see Look-Up-Table #96)	>0.5 to 1(s)
) OR	
{ Large acceleration enrichment protection of lambda controller	=FALSE
{ Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #91)	
and	

Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
) for time	>0.3 to 1 (s)
(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	
)	
)	
and Upstream Lambda closed loop control for bank 1	=TRUE
(Lambda control disabled during after cylinder cut-off	=FALSE
and Lambda swtiched ON after fuel cutoff	=TRUE
(Fuel cut off is active and	=FALSE
(Time running down after fuel cut-off for enabling lambda control OR	>8(s)
(Absolute value of diffence in lambda of bank 1 and	<0.2
Difference of counter time and plant time constant a-(b+c) where a is Time running down after fuel cut-off for enabling lambda control b is plant time constant for continuous air/fuel control c is plant parameter for dead time for lambda control	>0(s)
)	
)	
)	
and LSU sensor upstream to catalyst ready for operation	=TRUE
(Level of lambda sensor 1 signal	<12

)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate	=FALSE
exceeded	
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating	=FALSE
range present and MAF is main air	
charge sensor	
)	
and	
lambda control is active since	=TRUE
warmup is finished	
and	
Relative air charge	>0(%)
for time	>2(s)
)	
and	
Lambda control active due to GDI	=TRUE
mode change	
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
and	
Lambda set point	>0.65
and	
Minimum injection time limitation for	=FALSE
GDI mode is active	
and	
\	
Width of dead zone for lambda	<0
control deviation	
OR	
Lambda control continues error	>0
)	
)	
OR	
(
Unrestricted operation of Upstream	=TRUE
closed loop lambda controller of bank	
2 is active	
/	
Enleanment protection of lambda	=FALSE
controller	
(
(
Large deceleration enleanment	=FALSE
protection of lambda controller	

(	Relative fuel mass transient component threshold for deceleration enrichment	>-100(%/seg)
and	Relative fuel mass transient component threshold for deceleration enrichment in bank 2	>-100(%/seg)
)	for time (see Look-Up-Table #96)	<0.5 to 1 (s)
)	OR	
(	Large acceleration enrichment protection of lambda controller	=FALSE
(	Relative fuel mass transient component threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
	(see Look-Up-Table #91)	
and	Relative fuel mass transient component threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
	(see Look-Up-Table #92)	
)	for time	<0.3 to 1 (s)
	(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	
)		
)	and	
	Upstream Lambda closed loop control for bank 2	=TRUE
(	Lambda control disabled during after cylinder cut-off	=FALSE
and	Lambda switched ON after fuel cutoff	=TRUE
(	Fuel cut off is active	=FALSE

and	
(
Time running down after fuel cut-off	>8(s)
for enabling lambda control	
OR	
(
Absolute value of diffence in lambda	<0.2
of bank 2	
and	
Difference of counter time and plant	>0(s)
time constant	
a-(b+c)	
where a is Time running down after	
fuel cut-off for enabling lambda	
control	
b is plant time constant of bank 2 for	
continuous air/fuel control	
c is plant parameter of bank 2 for	
dead time for lambda control	
)	
)	
)	
and	
LSU sensor upstream to catalyst	=TRUE
ready for operation	
(
Level of lambda sensor 1, bank 2	<12
signal quality	
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate	=FALSE
exceeded	
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating	=FALSE
range present and MAF is main air	
charge sensor	
)	
and	
lambda control is active since	=TRUE
warmup is finished	
and	
Relative air charge	>0(%)
for time	>2(s)
)	
and	
Lamda control active due to GDI	=TRUE
mode change	
(
GDI mode transition	TRUE

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for time	>0.8(s)
)	
)	
and	
Lambda set point	>0.6499
and	
Minimum injection time limitation for GDI mode of bank 2 is active	=FALSE
and	
(
Width of dead zone for lambda control deviation	=0
OR	
Lambda control continues error	>0
)	
)	
for time	>2(s)
)	
and	
(
Difference between lambda value referenced to sensor fitting of bank 1 and bank 2	>0
and	
Lambda set point	<1.1
and	
{	
Detection of fuel mixture adaption	=TRUE
(
Lambda set point of bank 2	>0.87
)	
OR	
Lambda set point of bank 2	>0.96
)	
for time	>Max(A,B)(s)
where A - delay time for lambda fuel adaption (rich condition) (see Look-Up-Table #65)	=3 to 5(s)
where B - delay time for lambda fuel adaption (lean condition) (see Look-Up-Table #66)	=3 to 5(s)
)	
and	
Limitation due to fuel in oil is deactivated	=TRUE
and	
Limitation due to fuel in oil is deactivated for bank 2	=TRUE
)	
and	
)	
and	

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				Lambda closed loop control upstream catalyst, bank 1	=TRUE		
)			
				Multiplicative adaptation correction factor	>0		
)			
)			
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P2178	Multiplicative part of the Long Term Fuel Trim for Bank 1 in gasoline mode is less than a calibrated threshold.	Multiplicative part of LTFT for bank 1	<0.77	LTFT Multiplicative mixture adaptation bank 1 is active	=TRUE	0.2(s)	2 Trip Sim Cond
				(
				LTFT multiplicative part Bank 1 Integrator is stable which is of the following conditions	=TRUE		
				(
				(
				Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE		
				(
				Multiplicative part of LTFT for bank 1	>1.27		
				OR			
				Multiplicative part of LTFT for bank 1	<0.77		
)			
				OR			
				Similar conditions for multiplicative fuel adaptation fulfilled	=TRUE		
				(
				Difference between Measured and reference Engine speed	<375(rpm)		
				and			
				Difference between reference and measured Engine speed	<375(rpm)		
				and			
				Difference between measured load value to reference load	<20		
				and			
				Difference between reference load value to measured load	<20		
)			
)			
				and			

LTFT multiplicative part Bank 1 is stable, which is the following conditions for time	>10(s)
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE
(
Absolute change of LTFT multiplicative part, Bank 1	<2
)	
OR	
Absolute change of LTFT multiplicative part, Bank 1	<0.03
)	
and	
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE
OR	
Change in short term fuel trim, Bank 1	<0.03
)	
and	
Absolute difference between LTFT additive part, Bank 1 and its fixed value at beginning of multiplicative steady state phase	<0.75(%)
and	
Multiplicative mixture adaptation is active	=TRUE
(
(
Multiplicative mixture adaptation is active, which is the following conditions:	=TRUE
(
Fra operational readiness independent of the operating mode is active, which is the following conditions for time	>2(s)
(
Fundamental operating mode independent operation readiness of mixture adaption	=TRUE
(
(
Condition error suspicion in mixture adaptation	=TRUE
(
Constant Engine Temperature	SMIL (C, DV%)

where C - cut-in temperature adaptive precontrol for lambda closed-loop control	=59.3(°C)
where D - cut-in temperature fuel mixture adaptation in case of error suspicion	=57.8(°C)
) OR Coolant Engine Temperature	>59.3(°C)
) and Basic willingness of fuel mixture adaptation, except engine temperature	=TRUE
{ Intake air temperature	<90(°C)
and Condition of Wide Open Throttle	=FALSE
{ Propulsion torque after driving assistance coordination (see Look-Up-Table #5)	<900 to 1300(Nm)
) and Increased tolerances of air charge determination expected	=FALSE
and Maximum proportion of evaporating fuel from the engine oil to the fuel demand (model based)	<1.99
and { Number of injections for enabling fuel mixture adaptation	>2000(counts)
)) and FRA adaption physically enabled	=TRUE
{ Torque commanded to charge control (see Look-Up-Table #60)	>13.00 to 99.998(%)
and Torque commanded to charge control (see Look-Up-Table #59)	<0 to 75(%)
)) and	

Operating mode dependent Readiness LRA	=TRUE
(
(
Lambda closed loop control upstream catalyst, bank 1	=TRUE
(
Enleanment protection of lambda controller	=FALSE
(
(
Large deceleration enleanment protection of lambda controller	=FALSE
(
Relative fuel mass transient component threshold for deceleration enleanment	>-100(%/seg)
and	
Relative fuel mass transient component threshold for deceleration enleanment in bank 2	>-100(%/seg)
)	
for time (see Look-Up-Table #96)	>0.5 to 1(s)
)	
OR	
(
Large acceleration enrichment protection of lambda controller	=FALSE
{	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #91)	
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
)	
for time	>0.3to1(s)
(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	

)	
and	
Upstream Lambda closed loop control for bank 1	=TRUE
(
Lambda control disabled during after cylinder cut-off	=FALSE
and	
Lambda switched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
and	
\	
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
\	
Absolute value of difference in lambda of bank 1	<0.2
and	
Difference of counter time and plant time constant	>0(s)
$a-(b+c)$	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant for continuous air/fuel control	
c is plant parameter for dead time for lambda control	
)	
)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
Level of lambda sensor 1 signal quality	<12
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	

lambda control is active since warmup is finished and Relative air charge	=TRUE >0(%)
for time) and Lamda control active due to GDI mode change (GDI mode homogeneous for time)) and Lambda set point and Minimum injection time limitation for GDI mode is active and (Width of dead zone for lambda control deviation OR Lambda control continues error)) OR (Unrestricted operation of Upstream closed loop lambda controller of bank 2 is active (Enleanment protection of lambda controller ((Large deceleration enleanment protection of lambda controller (Relative fuel mass transient component threshold for deceleration enleanment and Relative fuel mass transient component threshold for deceleration enleanment in bank 2) for time (see Look-Up-Table #96)	>2(s) =TRUE =TRUE >0.8(s) =>0.65 =FALSE =<0 =>0 =TRUE =FALSE =FALSE =>-100(%/seg) =>-100(%/seg) =<0.5 to 1(s)


```

)
OR
(
  Large acceleration enrichment protection of lambda controller      =FALSE
(
  Relative fuel mass transient componet threshold for acceleration
  enrichment (Bank 1)                                          <4.99 to 49.99(%/seg)

  (see Look-Up-Table #91)

and

  Relative fuel mass transient componet threshold for acceleration
  enrichment (Bank 2)                                          <4.99 to 49.99(%/seg)

  (see Look-Up-Table #92)

)
  for time                                                    <0.3to1(s)

  (blocking time for activation LC after acceleration enrichment)
  (see Look-Up-Table #95)

)
)
and
  Upstream Lambda closed loop control for bank 2              =TRUE
(
  Lambda control disabled during after cylinder cut-off      =FALSE
and
  Lambda swtiched ON after fuel cutoff                        =TRUE

(
  Fuel cut off is active                                      =FALSE
and
(
  Time running down after fuel cut-off for enabling lambda control  >8(s)
OR
(
  Absolute value of diffence in lambda of bank 2              <0.2
and
  Difference of counter time and plant time constant          >0(s)
a-(b+c)

```

```

where a is Time running down after
fuel cut-off for enabling lambda
control
b is plant time constant of bank 2 for
continuous air/fuel control
c is plant parameter of bank 2 for
dead time for lambda control
)
)
)
and
LSU sensor upstream to catalyst
ready for operation                =TRUE
(
Level of lambda sensor 1, bank 2
signal quality                    <12
)
and
Lambda control disabled by a fault =FALSE
(
Catalyst damaging misfire rate
exceeded                        =FALSE
and
Injector power stage fault is active =FALSE
and
Camshaft fault in critical operating
range present and MAF is main air
charge sensor                    =FALSE
)
and
lambda control is active since
warmup is finished              =TRUE
and
Relative air charge              >0(%)

for time                        >2(s)
)
and
Lambda control active due to GDI
mode change                      =TRUE
(
GDI mode homogeneous            =TRUE
for time                        >0.8(s)
)
)
and
Lambda set point                 >0.65
and
Minimum injection time limitation for
GDI mode of bank 2 is active    =FALSE
and
/
Width of dead zone for lambda    =0

```

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OR	
Lambda control continues error	>0
)	
)	
for time	>2(s)
)	
and	
(
Difference between lambda value referenced to sensor fitting of bank 1 and bank 2	>0
and	
Lambda set point	<1.1
and	
(
Detection of fuel mixture adaption	=TRUE
(
Lambda set point of bank 2	>0.87
)	
OR	
Lambda set point of bank 2	>0.96
)	
for time	>Max(A,B)(s)
where A - delay time for lambda fuel adaption (rich condition) (see Look-Up-Table #65)	=3 to 5(s)
where B - delay time for lambda fuel adaption (lean condition) (see Look-Up-Table #66)	=3 to 5(s)
)	
and	
Limitation due to fuel in oil is deactivated	=TRUE
and	
Limitation due to fuel in oil is deactivated for bank 2	=TRUE
)	
)	
and	
Lambda closed loop control upstream catalyst, bank 1	=TRUE
)	
Multiplicative adaptation correction factor	>0
)	
)	
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tablas

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P2179	Multiplicative part of the Long Term Fuel Trim for Bank 2 in gasoline mode is greater than a calibrated threshold.	Multiplicative part of LTFT, Bank 2	>1.27	LTFT Multiplicative mixture adaptation bank 2 is active	=TRUE	0.2(s)	2 Trip Sim Cond
				(LTFT multiplicative part Bank 2 Integrator is stable which is of the following conditions ((Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 2 is stable (Multiplicative part of LTFT for bank 2	=TRUE		
				OR Multiplicative part of LTFT for bank 2	<0.77		
				) OR Similar conditions for multiplicative fuel adaptation fulfilled for bank 2 (Difference between Measured and reference Engine speed, bank 2 and Difference between reference and measured Engine speed, bank 2 and Difference between measured load value to reference load, bank 2 and Difference between reference load value to measured load, bank 2)) and LTFT multiplicative part Bank 2 is stable, which is the following conditions for time ((Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 2 is stable (Absolute change of LTFT multiplicative part, Bank 2) OR	=TRUE		
					<375(rpm)		
					<375(rpm)		
					<20		
					<20		
					>10(s)		
					=TRUE		
					<2		

Basic willingness of fuel mixture adaptation, except engine temperature	=TRUE
(
Intake air temperature	<90(°C)
and	
Condition of Wide Open Throttle	=FALSE
(
Propulsion torque after driving assistance coordination (see Look-Up-Table #5)	<900 to 1300(Nm)
)	
and	
Increased tolerances of air charge determination expected	=FALSE
and	
Maximum proportion of evaporating fuel from the engine oil to the fuel demand (model based)	<1.99
)	
and	
(
Number of injections for enabling fuel mixture adaptation	>2000(counts)
)	
)	
and	
FRA adaption physically enabled	=TRUE
(
Torque commanded to charge control (see Look-Up-Table #60)	>13.00 to 99.998(%)
and	
Torque commanded to charge control (see Look-Up-Table #59)	<0 to 75(%)
)	
)	
and	
Operating mode dependent Readiness LRA	=TRUE
(
(
Lambda closed loop control upstream catalyst, bank 1	=TRUE
(
Enleanment protection of lambda controller	=FALSE
(
(

Large deceleration enrichment protection of lambda controller	=FALSE
(
Relative fuel mass transient component threshold for deceleration enrichment	>-100(%/seg)
and	
Relative fuel mass transient component threshold for deceleration enrichment in bank 2	>-100(%/seg)
)	
for time	>0.5 to 1(s)
(see Look-Up-Table #96)	
)	
OR	
(
Large acceleration enrichment protection of lambda controller	=FALSE
{	
Relative fuel mass transient component threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #91)	
and	
Relative fuel mass transient component threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
)	
for time	>0.3 to 1(s)
(blocking time for activation LC after acceleration enrichment)	
(see Look-Up-Table #95)	
)	
)	
and	
Upstream Lambda closed loop control for bank 1	=TRUE
(
Lambda control disabled during after cylinder cut-off	=FALSE
and	
Lambda switched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
onrl	

(
Time running down after fuel cut-off for enabling lambda control	>3(8)
OR	
(
Absolute value of diffence in lambda of bank 1	<0.2
and	
Difference of counter time and plant time constant	>0(8)
a-(b+c)	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant for continuous air/fuel control	
c is plant parameter for dead time for lambda control	
)	
)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
Level of lambda sensor 1 signal quality	<12
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
for time	>2(s)
)	
and	
Lamda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous	=TRUE
for time	>0.2(s)


```

)
)
and
Lambda set point                                >0.65
and
Minimum injection time limitation for GDI mode is active =FALSE
and
{
Width of dead zone for lambda control deviation      <0
OR
Lambda control continues error                      >0
}
)
OR
{
Unrestricted operation of Upstream closed loop lambda controller of bank 2 is active =TRUE
{
Enleanment protection of lambda controller          =FALSE
(
Large deceleration enleanment protection of lambda controller =FALSE
(
Relative fuel mass transient component threshold for deceleration enleanment >-100(%/seg)

and
Relative fuel mass transient component threshold for deceleration enleanment in bank 2 >-100(%/seg)

)
for time (see Look-Up-Table #96)                <0.5 to 1(s)
)
OR
{
Large acceleration enrichment protection of lambda controller =FALSE
(
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1) <4.99 to 49.99(%/seg)

(see Look-Up-Table #91)

```

and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
)	
for time	<0.3 to 1 (s)
(blocking time for activation LC after acceleration enrichment)	
(see Look-Up-Table #95)	
)	
)	
and	
Upstream Lambda closed loop control for bank 2	=TRUE
(
Lambda control disabled during after cylinder cut-off	=FALSE
and	
Lambda swtiched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
and	
{	
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
{	
Absolute value of diffence in lambda of bank 2	<0.2
and	
Difference of counter time and plant time constant	>0(s)
a-(b+c)	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant of bank 2 for continuous air/fuel control	
c is plant parameter of bank 2 for dead time for lambda control	
)	
)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(

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Level of lambda sensor 1, bank 2 signal quality	<12
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
for time	>2(s)
)	
and	
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
and	
Lambda set point	>0.65
and	
Minimum injection time limitation for GDI mode of bank 2 is active	=FALSE
and	
(
Width of dead zone for lambda control deviation	=0
OR	
Lambda control continues error	>0
)	
)	
for time	>2(s)
)	
and	
(
Difference between lambda value referenced to sensor fitting of bank 1 and bank 2	>0
and	
Lambda set point	<1/

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				(Detection of fuel mixture adaption (Lambda set point of bank 2) OR Lambda set point of bank 2) for time where A - delay time for lambda fuel adaption (rich condition) (see Look-Up-Table #65) where B - delay time for lambda fuel adaption (lean condition) (see Look-Up-Table #66)) and Limitation due to fuel in oil is deactivated and Limitation due to fuel in oil is deactivated for bank 2)) and Lambda closed loop control upstream catalyst, bank 2 / Multiplicative adaptation correction factor of bank 2))) No pending or confirmed DTCs Basic enable conditions met	=TRUE >0.87 >0.96 >Max(A,B)(s) =3 to 5(s) =3 to 5(s) =TRUE =TRUE =TRUE >0 =see sheet inhibit tables =see sheet enable tables		
P2180	Multiplicative part of the Long Term Fuel Trim for Bank 2 in gasoline mode is less than a calibrated threshold.	Multiplicative part of LTFT for bank 2	<0.77	LTFT Multiplicative mixture adaptation bank 2 is active (LTFT multiplicative part Bank 2 Integrator is stable which is of the following conditions ((Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 2 is stable	=TRUE =TRUE =TRUE	0.2(s)	2 Trip Sim Cond

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(
Multiplicative part of LTFT for bank 2	>1.27
OR	
Multiplicative part of LTFT for bank 2	<0.77
)	
OR	
Similar conditions for multiplicative fuel adaptation fulfilled for bank 2	=TRUE
(
Difference between Measured and reference Engine speed, bank 2	<375(rpm)
and	
Difference between reference and measured Engine speed, bank 2	<375(rpm)
and	
Difference between measured load value to reference load, bank 2	<20
and	
Difference between reference load value to measured load, bank 2	<20
)	
)	
and	
LTFT multiplicative part Bank 2 is stable, which is the following conditions for time	>10(s)
(
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 2 is stable	=TRUE
(
Absolute change of LTFT multiplicative part, Bank 2	<2
)	
OR	
Absolute change of LTFT multiplicative part, Bank 2	<0.03
)	
and	
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 2 is stable	=TRUE
OR	
Change in short term fuel trim, Bank 2	<0.03
)	
and	

Absolute difference between LTFT additive part, Bank 1 and its fixed value at beginning of multiplicative steady state phase	<0.75(%)
and Multiplicative mixture adaptation is active, bank 2	=TRUE
((Multiplicative mixture adaptation is active, which is the following conditions:	=TRUE
(Fra operational readiness independent of the operating mode is active, which is the following conditions for time	>2(s)
(Fundamental operating mode independent operation readiness of mixture adaption	=TRUE
((Condition error suspicion in mixture adaptation	=TRUE
(Coolant Engine Temperature where C - cut-in temperature adaptive precontrol for lambda closed-loop control	>Min(C, D)(°C) =59.3(°C)
where D - cut-in temperature fuel mixture adaptation in case of error suspicion	=57.8(°C)
) OR	
Coolant Engine Temperature	>59.3(°C)
) and	
Basic willingness of fuel mixture adaptation, except engine temperature	=TRUE
((Intake air temperature	<90(°C)
and	
Condition of Wide Open Throttle	=FALSE
((Propulsion torque after driving assistance coordination (see Look-Up-Table #5)	<900 to 1300(Nm)
))	

Increased tolerances of air charge determination expected	=FALSE
and	
Maximum proportion of evaporating fuel from the engine oil to the fuel demand (model based)	<1.99
1	
and	
(
Number of injections for enabling fuel mixture adaptation	>2000(counts)
)	
)	
and	
FRA adaption physically enabled	=TRUE
(
Torque commanded to charge control	>13.00 to 99.998(%)
(see Look-Up-Table #60)	
and	
Torque commanded to charge control	<0 to 75(%)
(see Look-Up-Table #59)	
)	
)	
and	
Operating mode dependent Readiness LRA	=TRUE
(
(
Lambda closed loop control upstream catalyst, bank 1	=TRUE
{	
Enleanment protection of lambda controller	=FALSE
(
(
Large deceleration enleanment protection of lambda controller	=FALSE
{	
Relative fuel mass transient component threshold for deceleration enleanment	>-100(%/seg)
and	
Relative fuel mass transient component threshold for deceleration enleanment in bank 2	>-100(%/seg)
)	

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for time (see Look-Up-Table #96)	>0.5 to 1 (s)
)	
OR	
(
Large acceleration enrichment protection of lambda controller	=FALSE
(
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #91)	
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
)	
for time	>0.3 to 1 (s)
(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	
)	
)	
and	
Upstream Lambda closed loop control for bank 1	=TRUE
(
Lambda control disabled during after cylinder cut-off	=FALSE
and	
Lambda swtiched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
and	
(
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
(
Absolute value of diffence in lambda of bank 1	<0.2
and	

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Difference of counter time and plant time constant	>0(5)
a-(b+c)	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant for continuous air/fuel control	
c is plant parameter for dead time for lambda control	
)	
)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
Level of lambda sensor 1 signal quality	<12
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
(
for time	>2(s)
)	
and	
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
and	
Lambda set point	>0.65
and	
Minimum injection time limitation for GDI mode operation	=FALSE

```

and
(
Width of dead zone for lambda control deviation <0
OR
Lambda control continues error >0
)
)
OR
(
Unrestricted operation of Upstream closed loop lambda controller of bank 2 is active =TRUE
(
Enleanment protection of lambda controller =FALSE
(
Large deceleration enleanment protection of lambda controller =FALSE
{
Relative fuel mass transient component threshold for deceleration enleanment >-100(%/seg)

and
Relative fuel mass transient component threshold for deceleration enleanment in bank 2 >-100(%/seg)
}
for time <0.5 to 1 (s)
(see Look-Up-Table #96)

)
OR
(
Large acceleration enrichment protection of lambda controller =FALSE
{
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1) <4.99 to 49.99(%/seg)

(see Look-Up-Table #91)

and
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) <4.99 to 49.99(%/seg)

(see Look-Up-Table #92)

\

```

for time	<0.3 to 1(s)
(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	
)	
)	
and	
Upstream Lambda closed loop control for bank 2	=TRUE
(
Lambda control disabled during after cylinder cut-off	=FALSE
and	
Lambda switched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
and	
(
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
(
Absolute value of difference in lambda of bank 2	<0.2
and	
Difference of counter time and plant time constant	>0(s)
$a-(b+c)$	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant of bank 2 for continuous air/fuel control	
c is plant parameter of bank 2 for dead time for lambda control	
)	
)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
Level of lambda sensor 1, bank 2 signal quality	<12
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
and	

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Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating	=FALSE
range present and MAF is main air	
charge sensor	
)	
and	
lambda control is active since	=TRUE
warmup is finished	
and	
Relative air charge	>0(%)
(
for time	-2(s)
)	
and	
Lambda control active due to GDI	=TRUE
mode change	
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
and	
Lambda set point	>0.65
and	
Minimum injection time limitation for	=FALSE
GDI mode of bank 2 is active	
and	
(
Width of dead zone for lambda	=0
control deviation	
OR	
Lambda control continues error	>0
)	
)	
for time	52(s)
)	
and	
(
Difference between lambda value	>0
referenced to sensor fitting of bank 1	
and bank 2	
and	
Lambda set point	<1.1
and	
(
Detection of fuel mixture adaption	=TRUE
(
Lambda set point of bank 2	>0.87
)	
OR	
Lambda set point of bank 2	>0.96
,	

Similar conditions for multiplicative fuel adaptation fulfilled	=TRUE
(
Difference between Measured and reference Engine speed	<375(rpm)
and	
Difference between reference and measured Engine speed	<375(rpm)
and	
Difference between measured load value to reference load	<20
and	
Difference between reference load value to measured load	<20
)	
)	
and	
LTFT multiplicative part Bank 1 is stable, which is the following conditions for time	>10(s)
(
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE
(
Absolute change of LTFT multiplicative part, Bank 1	<2
)	
OR	
Absolute change of LTFT multiplicative part, Bank 1	<0.03
)	
and	
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE
OR	
Change in short term fuel trim, Bank 1	<0.03
)	
and	
Absolute difference between LTFT additive part, Bank 1 and its fixed value at beginning of multiplicative steady state phase	<0.75(%)
and	
Multiplicative mixture adaptation is active	=TRUE
(
(

Multiplicative mixture adaptation is active, which is the following conditions:	=TRUE
{	
Fra operational readiness independent of the operating mode is active, which is the following conditions for time	>2(s)
{	
Fundamental operating mode independent operation readiness of mixture adaption	=TRUE
(
(
Condition error suspicion in mixture adaptation	=TRUE
(
Coolant Engine Temperature where C - cut-in temperature adaptive precontrol for lambda closed-loop control	>Min(C, D)(°C) =59.3(°C)
where D - cut-in temperature fuel mixture adaptation in case of error suspicion	=57.8(°C)
)	
OR	
Coolant Engine Temperature	>59.3(°C)
)	
and	
Basic willingness of fuel mixture adaptation, except engine temperature	=TRUE
{	
Intake air temperature	<90(°C)
and	
Condition of Wide Open Throttle	=FALSE
{	
Propulsion torque after driving assistance coordination (see Look-Up-Table #5)	<900 to 1300(Nm)
)	
and	
Increased tolerances of air charge determination expected	=FALSE
and	
Maximum proportion of evaporating fuel from the engine oil to the fuel demand (model based)	<2
)	
and	
(

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Number of injections for enabling fuel mixture adaptation	>2000(counts)
)	
)	
and	
FRA adaption physically enabled	=TRUE
{	
Torque commanded to charge control (see Look-Up-Table #60)	>13.00 to 99.998(%)
and	
Torque commanded to charge control (see Look-Up-Table #59)	<0 to 75(%)
)	
)	
and	
Operating mode dependent Readiness LRA	=TRUE
{	
{	
Lambda closed loop control upstream catalyst, bank 1	=TRUE
{	
Enleanment protection of lambda controller	=FALSE
{	
{	
Large deceleration enleanment protection of lambda controller	=FALSE
{	
Relative fuel mass transient component threshold for deceleration enleanment	>-100(%/seg)
and	
Relative fuel mass transient component threshold for deceleration enleanment in bank 2	>-100(%/seg)
)	
for time (see Look-Up-Table #96)	>0.5 to 1(s)
)	
OR	
{	
Large acceleration enrichment protection of lambda controller	=FALSE
{	

Relative fuel mass transient
componet threshold for acceleration
enrichment (Bank 1)

<4.99 to 49.99(%/seg)

(see Look-Up-Table #91)

and

Relative fuel mass transient
componet threshold for acceleration
enrichment (Bank 2)

<4.99 to 49.99(%/seg)

(see Look-Up-Table #92)

)

for time

>0.3to1(s)

(blocking time for activation LC after
acceleration enrichment)
(see Look-Up-Table #95)

)

)

and

Upstream Lambda closed loop
control for bank 1

=TRUE

(

Lambda control disabled during after
cylinder cut-off

=FALSE

and

Lambda swtiched ON after fuel cutoff

=TRUE

(

Fuel cut off is active

=FALSE

and

(

Time running down after fuel cut-off
for enabling lambda control

>8(s)

OR

(

Absolute value of diffence in lambda
of bank 1

<0.2

and

Difference of counter time and plant
time constant

>0(s)

a-(b+c)

where a is Time running down after
fuel cut-off for enabling lambda
control

b is plant time constant for
continuous air/fuel control

c is plant parameter for dead time for
lambda control

)

)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
Level of lambda sensor 1 signal quality	<12
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
(	>2(s)
for time	
)	
and	
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous for time	=TRUE >0.8(s)
)	
and	
Lambda set point	>0.65
and	
Minimum injection time limitation for GDI mode is active	=FALSE
and	
(
Width of dead zone for lambda control deviation	<0
OR	
Lambda control continues error	>0
)	
)	
OR	
(

Unrestricted operation of Upstream closed loop lambda controller of bank 2 is active	=TRUE
(
Enleanment protection of lambda controller	=FALSE
(
(
Large deceleration enleanment protection of lambda controller	=FALSE
(
Relative fuel mass transient component threshold for deceleration enleanment	>-100(%/seg)
and	
Relative fuel mass transient component threshold for deceleration enleanment in bank 2	>-100(%/seg)
)	
for time	<0.5 to 1 (s)
(see Look-Up-Table #96)	
)	
OR	
(
Large acceleration enrichment protection of lambda controller	=FALSE
(
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #91)	
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
)	
for time	<0.3 to 1 (s)
(blocking time for activation LC after acceleration enrichment)	
(see Look-Up-Table #95)	
)	
)	
and	

Upstream Lambda closed loop control for bank 2	=TRUE
\	
Lambda control disabled during after cylinder cut-off	=FALSE
and	
Lambda switched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
and	
\	
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
\	
Absolute value of difference in lambda of bank 2	<0.2
and	
Difference of counter time and plant time constant	>0(s)
$a-(b+c)$	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant of bank 2 for continuous air/fuel control	
c is plant parameter of bank 2 for dead time for lambda control	
)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
Level of lambda sensor 1, bank 2 signal quality	<12
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
lambda control is active since	=TRUE

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and Relative air charge	>0(%)
(for time	>2(s)
) and Lamda control active due to GDI mode change	=TRUE
(GDI mode homogeneous for time	=TRUE >0.8(s)
)) and Lambda set point	>0.65
and Minimum injection time limitation for GDI mode of bank 2 is active and	=FALSE
(Width of dead zone for lambda control deviation	=0
OR Lambda control continues error	>0
)) for time	>2(s)
) and (Difference between lambda value referenced to sensor fitting of bank 1 and bank 2	>0
and Lambda set point	<1.1
and (Detection of fuel mixture adaption	=TRUE
(Lambda set point of bank 2	>0.87
) OR Lambda set point of bank 2	>0.96
) for time where A - delay time for lambda fuel adaption (rich condition) (see Look-Up-Table #65)	>Max(A,B)(s) =3 to 5(s)
where B - delay time for lambda fuel adaption (lean condition) (see Look-Up-Table #66)	=3 to 5(s)

)	
and	
Limitation due to fuel in oil is deactivated	=TRUE
and	
Limitation due to fuel in oil is deactivated for bank 2	=TRUE
)	
)	
and	
Lambda closed loop control upstream catalyst, bank 1	=TRUE
)	
Multiplicative adaptation correction factor, bank 1	>0
)	
)	
and	
(
LTFT additive part Bank 1 Integrator is stable which is of the following conditions	=TRUE
(
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 1 is stable	=TRUE
(
Additive part of LTFT for bank 1	>5.484(%)
OR	
Additive part of LTFT for bank 1	<-5.484(%)
)	
OR	
Similar conditions for additive fuel adaptation fulfilled	=TRUE
(
Difference between Measured and reference Engine speed	<375(rpm)
and	
Difference between reference and measured Engine speed	<375(rpm)
and	
Difference between measured load value to reference load	<20
and	
Difference between reference load value to measured load	<20
)	
)	
and	
LTFT additive part Bank 1 is stable, which is the following conditions for time	>10(s)
,	

(Condition diagnostic thresholds of additive correction currently exceeded of bank 1 is stable \	=TRUE
Absolute change of LTFT additive part, Bank 1)	<0.188(%)
OR Absolute change of LTFT additive part, Bank 1)	<0.188(%)
and \	
Condition diagnostic thresholds of additive correction currently exceeded of bank 1 is stable OR	=TRUE
Change in short term fuel trim, Bank 1 \	<0.03
) and Absolute difference between LTFT multiplicative part, Bank 1 and its fixed value at beginning of additive steady state phase and	<0.05(%)
Additive mixture adaptation is active	=TRUE
t (Additive mixture adaptation is active, which is the following conditions:	=TRUE
(Ora operational readiness independent of the operating mode is active, which is the following conditions for time \	>2(s)
Fundamental operating mode independent operation readiness of mixture adaption and	=TRUE
ORA adaption physically enabled	=TRUE
(Torque commanded to charge control (see Look-Up-Table #63)	>2.499 to 99.998(%)
and	

Difference between reference and measured Engine speed and	<375(rpm)
Difference between measured load value to reference load and	<20
Difference between reference load value to measured load	<20
)	
)	
and	
LTFT multiplicative part Bank 1 is stable, which is the following conditions for time	>10(s)
(
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE
(
Absolute change of LTFT multiplicative part, Bank 1	<2
)	
OR	
Absolute change of LTFT multiplicative part, Bank 1	<0.03
)	
and	
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE
OR	
Change in short term fuel trim, Bank 1	<0.03
)	
and	
Absolute difference between LTFT additive part, Bank 1 and its fixed value at beginning of multiplicative steady state phase	<0.75(%)
and	
Multiplicative mixture adaptation is active	=TRUE
(
(
Multiplicative mixture adaptation is active, which is the following conditions:	=TRUE
(
Fra operational readiness independent of the operating mode is active, which is the following	>2(s)

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Torque commanded to charge control (see Look-Up-Table #60)	>13.00 to 99.998(%)
and Torque commanded to charge control (see Look-Up-Table #59)	<0 to 75(%)
)	
) and Operating mode dependent Readiness LRA	=TRUE
(
(Lambda closed loop control upstream catalyst, bank 1	=TRUE
(Enleanment protection of lambda controller	=FALSE
(
(Large deceleration enleanment protection of lambda controller	=FALSE
(Relative fuel mass transient component threshold for deceleration enleanment	>-100(%/seg)
and Relative fuel mass transient component threshold for deceleration enleanment in bank 2	>-100(%/seg)
) for time (see Look-Up-Table #96)	>0.5 to 1(s)
)	
OR	
(Large acceleration enrichment protection of lambda controller	=FALSE
(Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #91)	
and	

Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
) for time	>0.3 to 1(s)
(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	
)) and Upstream Lambda closed loop control for bank 1	=TRUE
(Lambda control disabled during after cylinder cut-off and Lambda swtiched ON after fuel cutoff	=FALSE =TRUE
(Fuel cut off is active and { Time running down after fuel cut-off for enabling lambda control OR { Absolute value of diffence in lambda of bank 1 and Difference of counter time and plant time constant a-(b+c) where a is Time running down after fuel cut-off for enabling lambda control b is plant time constant for continuous air/fuel control c is plant parameter for dead time for lambda control	=FALSE >8(s) <0.2 >0(s)
))) and LSU sensor upstream to catalyst ready for operation	 =TRUE
(Level of lambda sensor 1 signal aualitv	<12

)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate	=FALSE
exceeded	
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating	=FALSE
range present and MAF is main air	
charge sensor	
)	
and	
lambda control is active since	=TRUE
warmup is finished	
and	
Relative air charge	>0(%)
(	>2(s)
for time	
)	
and	
Lambda control active due to GDI	=TRUE
mode change	
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
and	
Lambda set point	>0.65
and	
Minimum injection time limitation for	=FALSE
GDI mode is active	
and	
(
Width of dead zone for lambda	<0
control deviation	
OR	
Lambda control continues error	>0
)	
)	
OR	
(
Unrestricted operation of Upstream	=TRUE
closed loop lambda controller of bank	
2 is active	
(
Enleanment protection of lambda	=FALSE
controller	
(
(

Large deceleration enrichment protection of lambda controller (	=FALSE
Relative fuel mass transient component threshold for deceleration enrichment	>-100(%/seg)
and	
Relative fuel mass transient component threshold for deceleration enrichment in bank 2	>-100(%/seg)
)	
for time (see Look-Up-Table #96)	<0.5 to 1(s)
)	
OR	
(
Large acceleration enrichment protection of lambda controller (	=FALSE
Relative fuel mass transient component threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #91)	
and	
Relative fuel mass transient component threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
)	
for time	<0.3 to 1(s)
(blocking time for activation LC after acceleration enrichment)	
(see Look-Up-Table #95)	
)	
)	
and	
Upstream Lambda closed loop control for bank 2	=TRUE
(
Lambda control disabled during after cylinder cut-off	=FALSE
and	
Lambda switched ON after fuel cutoff	=TRUE

(
Fuel cut off is active		=FALSE
and		
/		
Time running down after fuel cut-off		>8(S)
for enabling lambda control		
OR		
\		
Absolute value of diffence in lambda		<0.2
of bank 2		
and		
Difference of counter time and plant		>0(s)
time constant		
a-(b+c)		
where a is Time running down after		
fuel cut-off for enabling lambda		
control		
b is plant time constant of bank 2 for		
continuous air/fuel control		
c is plant parameter of bank 2 for		
dead time for lambda control		
)		
)		
)		
and		
LSU sensor upstream to catalyst		=TRUE
ready for operation		
{		
Level of lambda sensor 1, bank 2		<12
signal quality		
)		
and		
Lambda control disabled by a fault		=FALSE
{		
Catalyst damaging misfire rate		=FALSE
exceeded		
and		
Injector power stage fault is active		=FALSE
and		
Camshaft fault in critical operating		=FALSE
range present and MAF is main air		
charge sensor		
)		
and		
lambda control is active since		=TRUE
warmup is finished		
and		
Relative air charge		>0(%)
(
for time		*2(s)
)		
and		

Lamda control active due to GDI mode change	=TRUE
(GDI mode homogeneous for time	=TRUE >0.8(s)
)	
)	
and	
Lambda set point	>0.65
and	
Minimum injection time limitation for GDI mode of bank 2 is active	=FALSE
and	
(
Width of dead zone for lambda control deviation	=0
OR	
Lambda control continues error	>0
)	
)	
for time	>2(s)
)	
and	
(
Difference between lambda value referenced to sensor fitting of bank 1 and bank 2	>0
and	
Lambda set point	<1.1
and	
(
Detection of fuel mixture adaption	=TRUE
(
Lambda set point of bank 2	>0.87
)	
OR	
Lambda set point of bank 2	>0.96
)	
for time	>Max(A,B)(s)
where A - delay time for lambda fuel adaption (rich condition) (see Look-Up-Table #65)	=3 to 5(s)
where B - delay time for lambda fuel adaption (lean condition) (see Look-Up-Table #66)	=3 to 5(s)
)	
and	
Limitation due to fuel in oil is deactivated	=TRUE
and	
Limitation due to fuel in oil is deactivated for bank 2	=TRUE

)	
and	
Lambda closed loop control upstream catalyst, bank 1	=TRUE
)	
Multiplicative adaptation correction factor, bank 1	>0
)	
)	
and	
(
LTFT additive part Bank 1 Integrator is stable which is of the following conditions	=TRUE
(
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 1 is stable	=TRUE
(
Additive part of LTFT for bank 1	>5.484(%)
OR	
Additive part of LTFT for bank 1	<-5.484(%)
)	
OR	
Similar conditions for additive fuel adaptation fulfilled	=TRUE
(
Difference between Measured and reference Engine speed	<375(rpm)
and	
Difference between reference and measured Engine speed	<375(rpm)
and	
Difference between measured load value to reference load	<20
and	
Difference between reference load value to measured load	<20
)	
)	
and	
LTFT additive part Bank 1 is stable, which is the following conditions for time	>10(s)
(
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 1 is stable	=TRUE
(
Absolute change of LTFT additive part, Bank 1	<0.188(%)
`	

OR	
Absolute change of LTFT additive part, Bank 1	<0.188(%)
1	
and	
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 1 is stable	=TRUE
OR	
Change in short term fuel trim, Bank 1	<0.03
1	
)	
and	
Absolute difference between LTFT multiplicative part, Bank 1 and its fixed value at beginning of additive steady state phase	<0.05(%)
and	
Additive mixture adaptation is active	=TRUE
t	
(
Additive mixture adaptation is active, which is the following conditions:	=TRUE
(
Ora operational readiness independent of the operating mode is active, which is the following conditions for time	>2(s)
(
Fundamental operating mode independent operation readiness of mixture adaption	=TRUE
and	
ORA adaption physically enabled	=TRUE
(
Torque commanded to charge control (see Look-Up-Table #63)	>2.499 to 99.998(%)
and	
Torque commanded to charge control (see Look-Up-Table #62)	<0 to 17.999(%)
)	
)	
and	
Operating mode dependent Readiness LRA	=TRUE
)	

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				Lambda closed loop control upstream catalyst, bank 1	=TRUE		
) and Additive adaptation correction factor, bank 1	>0		
)			
)			
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P2189	Additive part of the Long Term Fuel Trim for Bank 2 in gasoline mode is greater than a calibrated threshold	Additive part of LTFT, Bank 2	>■5.48(%)	LTFT Additive mixture adaptation bank 2 is active	=TRUE	0.2(s)	2 Trip Sim Cond
				(
				(
				LTFT multiplicative part Bank 2 Integrator is stable which is of the following conditions	=TRUE		
				(
				(
				Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 2 is stable	=TRUE		
				(
				Multiplicative part of LTFT for bank 2	>1.27		
				OR			
				Multiplicative part of LTFT for bank 2	<0.77		
)			
				OR			
				Similar conditions for multiplicative fuel adaptation fulfilled for bank 2	=TRUE		
				(
				Difference between Measured and reference Engine speed, bank 2	<375(rpm)		
				and			
				Difference between reference and measured Engine speed, bank 2	<375(rpm)		
				and			
				Difference between measured load value to reference load, bank 2	<20		
				and			
				Difference between reference load value to measured load, bank 2	<20		
)			
)			
				and			

LTFT multiplicative part Bank 2 is stable, which is the following conditions for time	>10(s)
(
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 2 is stable	=TRUE
(
Absolute change of LTFT multiplicative part, Bank 2	<2
)	
OR	
Absolute change of LTFT multiplicative part, Bank 2	<0.03
)	
and	
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 2 is stable	=TRUE
OR	
Change in short term fuel trim, Bank 2	<0.03
)	
and	
Absolute difference between LTFT additive part, Bank 1 and its fixed value at beginning of multiplicative steady state phase and	<0.75(%)
Multiplicative mixture adaptation is active, bank 2	=TRUE
(
(
Multiplicative mixture adaptation is active, which is the following conditions:	=TRUE
(
Fra operational readiness independent of the operating mode is active, which is the following conditions for time	>2(s)
(
Fundamental operating mode independent operation readiness of mixture adaption	=TRUE
(
(
Condition error suspicion in mixture adaptation	=TRUE
(
Coolant Engine Temperature	>Min(C, D)(°C)

where C - cut-in temperature adaptive precontrol for lambda closed-loop control	=59.3(°C)
where D - cut-in temperature fuel mixture adaptation in case of error suspicion	=57.8(°C)
) OR Coolant Engine Temperature	>59.3(°C)
) and Basic willingness of fuel mixture adaptation, except engine temperature	=TRUE
{ Intake air temperature	<90(°C)
and Condition of Wide Open Throttle	=FALSE
{ Propulsion torque after driving assistance coordination (see Look-Up-Table #5)	<900 to 1300(Nm)
) and Increased tolerances of air charge determination expected	=FALSE
and Maximum proportion of evaporating fuel from the engine oil to the fuel demand (model based)	<1.99
) and { Number of injections for enabling fuel mixture adaptation	>2000(counts)
)) and FRA adaption physically enabled	=TRUE
{ Torque commanded to charge control (see Look-Up-Table #60)	>13.00 to 99.998(%)
and Torque commanded to charge control (see Look-Up-Table #59)	<0 to 75(%)
)) and	

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Operating mode dependent Readiness LRA	=TRUE
(
(
Lambda closed loop control upstream catalyst, bank 1	=TRUE
(
Enleanment protection of lambda controller	=FALSE
(
(
Large deceleration enleanment protection of lambda controller	=FALSE
(
Relative fuel mass transient component threshold for deceleration enleanment	>-100(%/seg)
and	
Relative fuel mass transient component threshold for deceleration enleanment in bank 2	>-100(%/seg)
)	
for time (see Look-Up-Table #96)	>0.5 to 1(s)
)	
OR	
(
Large acceleration enrichment protection of lambda controller	=FALSE
(
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #91)	
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
)	
for time	>0.3to1(s)
(blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	

)	
)	
and Upstream Lambda closed loop control for bank 1	=TRUE
(Lambda control disabled during after cylinder cut-off	=FALSE
and Lambda switched ON after fuel cutoff	=TRUE
(Fuel cut off is active	=FALSE
and (Time running down after fuel cut-off for enabling lambda control	>8(5)
OR (Absolute value of difference in lambda of bank 1	<0.2
and Difference of counter time and plant time constant	>0(s)
a-(b+c) where a is Time running down after fuel cut-off for enabling lambda control b is plant time constant for continuous air/fuel control c is plant parameter for dead time for lambda control	
)	
)	
)	
and LSU sensor upstream to catalyst ready for operation	=TRUE
(Level of lambda sensor 1 signal quality	<12
)	
and Lambda control disabled by a fault	=FALSE
(Catalyst damaging misfire rate exceeded	=FALSE
and Injector power stage fault is active	=FALSE
and Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
`	

and lambda control is active since warmup is finished and Relative air charge	=TRUE >0(%)
(for time)	>2(s)
and Lamda control active due to GDI mode change	=TRUE
(GDI mode homogeneous for time)	=TRUE >0.8(s)
and Lambda set point	>0.65
and Minimum injection time limitation for GDI mode is active and	=FALSE
(Width of dead zone for lambda control deviation OR Lambda control continues error)	<0 >0
OR (Unrestricted operation of Upstream closed loop lambda controller of bank 2 is active	=TRUE
(Enleanment protection of lambda controller ((Large deceleration enleanment protection of lambda controller (Relative fuel mass transient component threshold for deceleration enleanment	=FALSE =FALSE >-100(%/seg)
and Relative fuel mass transient component threshold for deceleration enleanment in bank 2)	>-100(%/seg)

for time (see Look-Up-Table #96)	<0.5 to 1(s)
)	
OR	
(
Large acceleration enrichment protection of lambda controller	=FALSE
(
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #91)	
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2)	<4.99 to 49.99(%/seg)
(see Look-Up-Table #92)	
)	
for time	<0.3 to 1(s)
(blocking time for activation LC after acceleration enrichment)	
(see Look-Up-Table #95)	
)	
)	
and	
Upstream Lambda closed loop control for bank 2	=TRUE
(
Lambda control disabled during after cylinder cut-off	=FALSE
and	
Lambda swtiched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
and	
(
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
(
Absolute value of diffence in lambda of bank 2	<0.2
and	
Difference of counter time and plant time constant	>0(s)
~ (h+e)	

where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant of bank 2 for continuous air/fuel control	
c is plant parameter of bank 2 for dead time for lambda control	
)	
)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
Level of lambda sensor 1, bank 2 signal quality	<12
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
(	>2(s)
for time	
)	
and	
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
and	
Lambda set point	>0.65
and	
Minimum injection time limitation for GDI mode of bank 2 is active	=FALSE
and	
(

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Width of dead zone for lambda control deviation	=0
OR	
Lambda control continues error	>0
)	
)	
for time	>2(s)
)	
and	
(
Difference between lambda value referenced to sensor fitting of bank 1 and bank 2	>0
and	
Lambda set point	<1.1
and	
(
Detection of fuel mixture adaption	=TRUE
(
Lambda set point of bank 2	>0.87
)	
OR	
Lambda set point of bank 2	>0.96
)	
for time	>Max(A,B)(s)
where A - delay time for lambda fuel adaption (rich condition)	=3 to 5(s)
(see Look-Up-Table #65)	
where B - delay time for lambda fuel adaption (lean condition)	=3 to 5(s)
(see Look-Up-Table #66)	
)	
and	
Limitation due to fuel in oil is deactivated	=TRUE
and	
Limitation due to fuel in oil is deactivated for bank 2	=TRUE
)	
)	
and	
Lambda closed loop control upstream catalyst, bank 2	=TRUE
)	
Multiplicative adaptation correction factor, bank 2	>0
)	
)	
and	
(

LTFT additive part Bank 2 Integrator is stable which is of the following conditions	=TRUE
(
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 2 is stable	=TRUE
(
Additive part of LTFT for bank 2	>5.484(%)
OR	
Additive part of LTFT for bank 2	<-5.484(%)
)	
OR	
Similar conditions for additive fuel adaptation fulfilled, bank 2	=TRUE
(
Difference between Measured and reference Engine speed, bank 2	<375(rpm)
and	
Difference between reference and measured Engine speed, bank 2	<375(rpm)
and	
Difference between measured load value to reference load, bank 2	<20
and	
Difference between reference load value to measured load, bank 2	<20
)	
)	
and	
LTFT additive part Bank 2 is stable, which is the following conditions for time	>10(s)
(
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 2 is stable	=TRUE
(
Absolute change of LTFT additive part, Bank 2	<0.188(%)
)	
OR	
Absolute change of LTFT additive part, Bank 2	<0.188(%)
)	
and	
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 2 is stable	=TRUE
OR	

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Population (millions)	7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.3	9.5	9.7	9.9	10.1	10.3	10.5	10.7	10.9	11.1	11.3	11.5	11.7
GDP (trillion USD)	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2
Life expectancy (years)	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
Urban population (%)	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95
Renewable energy (%)	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
CO2 emissions (Gt)	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5
Forest cover (%)	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
Healthcare expenditure (%)	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Internet usage (%)	45	50	55	60	65	70	75	80	85	90	95	98	100	100	100	100	100	100	100	100	100
Gender inequality index	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52
Human Development Index	0.70	0.72	0.74	0.76	0.78	0.80	0.82	0.84	0.86	0.88	0.90	0.92	0.94	0.96	0.98	1.00	1.00	1.00	1.00	1.00	1.00

Change in short term fuel trim, Bank 2) and	<0.03
Absolute difference between LTFT multiplicative part, Bank 2 and its fixed value at beginning of additive steady state phase and	<0.05(%)
Additive mixture adaptation is active, bank2 ( (	=TRUE
Additive mixture adaptation is active, which is the following conditions: (	=TRUE
Ora operational readiness independent of the operating mode is active, which is the following conditions for time \	>2(s)
Fundamental operating mode independent operation readiness of mixture adaption and	=TRUE
ORA adaption physically enabled (	=TRUE
Torque commanded to charge control (see Look-Up-Table #63)	>2.499 to 99.998(%)
and	
Torque commanded to charge control (see Look-Up-Table #62)	<0 to 17.999(%)
)	
)	
and	
Operating mode dependent Readiness LRA	=TRUE
)	
and	
Lambda closed loop control upstream catalyst, bank 2	=TRUE
)	
and	
Additive adaptation correction factor, bank 2	>0
)	
)	
)	

Absolute change of LTFT multiplicative part, Bank 2	<2
)	
OR	
Absolute change of LTFT multiplicative part, Bank 2	<0.03
)	
and	
(
Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 2 is stable	=TRUE
OR	
Change in short term fuel trim, Bank 2	<0.03
)	
and	
Absolute difference between LTFT additive part, Bank 1 and its fixed value at beginning of multiplicative steady state phase	<0.75(%)
and	
Multiplicative mixture adaptation is active, bank 2	=TRUE
(
(
Multiplicative mixture adaptation is active, which is the following conditions:	=TRUE
(
Fra operational readiness independent of the operating mode is active, which is the following conditions for time	>2(s)
(
Fundamental operating mode independent operation readiness of mixture adaption	=TRUE
(
(
Condition error suspicion in mixture adaptation	=TRUE
(
Coolant Engine Temperature where C - cut-in temperature adaptive precontrol for lambda closed-loop control	>Min(C, D)(°C) =59.3(°C)
where D - cut-in temperature fuel mixture adaptation in case of error suspicion	=57.8(°C)
)	
OR	

Coolant Engine Temperature	>59.3(°C)
)	
and	
Basic willingness of fuel mixture adaptation, except engine temperature	=TRUE
(
Intake air temperature	<90(°C)
and	
Condition of Wide Open Throttle	=FALSE
{	
Propulsion torque after driving assistance coordination (see Look-Up-Table #5)	<900 to 1300(Nm)
)	
and	
Increased tolerances of air charge determination expected	=FALSE
and	
Maximum proportion of evaporating fuel from the engine oil to the fuel demand (model based)	<1.99
)	
and	
{	
Number of injections for enabling fuel mixture adaptation	>2000(counts)
)	
)	
and	
FRA adaption physically enabled	=TRUE
(
Torque commanded to charge control (see Look-Up-Table #60)	>13.00 to 99.998(%)
and	
Torque commanded to charge control (see Look-Up-Table #59)	<0 to 75(%)
)	
)	
and	
Operating mode dependent Readiness LRA	=TRUE
(
(
Lambda closed loop control upstream catalyst, bank 1	=TRUE
(
Enleanment protection of lambda controller	=FALSE


```

(
(
Large deceleration enleanment          =FALSE
protection of lambda controller

(
Relative fuel mass transient            >-100(%/seg)
component threshold for deceleration
enleanment

and
Relative fuel mass transient            >-100(%/seg)
component threshold for deceleration
enleanment in bank 2

)
for time                                >0.5 to 1(s)
(see Look-Up-Table #96)

)
OR
(
Large acceleration enrichment          =FALSE
protection of lambda controller

(
Relative fuel mass transient            <4.99 to 49.99(%/seg)
componet threshold for acceleration
enrichment (Bank 1)

(see Look-Up-Table #91)

and
Relative fuel mass transient            <4.99 to 49.99(%/seg)
componet threshold for acceleration
enrichment (Bank 2)

(see Look-Up-Table #92)

)
for time                                >0.3 to 1(s)

(blocking time for activation LC after
acceleration enrichment)
(see Look-Up-Table #95)

)
)
and
Upstream Lambda closed loop            =TRUE
control for bank 1

(
Lambda control disabled during after   =FALSE
cylinder cut-off

and

```

Lambda switched ON after fuel cutoff	=TRUE
(Fuel cut off is active and \	=FALSE
Time running down after fuel cut-off for enabling lambda control OR \	>8(s)
Absolute value of difference in lambda of bank 1 and Difference of counter time and plant time constant a-(b+c) where a is Time running down after fuel cut-off for enabling lambda control b is plant time constant for continuous air/fuel control c is plant parameter for dead time for lambda control))) and	<0.2
LSU sensor upstream to catalyst ready for operation (Level of lambda sensor 1 signal quality) and	>0(s)
Lambda control disabled by a fault (Catalyst damaging misfire rate exceeded and Injector power stage fault is active and Camshaft fault in critical operating range present and MAF is main air charge sensor) and	=TRUE
lambda control is active since warmup is finished and Relative air charge	=FALSE
(for time ,	>0(%)
	>2(s)

and Lamda control active due to GDI mode change	=TRUE
(GDI mode homogeneous for time	=TRUE >0.8(s)
)	
)	
and Lambda set point	>0.65
and Minimum injection time limitation for GDI mode is active	=FALSE
and	
(Width of dead zone for lambda control deviation	<0
OR	
Lambda control continues error	>0
)	
)	
OR	
(Unrestricted operation of Upstream closed loop lambda controller of bank 2 is active	=TRUE
(Enleanment protection of lambda controller	=FALSE
((Large deceleration enleanment protection of lambda controller	=FALSE
(Relative fuel mass transient component threshold for deceleration enleanment	>-100(%/seg)
and Relative fuel mass transient component threshold for deceleration enleanment in bank 2	>-100(%/seg)
) for time (see Look-Up-Table #96)	<0.5 to 1(s)
)	
OR	
(Large acceleration enrichment protection of lambda controller	=FALSE
(

Relative fuel mass transient
componet threshold for acceleration
enrichment (Bank 1)

<4.99 to 49.99(%/seg)

(see Look-Up-Table #91)

and

Relative fuel mass transient
componet threshold for acceleration
enrichment (Bank 2)

<4.99 to 49.99(%/seg)

(see Look-Up-Table #92)

)

for time

<0.3 to 1 (s)

(blocking time for activation LC after
acceleration enrichment)
(see Look-Up-Table #95)

)

)

and

Upstream Lambda closed loop
control for bank 2

=TRUE

(

Lambda control disabled during after
cylinder cut-off

=FALSE

and

Lambda swtiched ON after fuel cutoff

=TRUE

(

Fuel cut off is active

=FALSE

and

{

Time running down after fuel cut-off
for enabling lambda control

>8(s)

OR

{

Absolute value of diffence in lambda
of bank 2

<0.2

and

Difference of counter time and plant
time constant

>0(s)

a-(b+c)

where a is Time running down after
fuel cut-off for enabling lambda
control

b is plant time constant of bank 2 for
continuous air/fuel control

c is plant parameter of bank 2 for
dead time for lambda control

)

)	
)	
and	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
Level of lambda sensor 1, bank 2 signal quality	<12
)	
and	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
and	
Injector power stage fault is active	=FALSE
and	
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
and	
lambda control is active since warmup is finished	=TRUE
and	
Relative air charge	>0(%)
(	>2(s)
for time	
)	
and	
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
and	
Lambda set point	>0.65
and	
Minimum injection time limitation for GDI mode of bank 2 is active	=FALSE
and	
/	
Width of dead zone for lambda control deviation	=0
OR	
Lambda control continues error	>0
)	
)	
for time	>2(s)
)	
and	
,	

Difference between lambda value referenced to sensor fitting of bank 1 and bank 2	>0
and Lambda set point	<1.1
and)	
Detection of fuel mixture adaption (	=TRUE
Lambda set point of bank 2	>0.87012
)	
OR	
Lambda set point of bank 2	>0.95996
)	
for time	>Max(A,B)(s)
where A - delay time for lambda fuel adaption (rich condition)	=3 to 5(s)
(see Look-Up-Table #65)	
where B - delay time for lambda fuel adaption (lean condition)	=3 to 5(s)
(see Look-Up-Table #66)	
)	
and	
Limitation due to fuel in oil is deactivated	=TRUE
and	
Limitation due to fuel in oil is deactivated for bank 2	=TRUE
)	
)	
and	
Lambda closed loop control upstream catalyst, bank 2	=TRUE
)	
Multiplicative adaptation correction factor, bank 2	>0
)	
)	
and	
(
LTFT additive part Bank 2 Integrator is stable which is of the following conditions	=TRUE
(
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 2 is stable	=TRUE
(
Additive part of LTFT for bank 2	>5.484(%)
OR	
Arithmetic part of LTFT for bank 2	<5.484(%)

)	
OR	
Similar conditions for additive fuel adaptation fulfilled, bank 2	=TRUE
(
Difference between Measured and reference Engine speed, bank 2	<375(rpm)
and	
Difference between reference and measured Engine speed, bank 2	<375(rpm)
and	
Difference between measured load value to reference load, bank 2	<20
and	
Difference between reference load value to measured load, bank 2	<20
)	
)	
and	
LTFT additive part Bank 2 is stable, which is the following conditions for time	>10(s)
(
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 2 is stable	=TRUE
(
Absolute change of LTFT additive part, Bank 2	<0.188(%)
)	
OR	
Absolute change of LTFT additive part, Bank 2	<0.188(%)
)	
and	
(
Condition diagnostic thresholds of additive correction currently exceeded of bank 2 is stable	=TRUE
OR	
Change in short term fuel trim, Bank 2	<0.03
)	
and	
Absolute difference between LTFT multiplicative part, Bank 2 and its fixed value at beginning of additive steady state phase	<0.05(%)
and	
Additive mixture adaptation is active, bank2	=TRUE
(
,	

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				Additive mixture adaptation is active, which is the following conditions:	=TRUE		
				(
				Ora operational readiness independent of the operating mode is active, which is the following conditions for time	>2(s)		
				(
				Fundamental operating mode independent operation readiness of mixture adaption	=TRUE		
				and			
				ORA adaption physically enabled	=TRUE		
				(
				Torque commanded to charge control (see Look-Up-Table #63)	>2.499 to 99.998(%)		
				and			
				Torque commanded to charge control (see Look-Up-Table #62)	<0 to 17.999(%)		
)			
)			
				and			
				Operating mode dependent Readiness LRA	=TRUE		
)			
				and			
				Lambda closed loop control upstream catalyst, bank 2	=TRUE		
)			
				and			
				Additive adaptation correction factor, bank 2	>0		
)			
)			
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
8. UPSTREAM OXYGEN SENSOR FUEL TRIM DIAGNOSIS	P2096	Fuel trim fault diagnosis of upstream exhaust gas sensor when the lambda offset is not within the calibrated threshold range - out of range low	(Debounce condition for fault confirmation by offset adaptation (sensor 1, bank 1)	=TRUE	0.1(s)	2 Trip Sim Cond

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Lambda offset of upstream exhaust gas sensor	<-0.03	(
Lambda offset of upstream exhaust gas sensor	>-0.07	Debouncing of offset fault by slow offset adaptation	=TRUE
Difference between lambda offset of the sensor and lambda offset at the beginning of the driving cycle	<0.003	(
(		Slow offset adaptation	=TRUE
((
Maximum offset fault is healed in the current driving cycle	TRUE	Bit p-part controlability primary control enable	=TRUE
Minimum offset fault is healed in the current driving cycle	TRUE	(
)		(
OR		Lambda regulator setpoint active	=TRUE
(
Maximum offset fault is set in the previous driving cycle	TRUE		
OR			
Minimum offset fault is set in the previous driving cycle	TRUE	(
)		Lambda closed loop control (upstream catalyst), bank 1	=TRUE
OR		OR	
((
Fuel trim maximum fault is set in the previous driving cycle	TRUE	Lambda setpoint for sensor after addition of trim control action is not equal to 0	=TRUE
OR		Difference between upper limit action value lambda control and temporary value before test for enleanment protection	>0
Fuel trim minimum fault is set in the previous driving cycle	TRUE	Difference between temporary value before test for enleanment protection and lower bound of dfr during enleanmant protection	>0
)		Lambda (measured and setpoint) is below minimal measurable lambda (bank 1)	=FALSE
)		TEMIN-limitation active, bench 1	=FALSE
))	
OR)	
()	
(		Current lowpass value of p-part control upstream primary control enable	>0(%)
Fuel trim maximum fault is set in the previous driving cycle	TRUE	Lambda closed loop control (upstream catalyst), bank 1	=TRUE
OR		,	

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Fuel trim minimum fault is set in the previous driving cycle	=TRUE	Lambda control disabled during or after cylinder cut-off	=FALSE
)		Lambda switched ON after fuel cutoff	=TRUE
Lambda offset of upstream exhaust gas sensor	<0.07	(
)		Fuel cut off is active	=FALSE
		(
		Time running down after fuel cut-off for enabling lambda control	>8(s)
		OR	
		(
		Absolute value of control difference in lambda, bank 1	<0.2
		Difference of counter time and plant time constant	>0(s)
		a-(b+c)	
		where a is Time running down after fuel cut-off for enabling lambda control	
		b is plant time constant for continuous air/fuel control	
		c is plant parameter for dead time for lambda control	
)	
)	
)	
		LSU sensor upstream to catalyst ready for operation	=TRUE
		(
		lambda sensor 1 temperature, bank 1	>655(°C)
)	
		Lambda control disabled by a fault	=FALSE
		lambda control is active since warmup is finished	=TRUE
		Relative air charge	>0(%)
		for time	>2(s)
)	
		HEM condition to block lambda closed loop control upstream catalyst	=FALSE
		Lambda control active due to GDI mode change	=TRUE
		(
		GDI mode homogeneous	=TRUE
		for time	>0.8(s)
)	
)	
		(
		Lambda control enabled for Cold operation sensor 2 bank 1	=TRUE
)	

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HEGO sensor 2 bank 1, signal valid	=TRUE
(
Status of heating enable conditions for the sensor operating readiness	=TRUE
(
Protective heating is finished	=TRUE
for time	>25(s)
OR	
Internal resistance OK for operating readiness	=TRUE
/	
Unfiltered internal resistance of HEGO sensor	<2000(0hm)
Protective heating is finished	=TRUE
Counter for valid internal resistance measurements	>3(counts)
)	
)	
Status of sensor signal enable conditions for the sensor operating readiness	=TRUE
/	
Internal resistance OK for operating readiness	=TRUE
OR	
(
(
Output voltage of HEGO Sensor	>0.552(V)
Output voltage of HEGO Sensor	<1.201(V)
)	
OR	
Output voltage of HEGO Sensor	<0.322(V)
)	
OR	
Sensor voltage stuck in countervoltage band	=TRUE
(
(
(
Output voltage of HEGO Sensor	<0.552(V)
Output voltage of HEGO Sensor	>0.322(V)
)	
(
Sensor open circuit fault existed in previous trip	=TRUE
OR	

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Sensor open circuit fault currently not detected	=TRUE
)	
Electrical diagnostics enabled	=TRUE
)	
for time	>20(s)
)	
)	
for time	>0.2(s)
)	
)	
)	
Bit p-part system balanced primary control enable	=TRUE
(
(
Lambda setpoint for sensor is set equal to 1	=TRUE
OR	
Lambda setpoint for sensor is set equal to 1	=FALSE
for time	>10(s)
)	
Rich catalyst purge	=FALSE
Mass flow of exhaust gas, sensor 2	>0(g)
)	
P-part active from temperature and dynamic diagnosis	=TRUE
(
Temperature of catalyst 1	>250(°C)
Temperature of catalyst 1	<900(°C)
)	
)	
Bit l-part global primary control enable	=TRUE
(
(
Current lowpass value of l-part load primary control enable	>-1(%)
Current lowpass value of l-part load primary control enable	<1(%)
)	
Diagnosis of canister purge system is active	=FALSE
Width of dead zone for lambda control deviation	=0

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Maximum value among the engine coolant temperature and model-based substitute value for engine temperature signal in case of error	>35(°C)
(
Bit I-part global load and engine speed control enable	=TRUE
(
Engine speed with low resolution	<5000(rpm)
Engine speed with low resolution	>1320(rpm)
(
OR	
(
Relative air mass	<99.8(%)
Relative air mass (see Look-Up-Table #99)	>15.8 to 39.8(%)
)	
)	
)	
)	
(
Bit i-part system primary control enable	=TRUE
(
Current integrator value of P-part balanced primary control enable (see Look-Up-Table #98)	>200 to 300(g)
(
(
Dew point end of sensor 2 Bank1 is reached	=TRUE
End of start is reached	=TRUE
Exhaust gas mass flow sensor 2 Bank 1	>199.82(g)
)	
OR	
(
(
Dew point end of sensor 2 reached	=FALSE
OR	
End of start is reached	=FALSE
)	
Exhaust gas mass flow sensor 2 (see Look-Up-Table #97)	>219.73 to 320(g)
)	
)	
)	

Bit i-part system temperature primary control enable	=TRUE
(
Temperature of catalyst 1	>350(°C)
Temperature of catalyst 1	<900(°C)
)	
)	
)	
Cumulated time in which slow offset adaptation was active	>10(s)
)	
Debounce condition for fault confirmation by fast offset adaptation (sensor 1, bank 1)	=TRUE
General enabling condition of fast offset adaptation	
(
Enabling condition of fast offset adaptation due to catalyst conditioning	=TRUE
(
(
Bit signal valid, HEGO sensor 2 bank 1	=TRUE
Flag lambda setpoint for sensor equal to 1	=TRUE
Rich catalyst purge	=FALSE
Bank-independent disabling conditions of fast offset adaptation	=FALSE
(
Fuel cut-off	=TRUE
Mass flow exhaust gas catalyst 1	>50(g)
)	
OR	
(
Fuel cut-off	=FALSE
Mass flow exhaust gas catalyst 1	>50(g)
)	
)	
(
Parallelization done at least once from LSU plausibility diagnosis point of view (sensor 1, bank 1)	=TRUE
(
(
Target sensor voltage for rich during active parallelisation reached once, sensor 1, bank 2	=TRUE

Oil gas mass flow by active lambda shifting minus the maximal possible influence of LSU offset part, segment 1, bank 1 for time)	>1.8(g)
OR (
Lean target sensor voltage during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oxygen mass flow in catalyst 1, deduct from maximum present LSU Offset in a fault free system for time)	>1.6(g)
OR (
Dynamic diagnosis error of upstream exhaust gas sensor is not set	=TRUE
)	
OR (
lambda control is set when lambda controller reaches lower limit FRMIN	=TRUE
Lambda actual value sensor 1 bank 1	<1
Output voltage of HEGO sensor 2 bank 1)	<0.4
OR (
lambda control is set when lambda controller reaches lower limit FRMAX	=TRUE
Lambda actual value sensor 1 bank 1	>1
Output voltage of HEGO sensor 2 bank 1)	>0.6(V)
for time	>2(s)
Condition for Lambda closed loop control upstream catalyst; bank 1)	=TRUE
for time	52(s)
)	
(
Temperature of catalyst 1	>400(°C)

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Temperature of catalyst 1	<800(°C)
)	
for time	=0(s)
)	
(
(
Mass flow exhaust gas catalyst 1	>5.56(g/s)
Mass flow exhaust gas catalyst 1	<33.33(g/s)
)	
OR	
(
(
Mass flow exhaust gas catalyst 1	>5.56(g/s)
Mass flow exhaust gas catalyst 1	<5.56(g/s)
)	
for time	>0(s)
)	
)	
Condition for upstream cat LSU ready for operation f(lamsons_w)	=TRUE
(
lambda sensor 1 temperature, bank 1	>655(°C)
)	
Hydrogen-correction-voltage, HEGO sensor 2 bank 1 with high resolution	<80(V)
(
CAT damage during past interval	=FALSE
)	
Mass flow of exhaust gas catalyst 1	≥100(g)
Difference between Lambda offset (sensor 1, bank 1) and Lambda offset (delayed by one calculation raster)	<0.003
(
Counter for no step in offset or increasing offset in a row	>2(counts)
OR	
Counter for exhaust masses to debounce fault with fast offset adaptation	>6(counts)
)	
)	
)	

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)
No pending or confirmed DTCs see sheet inhibit table

Basic enable conditions met
=see sheet enable tables

P2097	Fuel trim fault diagnosis of upstream exhaust gas sensor when the lambda offset is not within the calibrated threshold range-out of range high	(		Debounce condition for fault confirmation by offset adaptation (sensor 1, bank 1)	=TRUE	0.1(s)	2 Trip Sim Cond
		Lambda offset of upstream exhaust gas sensor	>0.03	(
		Lambda offset of upstream exhaust gas sensor	<0.07	Debouncing of offset fault by slow offset adaptation	=TRUE		
		Difference between lambda offset at the beginning of the driving cycle and lambda offset of the sensor	<0.003	(
		(		Slow offset adaptation	=TRUE		
		((
		Maximum offset fault is healed in the current driving cycle	=TRUE	Bit p-part controlability primary control enable	=TRUE		
		Minimum offset fault is healed in the current driving cycle	=TRUE	(
)		(
		OR		Lambda regulator setpoint active	=TRUE		
		(
		Maximum offset fault is set in the previous driving cycle	=TRUE				
		OR					
		Minimum offset fault is set in the previous driving cycle	=TRUE	(
		)		Lambda closed loop control (upstream catalyst), bank 1	=TRUE		
		OR		OR			
		((
		Fuel trim maximum fault is set in the previous driving cycle	=TRUE	Lambda setpoint for sensor after addition of trim control action is not equal to 0	=TRUE		

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OR		Difference between upper limit action value lambda control and temporary value before test for enleanment protection	>0
Fuel trim minimum fault is set in the previous driving cycle	TRUE	Difference between temporary value before test for enleanment protection and lower bound of dfr during enleanmant protection	>0
)		Lambda (measured and setpoint) is below minimal measurable lambda (bank 1)	=FALSE
)		TEMIN-limitation active, bench 1	=FALSE
))	
OR)	
()	
(		Current lowpass value of p-part control upstream primary control enable	>0(%)
Fuel trim maximum fault is set in the previous driving cycle	TRUE	Lambda closed loop control (upstream catalyst), bank 1	=TRUE
OR		(
Fuel trim minimum fault is set in the previous driving cycle	TRUE	Lambda control disabled during or after cylinder cut-off	=FALSE
)		Lambda switched ON after fuel cutoff	=TRUE
Lambda offset of upstream exhaust gas sensor	>0.07	(
)		Fuel cut off is active	=FALSE
		(
		Time running down after fuel cut-off for enabling lambda control	>8(s)
		OR	
		(
		Absolute value of control difference in lambda, bank 1	<0.2
		Difference of counter time and plant time constant	>0(s)
		a-(b+c)	
		where a is Time running down after fuel cut-off for enabling lambda control	
		b is plant time constant for continuous air/fuel control	
		c is plant parameter for dead time for lambda control	
)	
)	
)	
		LSU sensor upstream to catalyst ready for operation	=TRUE

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lambda sensor 1 temperature, bank 1	>655(°C)
)	
Lambda control disabled by a fault	=FALSE
lambda control is active since	=TRUE
warmup is finished	
Relative air charge	>0(%)
for time	>2(s)
)	
HEM condition to block lambda	=FALSE
closed loop control upstream catalyst	
Lambda control active due to GDI	=TRUE
mode change	
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
(
Lambda control enabled for Cold	=TRUE
operation sensor 2 bank 1	
OR	
HEGO sensor 2 bank 1, signal valid	=TRUE
(
Status of heating enable conditions	=TRUE
for the sensor operating readiness	
(
Protective heating is finished	=TRUE
for time	>25(s)
OR	
Internal resistance OK for operating	=TRUE
readiness	
\	
Unfiltered internal resistance of	<2000(0hm)
HEGO sensor	
Protective heating is finished	=TRUE
Counter for valid internal resistance	>3(counts)
measurements	
)	
)	
Status of sensor signal enable	=TRUE
conditions for the sensor operating	
readiness	
/	
Internal resistance OK for operating	=TRUE
readiness	
OR	
,	

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(
Output voltage of HEGO Sensor	>0.552(V)
Output voltage of HEGO Sensor	<1.201(V)
)	
OR	
Output voltage of HEGO Sensor	<0.322266(V)
)	
OR	
Sensor voltage stuck in countervoltage band	=TRUE
(
(
(
Output voltage of HEGO Sensor	<0.552(V)
Output voltage of HEGO Sensor	>0.322(V)
)	
(
	=TRUE
Sensor open circuit fault existed in previous trip	
OR	
Sensor open circuit fault currently not detected	=TRUE
)	
Electrical diagnostics enabled	=TRUE
)	
for time	>20(s)
)	
)	
for time	>0.2(s)
)	
)	
Bit p-part system balanced primary control enable	=TRUE
(
(
Lambda setpoint for sensor is set equal to 1	=TRUE
OR	
Lambda setpoint for sensor is set equal to 1	=FALSE
for time	>10(s)
)	
Rich catalyst purge	=FALSE
Mass flow of exhaust gas, sensor 2	>0(g)
)	
P-part active from temperature and pressure difference	=TRUE

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(
Temperature of catalyst 1	>250(°C)
Temperature of catalyst 1	<900(°C)
)	
)	
Bit I-part global primary control enable	=TRUE
(
(
Current lowpass value of I-part load primary control enable	>-1(%)
Current lowpass value of I-part load primary control enable	<1(%)
)	
Diagnosis of canister purge system is active	=FALSE
Width of dead zone for lambda control deviation	=0
Maximum value among the engine coolant temperature and model-based substitute value for engine temperature signal in case of error	>35(°C)
(
Bit I-part global load and engine speed control enable	=TRUE
(
Engine speed with low resolution	<5000(rpm)
Engine speed with low resolution	>1320(rpm)
(
(
Relative air mass	<99.8(%)
Relative air mass (see Look-Up-Table #99)	>15.8 to 39.8(%)
)	
)	
)	
)	
)	
(
Bit i-part system primary control enable	=TRUE
(
Current integrator value of P-part balanced primary control enable (see Look-Up-Table #98)	>200 to 300(g)
(
(
Dew point end of sensor 2 Bank1 is reached	=TRUE
End of start is reached	>199.82

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Exhaust gas mass flow sensor 2 Bank 1	>199.82(g)
)	
OR	
(
(
Dew point end of sensor 2 reached	=FALSE
OR	
End of start is reached	=FALSE
)	
Exhaust gas mass flow sensor 2 (see Look-Up-Table #97)	>219.73 to 320(g)
)	
)	
)	
Bit i-part system temperature primary control enable	=TRUE
(
Temperature of catalyst 1	<900(°C)
Temperature of catalyst 1	<900(°C)
)	
)	
)	
Cumulated time in which slow offset adaptation was active	>10(s)
)	
Debounce condition for fault confirmation by fast offset adaptation (sensor 1, bank 1)	=TRUE
General enabling condition of fast offset adaptation	
(
Enabling condition of fast offset adaptation due to catalyst conditioning	=TRUE
(
(
Bit signal valid, HEGO sensor 2 bank 1	=TRUE
Flag lambda setpoint for sensor equal to 1	=FALSE
Rich catalyst purge	=FALSE
Bank-independent disabling conditions of fast offset adaptation	
(
Fuel cut-off	=TRUE
Mass flow exhaust gas catalyst 1	>50(g)
)	

OR	
(
Fuel cut-off	=FALSE
Mass flow exhaust gas catalyst 1	>50(9)
)	
)	
(
(
Parallelization done at least once	=TRUE
from LSU plausibility diagnosis point	
of view (sensor 1, bank 1)	
(
(
Target sensor voltage for rich during	=TRUE
active parallelisation reached once,	
sensor 1, bank 2	
Oil gas mass flow by active lambda	>1.8(g)
shifting minus the maximal possible	
influence of LSU offset part, segment	
1, bank 1	
for time	>1(s)
)	
OR	
(
Lean target sensor voltage during	=TRUE
active parallelisation reached once,	
sensor 1, bank 2	
Oxygen mass flow in catalyst 1,	>1(s)
deduct from maximum present LSU	
Offset in a fault free system	
for time	>1(s)
)	
)	
OR	
Dynamic diagnosis error of upstream	=TRUE
exhaust gas sensor is not set	
)	
OR	
(
(
lambda control is set when lambda	=TRUE
controller reaches lower limit FRMIN	
Lambda actual value sensor 1 bank 1	<1
Output voltage of HEGO sensor 2	<0.4
bank 1	
)	
OR	
(
lambda control is set when lambda	=TRUE
controller reaches lower limit FRMAX	

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Lambda actual value sensor 1 bank 1	>1
Output voltage of HEGO sensor 2 bank 1	>0.6(V)
)	
for time	>2(s)
Condition for Lambda closed loop control upstream catalyst; bank 1	=TRUE
)	
for time	22(s)
)	
(
(
Temperature of catalyst 1	>400(°C)
Temperature of catalyst 1	<800(°C)
)	
for time	= 0(s)
)	
(
(
Mass flow exhaust gas catalyst 1	>5.56(g/s)
Mass flow exhaust gas catalyst 1	<33.33(g/s)
)	
OR	
(
(
Mass flow exhaust gas catalyst 1	>5.56(g/s)
Mass flow exhaust gas catalyst 1	25.56(g/s)
)	
for time	20(s)
)	
)	
Condition for upstream cat LSU ready for operation f(lamsons_w)	=TRUE
(
lambda sensor 1 temperature, bank 1	>655(°C)
)	
Hydrogen-correction-voltage, HEGO sensor 2 bank 1 with high resolution	<80(V)
(
CAT damage during past interval	=FALSE
)	
Mass flow of exhaust gas catalyst 1	2100(g)

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					Difference between Lambda offset (sensor 1, bank 1) and Lambda offset (delayed by one calculation raster)	<0.003		
					(Counter for no step in offset or increasing offset in a row OR Counter for exhaust masses to debounce fault with fast offset adaptation)))))) No pending or confirmed DTCs	S2(counts) S6(counts) =see sheet inhibit table		
					Basic enable conditions met	=see sheet enable tables		
P2098	Fuel trim fault diagnosis of upstream exhaust gas sensor when the lambda offset is not within the calibrated threshold range - out of range low	(			Debounce condition for fault confirmation by offset adaptation (sensor 1, bank 2)	=TRUE	0.1(s)	2 Trip Sim Cond
		Lambda offset of upstream exhaust gas sensor, bank 2	<-0.03	(
		Lambda offset of upstream exhaust gas sensor, bank 2	>-0.07		Debouncing of offset fault by slow offset adaptation, bank 2	=TRUE		
		Difference between lambda offset of the sensor, bank 2 and lambda offset at the beginning of the driving cycle, bank 2	<0.003	(
		(			Slow offset adaptation, bank 2	=TRUE		
		((
		Maximum offset fault of the bank 2 sensor is healed in the current driving cycle	=TRUE		Bit p-part controllability primary control enable 2	=TRUE		
		Minimum offset fault of the bank 2 sensor is healed in the current driving cycle	=TRUE	(
)						
		OR			(
					Lambda regulator setpoint active, bank 2	=TRUE		
		(
		Maximum offset fault of the bank 2 sensor is set in the previous driving cycle	=TRUE					

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OR			
Minimum offset fault of the bank 2 sensor is set in the previous driving cycle	=TRUE	(
)		Lambda closed loop control (upstream catalyst), bank 2	=TRUE
OR		OR	
((
Fuel trim maximum fault of the bank 2 sensor is set in the previous driving cycle	=TRUE	Lambda setpoint for sensor after addition of trim control action, bank 2 is not equal to 0	=TRUE
OR		Difference between upper limit action value lambda control and temporary value before test for enrichment protection, bank 2	>0
Fuel trim minimum fault of the bank 2 sensor is set in the previous driving cycle	=TRUE	Difference between temporary value before test for enrichment protection, bank 2 and lower bound of dfr during enrichment protection	>0
)		Lambda (measured and setpoint) is below minimal measurable lambda (bank 2)	=FALSE
)		TEMIN-limitation active, bench 2	=FALSE
))	
OR)	
()	
(		Current lowpass value of p-part control upstream primary control enable 2	>0(%)
Fuel trim maximum fault of the bank 2 sensor is set in the previous driving cycle	=TRUE	Lambda closed loop control (upstream catalyst), bank 2	=TRUE
OR		(
Fuel trim minimum fault of the bank 2 sensor is set in the previous driving cycle	=TRUE	Lambda control disabled during or after cylinder cut-off, bank 2	=FALSE
)		Lambda switched ON after fuel cutoff, bank 2	=TRUE
Lambda offset of upstream exhaust gas sensor, bank 2	>0.07	(
)		Fuel cut off is active, bank 2	=FALSE
		(
		Time running down after fuel cut-off for enabling lambda control	>3(8)
		OR	
		(
		Absolute value of control difference in lambda, bank 2	<0.2
		Difference of counter time and plant time constant	>0(s)
		a-(b+c)	

where a is Time running down after
 fuel cut-off for enabling lambda
 control
 b is plant time constant for
 continuous air/fuel control, bank 2
 c is plant parameter for dead time for
 lambda control, bank 2
)
)
)
 LSU sensor upstream to catalyst
 ready for operation, bank 2 =TRUE
 (
 lambda sensor 1 temperature, bank 2 >655(°C)
)
 Lambda control disabled by a fault,
 bank 2 =FALSE
 lambda control is active since
 warmup is finished =TRUE
 Relative air charge >0(%)
 for time >2(s)
)
 HEM condition to block lambda
 closed loop control upstream
 catalyst, bank 2 =FALSE
 Lambda control active due to GDI
 mode change =TRUE
 (
 GDI mode homogeneous =TRUE
 for time >0.8(s)
)
)
 (
 Lambda control enabled for Cold
 operation sensor 2 bank 2 =TRUE
 OR
 HEGO sensor 2 bank 2, signal valid =TRUE
)
 (
 Status of heating enable conditions
 for the sensor operating readiness =TRUE
 (
 Protective heating is finished, bank 2 =TRUE
 for time >25(s)
 OR
 Internal resistance OK for operating
 readiness, bank 2 =TRUE
 (

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Unfiltered internal resistance of HEGO sensor, bank 2	<2000(0hm)
Protective heating is finished, bank 2	=TRUE
Counter for valid internal resistance measurements, bank 2	>3(counts)
)	
)	
Status of sensor signal enable conditions for the sensor operating readiness, bank 2	=TRUE
(
Internal resistance OK for operating readiness	=TRUE
OR	
(
(
Output voltage of HEGO Sensor, bank 2	>0.552(V)
Output voltae of HEGO Sensor, bank 2	<1.201(V)
)	
OR	
Output voltae of HEGO Sensor, bank 2	<0.322(V)
)	
OR	
Sensor voltage stuck in countervoltage band	=TRUE
(
(
(
Output voltage of HEGO Sensor, bank 2	<0.552(V)
Output voltage of HEGO Sensor, bank 2	>0.322(V)
)	
(
	=TRUE
Sensor open circuit fault existed in previous trip	
OR	
Sensor open circuit fault currently not detected	=TRUE
)	
Electrical diagnostics enabled, bank 2	=TRUE
)	
for time	>20(s)
,	

)	
for time	>0.2(s)
)	
)	
)	
Bit p-part system balanced primary control enable 2	=TRUE
(
(
Lambda setpoint for sensor is set equal to 1, bank 2	=TRUE
OR	
Lambda setpoint for sensor is set equal to 1, bank 2	=FALSE
for time	>10(s)
)	
Rich catalyst purge, bank 2	=FALSE
Mass flow of exhaust gas, sensor 1, bank 2	>0(g)
)	
P-part active from temperature and dynamic diagnosis, bank 2	=TRUE
(
Temperature of catalyst 1 bank 2	>250(°C)
Temperature of catalyst 1, bank 2	<900(°C)
)	
)	
Bit I-part global primary control enable	=TRUE
(
(
Current lowpass value of I-part load primary control enable	>-1(%)
Current lowpass value of I-part load primary control enable	<1(%)
)	
Diagnosis of canister purge system is active	=FALSE
Width of dead zone for lambda control deviation	=0
Maximum value among the engine coolant temperature and model-based substitute value for engine temperature signal in case of error	>35(°C)
(
Bit I-part global load and engine speed control enable	=TRUE
(
Engine speed with low resolution	<5000(rpm)
Engine speed with low resolution	>1320(rpm)
(
,	

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Relative air mass	<99.8(%)
Relative air mass (see Look-Up-Table #99)	>15.8 to 39.8(%)
)	
)	
)	
)	
)	
V	
Bit i-part system primary control enable, bank 2	=TRUE
(
Current integrator value of P-part balanced primary control enable (see Look-Up-Table #98)	>200 to 300(g)
(
(
Dew point end of sensor 1 Bank 2 is reached	=TRUE
End of start is reached	=TRUE
Exhaust gas mass flow sensor 1 Bank 2	>199.82(g)
)	
OR	
(
(
Dew point end of sensor 2 reached, bank 2	=FALSE
OR	
End of start is reached	=FALSE
)	
Exhaust gas mass flow sensor 2 (see Look-Up-Table #97)	>219.73 to 320(g)
)	
)	
)	
Bit i-part system temperature primary control enable, bank 2	=TRUE
(
Temperature of catalyst 1 bank 2	>350(°C)
Temperature of catalyst 1, bank 2	<900(°C)
)	
)	
)	
Cumulated time in which slow offset adaptation was active, bank 2	>10(s)
)	

Debounce condition for fault confirmation by fast offset adaptation (sensor 1, bank 2)	=TRUE
General enabling condition of fast offset adaptation, bank 2	
(
Enabling condition of fast offset adaptation due to catalyst conditioning, bank 2	=TRUE
(
(
Bit signal valid, HEGO sensor 2 bank 2	=TRUE
Flag lambda setpoint for sensor equal to 1, bank 2	=TRUE
and	
Rich catalyst purge, bank 2	=FALSE
Bank-independent disabling conditions of fast offset adaptation	=FALSE
(
Fuel cut-off, bank	=TRUE
Mass flow exhaust gas catalyst 1, bank 2	>50(g)
)	
OR	
(
Fuel cut-off	=FALSE
Mass flow exhaust gas catalyst 1, bank 2	>50(g)
)	
)	
(
(
Parallelization done at least once from LSU plausibility diagnosis point of view (sensor 1, bank 2)	=TRUE
(
(
Target sensor voltage for rich during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oil gas mass flow by active lambda shifting minus the maximal possible influence of LSU offset part, segment 1, bank 2	>1.8
for time	>1(s)
)	
OR	
(
Lean target sensor voltage during active parallelisation reached once, sensor 1, bank 2	=TRUE

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Oxygen mass flow in catalyst 1, deduct from maximum present LSU Offset in a fault free system, bank 2	≥1.6(g)
for time	>1(S)
)	
)	
OR	
Dynamic diagnosis error of upstream exhaust gas sensor is not set	=FALSE
)	
OR	
(
(
lambda control is set when lambda controller reaches lower limit FRMIN, bank 2	=TRUE
Lambda actual value sensor 1 bank 2	<1
Output voltage of HEGO sensor 2 bank 2	<0.4(V)
)	
OR	
(
lambda control is set when lambda controller reaches lower limit FRMAX, bank 2	=TRUE
Lambda actual value sensor 1 bank 2	>1
Output voltage of HEGO sensor 2 bank 2	>0.6(V)
)	
for time	>2(s)
Condition for Lambda closed loop control upstream catalyst; bank 2	=TRUE
)	
for time	>2(s)
)	
(
(
Temperature of catalyst 1, bank 2	>400(°C)
Temperature of catalyst 1, bank 2	<800(°C)
)	
for time	=0(s)
)	
(
(
Mass flow exhaust gas catalyst 1, bank 2	>5.56(g/s)
Mass flow exhaust gas catalyst 1, bank 2	<33.33(g/s)

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)	
OR	
(
(
Mass flow exhaust gas catalyst 1, bank 2	>5.56(g/s)
Mass flow exhaust gas catalyst 1, bank 2	<5.56(g/s)
)	
for time	>0(s)
)	
)	
Condition for upstream cat LSU ready for operation f(lamsons_w), bank 2	=TRUE
/	
lambda sensor 1 temperature, bank 2	>655(°C)
)	
Hydrogen-correction-voltage, HEGO sensor 2 bank 2 with high resolution	<80(V)
(
CAT damage during past interval	=FALSE
/	
Mass flow of exhaust gas catalyst 1 bank 2	≥100(g)
Difference between Lambda offset (sensor 1, bank 2) and Lambda offset (delayed by one calculation raster)	<0.003
(
Counter for no step in offset or increasing offset in a row, bank 2	>2(counts)
OR	
Counter for exhaust masses to debounce fault with fast offset adaptation, bank 2	>6(counts)
)	
)	
)	
)	
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable tables

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P2099	Fuel trim fault diagnosis of upstream exhaust gas sensor when the lambda offset is not within the calibrated threshold range - out of range high	(Debounce condition for fault confirmation by offset adaptation (sensor 1, bank 2)	=TRUE	0.1(s)	2 Trip Sim Cond
			Lambda offset of upstream exhaust gas sensor, bank 2	>0.03	(
			Lambda offset of upstream exhaust gas sensor, bank 2	<0.07	Debouncing of offset fault by slow offset adaptation, bank 2	=TRUE	
			Difference between lambda offset at the beginning of the driving cycle, bank 2 and lambda offset of the sensor, bank 2	<0.003	(
		(			Slow offset adaptation, bank 2	=TRUE	
		(	Maximum offset fault of the bank 2 sensor is healed in the current driving cycle	=TRUE	Bit p-part controllability primary control enable 2	=TRUE	
			Minimum offset fault of the bank 2 sensor is healed in the current driving cycle	=TRUE	(
)			(
		OR			Lambda regulator setpoint active, bank 2	=TRUE	
		(	Maximum offset fault of the bank 2 sensor is set in the previous driving cycle	=TRUE	{		
		OR					
			Minimum offset fault of the bank 2 sensor is set in the previous driving cycle	=TRUE	(
)					
		OR			Lambda closed loop control (upstream catalyst), bank 2	=TRUE	
		(	Fuel trim maximum fault of the bank 2 sensor is set in the previous driving cycle	=TRUE	(
		OR			Lambda setpoint for sensor after addition of trim control action, bank 2 is not equal to 0	=TRUE	
					Difference between upper limit action value lambda control and temporary value before test for enleanment protection, bank 2	>0	
			Fuel trim minimum fault of the bank 2 sensor is set in the previous driving cycle	=TRUE	Difference between temporary value before test for enleanment protection, bank 2 and lower bound of dfr during enleanment protection	>0	
)			Lambda (measured and setpoint) is below minimal measurable lambda (bank 2)	=FALSE	
)			and		

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)		TEMIN-limitation active, bench 2	=FALSE
OR)	
()	
()	
Fuel trim maximum fault of the bank 2 sensor is set in the previous driving cycle	TRUE	Current lowpass value of p-part control upstream primary control enable 2	
OR		Lambda closed loop control (upstream catalyst), bank 2	=TRUE
Fuel trim minimum fault of the bank 2 sensor is set in the previous driving cycle	TRUE	(
)		Lambda control disabled during or after cylinder cut-off, bank 2	=FALSE
Lambda offset of upstream exhaust gas sensor, bank 2	>0.07	Lambda switched ON after fuel cutoff, bank 2	=TRUE
)		(
		Fuel cut off is active, bank 2	=FALSE
		(
		Time running down after fuel cut-off for enabling lambda control	>8(5)
		OR	
		(
		Absolute value of control difference in lambda, bank 2	<0.2
		Difference of counter time and plant time constant	>0(s)
		a-(b+c)	
		where a is Time running down after fuel cut-off for enabling lambda control	
		b is plant time constant for continuous air/fuel control, bank 2	
		c is plant parameter for dead time for lambda control, bank 2	
)	
)	
)	
		LSU sensor upstream to catalyst ready for operation, bank 2	=TRUE
		(
		lambda sensor 1 temperature, bank 1	>655(°C)
)	
		Lambda control disabled by a fault, bank 2	=FALSE
		lambda control is active since warmup is finished	=TRUE
		Relative air charge	>0(%)
		for time	>2(s)
)	

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HEM condition to block lambda closed loop control upstream catalyst, bank 2	=FALSE
Lambda control active due to GDI mode change	=TRUE
(GDI mode homogeneous for time	=TRUE >0.8(s)
)	
(Lambda control enabled for Cold operation sensor 2 bank 2	=TRUE
OR	
HEGO sensor 2 bank 2, signal valid	=TRUE
(Status of heating enable conditions for the sensor operating readiness	=TRUE
(Protective heating is finished, bank 2	=TRUE
for time	>25(s)
OR	
Internal resistance OK for operating readiness, bank 2	=TRUE
/	
Unfiltered internal resistance of HEGO sensor, bank 2	<2000(Ohm)
Protective heating is finished, bank 2	=TRUE
Counter for valid internal resistance measurements, bank 2	>3(counts)
)	
) Status of sensor signal enable conditions for the sensor operating readiness, bank 2	=TRUE
/	
Internal resistance OK for operating readiness	=TRUE
OR	
((Output voltage of HEGO Sensor, bank 2	>0.552(V)
Output voltage of HEGO Sensor, bank 2	<1.201(V)
)	
OR	
Output voltage of HEGO Sensor, bank 2	<0.322(V)
^	

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)	
OR	
Sensor voltage stuck in countervoltage band	=TRUE
(
(
(
Output voltage of HEGO Sensor, bank 2	<0.552(V)
Output voltage of HEGO Sensor, bank 2	>0.322(V)
)	
(
Sensor open circuit fault existed in previous trip	=TRUE
OR	
Sensor open circuit fault currently not detected	=TRUE
)	
Electrical diagnostics enabled, bank 2	=TRUE
)	
for time	>20(s)
)	
for time	>0.2(s)
)	
)	
Bit p-part system balanced primary control enable 2	=TRUE
(
(
Lambda setpoint for sensor is set equal to 1, bank 2	=TRUE
OR	
Lambda setpoint for sensor is set equal to 1, bank 2	=FALSE
for time	>10(s)
)	
Rich catalyst purge, bank 2	=FALSE
Mass flow of exhaust gas, sensor 1, bank 2	>0(g)
)	
P-part active from temperature and dynamic diagnosis, bank 2	=TRUE
(

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Temperature of catalyst 1 bank 2	>250(°C)
Temperature of catalyst 1, bank 2	<900(°C)
)	
)	
Bit I-part global primary control enable	=TRUE
(
(
Current lowpass value of I-part load primary control enable	>-1(%)
Current lowpass value of I-part load primary control enable	<1(%)
/	
Diagnosis of canister purge system is active	=FALSE
Width of dead zone for lambda control deviation	=0
Maximum value among the engine coolant temperature and model-based substitute value for engine temperature signal in case of error	>35(°C)
(
Bit I-part global load and engine speed control enable	=TRUE
{	
Engine speed with low resolution	<5000(rpm)
Engine speed with low resolution	>1320(rpm)
(
(
Relative air mass	<99.8(%)
Relative air mass (see Look-Up-Table #99)	>15.8 to 39.8(%)
)	
)	
)	
)	
(
Bit i-part system primary control enable, bank 2	=TRUE
{	
Current integrator value of P-part balanced primary control enable (see Look-Up-Table #98)	>200 to 300(g)
(
(
Dew point end of sensor 1 Bank 2 is reached	=TRUE
End of start is reached	=TRUE

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Exhaust gas mass flow sensor 1 Bank 2	>199.82(g)
)	
OR	
(
(
Dew point end of sensor 2 reached, bank 2	=FALSE
OR	
End of start is reached	=FALSE
)	
Exhaust gas mass flow sensor 2 (see Look-Up-Table #97)	>219.73 to 320(g)
)	
)	
)	
Bit i-part system temperature primary control enable, bank 2	=TRUE
(
Temperature of catalyst 1 bank 2	>350(°C)
Temperature of catalyst 1, bank 2	<900(°C)
)	
)	
)	
Cumulated time in which slow offset adaptation was active, bank 2	>10(s)
)	
Debounce condition for fault confirmation by fast offset adaptation (sensor 1, bank 2)	=TRUE
General enabling condition of fast offset adaptation, bank 2	
(
Enabling condition of fast offset adaptation due to catalyst conditioning, bank 2	=TRUE
(
(
Bit signal valid, HEGO sensor 2 bank 2	=TRUE
Flag lambda setpoint for sensor equal to 1, bank 2	=TRUE
Rich catalyst purge, bank 2	=FALSE
Bank-independent disabling conditions of fast offset adaptation	=FALSE
(
Fuel cut-off, bank	=TRUE
Mass flow exhaust gas catalyst 1, bank 2	>50(g)

)	
OR	
(
Fuel cut-off	=FALSE
Mass flow exhaust gas catalyst 1, bank 2	>50(9)
)	
)	
(
(
Parallelization done at least once from LSU plausibility diagnosis point of view (sensor 1, bank 2)	=TRUE
(
(
Target sensor voltage for rich during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oil gas mass flow by active lambda shifting minus the maximal possible influence of LSU offset part, segment 1, bank 2	>1.8(g)
for time	>1(s)
)	
OR	
(
Lean target sensor voltage during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oxygen mass flow in catalyst 1, deduct from maximum present LSU Offset in a fault free system, bank 2	>1.6(g)
for time	>1(s)
)	
)	
OR	
Dynamic diagnosis error of upstream exhaust gas sensor is not set	=FALSE
)	
OR	
(
(
lambda control is set when lambda controller reaches lower limit FRMIN, bank 2	=TRUE
Lambda actual value sensor 1 bank 2	<1
Output voltage of HEGO sensor 2 bank 2	<0.4
)	
OR	
,	

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lambda control is set when lambda controller reaches lower limit	=TRUE
FRMAX, bank 2	
Lambda actual value sensor 1 bank 2	>1
Output voltage of HEGO sensor 2 bank 2	>0.6(V)
)	
for time	>2(s)
Condition for Lambda closed loop control upstream catalyst; bank 2	=TRUE
)	
for time	>2(s)
)	
(
(
Temperature of catalyst 1, bank 2	>400(°C)
Temperature of catalyst 1, bank 2	<800(°C)
)	
for time	=0(s)
)	
(
(
Mass flow exhaust gas catalyst 1, bank 2	>5.56(g/s)
Mass flow exhaust gas catalyst 1, bank 2	<33.33(g/s)
)	
OR	
(
(
Mass flow exhaust gas catalyst 1, bank 2	>5.56(g/s)
Mass flow exhaust gas catalyst 1, bank 2	<5.56(g/s)
)	
for time	>0(s)
)	
)	
Condition for upstream cat LSU ready for operation f(lamsons_w), bank 2	=TRUE
(
lambda sensor 1 temperature, bank 2	>655(°C)
)	
Hydrogen-correction-voltage, HEGO sensor 2 bank 2 with high resolution	<80(V)
(
CAT deactivation reset test	FALSE

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)			
					Mass flow of exhaust gas catalyst 1 bank 2	≥100(g)		
					Difference between Lambda offset (sensor 1, bank 2) and Lambda offset (delayed by one calculation raster)	<0.003		
					(
					Counter for no step in offset or increasing offset in a row, bank 2	>2(counts)		
					OR			
					Counter for exhaust masses to debounce fault with fast offset adaptation, bank 2	>6(counts)		
)			
)			
)			
)			
)			
					No pending or confirmed DTCs	=see sheet inhibit table		
					Basic enable conditions met	=see sheet enable tables		
9. FUEL SYSTEM MONITORING	P09E0	Cylinder Specific air-fuel imbalance detection too lean	Cylinder individual air-fuel ratio considering deviation from bank average air-fuel ratio	>2	Enable conditions for lambda imbalance diagnosis	=TRUE	0.1(s)	2 Trip
	P09E1				(			2 Trip
	P09E2				(			2 Trip
	P09E3				Basic enable conditions	=TRUE		2 Trip
	P09E4				(			2 Trip
	P09E5				Engine roughness signal is valid, which is the following conditions:	=TRUE		2 Trip
	P09E6				(			2 Trip

P09E7

Status of trigger wheel adaptation for segment time correction for cylinder individual lambda control function	=TRUE
and	
Condition segment duration plausible	=TRUE
and	
Active rough road detection	=FALSCH
and	
Clutch operator is active	=FALSCH
and	
Engine synchronisation is completed and engine is in normal operation mode	=TRUE
)	
and	
Engine operation point is within calibrated range (low or high operating range), as decribed below:	=TRUE
(
Relative air charge (with AT)	<A-B(%)
where	
A is Upper threshold for the relative air charge in order to determine the operating range LOW depending on the engine speed n _{mot} for automatic transmission	=50.3 to 54.8(%)
(see Look-Up-Table #3)	
B is the upper thresholds of the relative air charge for determining the operating ranges LOW and HIGH for automatic transmission	
and	
Relative air charge (with AT)	>20.3 to 24.8(%)
(see Look-Up-Table #4)	
and	
Engine speed (with AT)	<A-B(rpm)
where	
A is Upper engine speed threshold for determining for operating range LOW, AT	=2320(rpm)

2 Trip

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Population (millions)	7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.3	9.5	9.7	9.9	10.1	10.3	10.5	10.7	10.9	11.1	11.3	11.5	11.7
GDP (trillion USD)	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2
Life expectancy (years)	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
Urban population (%)	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89	91	93	95
Renewable energy (%)	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
CO2 emissions (Gt)	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5
Forest cover (%)	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
Healthcare expenditure (GDP %)	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1	9.4	9.7	10.0	10.3	10.6	10.9	11.2	11.5
Internet usage (%)	45	50	55	60	65	70	75	80	85	90	95	98	100	100	100	100	100	100	100	100	100
Gender inequality index	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.90	0.91	0.92
Human Development Index	0.70	0.72	0.74	0.76	0.78	0.80	0.82	0.84	0.86	0.88	0.90	0.92	0.94	0.96	0.98	1.00	1.00	1.00	1.00	1.00	1.00

B is the hysteresis for upper thresholds of the relative air charge for determining the operating ranges LOW and HIGH for automatic transmission	=40(rpm)
and Engine speed (with AT))	>1560(rpm)
OR (High operation range is released and (	=TRUE
Relative air charge (with AT) where A is Upper threshold for the relative air charge in order to determine the operating range LOW depending on the engine speed nmot for automatic transmission	<A-B(%) =0(%)
B is the upper thresholds of the relative air charge for determining the operating ranges LOW and HIGH for automatic transmission	=0.8(%)
and Relative air charge (with AT)	>191.3(%)
and Engine speed (with AT) where A is Upper engine speed threshold for determining for operating range HIGH, AT	<A-B(rpm) =0(rpm)
B is the hysteresis for upper engine speed thresholds for determining the operating ranges LOW and HIGH for automatic transmission	=40(rpm)
and Engine speed (with AT))) for time	>10200(rpm) >0.5(s)
and Environmental conditions are within calibrated range:	=TRUE

(Ambient pressure	>58(kPa)
and Environment temperature	>-40.04(°C)
)	
and Engine coolant temperature is within calibrated range:	=TRUE
(Engine coolant temperature	>58(°C)
and	
Engine coolant temperature	<143.26(°C)
)	
and Catalyst temperature is within calibrated range, which is the following conditions:	=TRUE
(max(a,b)	<950(°C)
Where:	
a is Maximum catalyst 1 temperature at bank 1	
b is Maximum catalyst 1 temperature at bank 2	
and	
max(a,b)	>400(°C)
Where:	
a is Minimum catalyst 1 temperature at bank 1	
b is Minimum catalyst 1 temperature at bank 2	
)	
and Inlet/outlet camshaft adjustment is released as follows:	=TRUE
(Condition release of intake camshaft control is valid	=TRUE
and	
State of camshaftw control is not in ready state	=TRUE
and	
Condition release of outlet camshaft control is valid	=TRUE
and	
State of camshaftw control is not in ready state	=TRUE
and	
)	
and	

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The following combustion conditions are fulfilled:	=TRUE
\	
Closed loop lambda control is active for bank 1	=TRUE
and	
Flag lambda setpoint for sensor equal to 1	=TRUE
and	
Closed loop lambda control is active for bank 2	=TRUE
and	
Flag lambda setpoint for sensor equal to 1, bank 2	=TRUE
and	
Catalyst heating is active	=FALSCH
and	
Homogenous mode is activated	=1
and	
Air fuel ratio commanded rich for component protection is active	=FALSCH
)	
and	
Current gear position	>6
and	
Current gear position	<8
and	
Waiting time after first end of start in a driving cycle	>0(s)
)	
and	
Sum of high and low range adaptations in current driving cycle	>1
and	
Deviation of the worst test cylinder	<0.999969
)	
for time	>15(s)
and	
(
Switching state of intake camshaft position for the diagnosis for AFIM has been reached	=TRUE
and	
Switching state of outlet camshaft position for the diagnosis for AFIM has been reached	=TRUE
and	

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				Actual rail pressure is adjusted to set point and Actual value of fuel part purge control	=TRUE <0.008		
				and Engine roughness signal is released	=TRUE		
				) for time	>0.1(s)		
				) Maximum number of cylinder enrichment is achieved	=FALSE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P09E8	Cylinder Specific air-fuel imbalance detection too rich	Cylinder individual air-fuel ratio considering deviation from bank average air-fuel ratio	<0.86	Enable conditions for lambda imbalance diagnosis	=TRUE	0.1(s)	2 Trip
P09E9				(			2 Trip
P09EA				(			2 Trip
P09EB				Basic enable conditions	=TRUE		2 Trip
P09EC				(			2 Trip
P09ED				Engine roughness signal is valid, which is the following conditions:	=TRUE		2 Trip
P09EE				(			2 Trip
P09EF				Status of trigger wheel adaptation for segment time correction for cylinder individual lambda control function	=TRUE		2 Trip
				and Condition segment duration plausible	=TRUE		
				and Active rough road detection	=FALSCH		
				and Clutch operator is active	=FALSCH		
				and Engine synchronisation is completed and engine is in normal operation mode	=TRUE		
)			

and Engine operation point is within calibrated range (low or high operating range), as described below:	=TRUE
(Relative air charge (with AT)	<A-B(%)
where A is Upper threshold for the relative air charge in order to determine the operating range LOW depending on the engine speed n _{mot} for automatic transmission	=50.3 to 54.8(%)
(see Look-Up-Table #3)	
B is the upper thresholds of the relative air charge for determining the operating ranges LOW and HIGH for automatic transmission	=0.8(%)
and Relative air charge (with AT)	>20.3 to 24.8(%)
(see Look-Up-Table #4)	
and Engine speed (with AT)	<A-B(rpm)
where A is Upper engine speed threshold for determining for operating range LOW, AT	=2320(rpm)
B is the hysteresis for upper thresholds of the relative air charge for determining the operating ranges LOW and HIGH for automatic transmission	=40(rpm)
and Engine speed (with AT)	>1560(rpm)
) OR	
(High operation range is released	=TRUE
and (Relative air charge (with AT)	<A-B(%)
where	

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A is Upper threshold for the relative air charge in order to determine the operating range LOW depending on the engine speed n_{mot} for automatic transmission	=0(%)
B is the upper thresholds of the relative air charge for determining the operating ranges LOW and HIGH for automatic transmission	=0.8(%)
and Relative air charge (with AT)	>191.3(%)
and Engine speed (with AT)	<A-B(rpm)
where A is Upper engine speed threshold for determining for operating range HIGH, AT	=0(rpm)
B is the hysteresis for upper engine speed thresholds for determining the operating ranges LOW and HIGH for automatic transmission	=40(rpm)
and Engine speed (with AT)	>10200(rpm)
)	
)	
for time	>0.5(s)
and Environmental conditions are within calibrated range:	=TRUE
(
Ambient pressure	>58(kPa)
and Environment temperature	>-40.04(°C)
)	
and Engine coolant temperature is within calibrated range:	=TRUE
{	
Engine coolant temperature	>58(°C)
and Engine coolant temperature	<143.26(°C)
)	
and Catalyst temperature is within calibrated range, which is the following conditions:	=TRUE
{	
max(a,b)	<950(°C)

Where:
a is Maximum catalyst 1 temperature
at bank 1
b is Maximum catalyst 1 temperature
at bank 2
and
max(a,b) >400(°C)
Where:
a is Minimum catalyst 1 temperature
at bank 1
b is Minimum catalyst 1 temperature
at bank 2
)
and
Inlet/outlet camshaft adjustment is
released as follows: =TRUE
(
Condition release of intake camshaft
control is valid =TRUE
and
State of camshaftw control is not in
ready state =TRUE
and
Condition release of outlet camshaft
control is valid =TRUE
and
State of camshaftw control is not in
ready state =TRUE
and
)
and
The following combustion conditions
are fulfilled: =TRUE
(
Closed loop lambda control is active
for bank 1 =TRUE
and
Flag lambda setpoint for sensor
equal to 1 =TRUE
and
Closed loop lambda control is active
for bank 2 =TRUE
and
Flag lambda setpoint for sensor
equal to 1, bank 2 =TRUE
and
Catalyst heating is active =FALSCH
and
Homogenous mode is activated =1
and
Air fuel ratio commanded rich for =FALSCH

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)	
and	
Current gear position	>6
and	
Current gear position	>8
and	
Waiting time after first end of start in a driving cycle	>0(s)
)	
and	
Sum of high and low range adaption in current driving cycle	>1
and	
Deviation of the worst test cylinder	<0.999969
)	
for time	>15(s)
and	
(
Switching state of intake camshaft position for the diagnosis for AFIM has been reached	=TRUE
and	
Switching state of outlet camshaft position for the diagnosis for AFIM has been reached	=TRUE
and	
Actual rail pressure is adjusted to set point	=TRUE
and	
Actual value of fuel part purge control	<0.008
and	
Engine roughness signal is released	=TRUE
)	
for time	>0.1(s)
)	
Maximum number of cylinder enrichment is achieved	=FALSE
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

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10. FUEL INJECTOR OFFSET LEARNING DIAGNOSIS	P10A4	Monitor 1: Rationality check of valve opening time delay (tantot) against default value	Difference between current opening time delay and default opening time delay	>0.00006(s)	Base Adaption is active	=TRUE	2(events)	2 Trip Sim Cond
	P10A6				No pending or confirmed DTCs	=see sheet inhibit tables		2 Trip Sim Cond
	P10A8				Basic enable conditions met	=see sheet enable tables		2 Trip Sim Cond
	P10AA							2 Trip Sim Cond
	P10AC	Monitor 4: Rationality check of (the total calculated injection time correction (dti) value			Pulse type of current injection is ballistic	=0	20(events)	2 Trip Sim Cond
	P10AE		Desired Open time(ti) on ballisitic area for CVO base adaption	>0.0002(s)	and			2 Trip Sim Cond
	P10B0		and		Base Adaption is active	=FALSE		2 Trip Sim Cond
	P10B2		Total calculated injection time correction (dti)	>0.0001(s)	and			2 Trip Sim Cond
			) OR (Desired Open time(ti) on ballisitic area for CVO base adaption and Total calculated injection time correction (dti)	<0.0002(s)	(Pause time OR Pause time)	=0 >0.003(s)		
)	>0.00005(s)	No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		

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Monitor 5: Rationality check of Current Full-Lift closing time the Full-Lift closing time (tab) <0.00062(s) Base Adaption is active =FALSE 100(events)

No pending or confirmed DTCs =see sheet inhibit tables
Basic enable conditions met =see sheet enable tables

Monitor 7: Rationality check of Integrated dti value after the the ballistic dTi at the adjustment-point controller is stable during base adaption >0.00005(s) Base Adaption is active =TRUE

No pending or confirmed DTCs =see sheet inhibit tables
Basic enable conditions met =see sheet enable tables

P10A3 **Monitor 1:** Rationality check of valve opening time delay (tantot) against default value Difference between current opening time delay and default opening time delay <-0.00006(s) Base Adaption is active =TRUE 2(events) 2 Trip Sim Cond

P10A5 OR No pending or confirmed DTCs =see sheet inhibit tables 2 Trip Sim Cond

P10A7 Opening time delay is found =FALSCH Basic enable conditions met =see sheet enable tables 2 Trip Sim Cond

P10A9 2 Trip Sim Cond

P10AB **Monitor 4:** Rationality check of (the total calculated injection time correction (dti) value Pulse type of current injection is ballistic =0 20(events) 2 Trip Sim Cond

P10AD Desired Open time(ti) on ballistic area for CVO base adaption >0.0002(s) and 2 Trip Sim Cond

P10AF and Base Adaption is active =FALSE 2 Trip Sim Cond

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P10B1

2 Trip
Sim Cond

)			(
	OR			Pause time	=0	
	(OR		
	Desired Open time(ti) on ballistic area for CVO base adaption and	<0.0002(s)		Pause time	>0.003(s)	
	Total calculated injection time correction (dti)	:-0.00005(s))		
			No pending or confirmed DTCs		=see sheet inhibit tables	
	)		Basic enable conditions met		=see sheet enable tables	
Monitor 5: Rationality check of the Full-Lift closing time	Current Full-Lift closing time (tab)	>0.0002(s)	Base Adaption is active	=FALSE	100(events)	
			No pending or confirmed DTCs	=see sheet inhibit tables		
			Basic enable conditions met	=see sheet enable tables		
Monitor 6: Detection of Full-lift closing time	CVO controller is faulty and full lift closing could not be detected	=TRUE	Base Adaption is active	=FALSE	20(events)	
			No pending or confirmed DTCs	=see sheet inhibit tables		
			Basic enable conditions met	=see sheet enable tables		
Monitor 7: Rationality check of the ballistic dTi at the adjustment-point	Integrated dti value after the controller is stable during base adaption	<-0.00005(s)	Base Adaption is active	=TRUE	20(events)	
			No pending or confirmed DTCs	=see sheet inhibit tables		
			Basic enable conditions met	=see sheet enable tables		

P13E7

Path1:diagnosis the CVO error during base adaption or regular operation for rich mixture

Maximum CVO error during base adaption or regular operation (rich mixture)

TRUE

Battery Voltage

>9(V)

CVO Sim
Cond

Basic enable conditions met

=see sheet enable
tables

Path2:Diagnosis the CVO error during base adaption or regular operation for lean mixture

Minimum CVO error during base adaption or regular operation (lean mixture)

TRUE

(

[illegible]

Monitoring of ASIC interrupt handling		Validity of IRQ diagnosis information	TRUE
Interrupt handling at ASIC base software does not work			
Bidirectional interrupt signal between ASIC and ECU-Microcontroller: too slow- or too fast response or no response	=TRUE	(Battery voltage	<16.1(V)
		Battery voltage	>10.7(V)
)	
		for time	>0.1(s)
		Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables
Monitoring of quantification of the analog digital converter		Cj135 is neither in IDLE nor in SWITCHON mode	=TRUE
Causes for error: ADC defect, 3,3V source not operational, low-pass defect			
Conversion value of the analog digital converter (amplifier mode 1)	<0.00040(V)	(Battery voltage	<16.1(V)
		Battery voltage	>10.7(V)
)	
OR		for time	>0.1(s)
Conversion value of the analog digital converter (amplifier mode 1)	>0.0007(V)	Basic enable conditions are met	=see sheet enable tables
OR		No pending or confirmed DTCs	=see sheet inhibit tables
Conversion value of the analog digital converter (amplifier mode 2)	<0.00110(V)		
OR			
Conversion value of the analog digital converter (amplifier mode 2)	>0.002(V)		
OR			
Conversion value of the analog digital converter (amplifier mode 3)	<0.00310(V)		
OR			
Conversion value of the analog digital converter (amplifier mode 3)	>0.0054(V)		

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Current source Isq/ Rgnd resistance check		Cj135 is not in IDLE mode	=TRUE
Causes for error: Isq defect, Rgnd damaged or wrong calibration value of Rgnd			
Ratio of requested amplitude of the pump current source and measured pump current source	<0.81	Adjustment bits ISQ reference of sensor 1 bank 1 is same as register value of desired Isq sensor 1 bank 1	=TRUE
OR		(Battery voltage	<16.1(V)
Ratio of requested amplitude of the pump current source and measured pump current source	>1.192553	Battery voltage)	>10.7(V)
		for time	>0.1 (s)
		Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables
Current source Isqr/ Real resistance check		Cj135 is neither in IDLE nor in SWITCHON mode	=TRUE
Causes for error: Isqr defect, Real damaged			
Ratio of requested amplitude of the pump current source and measured pump current source	<0.81	(Battery voltage	<16.1(V)
OR		Battery voltage	>10.7(V)
Ratio of requested amplitude of the pump current source and measured pump current source	>1.192553	) for time	>0.1 (s)
		Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables
Rmeas resistance check		Cj135 is in SWITCHON mode	=TRUE
Since Rmeas cannot be alone measured by ECU, then the entire resistance between pin APE and MES (Rparl) will be checked here			
		Calculated parallel resistance is valid	=TRUE
Calculated parallel resistance between APE and MES	<24(Ohm)	(Battery voltage	<16.1 (V)
Calculated parallel resistance between APE and MES	>360(Ohm)	Battery voltage)	>10.7(V)
		for time	>0.1 (s)

			Basic enable conditions are met	=see sheet enable tables		
			No pending or confirmed DTCs	=see sheet inhibit tables		
			Monitoring of ASIC supply voltage deviations from 3.3V	(Battery voltage	<16.1(V)	
			Measured reference voltage VCC3	<2.97(V)	Battery voltage	>10.7(V)
			Measured reference voltage VCC3	>3.63(V)	) for time	>0.1(s)
				Basic enable conditions are met	=see sheet enable tables	
				No pending or confirmed DTCs	=see sheet inhibit tables	
P064E	ECU: Self Check for Sensor ASIC of UEGO Sensor 1 Bank 2 An error is reported if the ASIC detects it or it delivers unplausible measurement	Monitoring of ASIC power supply: Undervoltage at UB: Battery voltage < 6V. ASIC has shut off due to low battery voltage (failure transition into IDLE state) OR Tests for production checks are active SPI test access port active OR Built-in self-test failed OR Monitoring of ASIC internal sequencing Internal sequencing does not work Error of watchdog signal of the sequencer OR Watchdog signal of the SP-unit Interrupt to close OR Watchdog signal of the SP-unit reading error of the Program rom if set without Over- or Undervoltage Flags	Diagnosis register of the ASIC is valid	=TRUE	0.01(s)	2 Trip
			=TRUE	(Battery voltage	<16.1(V)	
				Battery voltage / for time	>10.7(V) >0.1(s)	
			=TRUE	Basic enable conditions are met	=see sheet enable tables	
				No pending or confirmed DTCs	=see sheet inhibit tables	
			=TRUE			
			=TRUE			
			=TRUE			

OR**Check ASIC Chip**

ASIC chip ID is lower than BA-step

=TRUE

Monitoring of ASIC interrupt handling

Interrupt handling at ASIC base software does not work

Validity of IRQ diagnosis information

=TRUE

Bidirectional interrupt signal between ASIC and ECU-Microcontroller: too slow- or too fast response or no response

=TRUE

(Battery voltage
Battery voltage
)

<16.1(V)

>10.7(V)

for time
Basic enable conditions are met>0.1(s)
=see sheet enable
tables

No pending or confirmed DTCs

=see sheet inhibit
tables**Monitoring of quantification of the analog digital converter**

Causes for error: ADC defect, 3,3V source not operational, low-pass defect

Cj135 is neither in IDLE nor in SWITCHON mode

=TRUE

Conversion value of the analog digital converter (amplifier mode 1)

<0.00040(V)

(Battery voltage
Battery voltage
)

<16.1(V)

>10.7(V)

OR

Conversion value of the analog digital converter (amplifier mode 1)

>0.0007(V)

for time
Basic enable conditions are met>0.1(s)
=see sheet enable
tables

OR

No pending or confirmed DTCs

=see sheet inhibit
tables

Conversion value of the analog digital converter (amplifier mode 2)

<0.00110(V)

OR

Conversion value of the analog digital converter (amplifier mode 2)

>0.0019(V)

OR

Conversion value of the analog digital converter (amplifier mode 3)

<0.00310(V)

OR

Conversion value of the analog digital converter (amplifier mode 3)

>0.0054(V)

Current source Isq/ Rgnd resistance check		Cj135 is not in IDLE mode	=TRUE
Causes for error: Isq defect, Rgnd damaged or wrong calibration value of Rgnd			
Ratio of requested amplitude of the pump current source and measured pump current source	<0.81	Adjustment bits ISQ reference of sensor 1 bank 2 is same as register value of desired Isq sensor 1 bank 2	=TRUE
OR			
Ratio of requested amplitude of the pump current source and measured pump current source	>1.192553	(Battery voltage Battery voltage)	<16.1(V) >10.7(V)
		for time	>0.1(s)
		Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables
Current source Isqr/ Real resistance check		Cj135 is neither in IDLE nor in SWITCHON mode	=TRUE
Causes for error: Isqr defect, Real damaged			
Ratio of requested amplitude of the pump current source and measured pump current source	<0.81	(Battery voltage	<16.1(V)
OR			
Ratio of requested amplitude of the pump current source and measured pump current source	>1.192553	Battery voltage) for time	>10.7(V) >0.1(s)
		Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables
Rmeas resistance check		Cj135 is in SWITCHON mode	=TRUE
Since Rmeas cannot be alone measured by ECU, then the entire resistance between pin APE and MES (Rparl) will be checked here			
		Calculated parallel resistance is valid	=TRUE
Calculated parallel resistance between APE and MES	<24(Ohm)	(Battery voltage	<16.1(V)
Calculated parallel resistance between APE and MES	>360(Ohm)	Battery voltage)	>10.7(V)

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				for time	>0.1(s)		
				Basic enable conditions are met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
		Monitoring of ASIC supply voltage deviations from 3.3V		(Battery voltage	<16.1 (V)		
		Measured reference voltage VCC3	<2.97(V)	Battery voltage)	>10.7(V)		
		Measured reference voltage VCC3	>3.63(V)	for time	>0.1(s)		
				Basic enable conditions are met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P30D8	ECU: Self Check for Sensor ASIC of UEGO Sensor 1 Bank 1 An error is reported if the ASIC detects it or if it is not reacting to requests	Monitoring of diagnosis register, working registers and RAM values:		(Battery voltage	<16.1 (V)	0.01 (s)	2 Trip
		SPI error during transmission of diagnosis registers for time	>0.05(s)	Battery voltage)	>10.7(V)		
		OR		for time	>0.1(s)		
		SPI error during transmission of data registers for time	>0.05(s)	Flag locking the fault report due to currently requested Idle mode	=FALSE		
		OR		External reset request	=FALSE		
		SPI error during transmission of RAM data for time	>0.05(s)	Basic enable conditions are met	=see sheet enable tables		
		OR		No pending or confirmed DTCs	=see sheet inhibit tables		
		Monitoring ASIC (Chip) response/error					
		Availability of diagnostic register	=TRUE				
		(
		ASIC initialization wasn't successful	=TRUE				
		OR					
		Respond/actual state of the ASIC wasn't as expected of base software	=TRUE				
		OR					
		The bank wasn't switched between interrupt change	=TRUE				
)					
		OR					

		Monitoring setting register and operation mode				
		Register could not be set	=TRUE			
		Number of rejected requests	>200(counts)			
		OR				
		No values found in diagnosis register	=TRUE			
		OR				
		The ASIC does not switch to the requested mode for time	>2(s)			
P30D9	ECU: Self Check for Sensor ASIC of UEGO Sensor 1 Bank 2 An error is reported if the ASIC detects it or if it is not reacting to requests	Monitoring of diagnosis register, working registers and RAM values:	(Battery voltage	<16.1(V)	0.01(s)	2 Trip
		SPI error during transmission of diagnosis registers for time	>0.05(s)	Battery voltage	>10.7(V)	
		OR	) for time	>0.1(s)		
		SPI error during transmission of data registers for time	>0.05(s)	Flag locking the fault report due to currently requested Idle mode	=FALSE	
		OR		External reset request	=FALSE	
		SPI error during transmission of RAM data for time	>0.05(s)	Basic enable conditions are met	=see sheet enable tables	
		OR		No pending or confirmed DTCs	=see sheet inhibit tables	
		Monitoring ASIC (Chip) response/error				
		Availability of diagnostic register	=TRUE			
		(
		ASIC initialization wasn't successful	=TRUE			
		OR				
		Respond/actual state of the ASIC wasn't as expected of base software	=TRUE			
		OR				
		The bank wasn't switched between interrupt change	=TRUE			
)				
		OR				
		Monitoring setting register and operation mode				
		Register could not be set	=TRUE			
		Number of rejected requests	>200(counts)			
		OR				
		No values found in diagnosis register	=TRUE			

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			Basic enable conditions are met	=see sheet enable tables	
			and		
			No pending or confirmed DTCs	=see sheet inhibit tables	
Path 2: Permanent diagnosis	Ceramic temperature of upstream O2 sensor	<735(°C)	(Battery voltage	<10.7(V)	60(s)
Monitoring of ceramic temperature against low rationality threshold					
			and		
			Battery voltage	>16.1(V)	
)		
			for time	>0.1 (s)	
			and		
			Engine is running	=TRUE	
			and		
			Modelled exhaust gas temperature at upstream O2 sensor bank 1	>450(°C)	
			and		
			Fuel cut off is active	=FALSE	
			for time	>50(s)	
			and		
			HO2S closed loop heating control (inaccurate), which is the following condition for time:	>50(s)	
			(
			Deviation between actual temperature value and set point	>50(°C)	
)		
			and		
			Basic enable conditions are met	=see sheet enable tables	
			and		
			No pending or confirmed DTCs	=see sheet inhibit tables	
Path 3: Low Temperature Diagnosis	Temperature of ceramic upstream O2 sensor	<660(°C)	(Battery voltage	<10.7(V)	10(s)
Monitoring of ceramic temperature against very low rationality threshold (drops quickly to a critical low level)					
			and		
			Battery voltage	216.1 (V)	
)		
			for time	>0.1 (s)	

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and
Engine is running =TRUE
and
Modelled exhaust gas temperature at upstream 02 sensor bank 1 >350(°C)
and
Fuel cut off is active =FALSE
for time >50(s)

and
H02S closed loop heating control (inaccurate), which is the following condition for time:
(
Deviation between temperature value and set point >50(°C)
)
and
Basic enable conditions are met =see sheet enable tables

and
No pending or confirmed DTCs =see sheet inhibit tables

P2243	Lambda sensor wire diagnosis Circuit continuity - open load at pin RE detected by means of aborted RAM check at WARMUP mode	Aborted RAM check at ASIC shut-off when CJ135 in WARMUP mode Open load at pin RE detected if countinuity measurement was done before ASIC abort Short circuit to battery fault is detected at sensor lines IPE/APE/MES as per last accessed ASIC diagnostic register, means Voltage at least at one of the sensor lines IPE/APE/MES <9.1 to 10.3(V) Result of continuity measurement of sensor pumpcell using current source ISO (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM	=FALSE	Battery voltage)	>10.7(V)		
				for time Requested mode of UEGO sensor 1 Bank 1 is in WARMUP mode Upstream H02S Sensor is heated up, which is the following conditions:	>0.1 (s) =TRUE =TRUE		

(

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Upstream HO2S Sensor ceramic temperature	>790(°C)
OR	
Heating-up phase of the sensor is completed	=TRUE
)	
Basic enable conditions are met	=see sheet enable tables
No pending or confirmed DTCs	=see sheet inhibit tables

Lambda sensor wire diagnosis	Aborted RAM check at ASIC	(Battery voltage	<16.1(V)
Circuit continuity - open load at pin RE detected by means of aborted RAM check at NORMAL mode	shut-off when CJ135 in NORMAL mode		
	Open load at pin RE detected if current via Nernst cell is not OK		
	Current source ISQr is active: current via Nernst cell is OK	=FALSE	
		Battery voltage	>10.7(V)
)	
		for time	>0.1 (s)
		Upstream HO2S Sensor is heated up, which is the following conditions:	=TRUE
		(
		Upstream HO2S Sensor ceramic temperature	>790(°C)
		OR	
		Heating-up phase of the sensor is completed	=TRUE
)	
		UEGO Signal ASIC mode request of sensor 1 bank 1 is in NORMAL operation mode	=TRUE
		Validity of REFPAT register sensor 1 bank 1	=TRUE
		Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables

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Circuit continuity check - open circuit by means of nernst voltage monitoring during pump current operation	Monitoring of abnormalities at sensor line IPE during normal ASIC operation Open load at pin RE detected by means of nernst voltage monitoring	(Battery voltage	<16.1(V)
	Electrically corrected nernst voltage	>1.10016(V)	Battery voltage
		) for time	>0.1(s)
		Upstream HO2S Sensor is heated up, which is the following conditions:	=TRUE
		(Upstream HO2S Sensor ceramic temperature	>790(°C)
		OR	
		Heating-up phase of the sensor is completed	=TRUE
)	
		UEGO Signal ASIC mode request of sensor 1 bank 1 is not in IDLE mode (pumping current is active)	=TRUE
		Counter of verifications of the actual mode of the ASIC for sensor 1 bank 1	>10
		Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables
Circuit continuity check - open circuit by means of continuity measurements of sensor pumpcell respectively nernst cell during normal or aborted ASIC operation in WARMUP mode	Monitoring of abnormalities at sensor line RE during normal ASIC operation when CJ135 is in WARMUP mode Open load at pin RE detected by means of continuity measurements of sensor pumpcell and sensor nernst cell using current source ISQr	(Battery voltage	<16.1(V)

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Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiai - UgO)	> E * F	Battery voltage)	>10.7(V)
Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiei - UgO)	< E * F	for time Upstream HO2S Sensor is heated up, which is the following conditions:	>0.1(s) =TRUE
(E) Measured amplitude of the reference pump current source	=measured value	(
(F) Minimum sensitivity of the continuity measurements to resistance RGnd	=66(Ohm)	Upstream HO2S Sensor ceramic temperature	
		OR	
		Heating-up phase of the sensor is completed	=TRUE
)	
		Requested mode of UEGO sensor 1 Bank 1 is in WARMUP mode and	=TRUE
		{	
		(	=FALSE
		Last packet transfer aborted of sensor 1 bank 1	
		Counter of verifications of the actual mode of the ASIC for sensor 1 bank 2	>10(counts)
		Display for the validity of Isqr for UEGO sensor 1 Bank 1	=TRUE
)	
		OR	
		(	=TRUE
		Last packet transfer aborted of sensor 1 bank 1	

Result of continuity measurement of sensor pumpcell using current source ISO (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM	=TRUE
Short circuit to battery fault is detected at sensor lines RE/IPE/APE/MES as per last accessed ASIC diagnostic register, means	=TRUE
Voltage at least at one of the sensor lines (RE/IPE/APE/MES)	>9.1 to 10.3(V)
)	
)	
Basic enable conditions are met	=see sheet enable tables
No pending or confirmed DTCs	=see sheet inhibit tables

P0155	Path 1: Start diagnosis Monitoring of ceramic temperature after engine start from end of dew point onwards	Ceramic temperature of upstream O2 sensor	<735(°C)	Engine start has finished	=TRUE	70 to 70(s)	2 Trip
				and Dew point end for O2 sensor 1 bank 2 has reached (heating up is released)	=TRUE		
				and (Engine is running	=TRUE		
				{ Coolant temperature at engine start	>-40.04(°C)		
				) OR Engine is running	=FALSE		
				{ Coolant temperature at engine output	>-40.04(°C)		
				) ) and { Battery voltage	>10.7(V)		

and	
Battery voltage	<16.1(V)
/	
for time	>0.1(s)
and	
Deactivation after release of Start Check	>10(s)
Start Check will be aborted and deactivated for the rest of the driving cycle if any of the following conditions is not fulfilled for integrated sum time:	
(
Battery voltage	<16.1(V)
and	
{	
All injectors active in operation by running engine	=TRUE
OR	
Engine is running	=FALSE
)	
)	
Basic enable conditions are met	=see sheet enable tables
and	
No pending or confirmed DTCs	=see sheet inhibit tables

Path 2: Permanent diagnosis	Ceramic temperature of upstream O2 sensor	<735(°C)	(Battery voltage	<10.7(V)	60(s)
Monitoring of ceramic temperature against low rationality threshold					

and	
Battery voltage	>16.1(V)
)	
for time	>0.1(s)
and	
Engine is running	=TRUE
and	
Modelled exhaust gas temperature at upstream O2 sensor bank 2	>450(°C)
and	
Fuel cut off is active	=FALSE
for time	>50(s)
and	
HO2S closed loop heating control (inaccurate), which is the following condition for time:	>50(s)
(

			Deviation between actual temperature value and set point) and Basic enable conditions are met and No pending or confirmed DTCs	>50(°C) =see sheet enable tables =see sheet inhibit tables	
Path 3: Low Temperature Diagnosis Monitoring of ceramic temperature against very low rationality threshold (drops quickly to a critical low level)	Temperature of ceramic upstream O2 sensor	<660(°C)	(Battery voltage	<10.7(V)	10(s)
			and Battery voltage) for time and Engine is running and Modelled exhaust gas temperature at upstream O2 sensor bank 2 and Fuel cut off is active for time	>16.1 (V) >0.1 (s) >350(°C) =FALSE >50(s)	
			and H02S closed loop heating control (inaccurate), which is the following condition for time: (Deviation between temperature value and set point) and Basic enable conditions are met and No pending or confirmed DTCs	>50(s) >50(°C) =see sheet enable tables =see sheet inhibit tables	

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		Upstream HO2S Sensor is heated up, which is the following conditions:	=TRUE
		(
		Upstream HO2S Sensor ceramic temperature	>790(°C)
		OR	
		Heating-up phase of the sensor is completed	=TRUE
)	
		UEGO Signal ASIC mode request of sensor 1 bank 2 is in NORMAL operation mode	=TRUE
		Validity of REFPAT register sensor 1 bank 2	=TRUE
		Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables
Circuit continuity check - open circuit by means of nernst voltage monitoring during pump current operation	Monitoring of abnormalities at sensor line IPE during normal ASIC operation	(Battery voltage	<16.1(V)
	Open load at pin RE detected by means of nernst voltage monitoring)	
	Electrically corrected nernst voltage	>1.10016(V)	
		Battery voltage	>10.7(V)
)	
		for time	>0.1(s)
		Upstream HO2S Sensor is heated up, which is the following conditions:	=TRUE
		(
		Upstream HO2S Sensor ceramic temperature	>790(°C)
		OR	
		Heating-up phase of the sensor is completed	=TRUE
)	
		UEGO Signal ASIC mode request of sensor 1 bank 2 is not in IDLE mode (pumping current is active)	=TRUE
		Counter of verifications of the actual mode of the ASIC for sensor 1 bank 2	>10(counts)
		Basic enable conditions are met	=see sheet enable tables

No pending or confirmed DTCs

=see sheet inhibit
tables

Circuit continuity check - open circuit by means of continuity measurements of sensor pumpcell respectively nernst cell during normal or aborted ASIC operation in WARMUP mode	Monitoring of abnormalities at sensor line RE during normal ASIC operation when CJ135 is in WARMUP mode Open load at pin RE detected by means of continuity measurements of sensor pumpcell and sensor nernst cell using current source ISQr	(Battery voltage	<16.1
	Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiai - UgO)	>E * F Battery voltage)	>10.7(V)
	Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiei - UgO)	<E * F for time Upstream HO2S Sensor is heated up, which is the following conditions:	>0.1(s) =TRUE
	(E) Measured amplitude of the reference pump current source	=measured value (
	(F) Minimum sensitivity of the continuity measurements to resistance RGnd	=66(Ohm) Upstream HO2S Sensor ceramic temperature OR Heating-up phase of the sensor is completed)	>790(°C) TRUE

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					Requested mode of IIEGO sensor 1 Bank 2 is in WARMUP mode and	=TRUE		
					(
					(=FALSE		
					Last packet transfer aborted of sensor 1 bank 2			
					Counter of verifications of the actual mode of the ASIC for sensor 1 bank 2	>10(counts)		
					Display for the validity of Isqr for UEGO sensor 1 Bank 2	=TRUE		
)			
					OR			
					(	=TRUE		
					Last packet transfer aborted of sensor 1 bank 2			
					Result of continuity measurement of sensor pumpcell using current source ISO (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM	=TRUE		
					Short circuit to battery fault is detected at sensor lines RE/IPE/APE/MES as per last accessed ASIC diagnostic register, means	=TRUE		
					Voltage at least at one of the sensor lines (RE/IPE/APE/MES)	>9.1 to 10.3(V)		
)			
					Basic enable conditions are met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables			
13. UEGO HEATER CONTROL CIRCUIT DIAGNOSIS	P0032	Diagnoses the UEGO heater control powerstage of bank 1 sensor 1 for short circuit to battery fault at the low side of the driver circuit	Voltage high during driver ON state (indicates short-to-power)	=Short to power: < 0.5 Q impedance between signal and controller power	Release condition of heater powerstage diagnosis is enabled	=TRUE	0.5(s)	2 Trip
					The following release condition of diagnosis report of bank 1 sensor 1 is satisfied	=TRUE		
					(

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				(Battery Voltage for time Battery Voltage / for time) Duty cycle control powerstage heater sensor 1 bank 1 Basic enable conditions met No Pending or Confirmed DTCs	> 10.7(V) =1.5(s) <16.1 (V) >0.1 (s) >4(%) =see sheet enable tables =see sheet inhibit tables		
P0031	Diagnoses the IIEGO heater control powerstage of bank 1 sensor 1 for short circuit to ground fault at the low side of the driver circuit	Voltage low during driver OFF state (indicates short-to-ground)	=Short to ground: < 0.5 Q impedance between signal and controller ground	Release condition of heater powerstage diagnosis is enabled The following release condition of diagnosis report of bank 1 sensor 1 is satisfied ((Battery Voltage for time Battery Voltage / for time / Basic enable conditions met No Pending or Confirmed DTCs	=TRUE =TRUE > 10.7(V) =1.5(s) <16.1 (V) >0.1 (s) =see sheet enable tables =see sheet inhibit tables	2(s)	2 Trip
P0030	Diagnoses the IIEGO heater control powerstage of bank 1 sensor 1 for open circuit faults	Voltage low during driver OFF state (indicates open circuit)	=Open Circuits 200 K Q impedance between ECU pin and load	Release condition of heater powerstage diagnosis is enabled The following release condition of diagnosis report of bank 1 sensor 1 is satisfied ((Battery Voltage for time Battery Voltage / for time))	=TRUE =TRUE > 10.7(V) =1.5(s) <16.1 (V) >0.1 (s)	0.5(s)	2 Trip

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				Basic enable conditions met	=see sheet enable tables		
				No Pending or Confirmed DTCs	=see sheet inhibit tables		
P0052	Diagnoses the IIEGO heater control powerstage of bank 1 sensor 2 for short circuit to battery fault at the low side of the driver circuit	Voltage high during driver ON state (indicates short-to-power)	=Short to power: < 0.5 Q impedance between signal and controller power	Release condition of heater powerstage diagnosis is enabled	=TRUE	2(s)	2 Trip
				The following release condition of diagnosis report of bank 2 sensor 1 is satisfied	=TRUE		
				(
				(
				Battery Voltage	> 10.7(V)		
				for time	=1.5(s)		
				Battery Voltage	<16.1 (V)		
)			
				for time	>0.1 (s)		
)			
				Duty cycle control powerstage heater sensor 1 bank 2	>4(%)		
				Basic enable conditions met	=see sheet enable tables		
				No Pending or Confirmed DTCs	=see sheet inhibit tables		
P0051	Diagnoses the UEGO heater control powerstage of bank 2 sensor 1 for short circuit to ground fault at the low side of the driver circuit	Voltage low during driver OFF state (indicates short-to-ground)	=Short to ground: < 0.5 Q impedance between signal and controller ground	Release condition of heater powerstage diagnosis is enabled	=TRUE	0.5(s)	2 Trip
				The following release condition of diagnosis report of bank 2 sensor 1 is satisfied	=TRUE		
				(
				(
				Battery Voltage	> 10.7(V)		
				for time	=1.5(s)		
				Battery Voltage	<16.1 (V)		
)			
				for time	>0.1 (s)		
)			
				Basic enable conditions met	=see sheet enable tables		
				No Pending or Confirmed DTCs	=see sheet inhibit tables		

	P0050	Diagnoses the UEGO heater control powerstage of bank 2 sensor 1 for open circuit faults	Voltage low during driver OFF state (indicates open circuit)	=Open Circuits 200 K Q impedance between ECU pin and load	Release condition of heater powerstage diagnosis is enabled	=TRUE	0.5(s)	2 Trip
					The following release condition of diagnosis report of bank 2 sensor 1 is satisfied ((Battery Voltage > 10.7(V) for time =1.5(s) Battery Voltage <16.1(V)) for time >0.1(s)) Basic enable conditions met	=TRUE =see sheet enable tables		
					No Pending or Confirmed DTCs	=see sheet inhibit tables		
14. WIRE DIAGNOSIS OF UPSTREAM EXHAAUST GAS SENSOR	P2237	Lambda sensor wire diagnosis for UEGO sensor 1 bank 1 Circuit contiunity - open circuit at pin Apes	Monitoring of abnormalities at sensor line Apes during normal ASIC operation when CJ135 in WARMUP mode Open load at pin Apes detected by means of continuity measurements of sensor pumpcell and sensor nernst cell using current source ISQr Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiai - UgO)	<E * F(V)	(Battery voltage Battery voltage)	<16.1(V) >10.7(V)	0.01 (s)	2 Trip

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Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiei - UgO)	>E * F(V)	for time	>0.1(s)
(E) Measured amplitude of the reference pump current source	=measured value(A)	Upstream HO2S Sensor is heated up, which is the following conditions:	=TRUE
(F) Minimum sensitivity of the continuity measurements to resistance RGnd	=66(Ohm)	(
Aborted RAM check at ASIC shut-off when CJ135 in WARMUP mode Open load at pin Apes detected by means of continuity measurements of sensor pumpcell and sensor nernst cell using current source ISQr		Upstream HO2S Sensor ceramic temperature OR	
Result of continuity measurement of sensor pumpcell using current source ISQ (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM	=TRUE	Heating-up phase of the sensor is completed	=TRUE
Short circuit to battery fault is detected at sensor lines RE/IPE/APE/MES as per last accessed ASIC diagnostic register, means	=TRUE)	
Voltage at least at one of the sensor lines RE/IPE/APE/MES	>9.1 to 10.3(V)	Basic enable conditions are met	see sheet enable tables

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Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiai - UgO)	<D * F(V)	No pending or confirmed DTCs	=see sheet inhibit tables
Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiei - UgO)	>D * F(V)		
(D) Requested amplitude of the reference pump current source		=commanded value(A)	
(F) Minimum sensitivity of the continuity measurements to resistance RGnd		=66(Ohm)	

Aborted RAM check at ASIC shut-off when CJ135 in NORMAL mode

Open load at pin Apes detected if continuity measurement was done before abort
 Result of continuity measurement of sensor pumpcell using current source ISQ (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM

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P2237	Path 1 : Monitoring of prolonged activation of the blackening protection	Blackening protection is active for at least number of 16 successive checks	•5(counts)	(10(counts)	2 Trip
		for time	> 2.55(s)	Release of diagnosis report sensor 1 bank 1 ((Battery voltage for time Battery voltage) for time) Sensor in hot state / Sensor operation release, Sensor 1 Bank 1 \ Battery voltage for time { (End of start reached OR Engine operation in stopping and finish state (Heat quantity to dew-point end exceeds heat quantity threshold for dew-point end)) OR (Dew point end is reset for TSP sensor 1 Counter for repeated cold starts dew-point end not reached sensor 1 ((Catalyst heating request by cold engine and	=TRUE >10.7(V) >1.5(s) <16.1(V) >0.1 (s) =TRUE =TRUE <16.1(V) >0.06(s) =FALSE =FALSE =TRUE =FALSE <6(counts) =TRUE	

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Catalyst heating request in connection with engine speed	=TRUE
Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 1 (see Look-Up-Table #32)	>0 to 0.41
) OR Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 1 (see Look-Up-Table #30)	>0 to 1
)))) ((
Engine in running state	=TRUE
) OR (
Status of fast light-off for Lambda sensor	=TRUE
OR Function demand for oxygen sensor heating before start	=TRUE
) OR Dew point release requested by service tester	=TRUE
) (Battery voltage for time	>10.7(V) >1.5(s)
OR Heating up of open loop completed, sensor 1, bank 1	=TRUE
) Error with heater, sensor 1, bank 1	=FALSE
UEGO Signal ASIC mode request of sensor 1 bank 1	=0
Battery voltage for time	>9.8(V) >0.5(s)
Battery voltage	>8(V)

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for time	>0.05(s)
Status auxiliary power relay	=TRUE
ECU in drive state	=TRUE
)	
Evaluation temperature is valid, sensor 1 bank 1	=TRUE
(
Temperature of ceramic sensor 1 bank 1	>A - B(°C)
where	
(A) temperature set point for heater control	=800(°C)
(B) large temperature threshold of the control deviation of heater control	=50(°C)
OR	
Heating up open loop is completed, sensor 1, bank 1	=TRUE
\	
Open loop ramp phase finished	=TRUE
for time	>0(s)
OR	
Temperature of ceramic sensor 1 bank 1	>790(°C)
)	
)	
)	
for time	>0.1 (s)
Pump current operation for sensor 1 bank 1 is active	=TRUE
Counter of verifications of the actual mode of the ASIC for sensor 1 bank 1	>30(counts)
UEGO Signal ASIC mode request of sensor 1 bank 1	=0
Current pump package is valid	=TRUE
)	
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable tables

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Path 2: Monitoring of negative voltage drop deviation at ECU- internal resistor Rgnd by means of continuity measurements of sensor pumpcell	Negative voltage drop deviation, sensor 1 bank 1	<-0.15008(V)	Common conditions for voltage drop deviation:	
	and		(
	Negative voltage drop deviation, sensor 1 bank 1	>0.15008(V)	Release of diagnosis report sensor 1 bank 1	=TRUE
			(
			(
			Battery voltage for time	>10.7(V) >1.5(s)
			and	
			Battery voltage	<16.1(V)
			/	
			for time	>0.1(s)
)	
			Sensor in hot state	=TRUE
			\	
			Sensor operation release, Sensor 1 Bank 1	=TRUE
			/	
			Battery voltage for time	<16.1(V) >0.06(s)
			(
			(
			End of start reached	=FALSE
			OR	
			Engine operation in stopping and finish state	=FALSE
			(
			Heat quantity to dew-point end exceeds heat quantity threshold for dew-point end	=TRUE
)	
)	
			OR	
			/	
			Dew point end is reset for TSP sensor 1	=FALSE
			Counter for repeated cold starts dew-point end not reached sensor 1	<6(counts)
			(
			Catalyst heating request by cold engine	=TRUE
			Catalyst heating request in connection with engine speed	=TRUE

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(Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 1 (see Look-Up-Table #32)	>0 to 0.41
)	
OR	
Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 1 (see Look-Up-Table #30)	>0 to 1
)	
)	
(Engine in running state	=TRUE
)	
OR	
(Status of fast light-off for Lambda sensor	=TRUE
OR	
Function demand for oxygen sensor heating before start	=TRUE
)	
OR	
Dew point release requested by service tester	=TRUE
)	
(Battery voltage for time	>10.7(V) >1.5(s)
OR	
Heating up of open loop completed, sensor 1, bank 1	=TRUE
)	
Error with heater, sensor 1, bank 1	=FALSE
UEGO Signal ASIC mode request of sensor 1 bank 1	=0
Battery voltage for time	>9.8(V) >0.5(s)
Battery voltage for time	>8(V) >0.05(s)
Status auxiliary power relay	=TRUE

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ECU in drive state	=TRUE
)	
Evaluation temperature is valid, sensor 1 bank 1	=TRUE
(
Temperature of ceramic sensor 1 bank 1	>A - B(°C)
where	
(A) temperature set point for heater control	=800(°C)
(B) large temperature threshold of the control deviation of heater control	=50(°C)
OR	
Heating up open loop is completed, sensor 1, bank 1	=TRUE
/	
Open loop ramp phase finished	=TRUE
for time	>0(s)
OR	
Temperature of ceramic sensor 1 bank 1	>790(°C)
)	
)	
)	
for time	>0.1(s)
Pump current operation for sensor 1 bank 1 is active	=TRUE
Counter of verifications of the actual mode of the ASIC for sensor 1 bank 1	>30(counts)
UEGO Signal ASIC mode request of sensor 1 bank 1	!=0
Current pump package is valid	=TRUE
)	
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable tables

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Path 3: Monitoring of positive voltage drop deviation at ECU- internal resistor Rgnd by means of continuity measurements of sensor pumpcell	Positive voltage drop deviation, sensor 1 bank 1	<-0.15008(V)	Common conditions for voltage drop deviation	=TRUE
	Positive voltage drop deviation, sensor 1 bank 1	>0.15008(V)	Basic enable conditions met	=see sheet enable tables
<hr/>				
Path 4: Monitoring of the non-availability of the sensor signals for a prolonged duration	((
	Physical release conditions for oxygen sensor are fulfilled	=FALSCH	Release of diagnosis report sensor 1 bank 1	=TRUE
	OR		(
	Oxygen sensor signals are of high precision	=FALSCH	(
	)		Battery voltage	>10.7(V)
	for time	>10(s)	for time	>1.5(s)
			Battery voltage	<16.1(V)
			/	
			for time	>0.1(s)
)	
			Sensor in hot state	=TRUE
			\	
			Sensor operation release, Sensor 1 Bank 1	=TRUE
			/	
			Battery voltage	<16.1(V)
			for time	>0.06(s)
			(
			(
			End of start reached	=FALSE
			OR	
			Engine operation in stopping and finish state	=FALSE
			(
			Heat quantity to dew-point end exceeds heat quantity threshold for dew-point end	=TRUE
)	
)	
			OR	
			(
			Dew point end is reset for TSP sensor 1	=FALSE

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Counter for repeated cold starts dew-point end not reached sensor 1	<6(counts)
(
Catalyst heating request by cold engine	=TRUE
Catalyst heating request in connection with engine speed	=TRUE
(
Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 1 (see Look-Up-Table #32)	>0 to 0.41
)	
OR	
Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 1 (see Look-Up-Table #30)	>0 to 1
)	
)	
(
Engine in running state	=TRUE
)	
OR	
(
Status of fast light-off for Lambda sensor	=TRUE
OR	
Function demand for oxygen sensor heating before start	=TRUE
)	
OR	
Dew point release requested by service tester	=TRUE
)	
(
Battery voltage for time	>10.7(V) >1.5(s)
OR	
Heating up of open loop completed, sensor 1, bank 1	=TRUE
)	
Error with heater, sensor 1, bank 1	=FALSE

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IIEGO Signal ASIC mode request of sensor 1 bank 1	=0
Battery voltage	>9.8(V)
for time	>0.5(s)
Battery voltage	>8(V)
for time	>0.05(s)
Status auxiliary power relay	=TRUE
ECU in drive state	=TRUE
)	
Evaluation temperature is valid, sensor 1 bank 1	=TRUE
(
Temperature of ceramic sensor 1 bank 1	>A - B(°C)
where	
(A) temperature set point for heater control	=800(°C)
(B) large temperature threshold of the control deviation of heater control	=50(°C)
OR	
Heating up open loop is completed, sensor 1, bank 1	=TRUE
/	
Open loop ramp phase finished	=TRUE
for time	>0(s)
OR	
Temperature of ceramic sensor 1 bank 1	>790(°C)
)	
)	
)	
for time	>0.1(s)
Pump current operation for sensor 1 bank 1 is active	=TRUE
Counter of verifications of the actual mode of the ASIC for sensor 1 bank 1	>30(counts)
UEGO Signal ASIC mode request of sensor 1 bank 1	=0
Current pump package is valid	=TRUE
)	
No pending or confirmed DTCs	=see sheet inhibit table

			Basic enable conditions met	see sheet enable tables		
P2240	Lambda sensor wire diagnosis for UEGO sensor 1 bank 2 Circuit continuity - open circuit at pin Apes	<p>Monitoring of abnormalities at sensor line Apes during normal ASIC operation when CJ135 in WARMUP mode</p> <p>Open load at pin Apes detected by means of continuity measurements of sensor pumpcell and sensor nernst cell using current source ISQr</p> <p>Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiai - UgO)</p> <p>Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiei - UgO)</p> <p>(E) Measured amplitude of the reference pump current source =measured value(A)</p> <p>(F) Minimum sensitivity of the continuity measurements to resistance RGnd =66(Ohm)</p>	<p>(Battery voltage</p> <p><E * F(V)</p> <p>Battery voltage)</p> <p>>E * F(V)</p> <p>for time</p> <p>Upstream HO2S Sensor is heated up, which is the following conditions:</p> <p>(</p> <p>Upstream HO2S Sensor ceramic temperature</p>	<p><16.1(V)</p> <p>>10.7(°C)</p> <p>>0.1(s)</p> <p>=TRUE</p> <p>>790(°C)</p>	0.01 (s)	2 Trip

**Aborted RAM check at ASIC
shut-off when CJ135 in
WARMUP mode**

OR

Open load at pin Apes
detected by means of
continuity measurements of
sensor pumpcell and sensor
nernst cell using current
source ISQr
Result of continuity
measurement of sensor
pumpcell using current source
ISO (in a state, where the
ASIC-internal current source
ISQr is connected to the
sensor line "APE" via internal
switches and the sensor line
"IPE" is directly connected to
RGnd) is available in RAM

=TRUE

Heating-up phase of the sensor is
completed

=TRUE

Short circuit to battery fault is
detected at sensor lines
RE/IPE/APE/MES as per last
accessed ASIC diagnostic
register, means

=TRUE

)

Voltage at least at one of the
sensor lines RE/IPE/APE/MES

>9.1 to 10.3(V)

Basic enable conditions are met

=see sheet enable
tables

Difference of voltage drop at
ECU-internal resistor RG in a
state, where the ASIC-internal
current source ISQr is
connected to the sensor line
"APE" and the sensor line
"IPE" is directly connected to
RGnd and voltage drop at
ECU-internal resistor RG in a
state, where all sensor lines
are opened

<D * F(V)

No pending or confirmed DTCs

=see sheet inhibit
tables

(UgOiai - UgO)

Difference of voltage drop at
ECU-internal resistor RG in a
state, where the ASIC-internal
current source ISQr is
connected to the sensor line
"RE" and the sensor line "IPE"
is directly connected to RGnd
and voltage drop at ECU-
internal resistor RG in a state,
where all sensor lines are
opened

>D * F(V)

(UgOiei - UgO)

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(D) Requested amplitude of the reference pump current source
 (F) Minimum sensitivity of the continuity measurements to resistance RGnd
 commanded value(A)
 =66(Ohm)

Aborted RAM check at ASIC. **shut-off when CJ135 in.** **NORMAL mode**

Open load at pin Apes
 detected if countinuity measurement was done before abort
 Result of continuity measurement of sensor pumpcell using current source ISO (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM
 =TRUE

P2240	Path 1 : Monitoring of prolonged activation of the blackening protection	Blackening protection is active for at least number of 16 successive checks	>5(counts)	(		10(counts)	2 Trip
		for time	> 2.55(s)	Release of diagnosis report sensor 1 bank 2	=TRUE		
				(
				(
				Battery voltage for time and Battery voltage	>10.7(V) >1.5(s) <16.1(V)		
				/			
				for time	>0.1(s)		
)			
				Sensor in hot state	=TRUE		
				{			
				Sensor operation release, Sensor 1 Bank 2	=TRUE		
				(
				Battery voltage for time	<16.1(V) >0.06(s)		
				{			
				{			
				(
				End of start reached	=FALSE		

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OR	
Engine operation in stopping and finish state	=FALSE
(
Heat quantity to dew-point end exceeds heat quantity threshold for dew-point end	=TRUE
)	
)	
OR	
\	
Dew point end is reset for TSP sensor 1	=FALSE
Counter for repeated cold starts dew-point end not reached sensor 1	<6(counts)
(
(
Catalyst heating request by cold engine	=TRUE
and	
Catalyst heating request in connection with engine speed	=TRUE
Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 2	>0 to 0.41
(see Look-Up-Table #33)	
)	
OR	
Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 2	>0 to 1
(see Look-Up-Table #31)	
)	
)	
)	
(
Engine in running state	=TRUE
)	
OR	
(

Status of fast light-off for Lambda sensor	=TRUE
OR	
Function demand for oxygen sensor heating before start	=TRUE
)	
OR	
Dew point release requested by service tester	=TRUE
)	
(
Battery voltage	>10.7(V)
for time	>1.5(s)
OR	
Heating up of open loop completed, sensor 1, bank 2	=TRUE
)	
Error with heater, sensor 1, bank 2	=FALSE
UEGO Signal ASIC mode request of sensor 1 bank 2	=0
Battery voltage	>9.8(V)
for time	>0.5(s)
Battery voltage	>8(V)
for time	>0.05(s)
Status auxiliary power relay	=TRUE
ECU in drive state	=TRUE
)	
Evaluation temperature is valid, sensor 1 bank 2	=TRUE
(
Temperature of ceramic sensor 1 bank 2	>A - B(°C)
where	
(A) temperature set point for heater control	=800(°C)
(B) large temperature threshold of the control deviation of heater control	=50(°C)
OR	
Heating up open loop is completed, sensor 1, bank 2	=TRUE
\	
Open loop ramp phase finished	=TRUE
for time	>0(s)
OR	
Temperature of ceramic sensor 1 bank 2	>790(°C)
\	

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```

)
)
for time >0.1(s)
Pump current operation for sensor 1 bank 2 is active =TRUE
Counter of verifications of the actual mode of the ASIC for sensor 1 bank 2 >30(counts)
UEGO Signal ASIC mode request of sensor 1 bank 2 =0
Current pump package is valid =TRUE

)
No pending or confirmed DTCs =see sheet inhibit table

```

```

Basic enable conditions met =see sheet enable tables

```

Path 2: Monitoring of negative voltage drop deviation at ECU- internal resistor Rgnd by means of continuity measurements of sensor pumpcell	Negative voltage drop deviation, sensor 1 bank 2	<-0.15008(V)	Common conditions for voltage drop deviation:	
and	Negative voltage drop deviation, sensor 1 bank 2	>0.15008(V)	(
			Release of diagnosis report sensor 1 bank 2	=TRUE
			(
			(
			Battery voltage	>10.7(V)
			for time	>1.5(s)
			Battery voltage	<16.1(V)
)	
			for time	>0.1(s)
)	
			Sensor in hot state	=TRUE
			/	
			Sensor operation release, Sensor 1 bank 2	=TRUE
			/	
			Battery voltage	<16.1(V)
			for time	>0.06(s)
			(
			(
			End of start reached	=FALSE
			OR	

Engine operation in stopping and finish state	=FALSE
(Heat quantity to dew-point end exceeds heat quantity threshold for dew-point end	=TRUE
)	
)	
OR	
(Dew point end is reset for TSP sensor 1	=FALSE
Counter for repeated cold starts dew-point end not reached sensor 1	<6(counts)
(Catalyst heating request by cold engine	=TRUE
Catalyst heating request in connection with engine speed	=TRUE
(Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 2	>0 to 0.41
(see Look-Up-Table #33)	
)	
OR	
Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 2	>0 to 1
(see Look-Up-Table #31)	
)	
)	
(Engine in running state	=TRUE
)	
OR	
(Status of fast light-off for Lambda sensor	=TRUE

HR

Function demand for oxygen sensor heating before start	=TRUE
)	
OR	
Dew point release requested by service tester	=TRUE
)	
(
Battery voltage for time	>10.7(V) >1.5(s)
OR	
Heating up of open loop completed, sensor 1, bank 2	=TRUE
)	
Error with heater, sensor 1, bank 2	=FALSE
IIEGO Signal ASIC mode request of sensor 1 bank 2	=0
Battery voltage for time	>9.8(V) >0.5(s)
Battery voltage for time	>8(V) >0.05(s)
Status auxiliary power relay	=TRUE
ECU in drive state	=TRUE
)	
Evaluation temperature is valid, sensor 1 bank 2	=TRUE
(
Temperature of ceramic sensor 1 bank 2	>A - B(°C)
where	
(A) temperature set point for heater control	=800(°C)
(B) large temperature threshold of the control deviation of heater control	=50(°C)
OR	
Heating up open loop is completed, sensor 1, bank 2	=TRUE
(
Open loop ramp phase finished	=TRUE
for time	>0(s)
OR	
Temperature of ceramic sensor 1 bank 2	>790(°C)
)	
)	
)	
for time	>0.1(s)

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			Pump current operation for sensor 1 bank 2 is active	=TRUE
			Counter of verifications of the actual mode of the ASIC for sensor 1 bank 2	>30(counts)
			UEGO Signal ASIC mode request of sensor 1 bank 2	!=0
			Current pump package is valid	=TRUE
)	
			No pending or confirmed DTCs	=see sheet inhibit table
			Basic enable conditions met	=see sheet enable tables
Path 3: Monitoring of positive voltage drop deviation at ECU- internal resistor Rgnd by means of continuity measurements of sensor pumpcell	Positive voltage drop deviation, sensor 1 bank 2	<-0.15008(V)	Common conditions for voltage drop deviation	=TRUE
	Positive voltage drop deviation, sensor 1 bank 2	>0.15008(V)	Basic enable conditions met	=see sheet enable tables
Path 4: Monitoring of the non-availability of the sensor signals for a prolonged duration	((
	Physical release conditions for oxygen sensor are fulfilled	=FALSCH	Release of diagnosis report sensor 1 bank 2	=TRUE
	OR		(
	Oxygen sensor signals are of high precision	=FALSCH	(
	)		Battery voltage	>10.7(V)
	for time	>10(s)	for time	>1.5(s)
			Battery voltage	<16.1(V)
			/	
			for time	>0.1 (s)
)	
			Sensor in hot state	=TRUE
			/	
			Sensor operation release, Sensor 1 bank 2	=TRUE
			\	
			Battery voltage	<16.1(V)
			for time	>0.06(s)
			{	
			{	
			(
			End of start reached	=FALSE
			OR	

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Engine operation in stopping and finish state	=FALSE
(Heat quantity to dew-point end exceeds heat quantity threshold for dew-point end	=TRUE
)	
)	
OR	
(Dew point end is reset for TSP sensor 1	=FALSE
Counter for repeated cold starts dew-point end not reached sensor 1	<6(counts)
(Catalyst heating request by cold engine	=TRUE
Catalyst heating request in connection with engine speed	=TRUE
(Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 2	>0 to 0.41
(see Look-Up-Table #33)	
)	
OR	
Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 2	>0 to 1
(see Look-Up-Table #31)	
)	
)	
(Engine in running state	=TRUE
)	
OR	
(Status of fast light-off for Lambda sensor	=TRUE
OR	

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Function demand for oxygen sensor heating before start	=TRUE
)	
OR	
Dew point release requested by service tester	=TRUE
)	
(
Battery voltage for time	>10.7(V) >1.5(s)
OR	
Heating up of open loop completed, sensor 1, bank 2	=TRUE
)	
Error with heater, sensor 1, bank 2	=FALSE
IIEGO Signal ASIC mode request of sensor 1 bank 2	=0
Battery voltage for time	>9.8(V) >0.5(s)
Battery voltage for time	>8(V) >0.05(s)
Status auxiliary power relay	=TRUE
ECU in drive state	=TRUE
)	
Evaluation temperature is valid, sensor 1 bank 2	=TRUE
(
Temperature of ceramic sensor 1 bank 2	>A - B(°C)
where	
(A) temperature set point for heater control	=800(°C)
(B) large temperature threshold of the control deviation of heater control	=50(°C)
OR	
Heating up open loop is completed, sensor 1, bank 2	=TRUE
(
Open loop ramp phase finished	=TRUE
for time	>0(s)
OR	
Temperature of ceramic sensor 1 bank 2	>790(°C)
)	
)	
)	
for time	>0.1(s)

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				Pump current operation for sensor 1 bank 2 is active	=TRUE		
				Counter of verifications of the actual mode of the ASIC for sensor 1 bank 2	>30(counts)		
				UEGO Signal ASIC mode request of sensor 1 bank 2	=0		
				Current pump package is valid	=TRUE		
)			
				No pending or confirmed DTCs	=see sheet inhibit table		
				Basic enable conditions met	=see sheet enable tables		
P2251	Lambda sensor wire diagnosis for UEGO sensor 1 bank 1 Circuit countinuiuty - open circuit at pin IPE	Monitoring of abnormalities at sensor line IPE during normal ASIC operation when CJ135 is in NORMAL mode Open load at pin IPE detected by means of continuity measurements of sensor pumpcell during negative pump current pulse Result of continuity measurement of sensor pumpcell using current source ISO (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM (If control deviation of heater control of upstream HO2S Sensor (HO2S Sensor heater control is inaccurate) for time (		( Battery voltage	<16.1(V)	0.01 (s)	2 Trip
			=FALSCH	Battery voltage)	>10.7(V)		
			>49.9922(K)	for time Upstream HO2S Sensor is heated up, which is the following conditions:	>0.1 (s) =TRUE		
			>0.1 (s)	(Upstream HO2S Sensor ceramic temperature	>790(°C)		

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Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-Uga)	>0.49984(V)	OR	
for time	>0.1(s)	Heating-up phase of the sensor is completed	=TRUE
OR		/	
Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-Ugi)	>0.49984(V)	Basic enable conditions are met	=see sheet enable tables
for time	>0.1(s)	No pending or confirmed DTCs	=see sheet inhibit tables
)			
OR			
If control deviation of heater control of upstream HO2S Sensor (HO2S Sensor heater control is accurate)	<50(°C)		
(
Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-Uga)	>A + (B * C)		
for time	>0.1(s)		
OR			

Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-Ugi)	$>A + (B * C)$
for time	$>0.1 (s)$
)	
(A) Initial threshold for negative voltage deviation during Delta Ugx check	$=0.08992(V)$
(B) Voltage step for negative voltage deviation in delta Ugx check	$=0.08(V)$
(C) Number of negative overshoots of continuity measurement values Ugx	$=\text{measured value}$
)	
Monitoring of abnormalities at sensor line IPE during normal ASIC operation when CJ135 is in WARMUP mode	
Open load at pin IPE detected by means of continuity measurements of sensor pumpcell and sensor nernst cell using current source ISQr	
Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiai - UgO)	$<E * F$

Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened
(UgOiei - UgO)
(E) Measured amplitude of the reference pump current source

=measured value

(F) Minimum sensitivity of the continuity measurements to resistance RGnd

66(Ohm)

Aborted RAM check at ASIC shut-off when CJ135 in WARMUP mode

Open load at pin IPE detected by means of continuity measurements of sensor pumpcell and sensor nernst cell using current source ISQr

Result of continuity measurement of sensor pumpcell using current source ISQ (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM

=TRUE

Voltage at least at one of the sensor lines (RE/IPE/APE/MES)

>9.1 to 10.3(V)

Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened

<D * F

Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened
(UgOiei - UgO)
(D) Requested amplitude of the reference pump current source
(F) Minimum sensitivity of the continuity measurements to resistance RGnd

<D * F

=66

Aborted RAM check at ASIC shut-off when CJ135 in NORMAL mode

Open load at pin IPE detected if no continuity measurement was done before ASIC abort

Result of continuity measurement of sensor pumpcell using current source ISO (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM

=FALSCH

P2254	Lambda sensor wire diagnosis for UEGO sensor 1 bank 2 Circuit continuity - open circuit at pin IPE	Monitoring of abnormalities at sensor line IPE during normal ASIC operation when CJ135 is in NORMAL mode Open load at pin IPE detected by means of continuity measurements of sensor pumpcell during negative pump current pulse	(Battery voltage	<16.1(V)	0.01 (s)	2 Trip
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Result of continuity measurement of sensor pumpcell using current source ISQ (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM	=FALSCH	Battery voltage)	>10.7(V)
(If control deviation of heater control of upstream HO2S Sensor (HO2S Sensor heater control is inaccurate) for time	>49.9922(K)	for time Upstream HO2S Sensor is heated up, which is the following conditions:	>0.1(s) =TRUE
(Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-Uga) for time	>0.1(s) >0.49984(V)	(Upstream HO2S Sensor ceramic temperature OR	>790(°C)
OR Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-Ugi) for time	>0.1(s) >0.49984(V)	Heating-up phase of the sensor is completed / Basic enable conditions are met	=TRUE =see sheet enable tables
	>0.1(s)	No pending or confirmed DTCs	=see sheet inhibit tables
) OR			

If control deviation of heater control of upstream HO2S Sensor (HO2S Sensor heater control is accurate)	<50(°C)
(Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-Uga)	>A + (B * C)
for time	>0.1(s)
OR	
Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-Ugi)	>A + (B * C)
for time	>0.1(s)
)	
(A) Initial threshold for negative voltage deviation during Delta Ugx check	=0.08992(V)
(B) Voltage step for negative voltage deviation in delta Ugx check	=0.08(V)
(C) Number of negative overshoots of continuity measurement values Ugx	=measured value
)	
Monitoring of abnormalities at sensor line IPE during normal ASIC operation when CJ135 is in WARMUP mode	
Open load at pin IPE detected by means of continuity measurements of sensor pumpcell and sensor nernst cell using current source ISQr	

Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiai - UgO)	<E * F
Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiei - UgO)	<E * F
(E) Measured amplitude of the reference pump current source	=measured value(A)
(F) Minimum sensitivity of the continuity measurements to resistance RGnd	=66(Ohm)
Aborted RAM check at ASIC shut-off when CJ135 in WARMUP mode	
Open load at pin IPE detected by means of continuity measurements of sensor pumpcell and sensor nernst cell using current source ISQr	
Result of continuity measurement of sensor pumpcell using current source ISQ (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM	=TRUE
Voltage at least at one of the sensor lines (PE "IPE" / "APE" / "RE")	>9.1 to 10.3(V)

Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiai - UgO)	<D * F
Difference of voltage drop at ECU-internal resistor RG in a state, where the ASIC-internal current source ISQr is connected to the sensor line "RE" and the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RG in a state, where all sensor lines are opened (UgOiei - UgO)	<D * F
(D) Requested amplitude of the reference pump current source	=commanded value
(F) Minimum sensitivity of the continuity measurements to resistance RGnd	66(Ohm)
<u>Aborted RAM check at ASIC shut-off when CJ135 in NORMAL mode</u>	
Open load at pin IPE detected if no continuity measurement was done before ASIC abort	
Result of continuity measurement of sensor pumpcell using current source ISQ (in a state, where the ASIC-internal current source ISQr is connected to the sensor line "APE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM	=FALSCH

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P2626	Lambda sensor wire diagnosis for UEGO sensor 1 bank 1 Circuit countinuity - open circuit at Remp (compensation resistor)	Calculated parallel resistance between APE and MES for UEGO sensor 1 bank 1	>240(Ohm)	(Battery voltage) for time Upstream HO2S Sensor is heated up, which is the following conditions: (Upstream HO2S Sensor ceramic temperature OR Heating-up phase of the sensor is completed) Last packet transfer aborted of sensor 1 bank 1 Requested mode of UEGO sensor 1 Bank 1 is in SWITCHON mode Counter of verifications of the actual mode of the ASIC for sensor 1 bank Basic enable conditions are met No pending or confirmed DTCs	<16.1(V) >10.7(V) >0.1(s) =TRUE >790(°C) =TRUE =FALSE =TRUE >10(counts) =see sheet enable tables =see sheet inhibit tables	0.01(s)	2 Trip
P2629	Lambda sensor wire diagnosis for UEGO sensor 1 bank 2 Circuit countinuity - open circuit at Remp (compensation resistor)	Calculated parallel resistance between APE and MES for UEGO sensor 1 bank 2	>240(Ohm)	(Battery voltage) for time Upstream HO2S Sensor is heated up, which is the following conditions: (Upstream HO2S Sensor ceramic temperature OR Heating-up phase of the sensor is completed)	<16.1(V) >10.7(V) >0.1(s) =TRUE >790(°C) =TRUE	0.01(s)	2 Trip

Last packet transfer aborted of sensor 1 bank 2	=FALSE
Requested mode of UEGO sensor 1 Bank 2 is in SWITCHON mode	=TRUE
Counter of verifications of the actual mode of the ASIC for sensor 1 bank 2	>10(counts)
Basic enable conditions are met	=see sheet enable tables
No pending or confirmed DTCs	=see sheet inhibit tables

P0132	Lambda sensor wire diagnosis for sensor 1 bank 1 Circuit continuity - short circuit to battery	Path1: Monitoring of abnormalities at sensor lines RE/IPE/APE/MES during the normal ASIC operation when CJ135 is in IDLE mode Short circuit to battery detected by means of voltage monitoring at sensor lines RE/IPE/APE/MES as per last accessed ASIC diagnostic register Voltage at least at one of the sensor lines RE/IPE/APE/MES	>9.1 to 10.3(V)	and	(Battery voltage	<16.1(V)	0.01 (s)	2 Trip
					Battery voltage	>10.7(V)		
)			
					for time	>0.1(s)		
					Last packet transfer aborted of sensor 1 bank 1	=FALSE		
					Requested mode of UEGO Sensor 1 I	=TRUE		
					Validity of the diagnosis register of the ASIC of sensor 1 bank 1	=TRUE		
					Basic enable conditions are met	=see sheet enable tables		
					No pending or confirmed DTCs	=see sheet inhibit tables		

Path2 :		(Battery voltage	<16.1(V)
Monitoring of abnormalities at sensor lines APE/IPE during the normal ASIC operation when CJ135 is in SWITCHON or WARMUP mode			
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOi - UgO)	>0.07008(V)	and	
OR		Battery voltage	>10.7(V)
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOi - UgO)	>0.07008(V)	) for time	>0.1(s)
OR		Last packet transfer aborted of sensor 1 bank 1	=FALSCH
(		Requested mode of UEGO Sensor 1 Bank 1 is in SWITCHON mode or WARMUP mode	=TRUE
Clamping structure of the nerst cell active for sensor 1 bank 1	=TRUE	Counter of verifications of the actual mode of the ASIC for sensor 1 bank 1	>10(counts)
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "RE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOe - UgO)	>0.07008(V)	Basic enable conditions are met	=see sheet enable tables

)

No pending or confirmed DTCs

=see sheet inhibit
tables

Path 3 :		(Battery voltage	<16.1(V)
Aborted RAM check at ASIC shut-off when CJ135 not in IDLE mode			
Short circuit to battery detected by means of voltage monitoring at RGnd resistor or by means of contact measurements at sensor lines APE/IPE as per last accessed ASIC diagnostic register			
Voltage at RGnd resistor	>4(V)	and	
OR		Battery voltage	>10.7(V)
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOa - UgO)	>0.0438(V))	
OR		for time	>0.1(s)
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOi - UgO)	>0.0438(V)	Measured CJ135 Mode sensor 1 bank 1 is not in IDLE mode	=TRUE
OR		Last packet transfer aborted of sensor	TRUE

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Short circuit to battery detected at sensor lines IPE/APE/MES or by checking availability of continuity measurements in last accessed ASIC diagnostic register		Basic enable conditions are met	=see sheet enable tables
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Voltage at least at one of the sensor lines RE/IPE/APE/MES	>9.1 to 10.3(V)	No pending or confirmed DTCs	=see sheet inhibit tables
--	-----------------	------------------------------	---------------------------

Path 4:	(Battery voltage	<16.1(V)
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Aborted RAM check at ASIC shut-off when CJ135 in WARMUP mode

Short circuit to battery detected at sensor lines IPE/APE/MES or by checking availability of continuity measurements in last accessed ASIC diagnostic register

Voltage at least at one of the sensor lines IPE/APE/MES OR	>9.1 to 10.3(V)	and	
		Battery voltage	>10.7(V)

(Upstream HO2S Sensor is heated up, means	=TRUE)
--	-------	---

(Upstream HO2S Sensor ceramic temperature	>790(°C)	for time Measured CJ135 Mode sensor 1 bank 1 is in WARMUP mode	>0.1(s)
OR		Last packet transfer aborted of sensor 1 bank 1	=TRUE

Heating-up phase of the sensor is completed	=TRUE	Basic enable conditions are met	=see sheet enable tables
---	-------	---------------------------------	--------------------------

)		No pending or confirmed DTCs	=see sheet inhibit tables
---	--	------------------------------	---------------------------

AND
(

Results of both continuity
measurements of sensor
pumpcell using current source
ISQr are available in RAM
accessed ASIC diagnostic
register
OR
Aborted RAM check at ASIC
shut-off when CJ135 in
WARMUP mode
Short circuit to battery detected
as per last accessed ASIC
diagnostic register

=FALSCH

Results of both continuity
measurement of sensor
pumpcell using current source
ISQr are available in RAM
accessed ASIC diagnostic
register
Voltage at least at one of the
sensor lines
(RE/IPE/APE/MES)
AND

=TRUE

>9.1 to 10.3(V)

(
Difference of voltage drop at
ECU-internal resistor RGnd in
a state, where the ASIC -
internal current source ISQr is
connected to the sensor line
"APE" and the sensor line
"IPE" is directly connected to
RGnd (current flows through
the sensor and RGnd) and
voltage drop at ECU-internal
resistor RGnd in a state, where
all sensor lines are opened
(UgOiai-UgO)

>D * F(V)

AND
Difference of voltage drop at
ECU-internal resistor RGnd in
a state, where the ASIC -
internal current source ISQr is
connected to the sensor line
"RE" and the sensor line "IPE"
is directly connected to RGnd
(current flows through the
sensor and RGnd) and
voltage drop at ECU-internal
resistor RGnd in a state, where
all sensor lines are opened
(UgOiei-UgO)

>D * F(V)

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		(D) Requested amplitude of the reference pump current source ISQr	commanded value(A)			
		(F) Minimum sensitivity of the continuity measurements to resistance RGnd	=66(Ohm)			
)				
)				
)				
P0152	Lambda sensor wire diagnosis for sensor 1 bank 2 Circuit continuity - short circuit to battery	Path1: Monitoring of abnormalities at sensor lines RE/IPE/APE/MES during the normal ASIC operation when CJ135 is in IDLE mode Short circuit to battery detected by means of voltage monitoring at sensor lines RE/IPE/APE/MES as per last accessed ASIC diagnostic register	(Battery voltage	<16.1(V)	0.5(s)	2 Trip
		Voltage at least at one of the sensor lines RE/IPE/APE/MES	>9.1 to 10.3(V) and			
			Battery voltage	>10.7(V)		
)			
			for time	>0.1(s)		
			Last packet transfer aborted of sensor 1 bank 2	=FALSCH		
			Requested mode of UEGO sensor 1 t	=TRUE		
			Validity of the diagnosis register of the ASIC of sensor 1 bank 2	=TRUE		
			Basic enable conditions are met	=see sheet enable tables		
			No pending or confirmed DTCs	=see sheet inhibit tables		

Path2 :		(Battery voltage	<16.1(V)
Monitoring of abnormalities at sensor lines APE/IPE during the normal ASIC operation when CJ135 is in SWITCHON or WARMUP mode			
Short circuit to battery detected by means of contact measurements at sensor lines APE/IPE			
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOa - UgO)	>0.07008(V)	and	
OR		Battery voltage	>10.7(V)
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOi - UgO)	>0.07008(V)	) for time	>0.1(s)
OR		Last packet transfer aborted of sensor 1 bank 2	=FALSCH
		Requested mode of UEGO Sensor 1 Bank 2 is in SWITCHON or WARMUP mode	=TRUE
Clamping structure of the nerst cell active for sensor 1 bank 2	=TRUE	Counter of verifications of the actual mode of the ASIC for sensor 1 bank 2	>10(counts)
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "RE" is directly connected to RGnd and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOe - UgO)	>0.07008(V)	Basic enable conditions are met	=see sheet enable tables

No pending or confirmed DTCs

=see sheet inhibit
tables

Path 3 :		(Battery voltage	<16.1(V)
Aborted RAM check at ASIC shut-off when CJ135 not in IDLE mode			
Short circuit to battery detected by means of voltage monitoring at RGnd resistor or by means of contact measurements at sensor lines APE/IPE as per last accessed ASIC diagnostic register			
Voltage at RGnd resistor	>4(V)	and Battery voltage	<10.7(V)
OR		/	
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOa - UgO)	>0.0438(V)	for time Measured CJ135 Mode sensor 1 bank 2 is not in IDLE mode	>0.1(s) =TRUE
OR			
Difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgOi - UgO)	>0.0438(V)	Last packet transfer aborted of sensor 1 bank 2 Basic enable conditions are met	=TRUE =see sheet enable tables

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OR		No pending or confirmed DTCs	=see sheet inhibit tables
Short circuit to battery detected at sensor lines IPE/APE/MES or by checking availability of continuity measurements in last accessed ASIC diagnostic register			
Voltage at least at one of the sensor lines RE/IPE/APE/MES	>9.1 to 10.3(V)		
Path4: Aborted RAM check at ASIC shut-off when CJ135 in WARMUP mode Short circuit to battery detected at sensor lines IPE/APE/MES or by checking availability of continuity measurements in last accessed ASIC diagnostic register		(Battery voltage	<16.1(V)
Voltage at least at one of the sensor lines IPE/APE/MES	>9.1 to 10.3(V)	and	
OR		Battery voltage	>10.7(V)
(Upstream HO2S Sensor is heated up, means	=TRUE	) for time	>0.1(s)
(Upstream HO2S Sensor ceramic temperature	>790(°C)	Measured CJ135 Mode sensor 1 bank 2 is in WARMUP mode	=TRUE
OR		Last packet transfer aborted of sensor 1 bank 2	=TRUE
Heating-up phase of the sensor is completed	=TRUE	Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables
)			
AND			
(

Results of both continuity
measurements of sensor
pumpcell using current source
ISQr are available in RAM
accessed ASIC diagnostic
register
OR
Aborted RAM check at ASIC
shut-off when CJ135 in
WARMUP mode
Short circuit to battery detected
as per last accessed ASIC
diagnostic register

=FALSCH

Results of both continuity
measurement of sensor
pumpcell using current source
ISQr are available in RAM
accessed ASIC diagnostic
register
Voltage at least at one of the
sensor lines
(RE/IPE/APE/MES)
AND

=TRUE

>9.1 to 10.3(V)

(
Difference of voltage drop at
ECU-internal resistor RGnd in
a state, where the ASIC -
internal current source ISQr is
connected to the sensor line
"APE" and the sensor line
"IPE" is directly connected to
RGnd (current flows through
the sensor and RGnd) and
voltage drop at ECU-internal
resistor RGnd in a state, where
all sensor lines are opened
(UgOiai-UgO)

>D * F(V)

OR
Difference of voltage drop at
ECU-internal resistor RGnd in
a state, where the ASIC -
internal current source ISQr is
connected to the sensor line
"RE" and the sensor line "IPE"
is directly connected to RGnd
(current flows through the
sensor and RGnd) and
voltage drop at ECU-internal
resistor RGnd in a state, where
all sensor lines are opened
(UgOiei-UgO)

>D * F(V)

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		(D) Requested amplitude of the reference pump current source of IIEGO sensor 1 Bank 2	commanded value(A)		
		(F) Minimum sensitivity of the continuity measurements to resistance RGnd	=66(Ohm)		
)			
)			
)			
P0131	Lambda sensor wire diagnosis for sensor 1 bank 1 Circuit continuity - short circuit to ground	Path 1: Monitoring of abnormalities at sensor lines RE/APE/IPE during the normal ASIC operation when CJ135 in IDLE mode Short circuit to ground detected at sensor lines RE/IPE/APE/MES by means of voltage monitoring	(	0.5(s)	2 Trip
		Voltage at least at one of the sensor lines RE/IPE/APE/MES	<-0.15(V)		
		where RE: Nernst voltage (reference voltage) IPE: Virtual ground (inner electrode) APE: Pumping current (external electrode) MES: Trim current (output sensor line trim resistance)	Battery voltage and Battery voltage)	>10.7(V) <16.1(V)	
			for time Requested mode of UEGO Sensor 1 bank 1 in IDLE mode Validity of the diagnosis register of the	>0.1(s) =TRUE =TRUE	
			Last packet transfer aborted of sensor	=FALSE	
			Internal Control Module 02 Sensor Processor Performance Bank 1 Control Module Processor Serial Peripheral Interface Bus 3 Basic enable conditions are met	=FALSE =FALSE =see sheet enable tables	

No pending or confirmed DTCs

=see sheet inhibit
tables**Path 2:****Aborted RAM check at ASIC
shut-off when CJ135 in
SWITCHON or WARMUP
mode**

Short circuit to ground
detected by means of voltage
monitoring at sensor lines
RE/IPE/APE/MES or by means
of contact measurements at
sensor line APE/IPE as per
last accessed ASIC diagnostic
register

(
Voltage at least at one of the
sensor lines RE/IPE/APE/MES

<-0.15(V)

Battery voltage

>10.7(V)

OR
Negated difference of voltage
drop at ECU-internal resistor
RGnd in a state, where only
the sensor line "APE" is
directly connected to RGnd (no
current flows through the
sensor) and voltage drop at
ECU-internal resistor RGnd in
a state, where all sensor lines
are opened
(UgO- UgOa)

>0.0438(V)

and
Battery voltage

<16.1(V)

OR
Negated difference of voltage
drop at ECU-internal resistor
RGnd in a state, where only
the sensor line "IPE" is directly
connected to RGnd (no current
flows through the sensor) and
voltage drop at ECU-internal
resistor RGnd in a state, where
all sensor lines are opened
(UgO-UgOi)

>0.0438(V)

)
for time

>0.1(s)

)

Requested mode of UEGO Sensor 1 bank 1 in SWITCH ON mode or WARM UP mode	=TRUE
Last packet transfer aborted of sensoi	=TRUE
Internal Control Module 02 Sensor Processor Performance Bank 1	=FALSE
Control Module Processor Serial Peripheral Interface Bus 3	=FALSE
Basic enable conditions are met	=see sheet enable tables
No pending or confirmed DTCs	=see sheet inhibit tables

Path 3:			
Monitoring of abnormalities at sensor lines RE/APE/IPE during the normal ASIC operation when CJ135 is in SWITCHON or WARMUP mode			
Short circuit to ground detected by means of contact measurements at sensor lines APE/RE//IPE			
(Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO- UgOa) OR	>0.07008(V)	Battery voltage	>10.7(V)
		and	

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Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "RE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO - UgOe)	>0.07008(V)	Battery voltage	<16.1(V)
OR Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-UgOi)	>0.07008(V)	) for time	>0.1(s)
)	(	Requested mode of UEGO Sensor 1 bank 1 in SWITCHON mode or WARMUP mode for number of counts	=TRUE >10(counts)
	)	Last packet transfer aborted of sensoi	=FALSE
		Internal Control Module 02 Sensor Processor Performance Bank 1 Control Module Processor Serial Peripheral Interface Bus 3 Basic enable conditions are met	=FALSE =FALSE =see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables

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P0151	Lambda sensor wire diagnosis for sensor 1 bank 2 Circuit continuity - short circuit to ground	Path 1: Monitoring of abnormalities at sensor lines RE/APE/IPE during the normal ASIC operation when CJ135 in IDLE mode Short circuit to ground detected at sensor lines RE/IPE/APE/MES by means of voltage monitoring Voltage at least at one of the sensor lines RE/IPE/APE/MES where RE: Nernst voltage (reference voltage) IPE: Virtual ground (inner electrode) APE: Pumping current (external electrode) MES: Trim current (output sensor line trim resistance)	(0.5(s)	2 Trip
				Battery voltage and	>10.7(V)	
				Battery voltage	<16.1(V)	
)			
				for time	>0.1 (s)	
				Requested mode of UEGO Sensor 1 bank 2 in IDLE mode	=TRUE	
				Validity of the diagnosis register of the	=TRUE	
				Last packet transfer aborted of sensor	=FALSE	
				Internal Control Module 02 Sensor Processor Performance Bank 2	=FALSE	
				Control Module Processor Serial Peripheral Interface Bus 4	=FALSE	
				Basic enable conditions are met	=see sheet enable tables	
				No pending or confirmed DTCs	=see sheet inhibit tables	

Path 2:

**Aborted RAM check at ASIC
shut-off when CJ135 in
SWITCHON or WARMUP
mode**

Short circuit to ground
detected by means of voltage
monitoring at sensor lines
RE/IPE/APE/MES or by means
of contact measurements at
sensor line APE/IPE as per
last accessed ASIC diagnostic
register

(Voltage at least at one of the
sensor lines RE/IPE/APE/MES

<-0.15(V)	Battery voltage	>10.7(V)
-----------	-----------------	----------

OR
Negated difference of voltage
drop at ECU-internal resistor
RGnd in a state, where only
the sensor line "APE" is
directly connected to RGnd (no
current flows through the
sensor) and voltage drop at
ECU-internal resistor RGnd in
a state, where all sensor lines
are opened
(UgO - UgOa)

>0.0438(V)	and Battery voltage	<16.1(V)
------------	------------------------	----------

OR
Negated difference of voltage
drop at ECU-internal resistor
RGnd in a state, where only
the sensor line "IPE" is directly
connected to RGnd (no current
flows through the sensor) and
voltage drop at ECU-internal
resistor RGnd in a state, where
all sensor lines are opened
(UgO-UgOi)

>0.0438(V)) for time	>0.1(s)
------------	------------	---------

Requested mode of UEGO Sensor 1 bank 2 in SWITCH ON mode or WARM UP mode	=TRUE
Last packet transfer aborted of sensoi	=TRUE

Internal Control Module 02 Sensor Processor Performance Bank 2	=FALSE
Control Module Processor Serial	=FALSE

Peripheral Interface Bus 4 Basic enable conditions are met	see sheet enable
---	------------------

No pending or confirmed DTCs

=see sheet inhibit
tables**Path 3:**

**Monitoring of abnormalities
at sensor lines RE/APE/IPE
during the normal ASIC
operation when CJ135 is in
SWITCHON or WARMUP
mode**

Short circuit to ground
detected by means of contact
measurements at sensor lines
APE/RE//IPE

(	>0.07008(V)	Battery voltage	>10.7(V)
Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "APE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO - UgOa)			
OR	>0.07008(V)	and Battery voltage	<16.1(V)
Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "RE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO - UgOe)			
OR)		

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			Negated difference of voltage drop at ECU-internal resistor RGnd in a state, where only the sensor line "IPE" is directly connected to RGnd (no current flows through the sensor) and voltage drop at ECU-internal resistor RGnd in a state, where all sensor lines are opened (UgO-UgOi)	>0.07008(V)	for time	>0.1(s)		
			)		(	=TRUE		
					Requested mode of UEGO Sensor 1 bank 2 in SWITCHON mode or WARMUP mode			
					for number of counts	>10(counts)		
)			
					Last packet transfer aborted of sensoi	=FALSE		
					Internal Control Module 02 Sensor Processor Performance Bank 2	=FALSE		
					Control Module Processor Serial Peripheral Interface Bus 4	=FALSE		
					Basic enable conditions are met	=see sheet enable tables		
					No pending or confirmed DTCs	=see sheet inhibit tables		
15. OXYGEN SENSOR CIRCUIT SLOW RESPONSE CHECK DIAGNOSIS	P0133	PathI: Step response/identification measurement of Oxygen sensor and pattern has been detected with Step-response measurement within parallelization	Step response measurement:	Non bank-specific enabling conditions for continuous identification		=TRUE	0.01(s)	1Trip EWMA
			((
			Arithmetical average value of delay time from step response measurement in lean-rich direction	>0.3(s)	Vehicle speed	>3.125(mph)		
			OR		Fuel purge adaptation factor	<0		
			Arithmetical average value of transition time from step response measurement in lean-rich direction	>0.4(s)	(

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OR		Integral of purge mass flow after a longer purge stop	^{s2} (g)
Arithmetical average value of delay time from step response measurement in rich-lean direction	>0.38(s)	OR	
OR		Purge mass flow for DTEV	<0(g/s)
Arithmetical average value of transition time from step response measurement in rich-lean direction	>0.4(s))	
)		(
OR		Condition gear-shift in process	=FALSE
Identification measurement:			
()	
Status of step response measurement (detected pattern, bank 1)	>0	End of start is reached	=TRUE
(		for time	=5(s)
Identified delay time in lean-rich direction	>1(s)	(
OR		Absolute value of filling gradient for time	<12(%) =1(S)
Identified transition time in lean-rich direction	>1.5(s))	
OR			
Identified delay time in rich-lean direction	>1(s)		
OR			
Identified transition time in rich-lean direction	>1.5(s)		
		Relative air mass (see Look-Up-Table #21)	>15 to 1536(%)
		for time	=0(s)
)	
)	
		Ambient pressure	>0(kPa)
)	
		Bank-specific enabling conditions for continuous identification	=TRUE
		(
		Enabling conditions for lambda stability	
		(
		(
		Lambda closed loop control, Bank 1	=TRUE
		(
		Lambda control disabled during after r.vlndpr r.iit-nff	=FALSE

Lambda switched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
(
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
(
Absolute value of difference in lambda of bank 1	<0.2002
Difference of counter time and plant time constant	>0(s)
a-(b+c)	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant for continuous air/fuel control	
c is plant parameter for dead time for lambda control	
)	
)	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
lambda sensor 1 temperature	>655(°C)
)	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
Injector power stage fault is active	=FALSE
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
lambda control is active since warmup is finished	=TRUE
Relative air charge	>0(%)
for time	>2(s)
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
Rich catalyst purge is active	=TRUE

Lambda for component protection is active	=FALSE
OR	
Number of the lambda requests determining the lambda setpoint	!=5(counts)
)	
for time	=1(s)
)	
Plant time constant of continuous af control, base value, linear quantization	<0.15(s)
(
Exhaust gas mass flow Cat 1, Bank 1	<33.33(g/s)
(
Difference between exhaust gas mass flow Cat 1, Bank 1 with its filtered value	>-5.56(g/s)
Difference between exhaust gas mass flow Cat 1, Bank 1 with its filtered value	<5.56(g/s)
)	
for time	=0.01(s)
)	
Sensor LSU upstream cat ready for operation	=TRUE
for time	=10(s)
Enable LSU dynamic diagnosis w.r.t. scavenging	=TRUE
(
(
Transition time from step response measurement in rich-lean direction	<0.2(s)
Transition time from step response measurement in lean-rich direction	<0.2(s)
)	
(
Transition time from step response measurement in rich-lean direction	<0.1(s)
Transition time from step response measurement in lean-rich direction	<0.1(s)
)	
)	
Injection valve cut-off on Bank 1	=FALSE
)	
Identification trigger: rate of change of modeled lambda in lean to rich direction, bank 2	>0.024994
Identification trigger: rate of change of modeled lambda in rich to lean direction, bank 2	>0.024994
(

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Number of step response measurements in lean-rich direction fordriving cylce (sensor 1, bank 1)	=0
(Time to evaluate loss function	>30(s)
OR	
Square of difference between band pass filtered reciprocal lambda and modelled reciprocal lambda values	>100
)	
)	
OR	
Enabling conditions for step response measurement	
(
(
(
(
Lean lambda is requested and the cat is filled with oxygen gas	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=1.07
lambda	
for time	>3(s)
for time	>0.1(s)
Secondary 02 sensor voltage	<0.45(V)
(
Rich lambda is requested and the cat is filled with rich gas due to low sensor voltage	=TRUE
a commanded lambda	=TRUE
active	
primary A/F commanded	=0.87
lambda bank1	
for time	>3(s)
for time	>0.1(s)
OR	
Rich lamda is requested to empty the oxygen gas from the cat	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=0.87
lambda	
for time	>3(s)
for time	>0.1(s)
(

Secondary 02 sensor voltage	>0.86(V)
Or	
{	
Secondary 02 sensor voltage	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
Secondary 02 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow	>0.2(g)
bank 1	
)	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 1	- ⁵ (g)
)	
)	
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime and	
\	
Reciprocal of actual lambda value where in	>(A + (B*C))
(A) Minimal or maximal value of reciprocal lambda after step	
(B) Fraction of step height to end step response measurement	=0.3
(C) Step height in reciprocal lambda	
OR	
Difference between time after step measurement and LRS-plantparameter deadtime	>1(s)
)	
)	
OR	
(
(
Rich lambda is requested to empty the oxygen gas from the cat	=TRUE
a commanded lambda active	=TRUE

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primary A/F commanded	=0.87
lambda	
for time	>3(s)
for time	>0.1(s)
{	
Secondary 02 sensor	>0.86(V)
voltage	
Or	
/	
Secondary 02 sensor voltage	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
Secondary 02 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow	>0.2(g)
bank 1	
)	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation	=0.05
of lean mixture	
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation	<0.05
of rich mixture	
for time	>0.1(s)
Integrated rich exhaust gas	- ⁵ (g)
mass flow bank 1	
and	
/	
Lean lambda is requested and the	=TRUE
cat is filled with oxygen gas due to	
high sensor voltage	
a commanded lambda	=TRUE
active	
primary A/F commanded	=1.07
lambda	
for time	>3(s)
for time	>0.1(s)
((
Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.2(V)
Secondary 02 sensor voltage	<0.09944(V/s)

Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
)	
(Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
OR	
Lean lambda is requested and the cat is filled with oxygen gas	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
Secondary 02 sensor voltage	<0.45(V)
)	
)	
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime	
(
Reciprocal of actual lambda value	<(A-(B*C))
where in	
(A) Minimal or maximal value of reciprocal lambda after step	
(B) Fraction of step height to end step response measurement	=0.3
(C) Step height in reciprocal lambda	
OR	
Difference between time after step measurement and LRS-plantparameter deadtime	>1(s)
)	
)	
)	

Absolute difference between reciprocal of desired lambda limitation and reciprocal lambda setpoint in combustion chamber	>0.05
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime	
)	
(
(
Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	<3(counts)
Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	>0
(
(
Delay time from step response measurement in lean-rich direction (sensor 1, bank 1)	<A - ((A - B) * (C / D))(s)
where in	
(A) Delay time of best part unacceptable	=0.6(s)
(B) Fault threshold of delay time (step response, lean to rich)	=0.3(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	
Transition time from step response measurement in lean-rich direction (sensor 1, bank 1)	<A - ((A - B) * (C / D))(s)
where in	
(A) Transition time of best part unacceptable	=0.9(s)
(B) Fault threshold of transition time (step response, lean to rich)	=0.4(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	
)	
OR	
Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	>3(counts)
)	
)	
OR	
{	
Number of evaluated steps in rich-lean direction (sensor 1, bank 1)	<3(counts)

		Number of evaluated steps in rich-lean direction (sensor 1, bank 1) $\{ \text{Delay time from step response measurement in rich-lean direction (sensor 1, bank 1)} \}$ where in (A) Delay time of best part unacceptable (B) Fault threshold of delay time (step response, rich to lean) (C) Necessary number of measurements for fault-confirmation (D) Number of evaluated steps in rich-lean direction (sensor 1, bank 1)	>0 $<A - ((A - B) * (C / D)) (s)$ $=0.6(s)$ $=0.38(s)$ $=3(\text{counts})$
		Transition time from step response measurement in rich-lean direction (sensor 1, bank 1) where in (A) Transition time of best part unacceptable (B) Fault threshold of transition time (step response, rich to lean) (C) Necessary number of measurements for fault-confirmation (D) Number of evaluated steps in rich-lean direction (sensor 1, bank 1)	$<A - ((A - B) * (C / D)) (s)$ $=0.9(s)$ $=0.4(s)$ $=3(\text{counts})$
		) OR Number of evaluated steps in rich-lean direction (sensor 1, bank 1)))	$>3(\text{counts})$
Path 2: Step response/identification measurement of Oxygen sensor and pattern not detected with Step-response measurement within parallelization	Step response measurement: (Arithmetical average value of delay time from step response measurement in lean-rich direction OR	Non bank-specific enabling conditions for continuous identification	$=TRUE$
	(Arithmetical average value of delay time from step response measurement in lean-rich direction OR	(Vehicle speed and	$>0.3(s)$ $>3.125(\text{mph})$

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Arithmetical average value of transition time from step response measurement in lean-rich direction	>0.4(s)	Factor fuel purge adaptation factor	<0
OR		and	
Arithmetical average value of delay time from step response measurement in rich-lean direction	>0.38(s)	(
OR		Integral of purge mass flow after a longer purge stop	s ² (g)
Arithmetical average value of transition time from step response measurement in rich-lean direction	>0.4(s)	OR	
)		Purge mass flow for DTEV	<0(g/s)
OR)	
Identification measurement:		(
(		Condition gear-shift in process	=FALSE
Status of step response measurement (pattern is not detected bank 1)	=0		
()	
Sum time of identification in lean-rich direction	>1.5(s)	End of start is reached	=TRUE
OR		for time	=5(s)
Sum time of identification in rich-lean direction	>1.5(s)	(
)		Fault suspicion reported by continuous identification	=TRUE
)		{	
		Sum of identified delay time and transition time in lean to rich direction	>0.3(s)
		OR	
		Sum of identified delay time and transition time in rich to lean direction	>0.3(s)
		OR	
		Difference between sum of delay times and transition times in lean to rich and rich to lean directions respectively	>0.2(s)
		where in	
		(A) Identified transition time in lean-rich direction (bank 1)	
		(B) Identified delay time in lean-rich direction (bank 1)	
		(C) Identified transition time in rich-lean direction (bank 1)	

(D) Identified delay time in rich-lean direction (bank 1)	
OR	
Negative value of the sum of delay times and transition times in rich to lean and lean to rich directions respectively	>0.2(s)
where in	
(A) Identified transition time in lean-rich direction (bank 1)	
(B) Identified delay time in lean-rich direction (bank 1)	
(C) Identified transition time in rich-lean direction (bank 1)	
(D) Identified delay time in rich-lean direction (bank 1)	
(
Absolute value of filling gradient for time	<12(%) =3(s)
)	
)	
OR	
Fault suspicion reported by continuous identification	=FALSE
(
Absolute value of filling gradient for time	<12(%) =1(s)
)	
)	
(
Relative air mass (see Look-Up-Table #21)	>15 to 1536(%)
for time	=0(s)
)	
)	
Ambient pressure	>0(kPa)
)	
Bank-specific enabling conditions for continuous identification	=TRUE
(
Enabling conditions for lambda stability	
(
(
Lambda closed loop control, Bank 1	=TRUE
(
Lambda control disabled during after cylinder cut-off	=FALSE
and	
Lambda switched ON after fuel cutoff	=TRUE

(
Fuel cut off is active	=FALSE
(
Time running down after fuel cut-off	>8(5)
for enabling lambda control	
OR	
(
Absolute value of diffence in lambda	<0.2
of bank 1	
Difference of counter time and plant	>0(s)
time constant	
a-(b+c)	
where a is Time running down after	
fuel cut-off for enabling lambda	
control	
b is plant time constant for	
continuous air/fuel control	
c is plant parameter for dead time for	
lambda control	
)	
)	
)	
LSU sensor upstream to catalyst	=TRUE
ready for operation	
(
lambda sensor 1 temperature	>655(°C)
)	
Lambda control disabled by a fault	=FALSE
(
Catalyst damaging misfire rate	=FALSE
exceeded	
Injector power stage fault is active	=FALSE
Camshaft fault in critical operating	=FALSE
range present and MAF is main air	
charge sensor	
)	
lambda control is active since	=TRUE
warmup is finished	
Relative air charge	>0(%)
for time	>2(s)
Lamda control active due to GDI	=TRUE
mode change	
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
)	
Rich catalyst purge is active	=TRUE
(
Lambda for component protection is	=FALSE
active	

OR	
Number of the lambda requests determining the lambda setpoint	!=5
)	
for time	=1(s)
)	
Plant time constant of continuous af control, base value, linear quantization	<0.15(s)
(
Exhaust gas mass flow Cat 1, Bank 1	<33.33(g/s)
(
Difference between exhaust gas mass flow Cat 1, Bank 1 with its filtered value	>-5.56(g/s)
Difference between exhaust gas mass flow Cat 1, Bank 1 with its filtered value	<5.56(g/s)
)	
for time	=0.01(s)
)	
Sensor LSU upstream cat ready for operation	=TRUE
for time	=10(s)
(
(
Transition time from step response measurement in rich-lean direction	<0.2(s)
Transition time from step response measurement in lean-rich direction	<0.2(s)
)	
(
Transition time from step response measurement in rich-lean direction	<0.1(s)
Transition time from step response measurement in lean-rich direction	<0.1(s)
)	
)	
Injection valve cut-off on Bank 1	=FALSE
Turn-on delay after fuel cut-off)	>3(s)
Identification trigger: rate of change of modeled lambda in lean to rich direction, bank 2	>0.024994
Identification trigger: rate of change of modeled lambda in rich to lean direction, bank 2	>0.024994
(
Number of step response measurements in lean-rich direction for driving cylce (sensor 1, bank 1)	=0
(
Time to calculate base function	>0.01(s)

OR	
Square of difference between band pass filtered reciprocal lambda and modelled reciprocal lambda values	>100
)	
)	
OR	
Enabling conditions for step response measurement	
(
(
(
(
Lean lambda is requested and the cat is filled with oxygen gas	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=1.07
lambda	
for time	>3(s)
for time	>0.1(s)
Secondary 02 sensor voltage	<0.45(V)
(
Rich lambda is requested and the cat is filled with rich gas due to low sensor voltage	=TRUE
a commanded lambda	=TRUE
active	
primary A/F commanded	=0.87
lambda bank1	
for time	>3(s)
for time	>0.1(s)
OR	
Rich lambda is requested to empty the oxygen gas from the cat	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=0.87
lambda	
for time	>3(s)
for time	>0.1(s)
(
Secondary 02 sensor	>0.86(V)
voltage	
Or	
(
Secondary 02 sensor voltage	>0.76(V)
Secondary 02 sensor voltage	<0.50(V)

Secondary 02 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow	>0.2(g)
bank 1	
)	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation	=0.05005
of lean mixture	
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation	<0.05
of rich mixture	
for time	>0.1(s)
Integrated rich exhaust gas	- ⁵ (g)
mass flow bank 1	
)	
)	
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime	
and	
(
Reciprocal of actual lambda value	>(A + (B*C))
where in	
(A) Minimal or maximal value of	
reciprocal lambda after step	
(B) Fraction of step height to end	=0.3
step response measurement	
(C) Step height in reciprocal lambda	
OR	
Difference between time after step	>1(s)
measurement and LRS-	
plantparameter deadtime	
)	
)	
OR	
(
(
Rich lamda is requested to empty the	=TRUE
oxygen gas from the cat	
a commanded lambda active	=TRUE
primary A/F commanded	=0.87
lambda	
for time	>3(s)
for time	>0.1(s)
I	
Secondary 02 sensor	>0.86(V)

Or	
(
Secondary 02 sensor voltage	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
Secondary 02 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow	>0.2(g)
bank 1	
)	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation	=0.05
of lean mixture	
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation	<0.05
of rich mixture	
for time	>0.1(s)
Integrated rich exhaust gas	- ⁵ (g)
mass flow bank 1	
and	
/	
Lean lambda is requested and the	=TRUE
cat is filled with oxygen gas due to	
high sensor voltage	
a commanded lambda	=TRUE
active	
primary A/F commanded	=1.07
lambda	
for time	>3(s)
for time	>0.1(s)
((
Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage	<0.09944(V/s)
gradient over 0.05s	
Secondary 02 sensor voltage	>-0.09944(V/s)
gradient over 0.05s	
Integrated Oxygen mass flow	>0.15(g)
bank 1	
)	
(
Primary A/F sensor lambda	<(a) + (b)

(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
OR	
Lean lambda is requested and the cat is filled with oxygen gas	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
Secondary O2 sensor voltage	<0.45(V)
)	
)	
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime	
(
Reciprocal of actual lambda value	<(A-(B*C))
where in	
(A) Minimal or maximal value of reciprocal lambda after step	
(B) Fraction of step height to end step response measurement	=0.3
(C) Step height in reciprocal lambda	
OR	
Difference between time after step measurement and LRS-plantparameter deadtime	>1(s)
)	
)	
)	
Absolute difference between reciprocal of desired lambda limitation and reciprocal lambda setpoint in combustion chamber	>0.05
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime	
)	

(
Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	<3(counts)
Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	>0
(
(
Delay time from step response measurement in lean-rich direction (sensor 1, bank 1)	$<A - ((A - B) * (C / D))$ (s)
where in	
(A) Delay time of best part unacceptable	=0.6(s)
(B) Fault threshold of delay time (step response, lean to rich)	=0.3(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	
Transition time from step response measurement in lean-rich direction (sensor 1, bank 1)	$<A - ((A - B) * (C / D))$ (s)
where in	
(A) Transition time of best part unacceptable	=0.9(s)
(B) Fault threshold of transition time (step response, lean to rich)	=0.4(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	
)	
OR	
Number of evaluated steps in lean-rich direction (sensor 1, bank 1)	>3(counts)
)	
)	
OR	
(
Number of evaluated steps in rich-lean direction (sensor 1, bank 1)	<3(counts)
Number of evaluated steps in rich-lean direction (sensor 1, bank 1)	>0
(
(
Delay time from step response measurement in rich-lean direction (sensor 1, bank 1)	$<A - ((A - B) * (C / D))$ (s)
where in	

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			(A) Delay time of best part unacceptable	=0.6(s)		
			(B) Fault threshold of delay time (step response,rich to lean)	=0.38(s)		
			(C) Necessary number of measurements for fault-confirmation	=3(counts)		
			(D) Number of evaluated steps in rich-lean direction (sensor 1, bank 1)			
			Transition time from step response measurement in rich-lean direction (sensor 1, bank 1)	$<A - ((A - B) * (C / D))$ (s)		
			where in			
			(A) Transition time of best part unacceptable	=0.9(s)		
			(B) Fault threshold of transition time (step response,rich to lean)	=0.4(s)		
			(C) Necessary number of measurements for fault-confirmation	=3(counts)		
			(D) Number of evaluated steps in rich-lean direction (sensor 1, bank 1)			
)			
			OR			
			Number of evaluated steps in rich-lean direction (sensor 1, bank 1)	>3(counts)		
)			
)			
			No pending or confirmed DTCs	=see sheet inhibit table		
			Basic enable conditions met	=see sheet enable tables		
P0153	Path 1: Step response/identification measurement of Oxygen sensor of bank 2 and pattern has been detected with Step-response measurement within parallelization	Step response measurement:	Non bank-specific enabling conditions for continuous identification	=TRUE	0.01(s)	1Trip EWMA
		(Arithmetical average value of delay time from step response measurement in lean-rich direction (sensor 1, bank 2)	>0.3(s)	(Vehicle speed	>3.125(mph)	
		OR	Fuel purge adaptation factor	<0		

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Arithmetical average value of transition time from step response measurement in lean-rich direction, (sensor 1, bank 2)	>0.4(s)	(
OR			Integral of purge mass flow after a longer purge stop
Arithmetical average value of delay time from step response measurement in rich-lean direction, (sensor 1, bank 2)	>0.38(s)	OR	^{s2} (g)
OR			Purge mass flow for DTEV
Arithmetical average value of transition time from step response measurement in rich-lean direction, (sensor 1, bank 2)	>0.4(s)	)	<0(g/s)
)		(
OR		Condition gear-shift in process	=FALSE
Identification measurement:			
(
Status of step response measurement (detected pattern, bank 2)	>0)	
(
Identified delay time in lean-rich direction, bank 2	>1(s)	End of start is reached for time	=TRUE =5(S)
OR		(
Identified transition time in lean-rich direction, bank 2	>1.5(s)	Absolute value of filling gradient	<12(%)
OR		for time	=1(S)
Identified delay time in rich-lean direction, bank 2	>1(s))	
OR			
Identified transition time in rich-lean direction, bank 2	>1.5(s)	(
		Relative air mass (see Look-Up-Table #21)	>15 to 1536(%)
		for time	=0(s)
)	
)	
		Ambient pressure	>0(kPa)
)	
		Bank-specific enabling conditions for continuous identification, bank 2	=TRUE
		(

Enabling conditions for lambda stability	
(
(
Lambda closed loop control, Bank 2	=TRUE
(
Lambda control disabled during after cylinder cut-off, bank 2	=FALSE
Lambda switched ON after fuel cutoff, bank 2	=TRUE
(
Fuel cut off is active	=FALSE
(
Time running down after fuel cut-off for enabling lambda control	>8(5)
OR	
(
Absolute value of difference in lambda of bank 2	<0.2002
Difference of counter time and plant time constant	>0(s)
$a-(b+c)$	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant for continuous air/fuel control, bank 2	
c is plant parameter for dead time for lambda control, bank 2	
)	
)	
)	
LSU sensor upstream to catalyst ready for operation, bank 2	=TRUE
(
lambda sensor 1 temperature, bank 2	>655(°C)
)	
Lambda control disabled by a fault, bank 2	=FALSE
(
Catalyst damaging misfire rate exceeded	=FALSE
Injector power stage fault is active	=FALSE
Camshaft fault in critical operating range present and MAF is main air charge sensor	=FALSE
)	
lambda control is active since warmup is finished	=TRUE
Relative air charge	>0(%)

Lambda control active due to GDI mode change	=TRUE
(GDI mode homogeneous for time	=TRUE >0.8(s)
)	
)	
)	
Rich catalyst purge is active, bank 2	=TRUE
(Lambda for component protection is active	=FALSE
OR	
Number of the lambda requests determining the lambda setpoint	!=5
)	
for time	=1(s)
)	
Plant time constant of continuous af control, base value, bank 2, linear quantization	<0.15(s)
(Exhaust gas mass flow Cat 1, Bank 2	<33.33(g/s)
(Difference between exhaust gas mass flow Cat 1, Bank 2 with its filtered value	>-5.56(g/s)
Difference between exhaust gas mass flow Cat 1, Bank 2 with its filtered value	<5.56(g/s)
)	
for time	=0.01(s)
)	
Sensor LSU upstream cat ready for operation	=TRUE
for time	=10(s)
(
(Transition time from step response measurement in rich-lean direction (sensor 1, bank 2)	<0.2(s)
Transition time from step response measurement in lean-rich direction (sensor 1, bank 2)	<0.2(s)
)	
(Transition time from step response measurement in rich-lean direction (sensor 1, bank 2)	<0.1(s)
Transition time from step response measurement in lean-rich direction (sensor 1, bank 2)	<0.1(s)

)	
)	
Injection valve cut-off on Bank 2	=FALSE
)	
Identification trigger: rate of change of modeled lambda in lean to rich direction, bank 2	>0.024994
Identification trigger: rate of change of modeled lambda in rich to lean direction, bank 2	>0.024994
(
Number of step response measurements in lean-rich direction for driving cycle (sensor 1, bank 2)	=0
(
Time to evaluate loss function, bank 2	>30(s)
OR	
Square of difference between band pass filtered reciprocal lambda and modelled reciprocal lambda values (sensor 1, bank 2)	>100
)	
)	
OR	
Enabling conditions for step response measurement	
(
(
(
(
Lean lambda is requested and the cat is filled with oxygen gas	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=1.07
lambda	
for time	>3(s)
for time	>0.1(s)
Secondary O2 sensor voltage	<0.45(V)
(
Rich lambda is requested and the cat is filled with rich gas due to low sensor voltage, bank 2	=TRUE
a commanded lambda	=TRUE
active	
primary A/F commanded	=0.87
lambda bank2	
for time	>3(s)
for time	>0.1(s)

OR	
Rich lambda is requested to empty the oxygen gas from the cat	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=0.87
lambda	
for time	>3(s)
for time	>0.1(s)
{ Secondary 02 sensor	>0.86(V)
voltage	
Or	
{ Secondary 02 sensor voltage	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
Secondary 02 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow	>0.2(g)
bank 2	
)	
{ Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 2	- ⁵ (g)
)	
)	
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime, bank 2	
{ Reciprocal of actual lambda value, sensor 1, bank 2	>(A + (B*C))
where in	
(A) Minimal or maximal value of reciprocal lambda after step, bank 2	
(B) Fraction of step height to end step response measurement	=0.3
(C) Step height in reciprocal lambda, bank 2	
^^	

Difference between time after step measurement and LRS-plantparameter deadtime, bank 2	>1(s)
)	
)	
OR	
(
(
Rich lambda is requested to empty the oxygen gas from the cat, bank 2	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=0.87
lambda	
for time	>3(s)
for time	>0.1(s)
{	
Secondary 02 sensor	>0.86(V)
voltage	
Or	
{	
Secondary 02 sensor voltage	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
Secondary 02 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow	>0.2(g)
bank 2	
)	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 2	- ⁵ (g)
\	
Lean lambda is requested and the cat is filled with oxygen gas due to high sensor voltage, bank 2	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=1.07
lambda	
for time	>3(s)

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for time	>0.1(s)
((
Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage	<0.09944(V/s)
gradient over 0.05s	
Secondary 02 sensor voltage	>-0.09944(V/s)
gradient over 0.05s	
Integrated Oxygen mass flow	>0.15(g)
bank 2	
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation	=0.05
of lean mixture	
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation	<0.05
of rich mixture	
for time	>0.1(s)
Integrated lean exhaust gas	- ⁵ (g)
mass flow bank 2	
)	
OR	
Lean lambda is requested and the	=TRUE
cat is filled with oxygen gas, bank 2	
a commanded lambda active	=TRUE
primary A/F commanded	=1.07
lambda	
for time	>3(s)
for time	>0.1(s)
Secondary 02 sensor voltage	<0.45(V)
)	
)	
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime,	
bank 2	
(
Reciprocal of actual lambda value,	<(A - (B*C))
bank 2	

(A) Minimal or maximal value of reciprocal lambda after step, bank 2	
(B) Fraction of step height to end step response measurement	=0.3
(C) Step height in reciprocal lambda, bank 2	
OR	
Difference between time after step measurement and LRS-plantparameter deadtime, bank 2	>1(s)
)	
)	
)	
Absolute difference between reciprocal of desired lambda limitation of sensor 1, bank 2 and reciprocal lambda setpoint in combustion chamber	>0.05
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime, bank 2	
)	
(
(
Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	<3(counts)
Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	>0
(
Delay time from step response measurement in lean-rich direction (sensor 1, bank 2)	$<A - ((A - B) * (C / D))$ (s)
where in	
(A) Delay time of best part unacceptable	=0.6(s)
(B) Fault threshold of delay time (step response, lean to rich)	=0.3(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	
Transition time from step response measurement in lean-rich direction (sensor 1, bank 2)	$<A - ((A - B) * (C / D))$ (s)
where in	
(A) Transition time of best part unacceptable	=0.9(s)
(B) Fault threshold of transition time (step response, lean to rich)	=0.4(s)

(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	
)	
OR	
Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	>3(counts)
)	
OR	
(
Number of evaluated steps in rich-lean direction (sensor 1, bank 2)	<3(counts)
Number of evaluated steps in rich-lean direction (sensor 1, bank 2)	>0
(
Delay time from step response measurement in rich-lean direction (sensor 1, bank 2)	$<A - ((A - B) * (C / D))$ (s)
where in	
(A) Delay time of best part unacceptable	=0.6(s)
(B) Fault threshold of delay time (step response,rich to lean)	=0.38(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in rich-lean direction (sensor 1, bank 2)	
Transition time from step response measurement in rich-lean direction (sensor 1, bank 2)	$<A - ((A - B) * (C / D))$ (s)
where in	
(A) Transition time of best part unacceptable	=0.9(s)
(B) Fault threshold of transition time (step response,rich to lean)	=0.4(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in rich-lean direction (sensor 1, bank 2)	
)	
OR	
Number of evaluated steps in rich-lean direction (sensor 1, bank 2)	>3(counts)
)	
)	

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Path 2: Step response/identification measurement of Oxygen sensor of bank 2 and pattern not detected with Step- response measurement within parallelization	Step response measurement:		Non bank-specific enabling conditions for continuous identification	TRUE
	(Arithmetical average value of delay time from step response measurement in lean-rich direction (sensor 1, bank 2)	>0.3(s)	(Vehicle speed	>3.125(mph)
	OR		Factor fuel purge adaptation factor	<0
	Arithmetical average value of transition time from step response measurement in lean- rich direction, (sensor 1, bank 2)	>0.4(s)	(
	OR		Integral of purge mass flow after a longer purge stop	>2(g)
	Arithmetical average value of delay time from step response measurement in rich-lean direction, (sensor 1, bank 2)	>0.38(s)	OR	
	OR		Purge mass flow for DTEV	<0(g/s)
	Arithmetical average value of transition time from step response measurement in rich- lean direction, (sensor 1, bank 2)	>0.4(s))	
)		(
	OR		Condition gear-shift in process	=FALSE
	Identification measurement:			
	(Status of step response measurement (pattern is not detected bank 2)	=0	) End of start is reached	=TRUE
	(Sum time of identification in lean-rich direction (sensor 1, bank 2)	>1.5(s)	for time (	=5(s)
	OR		Fault suspicion reported by continuous identification	=TRUE
	Sum time of identification in rich-lean direction (sensor 1, bank 2)	>1.5(s)	(

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)	Sum of identified delay time and transition time in lean to rich direction, bank 2	>0.3(s)
)	OR	
	Sum of identified delay time and transition time in rich to lean direction, bank 2	>0.3(s)
	OR	
	Difference between sum of delay times and transition times in lean to rich and rich to lean directions respectively	>0.2(s)
	where in	
	(A) Identified transition time in lean-rich direction (bank 2)	
	(B) Identified delay time in lean-rich direction (bank 2)	
	(C) Identified transition time in rich-lean direction (bank 2)	
	(D) Identified delay time in rich-lean direction (bank 2)	
	OR	
	Negative value of the sum of delay times and transition times in rich to lean and lean to rich directions respectively	>0.2(s)
	where in	
	(A) Identified transition time in lean-rich direction (bank 1)	
	(B) Identified delay time in lean-rich direction (bank 1)	
	(C) Identified transition time in rich-lean direction (bank 1)	
	(D) Identified delay time in rich-lean direction (bank 1)	
(	Absolute value of filling gradient for time	<12(%) =3(s)
)		
)	OR	
	Fault suspicion reported by continuous identification	=FALSE
(	Absolute value of filling gradient for time	<12(%) =1(s)
)		
)		
(	Relative air mass (see Look-Up-Table #21)	>15 to 1536(%)
	for time	=0(s)

)	
)	
Ambient pressure	>0(kPa)
)	
Bank-specific enabling conditions for continuous identification, bank 2	=TRUE
(
Enabling conditions for lambda stability	
(
(
Lambda closed loop control, Bank 2	=TRUE
(
Lambda control disabled during after cylinder cut-off, bank 2	=FALSE
Lambda switched ON after fuel cutoff, bank 2	=TRUE
(
Fuel cut off is active	=FALSE
/	
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
/	
Absolute value of difference in lambda of bank 2	<0.2002
Difference of counter time and plant time constant	>0(s)
a-(b+c)	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant for continuous air/fuel control, bank 2	
c is plant parameter for dead time for lambda control, bank 2	
)	
)	
)	
LSU sensor upstream to catalyst ready for operation, bank 2	=TRUE
(
lambda sensor 1 temperature	>655(°C)
)	
Lambda control disabled by a fault, bank 2	=FALSE
/	
Catalyst damaging misfire rate exceeded	=FALSE
Injector power stage fault is active	=FALSE
Camshaft fault in critical operating range present and MAF is main air	=FALSE

)	
lambda control is active since warmup is finished	=TRUE
Relative air charge	>0(%)
for time	>2(s)
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
)	
Rich catalyst purge is active, bank 2	=TRUE
(
Lambda for component protection is active	=FALSE
OR	
Number of the lambda requests determining the lambda setpoint	!=5
)	
for time	=1(s)
)	
Plant time constant of continuous af control, base value, bank 2, linear quantization	<0.15(s)
(
Exhaust gas mass flow Cat 1, Bank 2	<33.33(g/s)
(
Difference between exhaust gas mass flow Cat 1, Bank 2 with its filtered value	>-5.56(g/s)
Difference between exhaust gas mass flow Cat 1, Bank 2 with its filtered value	<5.56(g/s)
)	
for time	=0.01(s)
)	
Sensor LSU upstream cat ready for operation	=TRUE
for time	=10(s)
(
(
Transition time from step response measurement in rich-lean direction (sensor 1, bank 2)	<0.2(s)
Transition time from step response measurement in lean-rich direction (sensor 1, bank 2)	<0.2(s)
)	
,	

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Transition time from step response measurement in rich-lean direction (sensor 1, bank 2)	<0.1(s)
Transition time from step response measurement in lean-rich direction (sensor 1, bank 2)	<0.1(s)
)	
)	
Injection valve cut-off on Bank 2	=FALSE
Turn-on delay after fuel cut-off)	>3(s)
Identification trigger: rate of change of modeled lambda in lean to rich direction, bank 2	>0.024994
Identification trigger: rate of change of modeled lambda in rich to lean direction, bank 2	>0.024994
{	
Number of step response measurements in lean-rich direction for driving cylce (sensor 1, bank 2)	=0
(
Time to evaluate loss function, bank 2	>30(s)
OR	
Square of difference between band pass filtered reciprocal lambda and modelled reciprocal lambda values (sensor 1, bank 2)	>100
)	
)	
OR	
Enabling conditions for step response measurement	
(
(
(
(
Lean lambda is requested and the cat is filled with oxygen gas, bank 2	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=1.07
lambda	
for time	>3(s)
for time	>0.1(s)
Secondary O2 sensor voltage	<0.45(V)
(
Rich lambda is requested and the cat is filled with rich gas due to low	=TRUE

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a commanded lambda	=TRUE
active	
primary A/F commanded	=0.87
lambda bank2	
for time	>3(s)
for time	>0.1(s)
OR	
Rich lambda is requested to empty the oxygen gas from the cat, bank 2	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=0.87
lambda	
for time	>3(s)
for time	>0.1(s)
{	
Secondary 02 sensor	>0.86(V)
voltage	
Or	
{	
Secondary 02 sensor voltage	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
Secondary 02 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow	>0.2(g)
bank 2	
)	
{	
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation of lean mixture	=0.05005
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set	
point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas	- ⁵ (g)
mass flow bank 2	
}	
)	
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime, bank 2	
and	
/	
Reciprocal of actual lambda value,	>(A + (B*C))

where in	
(A) Minimal or maximal value of reciprocal lambda after step, bank 2	
(B) Fraction of step height to end step response measurement	=0.3
(C) Step height in reciprocal lambda, bank 2	
OR	
Difference between time after step measurement and LRS-plantparameter deadtime, bank 2	>1(s)
)	
)	
OR	
(
(
Rich lambda is requested to empty the oxygen gas from the cat, bank 2	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded	=0.87
lambda	
for time	>3(s)
for time	>0.1(s)
(
Secondary 02 sensor	>0.86(V)
voltage	
Or	
(
Secondary 02 sensor voltage	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
Secondary 02 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow	>0.2(g)
bank 2	
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas	- ⁵ (g)
mass flow bank 2	

Lean lambda is requested and the cat is filled with oxygen gas due to high sensor voltage, bank 2	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
((Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
) Or	
{ Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
)	
{ Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda	=0.05
deviation of lean mixture Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda	<0.05
deviation of rich mixture for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	- ⁵ (g)
OR	
Lean lambda is requested and the cat is filled with oxygen gas, bank 2	=TRUE
a commanded lambda active primary A/F commanded lambda	=TRUE =1.07
for time	>3(s)
for time	>0.1(s)

Secondary 02 sensor voltage	<0.45(V)
)	
)	
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime, bank 2	
(
Reciprocal of actual lambda value, bank 2	<(A-(B*C))
where in	
(A) Minimal or maximal value of reciprocal lambda after step, bank 2	
(B) Fraction of step height to end step response measurement	=0.3
(C) Step height in reciprocal lambda, bank 2	
OR	
Difference between time after step measurement and LRS-plantparameter deadtime, bank 2	>1(s)
)	
)	
)	
Absolute difference between reciprocal of desired lambda limitation of sensor 1, bank 2 and reciprocal lambda setpoint in combustion chamber	>0.05
for time	=A*0.8(s)
where in	
(A) LRS-plantparameter deadtime, bank 2	
)	
(
(
Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	<3(counts)
Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	>0
(
Delay time from step response measurement in lean-rich direction (sensor 1, bank 2)	<A - ((A - B) * (C / D))(s)
where in	
(A) Delay time of best part unacceptable	=0.6(s)
(B) Fault threshold of delay time (step response, lean to rich)	=0.3(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)

(D) Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	
Transition time from step response measurement in lean-rich direction (sensor 1, bank 2)	$<A - ((A - B) * (C / D))$ (s)
where in	
(A) Transition time of best part unacceptable	=0.9(s)
(B) Fault threshold of transition time (step response, lean to rich)	=0.4(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	
)	
OR	
Number of evaluated steps in lean-rich direction (sensor 1, bank 2)	>3(counts)
)	
OR	
(
Number of evaluated steps in rich-lean direction (sensor 1, bank 2)	<3(counts)
Number of evaluated steps in rich-lean direction (sensor 1, bank 2)	>0
(
Delay time from step response measurement in rich-lean direction (sensor 1, bank 2)	$<A - ((A - B) * (C / D))$ (s)
where in	
(A) Delay time of best part unacceptable	=0.6(s)
(B) Fault threshold of delay time (step response, rich to lean)	=0.38(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)
(D) Number of evaluated steps in rich-lean direction (sensor 1, bank 2)	
Transition time from step response measurement in rich-lean direction (sensor 1, bank 2)	$<A - ((A - B) * (C / D))$ (s)
where in	
(A) Transition time of best part unacceptable	=0.9(s)
(B) Fault threshold of transition time (step response, rich to lean)	=0.4(s)
(C) Necessary number of measurements for fault-confirmation	=3(counts)

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				(D) Number of evaluated steps in rich-lean direction (sensor 1, bank 2)				
) OR Number of evaluated steps in rich-lean direction (sensor 1, bank 2)		>3(counts)		
				) No pending or confirmed DTCs		=see sheet inhibit table		
				Basic enable conditions met		=see sheet enable tables		
16. PLAUSIBILITY DIAGNOSIS OF UPSTREAM EXHAUST GAS SENSOR	P2196	Plausibility check of upstream exhaust gas sensor when the lambda offset is lesser than the calibrated threshold	Lambda offset of upstream exhaust gas sensor	<-0.07	Debounce condition for fault confirmation by offset adaptation (sensor 1, bank 1)	=TRUE	0.1(s)	2 Trip
				(Debouncing of offset fault by slow offset adaptation		=TRUE		
				(Slow offset adaptation		=TRUE		
				(Bit p-part controllability primary control enable		=TRUE		
				(Lambda regulator setpoint active		=TRUE		
				(Lambda closed loop control (upstream catalyst), bank 1		=TRUE		
				OR				
				(Lambda setpoint for sensor after addition of trim control action is not equal to 0		=TRUE		
				Difference between upper limit action value lambda control and temporary value before test for enleanment protection		>0		
				Difference between temporary value before test for enleanment protection and lower bound of dfr during enleanmant protection		>0		

Lambda (measured and setpoint) is below minimal measurable lambda (bank 1)	=FALSE
TEMIN-limitation active, bench 1	=FALSE
)	
)	
)	
Current lowpass value of p-part control upstream primary control enable	>0(%)
Lambda closed loop control (upstream catalyst), bank 1	=TRUE
(
Lambda control disabled during or after cylinder cut-off	=FALSE
Lambda switched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
(
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
(
Absolute value of control difference in lambda, bank 1	<0.2002
Difference of counter time and plant time constant	>0(s)
a-(b+c)	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant for continuous air/fuel control	
c is plant parameter for dead time for lambda control	
)	
)	
)	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
lambda sensor 1 temperature, bank 1	>655(°C)
)	
Lambda control disabled by a fault	=FALSE
lambda control is active since warmup is finished	=TRUE
Relative air charge	>0(%)
for time	>2(s)
)	

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HEM condition to block lambda closed loop control upstream catalyst	=FALSE
Lambda control active due to GDI mode change	=TRUE
(GDI mode homogeneous for time	=TRUE >0.8(s)
)	
(Lambda control enabled for Cold operation sensor 2 bank 1	=TRUE
OR	
HEGO sensor 2 bank 1, signal valid	=TRUE
(Status of heating enable conditions for the sensor operating readiness	=TRUE
(Protective heating is finished	
for time	>25(s)
OR	
Internal resistance OK for operating readiness	=TRUE
/	
Unfiltered internal resistance of HEGO sensor	<2000(0hm)
Protective heating is finished	
Counter for valid internal resistance measurements	>3(counts)
)	
)	
Status of sensor signal enable conditions for the sensor operating readiness	=TRUE
/	
Internal resistance OK for operating readiness	=TRUE
OR	
(
(	>0.552(V)
Output voltage of HEGO Sensor	
Output voltage of HEGO Sensor	<1.201(V)
)	
OR	
Output voltage of HEGO Sensor	<0.322(V)

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)		
OR		
Sensor voltage stuck in countervoltage band		=TRUE
(
(
(
Output voltage of HEGO Sensor	<0.552(V)	
Output voltage of HEGO Sensor	>0.322(V)	
)		
(
		=TRUE
Sensor open circuit fault existed in previous trip		
OR		
Sensor open circuit fault currently not detected		=TRUE
)		
Electrical diagnostics enabled		=TRUE
)		
for time		>20(s)
)		
)		
for time		>0.2(s)
)		
)		
Bit p-part system balanced primary control enable		=TRUE
(
(
Lambda setpoint for sensor is set equal to 1		=TRUE
OR		
Lambda setpoint for sensor is set equal to 1		=FALSE
for time		>10(s)
)		
Rich catalyst purge		=FALSE
Mass flow of exhaust gas, sensor 2		>0(g)
)		
P-part active from temperature and dynamic diagnosis		=TRUE
(
Temperature of catalyst 1		>250(°C)
Temperature of catalyst 1		<900(°C)
)		
,		

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Bit I-part global primary control enable	=TRUE
(
(
Current lowpass value of I-part load primary control enable	>-1(%)
Current lowpass value of I-part load primary control enable	<1(%)
)	
Diagnosis of canister purge system is active	=FALSE
Maximum value among the engine coolant temperature and model-based substitute value for engine temperature signal in case of error	>35(°C)
(
Bit I-part global load and engine speed control enable	=TRUE
(
Engine speed with low resolution	<5000(rpm)
Engine speed with low resolution	>1320(rpm)
Relative air mass	<99.8(%)
Relative air mass (see Look-Up-Table #99)	>15.8 to 39.8(%)
)	
)	
)	
)	
(
Bit i-part system primary control enable	=TRUE
(
Current integrator value of P-part balanced primary control enable (see Look-Up-Table #98)	>200 to 300(g)
(
(
Dew point end of sensor 2 Bank1 is reached	=TRUE
End of start is reached	=TRUE
Exhaust gas mass flow sensor 2 Bank 1	>199.82(g)
)	
OR	
(
(
Dew point end of sensor 2 reached	=FALSE
OR	
End of start is reached 1	=FALSE

Exhaust gas mass flow sensor 2 (see Look-Up-Table #97)	>219.73 to 320(g)
)	
)	
)	
Bit i-part system temperature primary control enable	=TRUE
(
Temperature of catalyst 1	>350(°C)
Temperature of catalyst 1	<900(°C)
)	
)	
Cumulated time in which slow offset adaptation was active	>0(s)
)	
Debounce condition for fault confirmation by fast offset adaptation (sensor 1, bank 1)	=TRUE
General enabling condition of fast offset adaptation	
(
Enabling condition of fast offset adaptation due to catalyst conditioning	=TRUE
(
(
Bit signal valid, HEGO sensor 2 bank 1	=TRUE
Flag lambda setpoint for sensor equal to 1	=TRUE
Rich catalyst purge	=FALSE
Bank-independent disabling conditions of fast offset adaptation	=FALSE
(
Fuel cut-off	=TRUE
Mass flow exhaust gas catalyst 1	>50(g)
)	
OR	
(
Fuel cut-off	=FALSE
Mass flow exhaust gas catalyst 1	>50(g)
)	
)	
(
(
Parallelization done at least once from LSU plausibility diagnosis point of view (sensor 1, bank 1)	=TRUE
(

(
Target sensor voltage for rich during active parallelisation reached once, sensor 1, bank 2	=TRUE	
Oil gas mass flow by active lambda shifting minus the maximal possible influence of LSU offset part, segment 1, bank 1	>1.8(g)	
for time	>1(s)	
)		
OR		
(
Lean target sensor voltage during active parallelisation reached once, sensor 1, bank 2	=TRUE	
Oxygen mass flow in catalyst 1, deduct from maximum present LSU Offset in a fault free system	>1.6(g)	
for time	>1(s)	
)		
)		
OR		
Dynamic diagnosis error of upstream exhaust gas sensor is not set	=TRUE	
)		
OR		
(
(
lambda control is set when lambda controller reaches lower limit FRMIN	=TRUE	
Lambda actual value sensor 1 bank 1	<1	
Output voltage of HEGO sensor 2 bank 1	<0.4(V)	
)		
OR		
(
lambda control is set when lambda controller reaches lower limit FRMAX	=TRUE	
Lambda actual value sensor 1 bank 1		
Output voltage of HEGO sensor 2 bank 1	>0.6(V)	
)		
for time	>2(s)	
Condition for Lambda closed loop control upstream catalyst; bank 1	=TRUE	
)		
for time	52(s)	
)		

```

(
  Temperature of catalyst 1 >400(°C)

  Temperature of catalyst 1 <800(°C)

)
for time =0(s)
)
(
  Mass flow exhaust gas catalyst 1 >5.56(g/s)

  Mass flow exhaust gas catalyst 1 <33.33(g/s)

)
OR
(
  Mass flow exhaust gas catalyst 1 >5.56(g/s)

  Mass flow exhaust gas catalyst 1 <33.33(g/s)

)
for time >0(s)

)
)
Condition for upstream cat LSU ready for operation f(lamsons_w) =TRUE
(
  Sensor type sensor 1 bank 1 >0
  Lambda signal quality sensor 1 bank 1 <12
)
Hydrogen-correction-voltage, HEGO sensor 2 bank 1 with high resolution <80(V)

(
  CAT damage during past interval =FALSE
)
Mass flow of exhaust gas catalyst 1 ≥100(g)

Difference between Lambda offset (sensor 1, bank 1) and Lambda offset (delayed by one calculation raster) <0.0029907

(
  Counter for no step in offset or increasing offset in a row >2(counts)
  OR
  Counter for exhaust masses to debounce fault with fast offset >6(counts)
)

```

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)
)
)
)
)
)
No pending or confirmed DTCs =see sheet inhibit table

Basic enable conditions met =see sheet enable tables

P2195	Plausibility check of upstream exhaust gas sensor when the lambda offset is greater than the calibrated threshold	Lambda offset of upstream exhaust gas sensor	>0.070007	Debounce condition for fault confirmation by offset adaptation (sensor 1, bank 1)	=TRUE	0.1(s)	2 Trip
				(Debouncing of offset fault by slow offset adaptation	=TRUE		
				(Slow offset adaptation	=TRUE		
				(Bit p-part controllability primary control enable	=TRUE		
				((Lambda regulator setpoint active	=TRUE		
				((Lambda closed loop control (upstream catalyst), bank 1 OR	=TRUE		
				(Lambda setpoint for sensor after addition of trim control action is not equal to 0	=TRUE		
				Difference between upper limit action value lambda control and temporary value before test for enleanment protection	>0		
				Difference between temporary value before test for enleanment protection and lower bound of dfr during enleanmant protection	>0		

Lambda (measured and setpoint) is below minimal measurable lambda (bank 1)	=FALSE
TEMIN-limitation active, bench 1	=FALSE
)	
)	
)	
Current lowpass value of p-part control upstream primary control enable	>0(%)
Lambda closed loop control (upstream catalyst), bank 1	=TRUE
(
Lambda control disabled during or after cylinder cut-off	=FALSE
Lambda switched ON after fuel cutoff	=TRUE
(
Fuel cut off is active	=FALSE
(
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
(
Absolute value of control difference in lambda, bank 1	<0.2002
Difference of counter time and plant time constant	>0(s)
$a-(b+c)$	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant for continuous air/fuel control	
c is plant parameter for dead time for lambda control	
)	
)	
)	
LSU sensor upstream to catalyst ready for operation	=TRUE
(
lambda sensor 1 temperature, bank 1	>655(°C)
)	
Lambda control disabled by a fault	=FALSE
lambda control is active since warmup is finished	=TRUE
Relative air charge	>0(%)
for time	>2(s)
)	

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HEM condition to block lambda closed loop control upstream catalyst	=FALSE
Lambda control active due to GDI mode change	=TRUE
(GDI mode homogeneous for time	=TRUE >0.8(s)
)	
(Lambda control enabled for Cold operation sensor 2 bank 1	=TRUE
OR	
HEGO sensor 2 bank 1, signal valid	=TRUE
(Status of heating enable conditions for the sensor operating readiness	=TRUE
(Protective heating is finished	
for time	>25(s)
OR	
Internal resistance OK for operating readiness	=TRUE
/	
Unfiltered internal resistance of HEGO sensor	<2000(0hm)
Protective heating is finished	
Counter for valid internal resistance measurements	>3(counts)
)	
)	
Status of sensor signal enable conditions for the sensor operating readiness	=TRUE
/	
Internal resistance OK for operating readiness	=TRUE
OR	
(
(	>0.552(V)
Output voltage of HEGO Sensor	
Output voltage of HEGO Sensor	<1.201(V)
)	
OR	
Output voltage of HEGO Sensor	<0.322(V)

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```

)
OR
Sensor voltage stuck in countervoltage band =TRUE
(
(
(
Output voltage of HEGO Sensor <0.552(V)
Output voltage of HEGO Sensor >0.322(V)
)
)
(
Sensor open circuit fault existed in previous trip
OR
Sensor open circuit fault currently not detected =TRUE
)
Electrical diagnostics enabled =TRUE
)
for time >20(s)
)
)
for time >0.2(s)
)
)
)
Bit p-part system balanced primary control enable =TRUE
(
(
Lambda setpoint for sensor is set equal to 1 =TRUE
OR
Lambda setpoint for sensor is set equal to 1 =FALSE
for time >10(s)
)
Rich catalyst purge =FALSE
Mass flow of exhaust gas, sensor 2 >0(g)
)
P-part active from temperature and dynamic diagnosis =TRUE
(
Temperature of catalyst 1 >250(°C)
Temperature of catalyst 1 <900(°C)
)

```

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Bit I-part global primary control enable	=TRUE
(
(
Current lowpass value of I-part load primary control enable	>-1(%)
Current lowpass value of I-part load primary control enable	<1(%)
)	
Diagnosis of canister purge system is active	=FALSE
Maximum value among the engine coolant temperature and model-based substitute value for engine temperature signal in case of error	>35(°C)
(
Bit I-part global load and engine speed control enable	=TRUE
(
Engine speed with low resolution	<5000(rpm)
Engine speed with low resolution	>1320(rpm)
(
Relative air mass	<99.8(%)
Relative air mass (see Look-Up-Table #99)	>15.8 to 39.8(%)
)	
)	
)	
)	
)	
(
Bit i-part system primary control enable	=TRUE
(
Current integrator value of P-part balanced primary control enable (see Look-Up-Table #98)	>200 to 300(g)
(
(
Dew point end of sensor 2 Bank1 is reached	=TRUE
End of start is reached	=TRUE
Exhaust gas mass flow sensor 2 Bank 1	>199.82(g)
)	
OR	
(
(
Dew point end of sensor 2 reached	=FALSE

--

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End of start is reached	=FALSE
)	
Exhaust gas mass flow sensor 2 (see Look-Up-Table #97)	>219.73 to 320(g)
)	
)	
)	
Bit i-part system temperature primary control enable	=TRUE
(
Temperature of catalyst 1	>350(°C)
Temperature of catalyst 1	<900(°C)
)	
)	
)	
Cumulated time in which slow offset adaptation was active	>0(s)
)	
Debounce condition for fault confirmation by fast offset adaptation (sensor 1, bank 1)	=TRUE
General enabling condition of fast offset adaptation	
(
Enabling condition of fast offset adaptation due to catalyst conditioning	=TRUE
(
(
Bit signal valid, HEGO sensor 2 bank 1	=TRUE
Flag lambda setpoint for sensor equal to 1	=TRUE
Rich catalyst purge	=FALSE
Bank-independent disabling conditions of fast offset adaptation	=FALSE
(
Fuel cut-off	=TRUE
Mass flow exhaust gas catalyst 1	>50(g)
)	
OR	
(
Fuel cut-off	=FALSE
Mass flow exhaust gas catalyst 1	>50(g)
)	
)	
(
(

Parallelization done at least once from LSU plausibility diagnosis point of view (sensor 1, bank 1)	=TRUE
(
(
Target sensor voltage for rich during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oil gas mass flow by active lambda shifting minus the maximal possible influence of LSU offset part, segment 1, bank 1	>1.8(g)
for time	>1(s)
)	
OR	
(
Lean target sensor voltage during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oxygen mass flow in catalyst 1, deduct from maximum present LSU Offset in a fault free system	>1.6(g)
for time	>1(s)
)	
)	
OR	
Dynamic diagnosis error of upstream exhaust gas sensor is not set	=TRUE
)	
OR	
(
(
lambda control is set when lambda controller reaches lower limit FRMIN	=TRUE
Lambda actual value sensor 1 bank 1	<1
Output voltage of HEGO sensor 2 bank 1	<0.4
)	
OR	
(
lambda control is set when lambda controller reaches lower limit FRMAX	=TRUE
Lambda actual value sensor 1 bank 1	
Output voltage of HEGO sensor 2 bank 1	
)	
for time	>2(s)
Condition for Lambda closed loop	=TRUE

)	
for time	>2(s)
)	
(
(
Temperature of catalyst 1	>400(°C)
Temperature of catalyst 1	<800(°C)
)	
for time	=0(s)
)	
(
(
Mass flow exhaust gas catalyst 1	>5.56(g/s)
Mass flow exhaust gas catalyst 1	<33.33(g/s)
)	
OR	
(
(
Mass flow exhaust gas catalyst 1	>5.56(g/s)
Mass flow exhaust gas catalyst 1	<33.33(g/s)
)	
for time	>0(s)
)	
)	
Condition for upstream cat LSU ready for operation f(lamsons_w)	=TRUE
(
Sensor type sensor 1 bank 1	>0
Lambda signal quality sensor 1 bank 1	<12
)	
Hydrogen-correction-voltage, HEGO sensor 2 bank 1 with high resolution	<80(V)
(
CAT damage during past interval	=FALSE
)	
Mass flow of exhaust gas catalyst 1	≥100(g)
Difference between Lambda offset (sensor 1, bank 1) and Lambda offset (delayed by one calculation raster)	<0.0029907
(
Counter for no step in offset or time between offset for a given	>2(counts)

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OR
Counter for exhaust masses to
debounce fault with fast offset
adaptation
)
)
)
)
)
No pending or confirmed DTCs =see sheet inhibit table

Basic enable conditions met =see sheet enable
tables

P2198	Plausibility check of upstream exhaust gas sensor when the lambda offset is lesser than the calibrated threshold	upstream Lambda offset of upstream exhaust gas sensor, bank 2	<-0.07	Debounce condition for fault confirmation by offset adaptation (sensor 1, bank 2)	=TRUE	0.1(s)	2 Trip
				(Debouncing of offset fault by slow offset adaptation, bank 2	=TRUE		
				(Slow offset adaptation, bank 2	=TRUE		
				(Bit p-part controlability primary control enable 2	=TRUE		
				((Lambda regulator setpoint active, bank 2	=TRUE		
				((Lambda closed loop control (upstream catalyst), bank 2	=TRUE		
				OR (Lambda setpoint for sensor after addition of trim control action, bank 2	=TRUE		
				is not equal to 0			
				Difference between upper limit action value lambda control and temporary value before test for enrichment protection, bank 2	>0		

Difference between temporary value before test for enleanment protection, bank 2 and lower bound of dfr during enleanmant protection	>0
Lambda (measured and setpoint) is below minimal measurable lambda (bank 2)	=FALSE
TEMIN-limitation active, bench 2	=FALSE
)	
)	
)	
Current lowpass value of p-part control upstream primary control enable 2	>0(%)
Lambda closed loop control (upstream catalyst), bank 2	=TRUE
{	
Lambda control disabled during or after cylinder cut-off, bank 2	=FALSE
Lambda swtiched ON after fuel cutoff, bank 2	=TRUE
{	
Fuel cut off is active, bank 2	=FALSE
{	
Time running down after fuel cut-off for enabling lambda control	>8(s)
OR	
{	
Absolute value of control difference in lambda, bank 2	<0.2002
Difference of counter time and plant time constant	>0(s)
$a-(b+c)$	
where a is Time running down after fuel cut-off for enabling lambda control	
b is plant time constant for continuous air/fuel control, bank 2	
c is plant parameter for dead time for lambda control, bank 2	
)	
)	
)	
LSU sensor upstream to catalyst ready for operation, bank 2	=TRUE
{	
lambda sensor 1 temperature, bank 2	>655(°C)
)	
Lambda control disabled by a fault, bank 2	=FALSE
lambda control is active since	=TRUE

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Relative air charge	>0(%)
for time	>2(s)
)	
HEM condition to block lambda	=FALSE
closed loop control upstream	
catalyst, bank 2	
Lambda control active due to GDI	=TRUE
mode change	
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
(
Lambda control enabled for Cold	=TRUE
operation sensor 2 bank 2	
OR	
HEGO sensor 2 bank 2, signal valid	=TRUE
(
Status of heating enable conditions	=TRUE
for the sensor operating readiness	
(
Protective heating is finished, bank 2	
for time	>25(s)
OR	
Internal resistance OK for operating	=TRUE
readiness, bank 2	
/	
Unfiltered internal resistance of	<2000(0hm)
HEGO sensor, bank 2	
Protective heating is finished, bank 2	
Counter for valid internal resistance	>3(counts)
measurements, bank 2	
)	
)	
Status of sensor signal enable	=TRUE
conditions for the sensor operating	
readiness, bank 2	
\	
Internal resistance OK for operating	=TRUE
readiness	
OR	
(
(
Output voltage of HEGO Sensor,	>0.552(V)
bank 2	
Output voltae of HEGO Sensor, bank	<1.201(V)
^	

)	
OR	
Output voltage of HEGO Sensor, bank 2	<0.322(V)
)	
OR	
Sensor voltage stuck in countervoltage band	=TRUE
(
(
(
Output voltage of HEGO Sensor, bank 2	<0.552(V)
Output voltage of HEGO Sensor, bank 2	>0.322(V)
)	
(
Sensor open circuit fault existed in previous trip	=TRUE
OR	
Sensor open circuit fault currently not detected	=TRUE
)	
Electrical diagnostics enabled, bank 2	=TRUE
)	
for time	>20(s)
)	
)	
for time	>0.2(s)
)	
)	
Bit p-part system balanced primary control enable 2	=TRUE
(
(
Lambda setpoint for sensor is set equal to 1, bank 2	=TRUE
OR	
Lambda setpoint for sensor is set equal to 1, bank 2	=FALSE
for time	>10(s)
)	
Rich catalyst purge, bank 2	=FALSE
Mass flow of exhaust gas, sensor 1, bank 2	>0(g)

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P-part active from temperature and dynamic diagnosis, bank 2	=TRUE
(
Temperature of catalyst 1 bank 2	>250(°C)
Temperature of catalyst 1, bank 2	<900(°C)
)	
)	
Bit I-part global primary control enable	=TRUE
(
(
Current lowpass value of I-part load primary control enable	>-1(%)
Current lowpass value of I-part load primary control enable	<1(%)
)	
Diagnosis of canister purge system is active	=FALSE
Maximum value among the engine coolant temperature and model-based substitute value for engine temperature signal in case of error	>35(°C)
(
Bit I-part global load and engine speed control enable	=TRUE
(
Engine speed with low resolution	<5000(rpm)
Engine speed with low resolution	>1320(rpm)
(
Relative air mass	<99.8(%)
Relative air mass (see Look-Up-Table #99)	>15.8 to 39.8(%)
)	
)	
)	
)	
)	
(
Bit i-part system primary control enable, bank 2	=TRUE
(
Current integrator value of P-part balanced primary control enable (see Look-Up-Table #98)	>200 to 300(g)
(
(
Dew point end of sensor 1 Bank 2 is reached	=TRUE
End of start is reached	=TRUE

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Exhaust gas mass flow sensor 1 Bank 2	>199.82(g)
)	
OR	
(
(
Dew point end of sensor 2 reached, bank 2	=FALSE
OR	
End of start is reached	=FALSE
)	
Exhaust gas mass flow sensor 2 (see Look-Up-Table #97)	>219.73 to 320(g)
)	
)	
)	
Bit i-part system temperature primary control enable, bank 2	=TRUE
(
Temperature of catalyst 1 bank 2	>350(°C)
Temperature of catalyst 1, bank 2	<900(°C)
)	
)	
)	
Cumulated time in which slow offset adaptation was active, bank 2	>0(s)
)	
Debounce condition for fault confirmation by fast offset adaptation (sensor 1, bank 2)	=TRUE
General enabling condition of fast offset adaptation, bank 2	
(
Enabling condition of fast offset adaptation due to catalyst conditioning, bank 2	=TRUE
(
(
Bit signal valid, HEGO sensor 2 bank 2	=TRUE
Flag lambda setpoint for sensor equal to 1, bank 2	=TRUE
Rich catalyst purge, bank 2	=FALSE
Bank-independent disabling conditions of fast offset adaptation	=FALSE
(
Fuel cut-off, bank	=TRUE
Mass flow exhaust gas catalyst 1, bank 2	>50(g)

)	
OR	
(
Fuel cut-off	=FALSE
Mass flow exhaust gas catalyst 1, bank 2	>50(9)
)	
)	
(
(
Parallelization done at least once from LSU plausibility diagnosis point of view (sensor 1, bank 2)	=TRUE
(
(
Target sensor voltage for rich during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oil gas mass flow by active lambda shifting minus the maximal possible influence of LSU offset part, segment 1, bank 2	>1.8(g)
for time	>1(s)
)	
OR	
(
Lean target sensor voltage during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oxygen mass flow in catalyst 1, deduct from maximum present LSU Offset in a fault free system, bank 2	>1.6(g)
for time	>1(s)
)	
)	
OR	
Dynamic diagnosis error of upstream exhaust gas sensor is not set	=TRUE
)	
OR	
(
(
lambda control is set when lambda controller reaches lower limit FRMIN, bank 2	=TRUE
Lambda actual value sensor 1 bank 2	<1
Output voltage of HEGO sensor 2 bank 2	<0.4(v)
)	
OR	
,	

lambda control is set when lambda controller reaches lower limit FRMAX, bank 2	=TRUE
Lambda actual value sensor 1 bank 2	
Output voltage of HEGO sensor 2 bank 2	
)	
for time	>2(s)
Condition for Lambda closed loop control upstream catalyst; bank 2	=TRUE
)	
for time	>2(s)
)	
(
(
Temperature of catalyst 1, bank 2	>400(°C)
Temperature of catalyst 1, bank 2	<800(°C)
)	
for time	=0(s)
)	
(
(
Mass flow exhaust gas catalyst 1, bank 2	>5.56(g/s)
Mass flow exhaust gas catalyst 1, bank 2	<33.33(g/s)
)	
OR	
(
(
Mass flow exhaust gas catalyst 1, bank 2	>5.56(g/s)
Mass flow exhaust gas catalyst 1, bank 2	<33.33(g/s)
)	
for time	>0(s)
)	
)	
Condition for upstream cat LSU ready for operation f(lamsons_w), bank 2	=TRUE
(
Sensor type sensor 1 bank 2	>0
Lambda signal quality sensor 1 bank 2	<12
)	
Hydrogen-correction-voltage, HEGO sensor 2 bank 2 with high resolution	<80(V)

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CAT damage during past interval	=FALSE
)	
Mass flow of exhaust gas catalyst 1 bank 2	>100(g)
Difference between Lambda offset (sensor 1, bank 2) and Lambda offset (delayed by one calculation raster)	<0.0029907
(
Counter for no step in offset or increasing offset in a row, bank 2	S2(counts)
OR	
Counter for exhaust masses to debounce fault with fast offset adaptation, bank 2	S6(counts)
)	
)	
)	
)	
)	
No pending or confirmed DTCs	=see sheet inhibit table

Basic enable conditions met	=see sheet enable tables
-----------------------------	--------------------------

P2197	Plausibility check of upstream exhaust gas sensor when the lambda offset is greater than the calibrated threshold	upstream exhaust gas sensor, bank 2	Lambda offset of upstream exhaust gas sensor, bank 2	>0.070007	Debounce condition for fault confirmation by offset adaptation (sensor 1, bank 2)	=TRUE	0.1(s)	2 Trip
					(
					Debouncing of offset fault by slow offset adaptation, bank 2	=TRUE		
					(
					Slow offset adaptation, bank 2	=TRUE		
					(
					Bit p-part controlability primary control enable 2	=TRUE		
					(
					(
					Lambda regulator setpoint active, bank 2	=TRUE		
					(

(Lambda closed loop control (upstream catalyst), bank 2 OR	=TRUE
(Lambda setpoint for sensor after addition of trim control action, bank 2 is not equal to 0	=TRUE
Difference between upper limit action value lambda control and temporary value before test for enrichment protection, bank 2	>0
Difference between temporary value before test for enrichment protection, bank 2 and lower bound of dfir during enrichment protection	>0
Lambda (measured and setpoint) is below minimal measurable lambda (bank 2)	=FALSE
TEMIN-limitation active, bench 2	=FALSE
)	
)	
)	
Current lowpass value of p-part control upstream primary control enable 2	>0(%)
Lambda closed loop control (upstream catalyst), bank 2	=TRUE
(Lambda control disabled during or after cylinder cut-off, bank 2	=FALSE
Lambda switched ON after fuel cutoff, bank 2	=TRUE
(Fuel cut off is active, bank 2	=FALSE
(Time running down after fuel cut-off for enabling lambda control OR	>3(8)
(Absolute value of control difference in lambda, bank 2	<0.2002
Difference of counter time and plant time constant a-(b+c) where a is Time running down after fuel cut-off for enabling lambda control b is plant time constant for continuous air/fuel control, bank 2 c is plant parameter for dead time for lambda control, bank 2	>0(s)

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)	
)	
LSU sensor upstream to catalyst ready for operation, bank 2	=TRUE
(
lambda sensor 1 temperature, bank 2	>655(°C)
)	
Lambda control disabled by a fault, bank 2	=FALSE
lambda control is active since warmup is finished	=TRUE
Relative air charge	>0(%)
for time	>2(s)
)	
HEM condition to block lambda closed loop control upstream catalyst, bank 2	=FALSE
Lambda control active due to GDI mode change	=TRUE
(
GDI mode homogeneous	=TRUE
for time	>0.8(s)
)	
)	
(
Lambda control enabled for Cold operation sensor 2 bank 2	=TRUE
OR	
HEGO sensor 2 bank 2, signal valid	=TRUE
(
Status of heating enable conditions for the sensor operating readiness	=TRUE
(
Protective heating is finished, bank 2	
for time	>25(s)
OR	
Internal resistance OK for operating readiness, bank 2	=TRUE
(
Unfiltered internal resistance of HEGO sensor, bank 2	<2000(0hm)
Protective heating is finished, bank 2	
Counter for valid internal resistance measurements, bank 2	>3(counts)
)	
)	

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Status of sensor signal enable conditions for the sensor operating readiness, bank 2	=TRUE
Internal resistance OK for operating readiness	=TRUE
OR	
(
(
Output voltage of HEGO Sensor, bank 2	>0.552(V)
Output voltage of HEGO Sensor, bank 2	<1.201(V)
)	
)	
OR	
Output voltage of HEGO Sensor, bank 2	<0.322(V)
)	
OR	
Sensor voltage stuck in countervoltage band	=TRUE
{	
(
Output voltage of HEGO Sensor, bank 2	<0.552(V)
Output voltage of HEGO Sensor, bank 2	>0.322(V)
)	
(
Sensor open circuit fault existed in previous trip	=TRUE
OR	
Sensor open circuit fault currently not detected	=TRUE
)	
Electrical diagnostics enabled, bank 2	=TRUE
)	
for time	>20(s)
)	
)	
for time	>0.2(s)
)	
)	
Bit p-part system balanced primary control enable 2	=TRUE

(
Lambda setpoint for sensor is set equal to 1, bank 2	=TRUE
OR	
Lambda setpoint for sensor is set equal to 1, bank 2	=FALSE
for time	>10(s)
)	
Rich catalyst purge, bank 2	=FALSE
Mass flow of exhaust gas, sensor 1, bank 2	>0(g)
)	
P-part active from temperature and dynamic diagnosis, bank 2	=TRUE
(
Temperature of catalyst 1	>250(°C)
Temperature of catalyst 1, bank 2	<900(°C)
)	
)	
Bit I-part global primary control enable	=TRUE
(
(
Current lowpass value of I-part load primary control enable	>-1(%)
Current lowpass value of I-part load primary control enable	<1(%)
)	
Diagnosis of canister purge system is active	=FALSE
Maximum value among the engine coolant temperature and model-based substitute value for engine temperature signal in case of error	>35(°C)
(
Bit I-part global load and engine speed control enable	=TRUE
(
Engine speed with low resolution	<5000(rpm)
Engine speed with low resolution	>1320(rpm)
(
Relative air mass	<99.8(%)
Relative air mass (see Look-Up-Table #99)	>15.8 to 39.8(%)
)	
)	
)	
)	
)	
(

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Bit i-part system primary control enable, bank 2	=TRUE
(
Current integrator value of P-part balanced primary control enable (see Look-Up-Table #98)	>200 to 300(g)
(
(
Dew point end of sensor 1 Bank 2 is reached	=TRUE
End of start is reached	=TRUE
Exhaust gas mass flow sensor 1 Bank 2	>199.82(g)
)	
OR	
(
(
Dew point end of sensor 2 reached, bank 2	=FALSE
OR	
End of start is reached	=FALSE
)	
Exhaust gas mass flow sensor 2 (see Look-Up-Table #97)	>219.73 to 320(g)
)	
)	
)	
Bit i-part system temperature primary control enable, bank 2	=TRUE
(
Temperature of catalyst 1 bank 2	>350(°C)
Temperature of catalyst 1, bank 2	<900(°C)
)	
)	
)	
Cumulated time in which slow offset adaptation was active, bank 2	>0(s)
)	
Debounce condition for fault confirmation by fast offset adaptation (sensor 1, bank 2)	=TRUE
General enabling condition of fast offset adaptation, bank 2	
(
Enabling condition of fast offset adaptation due to catalyst conditioning, bank 2	=TRUE
(
(

Bit signal valid, HEGO sensor 2 bank 2	=TRUE
Flag lambda setpoint for sensor equal to 1, bank 2	=TRUE
Rich catalyst purge, bank 2	=FALSE
Bank-independent disabling conditions of fast offset adaptation	=FALSE
(Fuel cut-off, bank 2	=TRUE
Mass flow exhaust gas catalyst 1, bank 2	> 50(g)
)	
OR	
(Fuel cut-off	=FALSE
Mass flow exhaust gas catalyst 1, bank 2	> 50(g)
)	
)	
(
(Parallelization done at least once from LSU plausibility diagnosis point of view (sensor 1, bank 2)	=TRUE
(
(Target sensor voltage for rich during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oil gas mass flow by active lambda shifting minus the maximal possible influence of LSU offset part, segment 1, bank 2	>1.8(g)
for time	>1(s)
)	
OR	
(Lean target sensor voltage during active parallelisation reached once, sensor 1, bank 2	=TRUE
Oxygen mass flow in catalyst 1, deduct from maximum present LSU Offset in a fault free system, bank 2	>1.6(g)
for time	>1(s)
)	
)	
OR	
Dynamic diagnosis error of upstream exhaust gas sensor is not set	=TRUE
)	
OR	

(
(
lambda control is set when lambda controller reaches lower limit FRMIN, bank 2	=TRUE
Lambda actual value sensor 1 bank 2	<1
Output voltage of HEGO sensor 2 bank 2	<0.4(V)
)	
OR	
(
lambda control is set when lambda controller reaches lower limit FRMAX, bank 2	=TRUE
Lambda actual value sensor 1 bank 2	
Output voltage of HEGO sensor 2 bank 2	
)	
for time	>2(s)
Condition for Lambda closed loop control upstream catalyst; bank 2	=TRUE
)	
for time	>2(s)
)	
(
(
Temperature of catalyst 1, bank 2	>400(°C)
Temperature of catalyst 1, bank 2	<800(°C)
)	
for time	=0(s)
)	
(
Mass flow exhaust gas catalyst 1, bank 2	>5.56(g/s)
Mass flow exhaust gas catalyst 1, bank 2	<33.33(g/s)
)	
OR	
(
Mass flow exhaust gas catalyst 1, bank 2	>5.56(g/s)
Mass flow exhaust gas catalyst 1, bank 2	<33.33(g/s)
)	
for time	>0(s)
)	
,	

				Condition for upstream cat LSU ready for operation f(lamsons_w), bank 2	=TRUE		
				Sensor type sensor 1 bank 2	>0		
				Lambda signal quality sensor 1 bank 2	<12		
				Hydrogen-correction-voltage, HEGO sensor 2 bank 2 with high resolution	<80(V)		
				CAT damage during past interval	=FALSE		
				Mass flow of exhaust gas catalyst 1	≥100(g)		
				Difference between Lambda offset (sensor 1, bank 2) and Lambda offset (delayed by one calculation raster)	<0.0029907		
				Counter for no step in offset or increasing offset in a row, bank 2	>2(counts)		
				OR			
				Counter for exhaust masses to debounce fault with fast offset adaptation, bank 2	>6(counts)		
				No pending or confirmed DTCs	=see sheet inhibit table		
				Basic enable conditions met	=see sheet enable tables		
17. DIAGNOSIS OF OXYGEN SENSORS	P2297	Air fuel ratio signal check for oxygen sensor 1 bank 1	Lambda equivalent value based on electrically corrected pump current sensor 1 bank 1	>12	UEGO Release condition for O2 signal is fulfilled under following condition for sensor1 bank1 :	=TRUE	10(s) 2 Trip
				Temperature of sensor 1 bank 1	>655(°C)		

				(
				Calculation of reverse charge sensor 1 bank 1	=TRUE		
				Condition for pump current calculation in sync started	=TRUE		
				Reference pump current for pump current correction status	=TRUE		
				Valid status of correction	=TRUE		
				for time	=0.5(s)		
				/			
				Validity of Reverse Pump Current Mode Sensor 1 Bank 1	=FALSCH		
				(
				Condition for evaluation temperature valid sensor 1 bank 1	=TRUE		
				for time	=1(s)		
)			
				Condition of UNO for sensor 1 and bank 1 regulated	=TRUE		
)			
				Injection valves are activated	=TRUE		
				End of start is reached and combustion engine runs on its own power	=TRUE		
				Required lambda referring to lambda sensor fitting location	<1.6		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P2298	Air fuel ratio signal check for oxygen sensor 1 bank 2	Lambda equivalent value based on electrically corrected pump current sensor 1 bank 2	>12	UEGO Release condition for O2 signal is fulfilled under following condition for sensor 1 bank 2 :	=TRUE	10(s)	2 Trip
				(
				Temperature of ceramic Sensor 1.Bank 2	>655(°C)		
				(
				Calculation of reverse charge sensor 1 bank 2	=TRUE		
				Condition for pump current calculation in sync started	=TRUE		
				Reference pump current for pump current correction status	=TRUE		

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				Valid status of correction	=TRUE			
				for time	=0.5(s)			
)				
				Validity of Reverse Pump Current Mode Sensor 1 Bank 2	=FALSCH			
				(
				Condition for evaluation temperature valid sensor 1 bank 2	=TRUE			
				for time	=1(s)			
)				
				Condition of UNO for sensor 1 and bank 2 regulated	=TRUE			
)				
				Injection valves are activated	=TRUE			
				End of start is reached and combustion engine runs on its own power	=TRUE			
				Required lambda referring to lambda sensor fitting location	<1.6			
				No pending or confirmed DTCs	=see sheet inhibit tables			
				Basic enable conditions met	=see sheet enable tables			
18. DOWNSTREAM OXYGEN SENSOR SLOW RESPONSE DIAGNOSIS	P013A	Compares measured transition response time of Secondary 02 sensor 2 bank 1 with the calibrated threshold when the sensor voltage changes Rich	arithmetic filtered delay	>0.75(s)	primary A/F commanded lambda	=1	2(counts)	1Trip
			response time of Secondary 02 sensor 2, bank 1, Rich to Lean: tiArth					EWMA
			tiArth = old tiArth + (((a) - (b)) - old tiArth) * 1/ sample order)		engine runs	=True		
			(a) Raw transition response time of secondary 02 S2B1 Rich to Lean		Vehicle speed	>6.25(mph)		
			(b) Exhaust mass flow dependent correction for transition response time of secondary 02 S2B1 Rich to Lean (see Look-Up-Table #25)	=0.04 to 0.1(s)	engine speed	<4000(rpm)		
					engine speed	>1000(rpm)		
					engine load (see Look-Up-Table #20)	> 13.00 to 1536(%)		
					Integrated air mass flow	>600(g)		
					measured ambient temperature	>-48(°C)		
					measured ambient pressure	>0(kPa)		

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measured engine coolant temperature	>57.96(°C)
no transmission gear change for time	=True >2(s)
)	
(
integrated exhaust gas mass flow after the following operation points are in the monitoring window Bank 2	>600(g)
(
Change of exhaust gas mass flow Bank 2:	<11.11(g/s)
(a) - (b)	
Change of exhaust gas mass flow Bank 2:	>-11.11(g/s)
(a) - (b)	
(a) exhaust gas mass flow Bank 2	
(b) filtered exhaust gas mass flow Bank 2	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow Bank 2	<111.11(g/s)
Low window exhaust gas mass flow Bank 2	>5.56(g/s)
Low window exhaust gas mass flow bank 1	>(a)-(b)
(a) minimum exhaust gas mass flow bank 1	<5.56(g/s)
(b) offset exhaust gas mass flow bank 1 at tip-out	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 1	<0(g/s)
High window exhaust gas mass flow bank 1	>1820.42(g/s)
)	
(
Modeled catalyst temperature gradient bank 1:	<40(°C)
(a) - (b)	
Modeled catalyst temperature gradient bank 1:	>-40(°C)
(a) - (b)	

(a) Modeled catalyst temperature bank 1	
(b) filtered modeled catalyst temperature bank 1	=5(s)
PT1 time constant	
Low window modeled catalyst temperature bank 1	<1000(°C)
Low window Modeled catalyst temperature bank 1	>475(°C)
High window modeled catalyst temperature bank 1	<-273(°C)
High window Modeled catalyst temperature bank 1	>1263(°C)
Modeled catalyst temperature bank 1 after the first engine start and driving	>350(°C)
for time	>60(s)
)	
((
Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control	
(b) fuel mass supplied by injection	
Or	
open loop canister purge control	
Or	
canister purge control mass flow into the manifold	<7.11(g/s)
((
integrated exhaust gas mass flow bank 1 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 1 after the following sensors's readiness	>100(g)
(
Secondary O2 sensor readiness bank 1	
Primary A/F sensor readiness bank 1	
)	

	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 1: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control (b) measured primary A/F sensor temperature for heater control)	<800(°C)
statemachine = sm statemachine (sm =0) : inactive a commanded lambda active primary A/F commanded lambda if the following conditions are met, sm moves to sm =2	=1
Secondary 02 sensor voltage bankl	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage bankl	<0(V)
Secondary 02 sensor voltage bankl	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst a commanded lambda active primary A/F commanded lambda bankl for time	=0.87 >3(s)
for time if the following conditions are met, sm moves to sm =2 ((	>0.1(s)
Secondary 02 sensor voltage gradient over 0.05s	>0.0994(V/s)
Secondary 02 sensor voltage bankl	>0.68(V)
) Or	
Secondary 02 sensor voltage bankl	>0(V)
) Integrated exhaust mass flow bank 1	*0(g)

**if the following conditions are met,
sm moves to sm =3**

(
Secondary 02 sensor voltage bank 1 >0.86(V)

Or

(
Secondary 02 sensor voltage bank 1 >0.76(V)

Secondary 02 sensor voltage
gradient over 0.05s <66.5(V/s)

Secondary 02 sensor voltage
gradient over 0.05s >-66.5(V/s)

Integrated Oxygen mass flow bank 1 >0-2(g)

))

(
Primary A/F sensor lambda bank 1
(a) Primary lambda control set point
bank 1

(b) maximum lambda deviation of
lean mixture =0.05

Primary A/F sensor lambda bank 1
(a) Primary lambda control set point

(b) maximum lambda deviation of rich
mixture <0.05

for time >0.1(s)

Integrated rich exhaust gas mass
flow bank 1 ≥5(g)

)

And

(
Secondary 02 sensor voltage bank 1 >(a) + (b)

(a) minimum secondary 02 voltage

(b) Offset voltage of Secondary 02
sensor =0.019531 (V)

)

**statemachine (sm=2) -
Lean mixture in catalyst**

a commanded lambda active
primary A/F commanded lambda
for time =1.07
>3(s)

for time >0.1(s)

**if the following conditions are met,
sm moves to sm =4**

((

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Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage	<0.09944(V/s)
gradient over 0.05s	
Secondary 02 sensor voltage	>-0.09944(V/s)
gradient over 0.05s	
Integrated Oxygen mass flow bank 1	>0.15(g)
))	
(
Primary A/F sensor lambda	
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
statemachine (sm=3) - Lean mixture in catalyst	= True
a commanded lambda active bank 1	=True
primary A/F commanded lambda bank 1	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
(
Secondary 02 sensor voltage bank 1	<0.200195(V)
Secondary 02 sensor voltage	<0.09944(V/s)
gradient over 0.05s	

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Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
)	
{	
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
(
Secondary 02 sensor voltage difference: (a) - (b)	<0.015(V)
(a) old Secondary 02 sensor voltage bank 1	
(b) Secondary 02 sensor voltage bank 1	
Secondary 02 sensor voltage bank 1	<0.202637(V)
)	
statemachine (sm=4) -	=TRUE
Rich mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 1	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(g)

``

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(
 Primary A/F sensor lambda bank 1 <(a) + (b)
 (a) Primary lambda control set point
 bank 1
 (b) maximum lambda deviation of
 lean mixture =0.05
 Primary A/F sensor lambda bank 1 >(a) - (b)
 (a) Primary lambda control set point

 (b) maximum lambda deviation of rich
 mixture <0.05
 for time >0.1 (s)
 Integrated rich exhaust gas mass
 flow bank 1 ≤5(g)
)
 And
 (

 No pending or confirmed DTCs =see sheet inhibit table

Basic enable conditions met =see sheet enable
 tables

P013B	Compares measured transition response time of Secondary 02 sensor 2 bank 1 with the calibrated threshold when the sensor voltage changes Lean	arithmetic filtered delay response time of Secondary 02 sensor 2, bank 1, Lean to Rich: tiArth	>0(s)	primary A/F commanded lambda	=1	2(counts)	1Trip EWMA
		tiArth = old tiArth + (((a) - (b)) - old tiArth) * 1/ sample order)		engine runs	=True		
		(a) Raw transition response time of secondary 02 S2B1 Lean to Rich		Vehicle speed	>6.25(mph)		
		(b) Exhaust mass flow dependent correction for transition response time of secondary 02 S2B1 Lean to Rich (see Look-Up-Table #24)	=0.03 to 0.08(s)	engine speed	<4000(rpm)		
				engine speed engine load (see Look-Up-Table #20)	>1000(rpm) > 13.00 to 1536(%)		
				Integrated air mass flow	>60(g)		
				measured ambient temperature measured ambient pressure	>-48(°C) >0(kPa)		

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measured engine coolant temperature	>57.96(°C)
no transmission gear change for time	=True >2(s)
)	
(
integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 1	>60(g)
(
Change of exhaust gas mass flow bank 1:	<11.11(g/s)
(a) - (b)	
Change of exhaust gas mass flow bank 1:	>-11.11(g/s)
(a) - (b)	
(a) exhaust gas mass flow bank 1	
(b) filtered exhaust gas mass flow bank 1	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 1	<111.11(g/s)
Low window exhaust gas mass flow bank 1	>5.56(g/s)
Low window exhaust gas mass flow bank 1	>(a)-(b)
(a) minimum exhaust gas mass flow bank 1	<5.56(g/s)
(b) offset exhaust gas mass flow bank 1 at tip-out	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 1	<0(g/s)
High window exhaust gas mass flow bank 1	>1820.44(g/s)
)	
(
Modeled catalyst temperature gradient bank 1:	<40(°C)
(a) - (b)	
Modeled catalyst temperature gradient bank 1:	>-40(°C)
(a) - (b)	

(a) Modeled catalyst temperature bank 1	
(b) filtered modeled catalyst temperature bank 1	=4.999(s)
PT1 time constant	
Low window modeled catalyst temperature bank 1	<1000(°C)
Low window Modeled catalyst temperature bank 1	>475(°C)
High window modeled catalyst temperature bank 1	<-273(°C)
High window Modeled catalyst temperature bank 1	>1263(°C)
Modeled catalyst temperature bank 1 after the first engine start and driving	>350(°C)
for time	>60(s)
)	
((
Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control	
(b) fuel mass supplied by injection	
Or	
open loop canister purge control	
Or	
canister purge control mass flow into the manifold	<7.11(g/s)
((
integrated exhaust gas mass flow bank 1 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 1 after the following sensors's readiness	>100(g)
(
Secondary O2 sensor readiness bank 1	
Primary A/F sensor readiness bank 1	
)	

	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 1: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control (b) measured primary A/F sensor temperature for heater control)	<800(°C)
statemachine = sm statemachine (sm =0) : inactive a commanded lambda active primary A/F commanded lambda if the following conditions are met, sm moves to sm =2	=False =1
Secondary 02 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage bank1	<0(V)
Secondary 02 sensor voltage bank1	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active primary A/F commanded lambda bank1 for time	=True =0.87 >3(s)
for time if the following conditions are met, sm moves to sm =2 (	>0.1(s)
Secondary 02 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary 02 sensor voltage bank1	>0.68(V)
) Or	
Secondary 02 sensor voltage bank1	>0(V)
) Integrated exhaust mass flow bank 1	≥0(g)
if the following conditions are met, sm moves to sm =3	

```

(
Secondary 02 sensor voltage bank 1      >0.86(V)

Or

(
Secondary 02 sensor voltage bank 1      >0.76(V)

Secondary 02 sensor voltage
gradient over 0.05s                     <66.5(V/s)
Secondary 02 sensor voltage
gradient over 0.05s                     >-66.5(V/s)
Integrated Oxygen mass flow bank 1      >0.2(g)

))

(
Primary A/F sensor lambda bank 1        <(a) + (b)
(a) Primary lambda control set point
bank 1
(b) maximum lambda deviation of
lean mixture                            =0.05
Primary A/F sensor lambda bank 1        >(a)-(b)
(a) Primary lambda control set point

(b) maximum lambda deviation of rich
mixture                                <0.05
for time                               >0.1(s)
Integrated rich exhaust gas mass
flow bank 1                             ≥ >(g)

)
And

(
Secondary 02 sensor voltage bank 1      >(a) + (b)

(a) minimum secondary 02 voltage

(b) Offset voltage of Secondary 02
sensor                                  =0.019531 (V)

)
statemachine (sm=2) -
Lean mixture in catalyst
a commanded lambda active                =True
primary A/F commanded lambda
for time                                 >1.07
                                           >3(s)

for time                                 >0.1(s)
if the following conditions are met,
sm moves to sm =4

((
Secondary 02 sensor voltage              <0.100098(V)

for time                                 >0.1(s)

)
~

```

```

(
Secondary 02 sensor voltage          <0.200195(V)

Secondary 02 sensor voltage
gradient over 0.05s                  <0.09944(V/s)
Secondary 02 sensor voltage
gradient over 0.05s                  >-0.09944(V/s)
Integrated Oxygen mass flow bank 1    >0.15(g)

))
(
Primary A/F sensor lambda            <(a) + (b)
(a) Primary lambda control set point

(b) maximum lambda deviation of
lean mixture                         =0.05
Primary A/F sensor lambda            >(a)-(b)
(a) Primary lambda control set point

(b) maximum lambda deviation of rich
mixture                             <0.05
for time                             >0.1(s)
Integrated lean exhaust gas mass
flow bank 1                          -5 (g)
)

statemachine (sm=3) -                = True
Lean mixture in catalyst
a commanded lambda active bank 1     =True

primary A/F commanded lambda
bank 1                               =1.07
for time                             >3(s)

for time                             >0.1(s)
if the following conditions are met,
sm moves to sm =4

(
Secondary 02 sensor voltage bank 1    <0.100098(V)

for time                             >0.1(s)
Or
(
Secondary 02 sensor voltage bank 1    <0.200195(V)

Secondary 02 sensor voltage
gradient over 0.05s                  <0.09944(V/s)
Secondary 02 sensor voltage
gradient over 0.05s                  >-0.09944(V/s)
Integrated Oxygen mass flow bank 1    >0.15(g)

))

```

Primary A/F sensor lambda bank 1 (a) Primary lambda control set point	<(a) + (b)
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1 (a) Primary lambda control set point	>(a)-(b)
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
) statemachine (sm=4) - Rich mixture in catalyst	=TRUE
a commanded lambda active	
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =3	
(Secondary 02 sensor voltage bank 1	>0.86(V)
Or (Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0-2(g)
)) (Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1 (a) Primary lambda control set point	>(a)-(b)
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 1	- ⁵ (g)
)	

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		(
		Secondary 02 sensor voltage				>0.0147(V)	
		difference: (a) - (b)					
		(a) old Secondary 02 sensor voltage					
		bank 1					
		(b) Secondary 02 sensor voltage					
		bank 1					
		Secondary 02 sensor voltage bank 1				>0.75(V)	
)					
		No pending or confirmed DTCs				=see sheet inhibit table	
		Basic enable conditions met				=see sheet enable tables	
P013C	Compares measured transition response time of Secondary 02 sensor 2 bank 2 with the calibrated threshold when the sensor voltage changes Rich	arithmetic filtered delay response time of Secondary 02 sensor 2, bank 2, Rich to Lean: tiArth	>0.75(s)	primary A/F commanded lambda	=1	2(counts)	1Trip EWMA
		tiArth = old tiArth + (((a) - (b)) - old tiArth) * 1/ sample order)		engine runs	=True		
		(a) Raw transition response time of secondary 02 S2B2 Rich to Lean		Vehicle speed	>6.25(mph)		
		(b) Exhaust mass flow dependent correction for transition response time of secondary 02 S2B2 Rich to Lean (see Look-Up-Table #25)	=0.04 to 0.1(s)	engine speed	<4000(rpm)		
				engine speed	>1000(rpm)		
				engine load (see Look-Up-Table #20)	> 13.00 to 1536(%)		
				Integrated air mass flow	>600(g)		
				measured ambient temperature	>-48(°C)		
				measured ambient pressure	>0(kPa)		
				measured engine coolant temperature	>57.96(°C)		
				no transmission gear change for time	=True		
					>2(s)		
)			
				(

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integrated exhaust gas mass flow after the following operation points are in the monitoring window Bank 2	>600(g)
(
Change of exhaust gas mass flow Bank 2:	<11.11(g/s)
(a) - (b)	
Change of exhaust gas mass flow Bank 2:	>-11.11(g/s)
(a) - (b)	
(a) exhaust gas mass flow Bank 2	
(b) filtered exhaust gas mass flow Bank 2	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow Bank 2	<111.11(g/s)
Low window exhaust gas mass flow Bank 2	>5.56(g/s)
Low window exhaust gas mass flow bank 2	>(a)-(b)
(a) minimum exhaust gas mass flow bank 2	<5.56(g/s)
(b) offset exhaust gas mass flow bank 2 at tip-out	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 2	<0(g/s)
High window exhaust gas mass flow bank 2	>1280.44(g/s)
)	
(
Modeled catalyst temperature gradient bank 2:	<40(°C)
(a) - (b)	
Modeled catalyst temperature gradient bank 2:	>-40(°C)
(a) - (b)	
(a) Modeled catalyst temperature bank 2	
(b) filtered modeled catalyst temperature bank 2	=4.999(s)
PT1 time constant	
Low window modeled catalyst	<1000(°C)
Low window Modeled catalyst	>475(°C)

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High window modeled catalyst temperature bank 2	<-273(°C)
High window Modeled catalyst temperature bank 2	>1263(°C)
Modeled catalyst temperature bank 2 after the first engine start and driving	>350(°C)
for time)	>60(s)
((Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control (b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or canister purge control mass flow into the manifold	<7.n(g/s)
((integrated exhaust gas mass flow bank 2 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 2 after the following sensors's readiness (Secondary 02 sensor readiness bank 2 Primary A/F sensor readiness bank 2)	>100(g)
	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 2: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control (b) measured primary A/F sensor temperature for heater control	<800(°C)

)	
statemachine = sm	
statemachine (sm=0) : inactive	
a commanded lambda active	
primary A/F commanded lambda	=1
if the following conditions are met, sm moves to sm =2	
Secondary 02 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage bank1	<0(V)
Secondary 02 sensor voltage bank1	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
bank1	
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =2	
((
Secondary 02 sensor voltage	>0.09944(V/s)
gradient over 0.05s	
Secondary 02 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary 02 sensor voltage bank1	>0(V)
)	
Integrated exhaust mass flow bank 2	-0(g)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 2	>0.76(V)

Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0-2(g)
))	
{	
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point bank 2	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a) - (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1 (s)
Integrated rich exhaust gas mass flow bank 2	*5(g)
)	
And	
{	
Secondary 02 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=2) - Lean mixture in catalyst	
a commanded lambda active primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
((
Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
{	
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)

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Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
{	
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	- ⁵ (g)
)	
statemachine (sm=3) - Lean mixture in catalyst	= True
a commanded lambda active bank 2	=True
primary A/F commanded lambda bank 2	=1.07
for time	>3(s)
for time	>0.1 (s)
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 2	<0.100098(V)
for time	>0.1(s)
Or	
/	
Secondary 02 sensor voltage bank 2	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
{	
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05

Primary A/F sensor lambda bank 2 (a) Primary lambda control set point	>(a)-(b)
(b) maximum lambda deviation of rich mixture for time	<0.05 >0.1(s)
Integrated lean exhaust gas mass flow bank 2	- ⁵ (g)
)	
(
Secondary 02 sensor voltage difference: (a) - (b)	<0.015(V)
(a) old Secondary 02 sensor voltage bank 2	
(b) Secondary 02 sensor voltage bank 2	
Secondary 02 sensor voltage bank 2	<0.202637(V)
)	
statemachine (sm=4) -	=True
Rich mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda for time	=0.87 >3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 2	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0.2(g)
))	
(
Primary A/F sensor lambda bank 2 (a) Primary lambda control set point bank 2	<(a) + (b)
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2 (a) Primary lambda control set point	>(a)-(b)
(b) maximum lambda deviation of rich	<0.05

Change of exhaust gas mass flow bank 2: (a) - (b)	<11.11(g/s)
Change of exhaust gas mass flow bank 2: (a) - (b)	>-11.11(g/s)
(a) exhaust gas mass flow bank 2	
(b) filtered exhaust gas mass flow bank 2	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 2	<111.11(g/s)
Low window exhaust gas mass flow bank 2	>5.56(g/s)
Low window exhaust gas mass flow bank 2	>(a)-(b)
(a) minimum exhaust gas mass flow bank 2	<5.56(g/s)
(b) offset exhaust gas mass flow bank 2 at tip-out for time	=5(g/s) >3(s)
High window exhaust gas mass flow bank 2	<0(g/s)
High window exhaust gas mass flow bank 2	>1280.44(g/s)
} Modeled catalyst temperature gradient bank 2: (a) - (b)	<40(°C)
Modeled catalyst temperature gradient bank 2: (a) - (b)	>-40(°C)
(a) Modeled catalyst temperature bank 2	
(b) filtered modeled catalyst temperature bank 2	=4.999(s)
PT1 time constant	
Low window modeled catalyst temperature bank 2	<1000(°C)
Low window Modeled catalyst temperature bank 2	>475(°C)
High window modeled catalyst temperature bank 2	<-273(°C)
High window Modeled catalyst temperature bank 2	>1263(°C)

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Modeled catalyst temperature bank 2 after the first engine start and driving	>350(°C)
for time)	>60(s)
((Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control (b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or canister purge control mass flow into the manifold	<7.n(g/s)
((integrated exhaust gas mass flow bank 2 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 2 after the following sensors's readiness (Secondary 02 sensor readiness bank 2 Primary A/F sensor readiness bank 2)	>100(g)
temperature deviation of Primary A/F sensor heater control bank 2: (a) - (b)	>450(°C)
(a) primary A/F sensor temperature set point for heater control (b) measured primary A/F sensor temperature for heater control)	<50(°C)
statemachine = sm statemachine (sm =0) : inactive	<800(°C)

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a commanded lambda active	=False
primary A/F commanded lambda	=1
if the following conditions are met, sm moves to sm =2	
Secondary 02 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage bank1	<0(V)
Secondary 02 sensor voltage bank1	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
bank1	
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =2	
((
Secondary 02 sensor voltage	>0.09944(V/s)
gradient over 0.05s	
Secondary 02 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary 02 sensor voltage bank1	>0(V)
)	
Integrated exhaust mass flow bank 2	-0(g)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 2	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
gradient over 0.05s	
Secondary 02 sensor voltage	>-66.5(V/s)
gradient over 0.05s	
Integrated Oxygen mass flow bank 2	>0.2(g)

))	
(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point bank 2	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	=0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 2	≥ >(g)
)	
(
Secondary 02 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=2) -	
Lean mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
((
Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	

(b) maximum lambda deviation of lean mixture Primary A/F sensor lambda (a) Primary lambda control set point	=0.05
(b) maximum lambda deviation of rich mixture for time Integrated lean exhaust gas mass flow bank 2)	<0.05 >0.1(s) - ⁵ (g)
statemachine (sm=3) - Lean mixture in catalyst a commanded lambda active bank 2	= True =True
primary A/F commanded lambda bank 2 for time for time if the following conditions are met, sm moves to sm =4	=1.07 >3(s) >0.1(s)
(Secondary 02 sensor voltage bank 2 for time Or (Secondary 02 sensor voltage bank 2 Secondary 02 sensor voltage gradient over 0.05s Secondary 02 sensor voltage gradient over 0.05s Integrated Oxygen mass flow bank 2)) (Primary A/F sensor lambda bank 2 (a) Primary lambda control set point	<0.100098(V) >0.1(s) <0.200195(V) <0.09944(V/s) >-0.09944(V/s) >0.15(g)
(b) maximum lambda deviation of lean mixture Primary A/F sensor lambda bank 2 (a) Primary lambda control set point	=0.05 >(a)-(b)
(b) maximum lambda deviation of rich mixture for time Integrated lean exhaust gas mass flow bank 2 ,	<0.05 >0.1(s) - ⁵ (g)

statemachine (sm=4) -	=True
Rich mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 2	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0.2(g)
))	
(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point bank 2	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 2	- ⁵ (g)
)	
(
Secondary 02 sensor voltage difference: (a) - (b)	>0.014648(V)
(a) old Secondary 02 sensor voltage bank 2	
(b) Secondary 02 sensor voltage bank 2	
Secondary 02 sensor voltage bank 2	>0.749512(V)
)	

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				No pending or confirmed DTCs	see sheet inhibit table			
				Basic enable conditions met	=see sheet enable tables			
19. DOWNSTREAM OXYGEN SENSOR DELAYED RESPONSE DIAGNOSIS (BANK 1 AND BANK 2)	P013E	Compares measured delayed response time of Secondary 02 sensor 2 bank 1 with the calibrated threshold when the sensor voltage changes Rich	Ewma filtered delay response time of Secondary 02 sensor 2, bank 1, Rich to Lean	>0.75(s)	primary A/F commanded lambda	=1	2(counts)	1Trip EWMA
			(a) Raw delay response time of secondary 02 S2B1 Rich to Lean		engine runs	=True		
			(b) Exhaust mass flow dependent correction for delay response time of secondary 02 sensor Rich to Lean (see Look-Up-Table #23)	=0.04 to 0.08(s)	Vehicle speed	>6.25(mph)		
					engine speed	<4000(rpm)		
					engine speed	>1000(rpm)		
					engine load (see Look-Up-Table #20)	> 13.00 to 1536(%)		
					Integrated air mass flow	>60(g)		
					measured ambient temperature	>-48(°C)		
					measured ambient pressure	>0(kPa)		
					measured engine coolant temperature	>57.96(°C)		
					no transmission gear change for time	=True >2(s)		
)			
					(
					integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 1	>60(g)		
					(
					Change of exhaust gas mass flow bank 1:	<11.11(g/s)		
					(a) - (b)			
					Change of exhaust gas mass flow bank 1:	>-11.11(g/s)		
					(a) - (b)			
					(a) exhaust gas mass flow bank 1			

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(b) filtered exhaust gas mass flow bank 1	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 1	<111.11(g/s)
Low window exhaust gas mass flow bank 1	>5.56(g/s)
Low window exhaust gas mass flow bank 1	>(a) - (b)
(a) minimum exhaust gas mass flow bank 1	<5.56(g/s)
(b) offset exhaust gas mass flow bank 1 at tip-out	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 1	<0(g/s)
High window exhaust gas mass flow bank 1	>1820.44(g/s)
)	
(
Modeled catalyst temperature gradient bank 1:	<40(°C)
(a) - (b)	
Modeled catalyst temperature gradient bank 1:	>-40(°C)
(a) - (b)	
(a) Modeled catalyst temperature bank 1	
(b) filtered modeled catalyst temperature bank 1	=4.999(s)
PT1 time constant	
Low window modeled catalyst	<1000(°C)
Low window Modeled catalyst	>475(°C)
temperature bank 1	
High window modeled catalyst	<-273(°C)
temperature bank 1	
High window Modeled catalyst	>1262(°C)
temperature bank 1	
Modeled catalyst temperature bank 1	>350(°C)
after the first engine start and driving	
for time	>60(s)
))	
((
Integrated purge mass flow after a	≥5.02(g)

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HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control	
(b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or	
canister purge control mass flow into the manifold	<7.11(g/s)
((integrated exhaust gas mass flow bank 1 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 1 after the following sensors's readiness	>100(g)
(Secondary 02 sensor readiness bank 1 Primary A/F sensor readiness bank 1	
)	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 1: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control	<800(°C)
(b) measured primary A/F sensor temperature for heater control	
)	
statemachine = sm	
statemachine (sm =0) : inactive	
a commanded lambda active	=False
primary A/F commanded lambda	=1
if the following conditions are met, sm moves to sm =2	
Secondary 02 sensor voltage Bank 1	>0(V)

**if the following conditions are met,
sm moves to sm = 1**

Secondary 02 sensor voltage Bank 1 <0(V)

Secondary 02 sensor voltage Bank 1 >0.45(V)

**statemachine (sm=1) - rich mixture
in catalyst** = True

a commanded lambda active =True

primary A/F commanded lambda =0.87

Bank 1

for time >3(s)

for time >0.1(s)

**if the following conditions are met,
sm moves to sm = 2**

((
Secondary 02 sensor voltage >0.09944(V/s)

gradient over 0.05s

Secondary 02 sensor voltage Bank 1 >0.68(V)

)

Or

Secondary 02 sensor voltage Bank 1 >0(V)

)

Integrated exhaust mass flow bank 1 -0(g)

**if the following conditions are met,
sm moves to sm = 3**

(
Secondary 02 sensor voltage bank 1 >0.86(V)

Or

(
Secondary 02 sensor voltage bank 1 >0.76(V)

Secondary 02 sensor voltage <66.5(V/s)

gradient over 0.05s

Secondary 02 sensor voltage >-66.5(V/s)

gradient over 0.05s

Integrated Oxygen mass flow bank 1 >0.2(g)

))

(
Primary A/F sensor lambda bank 1 <(a) + (b)

(a) Primary lambda control set point
bank 1

(b) maximum lambda deviation of =0.05

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Primary A/F sensor lambda bank 1	>(a) - (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1 (s)
Integrated rich exhaust gas mass flow bank 1	s5(g)
)	
And	
(
Secondary 02 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=2) -	
Lean mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1 (s)
if the following conditions are met,	
sm moves to sm =4	
((
Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
/	
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
)	
{	
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	

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(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
statemachine (sm=3) -	= True
Lean mixture in catalyst	
a commanded lambda active bank 1	=True
primary A/F commanded lambda bank 1	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
/	
Secondary 02 sensor voltage bank 1	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
)	
{	
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	≥ >(g)
}	
{	
Primary A/F commanded lambda bank 1	<(a) + (b)
(a) Primary A/F commanded lambda	

(b) offset to the commanded lambda bank 1	=0.08
Secondary 02 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary 02 voltage Bank 1	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=4) - Rich mixture in catalyst	=True
a commanded lambda active	=True
primary A/F commanded lambda for time	=0.87 >3(s)
for time	>0.1 (s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 1	>0.86(V)
Or	
\	
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(g)
))	
{	
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	=0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 1	- ⁵ (g)
)	
EWMA filter strategy	
Fast initialization mode (FIR)	=True
EWMA filter initial value for FIR	=0(s)

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EWMA filter constant	=0.3516
Maximum number of samples per trip	=2(counts)
Total number of samples for FIR mode	=3(counts)
Response to Step Change mode (RSC)	=True
Response to Step Change mode inactive	=True
absolute difference : ABS((a) - (b))	>(b) ^ (c)
(a) measured delayed response time	
(b) EWMA filtered normalized monitoring result	
(c) Step change detection factor	=0.25(s)
EWMA filter constant	=0.3516
Maximum number of samples per trip	=2(counts)
Total number of samples for RSC mode	=3(counts)
EWMA filter constant	=0.3516
Total number of samples for stabilized mode	=1(counts)
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable tables

P013F	Compares measured delay response time of Secondary 02 sensor 2 bank 1 with the calibrated threshold when the sensor voltage changes Lean to Rich	arithmetic filtered delay response time tiArth of Secondary 02 sensor 2, bank 1, Lean to Rich: tiArth	>0.75(s)	primary A/F commanded lambda	=1	2(counts)	1Trip EWMA
		tiArth = old tiArth + (((a) - (b)) - old tiArth) * 1/ sample order)		engine runs	=True		
		(a) Raw delay response time of secondary 02 S2B1 Lean to Rich		Vehicle speed	>6.25(mph)		

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(b) Exhaust mass flow dependent correction for delay response time of secondary 02 sensor Lean to Rich (see Look-Up-Table #22)	=0 to 0.04(s)	engine speed	<4000(rpm)
		engine speed engine load (see Look-Up-Table #20)	>1000(rpm) > 13.00 to 1536(%)
		Integrated air mass flow	>600(g)
		measured ambient temperature	>-48(°C)
		measured ambient pressure	>0(kPa)
		measured engine coolant temperature	>57.96(°C)
		no transmission gear change for time	=True >2(s)
)	
		(integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 1	>600(g)
		(
		Change of exhaust gas mass flow bank 1: (a) - (b)	<11.11(g/s)
		Change of exhaust gas mass flow bank 1: (a) - (b)	>-11.11(g/s)
		(a) exhaust gas mass flow bank 1	
		(b) filtered exhaust gas mass flow bank 1 PT1 time constant	=0.2(s)
		Low window exhaust gas mass flow bank 1	<111.11(g/s)
		Low window exhaust gas mass flow bank 1	>5.56(g/s)
		Low window exhaust gas mass flow bank 1 (a) minimum exhaust gas mass flow bank 1	>(a) - (b) <5.56(g/s)
		(b) offset exhaust gas mass flow bank 1 at tip-out for time	=5(g/s) >3(s)

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High window exhaust gas mass flow bank 1	<0(g/s)
High window exhaust gas mass flow bank 1	>1820.44(g/s)
)	
(
Modeled catalyst temperature gradient bank 1:	<40(°C)
(a) - (b)	
Modeled catalyst temperature gradient bank 1:	>-40(°C)
(a) - (b)	
(a) Modeled catalyst temperature bank 1	
(b) filtered modeled catalyst temperature bank 1	=4.999(s)
PT1 time constant	
Low window modeled catalyst temperature bank 1	<1000(°C)
Low window Modeled catalyst temperature bank 1	>475(°C)
High window modeled catalyst temperature bank 1	<-273(°C)
High window Modeled catalyst temperature bank 1	>1263(°C)
Modeled catalyst temperature bank 1 after the first engine start and driving	>350(°C)
for time	>60(s)
))	
((
Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control	
(b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or	
canister purge control mass flow into the manifold	<7.11(g/s)

((

integrated exhaust gas mass flow bank 1 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 1 after the following sensors's readiness	>100(g)
(Secondary O2 sensor readiness bank 1 Primary A/F sensor readiness bank 1)	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 1: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control	<800(°C)
(b) measured primary A/F sensor temperature for heater control)	
statemachine = sm	
statemachine (sm =0) : inactive	
a commanded lambda active	=False
primary A/F commanded lambda	=1
if the following conditions are met, sm moves to sm =2	
Secondary O2 sensor voltage Bank 1	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary O2 sensor voltage Bank 1	<0(V)
Secondary O2 sensor voltage Bank 1	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
Bank 1	
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =2	
((Secondary O2 sensor voltage gradient over 0.05s	>0.09944(V/s)

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Secondary 02 sensor voltage Bank 1	>0.68(V)
)	
Or	
Secondary 02 sensor voltage Bank 1	>0(V)
)	
Integrated exhaust mass flow bank 1	-0(g)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 1	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 1	≥ >(g)
)	
(
Secondary 02 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=2) - Lean mixture in catalyst	
a commanded lambda active	=True

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for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
((Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
) Or	
(Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
))	
(Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
statemachine (sm=3) - Lean mixture in catalyst	= True
a commanded lambda active bank 1	=True
primary A/F commanded lambda bank 1	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
(Secondary 02 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)

Or (
Secondary 02 sensor voltage bank 1	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
))	
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
statemachine (sm=4) - Rich mixture in catalyst	=True
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1 (s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 1	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point	

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(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 1	≥ >(g)
)	
(
Primary A/F commanded lambda bank 1	<(a) + (b)
(a) Primary A/F commanded lambda bank 1	
(b) offset to the commanded lambda bank 1	=0.1001
Secondary 02 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary 02 voltage Bank 1	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
No pending or confirmed DTCs	=see sheet inhibit table

Basic enable conditions met =see sheet enable tables

P014A	Compares measured delay response time of Secondary 02 sensor 2 bank 2 with the calibrated threshold when the sensor voltage changes Rich	Ewma filtered delay response time of Secondary 02 sensor 2, bank 2, Rich to Lean	>0.75(s)	primary A/F commanded lambda Bank 2	=1	2(counts)	1Trip EWMA
		(a) Raw delay response time of secondary 02 S2B2 Rich to Lean		engine runs	=True		
		(b) Exhaust mass flow dependent correction for delay response time of secondary 02 sensor Rich to Lean (see Look-Up-Table #23)	=0.04 to 0.08(s)	Vehicle speed	>6.25(mph)		
				engine speed	<4000(rpm)		
				engine speed	>1000(rpm)		
				engine load	> 13.00 to 1536(%)		
				(see Look-Up-Table #20)			

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Integrated air mass flow	>60(g)
measured ambient temperature	>-48(°C)
measured ambient pressure	>0(kPa)
measured engine coolant temperature	>57.96(°C)
no transmission gear change for time	=True >2(s)
)	
(
integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 2	>60(g)
(
Change of exhaust gas mass flow bank 2:	<11.11(g/s)
(a) - (b)	
Change of exhaust gas mass flow bank 2:	>-11.11(g/s)
(a) - (b)	
(a) exhaust gas mass flow bank 2	
(b) filtered exhaust gas mass flow bank 2	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 2	<111.11(g/s)
Low window exhaust gas mass flow bank 2	>5.56(g/s)
Low window exhaust gas mass flow bank 2	>(a)-(b)
(a) minimum exhaust gas mass flow bank 2	<5.56(g/s)
(b) offset exhaust gas mass flow bank 2 at tip-out	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 2	<0(g/s)
High window exhaust gas mass flow bank 2	>1820.44(g/s)
)	
(
Modeled catalyst temperature gradient bank 2:	<40(°C)

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Modeled catalyst temperature gradient bank 2: (a) - (b)	>-40(°C)
(a) Modeled catalyst temperature bank 2	
(b) filtered modeled catalyst temperature bank 2	=4.999(s)
PT1 time constant	
Low window modeled catalyst temperature bank 2	<1000(°C)
High window modeled catalyst temperature bank 2	>475(°C)
High window Modeled catalyst temperature bank 2	<-273(°C)
High window Modeled catalyst temperature bank 2	>1263(°C)
Modeled catalyst temperature bank 2 after the first engine start and driving	>350(°C)
for time)	>60(s)
((Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control	
(b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or	
canister purge control mass flow into the manifold	<7.n(g/s)
((integrated exhaust gas mass flow bank 2 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 2 after the following sensors's readiness	>100(g)
(Secondary 02 sensor readiness bank 2	

Primary A/F sensor readiness bank 2	
)	
temperature deviation of Primary A/F sensor heater control bank 2: (a) - (b)	>450(°C)
(a) primary A/F sensor temperature set point for heater control	<50(°C)
(b) measured primary A/F sensor temperature for heater control	
)	
statemachine = sm	
statemachine (sm =0) : inactive	
a commanded lambda active	=False
primary A/F commanded lambda	=1
if the following conditions are met, sm moves to sm =2	
Secondary 02 sensor voltage Bank 2	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage Bank 2	<0(V)
Secondary 02 sensor voltage Bank 2	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active	=True
primary A/F commanded lambda Bank 2	=0.87
for time	>3(s)
for time	>0.1 (s)
if the following conditions are met, sm moves to sm =2	
((
Secondary 02 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary 02 sensor voltage Bank 2	>0.68(V)
)	
Or	
Secondary 02 sensor voltage Bank 2	>0(V)
)	
Integrated exhaust mass flow bank 2	*0(g)

**if the following conditions are met,
sm moves to sm =3**

(
Secondary 02 sensor voltage bank 2 >0.86(V)

Or

(
Secondary 02 sensor voltage bank 2 >0.76(V)

Secondary 02 sensor voltage
gradient over 0.05s <66.5(V/s)

Secondary 02 sensor voltage
gradient over 0.05s >-66.5(V/s)

Integrated Oxygen mass flow bank 2 >0.2(g)

))

(
Primary A/F sensor lambda bank 2 <(a) + (b)

(a) Primary lambda control set point
bank 2

(b) maximum lambda deviation of
lean mixture =0.05

Primary A/F sensor lambda bank 2 >(a)-(b)

(a) Primary lambda control set point

(b) maximum lambda deviation of rich
mixture <0.05

for time >0.1(s)

Integrated rich exhaust gas mass
flow bank 2 ≥ >(g)

)

And

(
Secondary 02 sensor voltage bank 2 >(a) + (b)

(a) minimum secondary 02 voltage

(b) Offset voltage of Secondary 02
sensor =0.019531 (V)

)

statemachine (sm=2) -

Lean mixture in catalyst

a commanded lambda active =True

primary A/F commanded lambda =1.07

for time >3(s)

for time >0.1(s)

**if the following conditions are met,
sm moves to sm =4**

((
Secondary 02 sensor voltage <0.100098(V)

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for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	- ⁵ (g)
)	
statemachine (sm=3) - Lean mixture in catalyst	= True
a commanded lambda active bank 2	=True
primary A/F commanded lambda bank 2	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 2	<0.100098(V)
for time	>0.1(s)
Or	
(
Secondary 02 sensor voltage bank 2	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)

Integrated Oxygen mass flow bank 2	>0.15(g)
)	
(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	≥ >(g)
)	
(
Primary A/F commanded lambda bank 2	<(a) + (b)
(a) Primary A/F commanded lambda bank 2	
(b) offset to the commanded lambda bank 2	=0.08
Secondary 02 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary 02 voltage Bank 2	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=4) - Rich mixture in catalyst	=True
a commanded lambda active	=True
primary A/F commanded lambda for time	=0.87
	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 2	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)

Integrated Oxygen mass flow bank 2	>0.2(g)
))	
(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point bank 2	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a) - (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1 (s)
Integrated rich exhaust gas mass flow bank 2	*5(g)
)	
EWMA filter strategy	
Fast initialization mode (FIR)	=True
EWMA filter initial value for FIR mode	=0(s)
EWMA filter constant	=0.3516
Maximum number of samples per trip	=2(counts)
Total number of samples for FIR mode	=3(counts)
Response to Step Change mode (RSC)	=True
Response to Step Change mode inactive	=True
absolute difference : $ABS((a) - (b))$	>(b)*(c)
(a) measured delayed response time	
(b) EWMA filtered normalized monitoring result	
(c) Step change detection factor	=0.25(s)
EWMA filter constant	=0.3516
Maximum number of samples per trip	=2(counts)
Total number of samples for RSC mode	=3(counts)
EWMA filter constant	=0.3516

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Total number of samples for stabilized mode =1(counts)

No pending or confirmed DTCs =see sheet inhibit table

Basic enable conditions met =see sheet enable tables

P014B	Compares measured delay response time of Secondary 02 sensor 2 bank 2 with the calibrated threshold when the sensor voltage changes Lean to Rich	arithmetic filtered delay response time tiArth of Secondary 02 sensor 2, bank 2, Lean to Rich: tiArth	>0.75(s)	primary A/F commanded lambda Bank 2	=1	2(counts)	1Trip EWMA
		tiArth = old tiArth + (((a) - (b)) - old tiArth) * 1/ sample order)		engine runs	=True		
		(a) Raw delay response time of secondary 02 S2B2 Lean to Rich		Vehicle speed	>6.25(mph)		
		(b) Exhaust mass flow dependent correction for delay response time of secondary 02 sensor Lean to Rich (see Look-Up-Table #22)	=0 to 0.04(s)	engine speed	<4000(rpm)		
				engine speed engine load (see Look-Up-Table #20)	>1000(rpm) > 13.00 to 1536(%)		
				Integrated air mass flow	>600(g)		
				measured ambient temperature	>-48(°C)		
				measured ambient pressure	>0(kPa)		
				measured engine coolant temperature	>57.96(°C)		
				no transmission gear change for time	=True >2(s)		
)			
				(integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 2	>600(g)		
				(

Change of exhaust gas mass flow bank 2: (a) - (b)	<11.11(g/s)
Change of exhaust gas mass flow bank 2: (a) - (b)	>-11.11(g/s)
(a) exhaust gas mass flow bank 2	
(b) filtered exhaust gas mass flow bank 2	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 2	<111.11(g/s)
Low window exhaust gas mass flow bank 2	>5.56(g/s)
Low window exhaust gas mass flow bank 2	>(a)-(b)
(a) minimum exhaust gas mass flow bank 2	<5.56(g/s)
(b) offset exhaust gas mass flow bank 2 at tip-out	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 2	<0(g/s)
High window exhaust gas mass flow bank 2	>1820.44(g/s)
)	
(
Modeled catalyst temperature gradient bank 2: (a) - (b)	<40(°C)
Modeled catalyst temperature gradient bank 2: (a) - (b)	>-40(°C)
(a) Modeled catalyst temperature bank 2	
(b) filtered modeled catalyst temperature bank 2	=4.999(s)
PT1 time constant	
Low window modeled catalyst temperature bank 2	<1000(°C)
Low window Modeled catalyst temperature bank 2	>475(°C)
High window modeled catalyst temperature bank 2	<-273(°C)
High window Modeled catalyst temperature bank 2	>1263(°C)

primary A/F commanded lambda if the following conditions are met, sm moves to sm =2	=1
Secondary 02 sensor voltage Bank 2	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage Bank 2	<0(V)
Secondary 02 sensor voltage Bank 2	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active	=True
primary A/F commanded lambda Bank 2 for time	=0.87 >3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =2	
((Secondary 02 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary 02 sensor voltage Bank 2	>0.68(V)
) Or	
Secondary 02 sensor voltage Bank 2	>0(V)
) Integrated exhaust mass flow bank 2	-0(g)
if the following conditions are met, sm moves to sm =3	
(Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(Secondary 02 sensor voltage bank 2	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0.2(g)

``

(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point bank 2	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 2	≥ >(g)
)	
And	
(
Secondary 02 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=2) - Lean mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
((
Secondary 02 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	

(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a) - (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	>5(g)
)	
statemachine (sm=3) - Lean mixture in catalyst	= True
a commanded lambda active bank 2	=True
primary A/F commanded lambda bank 2	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 2	<0.100098(V)
for time	>0.1(s)
Or	
\	
Secondary 02 sensor voltage bank 2	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
\	
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	- ⁵ (g)
\	

statemachine (sm=4) -	=True
Rich mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 2	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
gradient over 0.05s	
Secondary 02 sensor voltage	>-66.5(V/s)
gradient over 0.05s	
Integrated Oxygen mass flow bank 2	>0.2(g)
))	
(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point bank 2	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 2	≥ >(g)
)	
(
Primary A/F commanded lambda bank 2	<(a) + (b)
(a) Primary A/F commanded lambda bank 2	
(b) offset to the commanded lambda bank 2	=0.1001
Secondary 02 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary 02 voltage Bank 2	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	

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				(Secondary 02 sensor voltage bank 2 (a) minimum secondary 02 voltage Bank 2 (b) Offset voltage of Secondary 02 sensor) No pending or confirmed DTCs	>(a) + (b) =0.019531 (V) =see sheet inhibit table		
				Basic enable conditions met	=see sheet enable tables		
20. DOWNSTREAM OXYGEN SENSOR RANGE CHECK DIAGNOSIS	P2270	Compare maximum secondary 02 sensor voltage bank 1 with a calibrated threshold during intrusive commanded rich lambda	Maximum Secondary 02 sensor voltage bank 1 during lambda shifting to rich	<0.76(V)		0.1(s)	2 Trip
				primary A/F commanded lambda	=1		
				engine runs	=True		
				(Deceleration Fuel Cut-Off (DFCO) for time	=False >10(s)		
				Vehicle speed	>6.25(mph)		
				engine speed	<4000(rpm)		
				engine speed	>1000(rpm)		
				engine load (see Look-Up-Table #20)	> 13.00 to 1536(%)		
				Integrated air mass flow	>60(g)		
				measured ambient temperature	>-48(°C)		
				measured ambient pressure	>0(kPa)		
				measured engine coolant temperature	>57.96(°C)		
				no transmission gear change for time	=True >2(s)		
)			
				(integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 1	>60(g)		
				(

Change of exhaust gas mass flow bank 1: (a) - (b)	<11.11(g/s)
Change of exhaust gas mass flow bank 1: (a) - (b)	>-11.11(g/s)
(a) exhaust gas mass flow bank 1	
(b) filtered exhaust gas mass flow bank 1	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 1	<111.11(g/s)
Low window exhaust gas mass flow bank 1	>5.56(g/s)
Low window exhaust gas mass flow bank 1	>(a) - (b)
(a) minimum exhaust gas mass flow bank 1	<5.56(g/s)
(b) offset exhaust gas mass flow bank 1 at tip-out for time	=5(g/s) >3(s)
High window exhaust gas mass flow bank 1	<0(g/s)
High window exhaust gas mass flow bank 1	>1820.44(g/s)
) (
Modeled catalyst temperature gradient bank 1: (a) - (b)	<40(°C)
Modeled catalyst temperature gradient bank 1: (a) - (b)	>-40(°C)
(a) Modeled catalyst temperature bank 1	
(b) filtered modeled catalyst temperature bank 1	=4.999(s)
PT1 time constant	
Low window modeled catalyst temperature bank 1	<1000(°C)
Low window Modeled catalyst temperature bank 1	>475(°C)
High window modeled catalyst temperature bank 1	<-273(°C)
High window Modeled catalyst	>1263(°C)

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Modeled catalyst temperature bank 1 after the first engine start and driving	>350(°C)
for time)	>60(s)
((Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control (b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or	
canister purge control mass flow into the manifold	<7.n(g/s)
((integrated exhaust gas mass flow bank 1 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 1 after the following sensors's readiness	>100(g)
(Secondary 02 sensor readiness bank 1	=True
Primary A/F sensor readiness bank 1	=True
)	
	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 1: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control (b) measured primary A/F sensor temperature for heater control)	<800(°C)
statemachine = sm statemachine (sm =0) : inactive	

a commanded lambda active	=False
primary A/F commanded lambda	=1
if the following conditions are met, sm moves to sm =2	
Secondary 02 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage bank1	<0(V)
Secondary 02 sensor voltage bank1	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
bank1	
for time	>3(s)
for time	>0.1 (s)
Integrated Rich Gas Storage Capacity	*1-8 (g)
for time	
Primary A/F commanded lambda bank 1	<0.8
Integrated Exhaust mass flow	£200(g)
for time	>0(s)
if the following conditions are met, sm moves to sm =2	
((
Secondary 02 sensor voltage	>0.09944(V/s)
gradient over 0.05s	
Secondary 02 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary 02 sensor voltage bank1	>0(V)
)	
Integrated exhaust mass flow bank 1	≥0(g)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 1	>0.86(V)

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Or	
(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage	<66.5(V/s)
gradient over 0.05s	
Secondary 02 sensor voltage	>-66.5(V/s)
gradient over 0.05s	
Integrated Oxygen mass flow bank 1	>0.2(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point	
bank 1	
(b) maximum lambda deviation of	=0.05
lean mixture	
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich	<0.05
mixture	
for time	>0.1(s)
Integrated rich exhaust gas mass	>60(g)
flow bank 1	
)	
(
Secondary 02 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02	=0.019531 (V)
sensor	
)	
statemachine (sm=2) -	
Lean mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met,	
sm moves to sm =4	
((
Secondary 02 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.200195(V)

Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
statemachine (sm=3) - Lean mixture in catalyst	= True
a commanded lambda active bank 1	=True
primary A/F commanded lambda bank 1	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
(
Secondary 02 sensor voltage bank 1	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point	

(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	≥5(g)
)	
statemachine (sm=4) - Rich mixture in catalyst	=True
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1 (s)
Integrated Rich Gas Storage Capacity	*i-8(g)
for time	
Primary A/F commanded lambda bank 1	<0.8
Integrated Exhaust mass flow	£200(g)
for time	>0(s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 1	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a) - (b)

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(a) Primary lambda control set point

(b) maximum lambda deviation of rich mixture
for time
Integrated rich exhaust gas mass flow bank 1
)

<0.05
>0.1(s)
- ⁵ (g)

No pending or confirmed DTCs =see sheet inhibit table

Basic enable conditions met =see sheet enable tables

P2271	Compare maximum secondary 02 sensor voltage bank 1 with a calibrated threshold during intrusive commanded rich lambda	Minimum secondary 02 sensor voltage bank 1 during lambda shifting to lean	>0.200195(V)	primary A/F commanded lambda	=1	0.1(s)	2 Trip
				engine runs (Deceleration Fuel Cut-Off (DFCO) for time Vehicle speed	=True =False >10(s) >6.25(mph)		
				engine speed engine speed engine load (see Look-Up-Table #20)	<4000(rpm) >1000(rpm) > 13.00 to 1536(%)		
				Integrated air mass flow	>60(g)		
				measured ambient temperatuer measured ambient pressure measured engine coolant temperature	>-48(°C) >0(kPa) >57.96(°C)		
				no transmission gear change for time)	=True >2(s)		
				(integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 1 (	>60(g)		

Change of exhaust gas mass flow bank 1: (a) - (b)	<11.11(g/s)
Change of exhaust gas mass flow bank 1: (a) - (b)	>-11.11(g/s)
(a) exhaust gas mass flow bank 1	
(b) filtered exhaust gas mass flow bank 1	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 1	<111.11(g/s)
Low window exhaust gas mass flow bank 1	>5.56(g/s)
Low window exhaust gas mass flow bank 1	>(a) - (b)
(a) minimum exhaust gas mass flow bank 1	<5.56(g/s)
(b) offset exhaust gas mass flow bank 1 at tip-out for time	=5(g/s) >3(s)
High window exhaust gas mass flow bank 1	<0(g/s)
High window exhaust gas mass flow bank 1	>1820.44(g/s)
) (
Modeled catalyst temperature gradient bank 1: (a) - (b)	<40(°C)
Modeled catalyst temperature gradient bank 1: (a) - (b)	>-40(°C)
(a) Modeled catalyst temperature bank 1	
(b) filtered modeled catalyst temperature bank 1	=4.999(s)
PT1 time constant	
Low window modeled catalyst temperature bank 1	<1000(°C)
Low window Modeled catalyst temperature bank 1	>475(°C)
High window modeled catalyst temperature bank 1	<-273(°C)
High window Modeled catalyst	>1263(°C)

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Modeled catalyst temperature bank 1 after the first engine start and driving	>350(°C)
for time)	>60(s)
((Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control (b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or	
canister purge control mass flow into the manifold	<7.n(g/s)
((integrated exhaust gas mass flow bank 1 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 1 after the following sensors's readiness	>100(g)
(Secondary 02 sensor readiness bank 1	=True
Primary A/F sensor readiness bank 1	=True
)	
	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 1: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control (b) measured primary A/F sensor temperature for heater control)	<800(°C)
statemachine = sm statemachine (sm =0) : inactive	-

primary A/F commanded lambda	=1
if the following conditions are met, sm moves to sm =2	
Secondary 02 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage bank1	<0(V)
Secondary 02 sensor voltage bank1	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active	=True
primary A/F commanded lambda bank1	=0.87
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =2	
((
Secondary 02 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary 02 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary 02 sensor voltage bank1	>0(V)
)	
Integrated exhaust mass flow bank 1	≥0(g)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 1	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.49797(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0-2(g)

``

(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 1	≥ >(g)
)	
(
Secondary 02 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=2) - Lean mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
(
Integrated Oxygen Storage Capacity	≥1-6(g)
for time	>1(s)
Primary A/F commanded lambda bank 1	>1.1499
Integrated Exhaust mass flow	≥200(g)
for time	>0(s)
)	
if the following conditions are met, sm moves to sm =4	
((
Secondary 02 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage	<0.09944(V/s)

Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
statemachine (sm=3) - Lean mixture in catalyst	= True
a commanded lambda active bank 1	=True
primary A/F commanded lambda bank 1	=1.07
for time	>3(s)
for time	>0.1(s)
Integrated Oxygen Storage Capacity	>1.6(g)
for time	>1(s)
Primary A/F commanded lambda bank 1	>1.1499
Integrated Exhaust mass flow for time	≥200(g) >0(s)
)	
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
(
Secondary 02 sensor voltage bank 1	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)

Integrated Oxygen mass flow bank 1	>0.15(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
statemachine (sm=4) -	=True
Rich mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
if the following conditions are met,	
sm moves to sm =3	
(
Secondary 02 sensor voltage bank 1	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0-2(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich	<0.05

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for time
Integrated rich exhaust gas mass
flow bank 1
)
No pending or confirmed DTCs =see sheet inhibit table

>0.1(s)
≥5(g)

Basic enable conditions met

=see sheet enable
tables

P2272	Compare maximum secondary 02 sensor voltage bank 1 with a calibrated threshold during intrusive commanded rich lambda	Maximum Secondary 02 sensor voltage bank 1 during lambda shifting to rich	<0.76(V)	0.1(s)	2 Trip
-------	---	---	----------	--------	--------

primary A/F commanded lambda

=1

engine runs

=True

(

Deceleration Fuel Cut-Off (DFCO)

=False

for time

>10(s)

Vehicle speed

>6.25(mph)

engine speed

<4000(rpm)

engine speed

>1000(rpm)

engine load

> 13.00 to 1536(%)

(see Look-Up-Table #20)

Integrated air mass flow

>60(g)

measured ambient temperatuer

>-48(°C)

measured ambient pressure

>0(kPa)

measured engine coolant

>57.96(°C)

temperature

no transmission gear change

=True

for time

>2(s)

)

(

integrated exhaust gas mass flow

>60(g)

after the following operation points
are in the monitoring window bank 1

(

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Change of exhaust gas mass flow bank 1: (a) - (b)	<11.11(g/s)
Change of exhaust gas mass flow bank 1: (a) - (b)	>-11.11(g/s)
(a) exhaust gas mass flow bank 1	
(b) filtered exhaust gas mass flow bank 1	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 1	<111.11(g/s)
Low window exhaust gas mass flow bank 1	>5.56(g/s)
Low window exhaust gas mass flow bank 1	>(a) - (b)
(a) minimum exhaust gas mass flow bank 1	<5.56(g/s)
(b) offset exhaust gas mass flow bank 1 at tip-out	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 1	<0(g/s)
High window exhaust gas mass flow bank 1	>1820.44(g/s)
)	
(
Modeled catalyst temperature gradient bank 1: (a) - (b)	<40(°C)
Modeled catalyst temperature gradient bank 1: (a) - (b)	>-40(°C)
(a) Modeled catalyst temperature bank 1	
(b) filtered modeled catalyst temperature bank 1	=4.999(s)
PT1 time constant	
Low window modeled catalyst temperature bank 1	<1000(°C)
Low window Modeled catalyst temperature bank 1	>475(°C)
High window modeled catalyst temperature bank 1	<-273(°C)
High window Modeled catalyst temperature bank 1	>1263(°C)

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Modeled catalyst temperature bank 1 after the first engine start and driving	>350(°C)
for time)	>60(s)
((Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control (b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or	
canister purge control mass flow into the manifold	<7.n(g/s)
((integrated exhaust gas mass flow bank 1 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 1 after the following sensors's readiness {	>100(g)
Secondary 02 sensor readiness bank 1	=True
Primary A/F sensor readiness bank 1	=True
)	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 1: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control (b) measured primary A/F sensor temperature for heater control)	<800(°C)
statemachine = sm statemachine (sm =0) : inactive a commanded lambda active	-False

primary A/F commanded lambda if the following conditions are met, sm moves to sm =2	=1
Secondary 02 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage bank1	<0(V)
Secondary 02 sensor voltage bank1	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active	=True
primary A/F commanded lambda bank1 for time	=0.87 >3(s)
for time	>0.1 (s)
Integrated Rich Gas Storage Capacity for time	*1-8(g)
Primary A/F commanded lambda bank 1	<0.8
Integrated Exhaust mass flow for time	£200(g) >0(s)
if the following conditions are met, sm moves to sm =2	
((Secondary 02 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary 02 sensor voltage bank1	>0.68(V)
) Or	
Secondary 02 sensor voltage bank1	>0(V)
) Integrated exhaust mass flow bank 1	≥0(g)
if the following conditions are met, sm moves to sm =3	
(Secondary 02 sensor voltage bank 1	>0.86(V)

(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 1	≥ >(g)
)	
(
Secondary 02 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=2) - Lean mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
((
Secondary 02 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	<0.200195(V)
Secondary 02 sensor voltage	<0.09944(V/s)

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Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	- ⁵ (g)
)	
statemachine (sm=3) - Lean mixture in catalyst	= True
a commanded lambda active bank 1	=True
primary A/F commanded lambda bank 1	=1.07
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
(
Secondary 02 sensor voltage bank 1	<0.200195(V)
Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 1	>0.15(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of	=0.05

Primary A/F sensor lambda bank 1	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 1	≥5(g)
)	
statemachine (sm=4) -	=True
Rich mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
Integrated Rich Gas Storage Capacity	*i-8(g)
for time	
Primary A/F commanded lambda bank 1	<0.8
Integrated Exhaust mass flow	£200(g)
for time	>0(s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 1	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 1	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(g)
))	
(
Primary A/F sensor lambda bank 1	<(a) + (b)
(a) Primary lambda control set point bank 1	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 1	>(a) - (b)
(a) Primary lambda control set point	

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(b) maximum lambda deviation of rich mixture for time <0.05
Integrated rich exhaust gas mass flow bank 1 >0.1 (s)
*)5(g)
)
No pending or confirmed DTCs =see sheet inhibit table

Basic enable conditions met =see sheet enable tables

P2273	Compare maximum secondary 02 sensor voltage bank 2 with a calibrated threshold during intrusive commanded rich lambda	Minimum secondary 02 sensor voltage bank 2 during lambda shifting to lean	>0.200195(V)	primary A/F commanded lambda	=1	0.1(s)	2 Trip
				engine runs (Deceleration Fuel Cut-Off (DFCO) for time Vehicle speed	=True =False >10(s) >6.25(mph)		
				engine speed engine speed engine load (see Look-Up-Table #20)	<4000(rpm) >1000(rpm) > 13.00 to 1536(%)		
				Integrated air mass flow	>60(g)		
				measured ambient temperature measured ambient pressure measured engine coolant temperature	>-48(°C) >0(kPa) >57.96(°C)		
				no transmission gear change for time)	=True >2(s)		
				(integrated exhaust gas mass flow after the following operation points are in the monitoring window bank 2 (>60(g)		

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Change of exhaust gas mass flow bank 2:	<11.11(g/s)
(a) - (b)	
Change of exhaust gas mass flow bank 2:	>-11.1(g/s)
(a) - (b)	
(a) exhaust gas mass flow bank 2	
(b) filtered exhaust gas mass flow bank 2	
PT1 time constant	=0.2(s)
Low window exhaust gas mass flow bank 2	<111.11(g/s)
Low window exhaust gas mass flow bank 2	>5.56(g/s)
Low window exhaust gas mass flow bank 2	>(a)-(b)
(a) minimum exhaust gas mass flow bank 2	<5.56(g/s)
(b) offset exhaust gas mass flow bank 2 at tip-out	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 2	<0(g/s)
High window exhaust gas mass flow bank 2	>1820.44(g/s)
)	
(
Modeled catalyst temperature gradient bank 2:	<40(°C)
(a) - (b)	
Modeled catalyst temperature gradient bank 2:	>-40(°C)
(a) - (b)	
(a) Modeled catalyst temperature bank 2	
(b) filtered modeled catalyst temperature bank 2	=4.999(s)
PT1 time constant	
Low window modeled catalyst temperature bank 2	<1000(°C)
Low window Modeled catalyst temperature bank 2	>475(°C)
High window modeled catalyst temperature bank 2	<-273(°C)
High window Modeled catalyst temperature bank 2	>1263(°C)

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Modeled catalyst temperature bank 2 after the first engine start and driving	>350(°C)
for time)	>60(s)
((Integrated purge mass flow after a longer purge stop	≥5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b)	<0.3
(a) fuel mass supplied by canister purge control (b) fuel mass supplied by injection	
Or	
open loop canister purge control	=True
Or	
canister purge control mass flow into the manifold	S7.11(g/s)
((integrated exhaust gas mass flow bank 2 since engine start (see Look-Up-Table #19)	>2250 to 10000(g)
integrated exhaust gas mass flow bank 2 after the following sensors's readiness {	>100(g)
Secondary 02 sensor readiness bank 2	=True
Primary A/F sensor readiness bank 2	=True
)	
	>450(°C)
temperature deviation of Primary A/F sensor heater control bank 2: (a) - (b)	<50(°C)
(a) primary A/F sensor temperature set point for heater control (b) measured primary A/F sensor temperature for heater control)	<800(°C)
statemachine = sm statemachine (sm =0) : inactive a rnmmanrlorl lamhrla artiVo	= Paleo

primary A/F commanded lambda if the following conditions are met, sm moves to sm =2	=1
Secondary 02 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm =1	
Secondary 02 sensor voltage bank1	<0(V)
Secondary 02 sensor voltage bank1	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	= True
a commanded lambda active	=True
primary A/F commanded lambda bank1 for time	=0.87 >3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =2	
((Secondary 02 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary 02 sensor voltage bank1	>0.68(V)
) Or	
Secondary 02 sensor voltage bank1	>0(V)
) Integrated exhaust mass flow bank 2	-0(g)
if the following conditions are met, sm moves to sm =3	
(Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(Secondary 02 sensor voltage bank 2	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0.2(g)

``

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(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point bank 2	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated rich exhaust gas mass flow bank 2	≥ >(g)
)	
(
Secondary 02 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary 02 voltage	
(b) Offset voltage of Secondary 02 sensor	=0.019531 (V)
)	
statemachine (sm=2) -	
Lean mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=1.07
for time	>3(s)
for time	>0.1 (s)
(
Integrated Oxygen Storage Capacity	21.6(g)
for time	>1(s)
Primary A/F commanded lambda bank 2	>1.1499
Integrated Exhaust mass flow	£200(g)
for time	>0(s)
)	
if the following conditions are met, sm moves to sm =4	
((
Secondary 02 sensor voltage bank 2	<0.1(V)
for time	>0.1(s)
)	
Or	
(
Secondary 02 sensor voltage	≤0.2(V)

Secondary 02 sensor voltage gradient over 0.05s	<0.1(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.1(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
(
Primary A/F sensor lambda	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda	>(a) - (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	>5(g)
)	
statemachine (sm=3) - Lean mixture in catalyst	= True
a commanded lambda active bank 2	=True
primary A/F commanded lambda bank 2	=1.07
for time	>3(s)
for time	>0.1(s)
(
Integrated Oxygen Storage Capacity	>1.6(g)
for time	>1(s)
Primary A/F commanded lambda bank 2	>1.1499
Integrated Exhaust mass flow	>200(g)
for time	>0(s)
)	
if the following conditions are met, sm moves to sm =4	
(
Secondary 02 sensor voltage bank 2	<0.1(V)
for time	>0.1(s)
Or	
(
Secondary 02 sensor voltage bank 2	<0.2(V)

Secondary 02 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-0.09944(V/s)
Integrated Oxygen mass flow bank 2	>0.15(g)
))	
(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a)-(b)
(a) Primary lambda control set point	
(b) maximum lambda deviation of rich mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	- ⁵ (g)
)	
statemachine (sm=4) -	=True
Rich mixture in catalyst	
a commanded lambda active	=True
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
if the following conditions are met, sm moves to sm =3	
(
Secondary 02 sensor voltage bank 2	>0.86(V)
Or	
(
Secondary 02 sensor voltage bank 2	>0.76(V)
Secondary 02 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary 02 sensor voltage gradient over 0.05s	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0-2(g)
))	
(
Primary A/F sensor lambda bank 2	<(a) + (b)
(a) Primary lambda control set point bank 2	
(b) maximum lambda deviation of lean mixture	=0.05
Primary A/F sensor lambda bank 2	>(a) - (b)

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				(a) Primary lambda control set point				
				(b) maximum lambda deviation of rich mixture for time	<0.05			
				Integrated rich exhaust gas mass flow bank 2	>0.1(s)			
				)	>5(g)			
				No pending or confirmed DTCs	=see sheet inhibit table			
				Basic enable conditions met	=see sheet enable tables			
21. UPSTREAM/D OWNSTREA M OXYGEN SENSOR CIRCUIT	P0140	Path 1: Signal range check - open circuit	Mean value of difference between loaded and unloaded sensor voltage for 3 load pulses	>3.598633(V)	Fault suspicion is active for time, which is the following:	>3(s)	0(s)	2 Trip
			for time	>5(s)	(
					Output voltage of 02 sensor	>0.322(V)		
					Output voltage of 02 sensor	<0.552(V)		
)			
					Enable conditions for operating readiness of 02 sensor 2 bank 1(refer above common conditions)	=TRUE		
			Path 2:					
			Internal resistance of 02 sensor	>40000(0hm)	Exhaust gas temperature at 02 sensor	>600(°C)		
			Internal resistance plausibility - interrupted ground wire		Enable conditions for operating readiness of 02 sensor 2 bank 1 (refer above common conditions)	=TRUE		
					Basic enable conditions met	=see sheet enable tables		
					No pending or confirmed DTCs	=see sheet inhibit tables		
	P0160	Path 1: Signal range check - open circuit	Mean value of difference between loaded and unloaded sensor voltage for 3 load pulses	>3.598633(V)	Fault suspicion is active for time, which is the following:	>3(s)	0(s)	2 Trip

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		for time	>5(s)	(Output voltage of 02 sensor Output voltage of 02 sensor) Enable conditions for operating readiness of 02 sensor 2 bank 2 (refer above common conditions)	>0.322(V) <0.552(V) =TRUE		
	Path 2: Internal resistance plausibility - sensor interrupted ground wire	Internal resistance of 02 sensor	>40000(0hm)	Exhaust gas temperature at 02 sensor Enable conditions for operating readiness of 02 sensor 2 bank 2 (refer above common conditions) Basic enable conditions met No pending or confirmed DTCs	>600(°C) =TRUE =see sheet enable tables =see sheet inhibit tables		
P0138	Signal range check - short circuit to battery	Set point lambda	>0.995	Common Conditions: Enable conditions for operating readiness of 02 sensor 2 bank 1 (Battery voltage Enable conditions for the status of signal fault in the previous driving with the availability of internal resistance value (Internal resistance is valid (Internal resistance is valid after X measurements X = counter for validating internal resistance) 02 Sensor open circuit fault detected) (Expected downstream 02 sensor readiness (Protective heating is finished (Status of downstream 02 sensor heating for hot engine conditions (Engine coolant temperature Conditions for enabling sensor heating for 02 sensor ,	=TRUE =TRUE =TRUE =TRUE =FALSE =TRUE =TRUE	0.2(s)	2 Trip

ECU is not in POST DRIVE state	=TRUE
Battery Voltage	<16.5(V)
Engine start is completed	=TRUE
)	
)	
Dew point end is reached	=TRUE
(
(
$a > (b)'(((c)'(d)) + 1)$	
Where:	
(a) Integrated heat release since engine start	
(b) Downstream O ₂ sensor heat threshold for release of heating (kJ) (see Look-Up-Table #15)	=200 to 2200(kJ)
(c) Instance of dew point end class of sensor 2 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #16)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 4)	
)	
Dew point end is reached at upstream of catalyst	
(
$a > (b)'(((c)'(d)) + 1)$	
Where:	
(a) Integrated heat release since engine start	
(b) Upstream O ₂ sensor heat threshold for release of heating (kJ) (see Look-Up-Table #11)	=10 to 500(kJ)
(c) Instance of dew point end class of sensor 1 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #12)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 3)	

)	
)	
)	
for time	>A+B(s)
where	=25(s)
A: Operating readiness, HEGO sensor 2	
bank 1 / Debouncing time	
protective heating finished	
B: Operating readiness, HEGO sensor 2 bank 1 / Debouncing time for expected operating readiness	=30(s)
)	
OR	
Exhaust gas sensor ready for operation	=TRUE
(
Status of heating enable conditions for the sensor operating readiness	=TRUE
(
Protective heating is finished	
for time	>25(s)
OR	
Internal resistance OK for operating readiness	=TRUE
(
Unfiltered internal resistance of HEGO sensor	<2000(0hm)
Protective heating is finished	
Counter for valid internal resistance measurements	>3(counts)
)	
)	
Status of sensor signal enable conditions for the sensor operating readiness	=TRUE
(
Internal resistance OK for operating readiness	=TRUE
OR	
(
(
Output voltage of HEGO Sensor and	>0.552(V)
Output voltage of HEGO Sensor	<1.201(V)
,	

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				OR			
				Output voltage of HEGO Sensor	<0.322(V)		
)			
				OR			
				Sensor voltage stuck in countervoltage band	=TRUE		
				(
				{			
				(
				Output voltage of HEGO Sensor	<0.552(V)		
				Output voltage of HEGO Sensor	>0.322(V)		
)			
				(
					=TRUE		
				Sensor open circuit fault existed in previous trip			
				OR			
				Sensor open circuit fault currently not detected	=TRUE		
)			
				Electrical diagnostics enabled	=TRUE		
)			
				for time	>20(s)		
)			
)			
				for time	>0.2(s)		
)			
)			
)			
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P0158	Signal range check - short circuit to battery	Set point lambda	>0.995	Common Conditions:	=TRUE	0.2(s)	2 Trip
				Enable conditions for operating readiness of 02 sensor 2 bank 2			
		Output voltage of 02 sensor	>1.201172(V)	(
				Battery voltage	>10.7(V)		
				Enable conditions for the status of signal fault in the previous driving with the availability of internal resistance value	=TRUE		
				(
				Internal resistance is valid	=TRUE		
				(
				Internal resistance is valid after X measurements	=TRUE		

X = counter for validating internal resistance	>10(counts)
)	
02 Sensor open circuit fault detected	=FALSE
)	
(
Expected downstream 02 sensor readiness	
(
Protective heating is finished	=TRUE
(
Status of downstream 02 sensor heating for hot engine conditions	
(
Engine coolant temperature	>-48(°C)
Conditions for enabling sensor heating for 02 sensor	=TRUE
(
ECU is not in POST DRIVE state	=TRUE
Battery Voltage	<16.5(V)
Engine start is completed	=TRUE
)	
)	
Dew point end is reached	=TRUE
(
(
$a > (b) * (((c) * (d)) + 1)$	
Where:	
(a) Integrated heat release since engine start	
(b) Downstream 02 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #17)	=200 to 2200(kJ)
(c) Instance of dew point end class of sensor 2 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #18)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 4)	
)	
Dew point end is reached at upstream of catalyst	
(
$a > (b) * (((c) * (d)) + 1)$	
Where:	

(a) Integrated heat release since engine start	
(b) Upstream O ₂ sensor heat threshold for release of heating (kJ) (see Look-Up-Table #13)	=10 to 500(kJ)
(c) Instance of dew point end class of sensor 1 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #14)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 3))))) for time	>A+B(s)
where	=25(s)
A: Operating readiness, HEGO sensor 2 bank 1 / Debouncing time protective heating finished	
B: Operating readiness, HEGO sensor 2 bank 1 / Debouncing time for expected operating readiness	=30(s)
) OR Exhaust gas sensor ready for operation { Status of heating enable conditions for the sensor operating readiness { Protective heating is finished	=TRUE
for time	>25(s)
OR Internal resistance OK for operating readiness (Unfiltered internal resistance of HEGO sensor Protective heating is finished	=TRUE
	<2000(0hm)

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Counter for valid internal resistance measurements	>3(counts)
)	
)	
Status of sensor signal enable conditions for the sensor operating readiness	=TRUE
\	
Internal resistance OK for operating readiness	=TRUE
OR	
(
(
Output voltage of HEGO Sensor	>0.552(V)
Output voltage of HEGO Sensor	<1.201(V)
)	
OR	
Output voltage of HEGO Sensor	<0.322(V)
)	
OR	
Sensor voltage stuck in countervoltage band	=TRUE
(
(
(
Output voltage of HEGO Sensor	<0.552(V)
Output voltage of HEGO Sensor	>0.322(V)
)	
(
	=TRUE
Sensor open circuit fault existed in previous trip	
OR	
Sensor open circuit fault currently not detected	=TRUE
)	
Electrical diagnostics enabled	=TRUE
)	
for time	>20(s)
)	
)	
for time	>0.2(s)
)	
)	
)	
Basic enable conditions met	=see sheet enable

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				No pending or confirmed DTCs	=see sheet inhibit tables		
P0137	Signal range check - short circuit to ground	Mean value of difference between loaded and unloaded sensor voltage for 3 load pulses for time	<0.014648(V) >5(s)	Fault suspicion is active when the following conditions are satisfied for time (Output voltage of 02 sensor Catalyst purge active Deceleration Fuel Cut-Off Battery voltage) Basic enable conditions met No pending or confirmed DTCs	>3(s) <0.06(V) =FALSE =FALSE >10.7(V) =see sheet enable tables =see sheet inhibit tables	0(s)	2 Trip
P0157	Signal range check - short circuit to ground	Mean value of difference between loaded and unloaded sensor voltage for 3 load pulses for time	<0.014648(V) >5(s)	Fault suspicion is active when the following conditions are satisfied for time (Output voltage of 02 sensor Catalyst purge active Deceleration Fuel Cut-Off Battery voltage) Basic enable conditions met No pending or confirmed DTCs	>3(s) <0.06(V) =FALSE =FALSE >10.7(V) =see sheet enable tables =see sheet inhibit tables	0(s)	2 Trip
P2232	Heater Coupling- Short Circuit between the sensor signal wire and the sensor heater	Difference of the present and the previous output voltage of 02 sensor Counter for Heater turn off events	>2.001953(V) >6(events)	Time frame for checking heater coupling is active (Dew point end is reached for time Sensor heating is turned on) Enable conditions for operating readiness of 02 sensor 2 bank 1 (refer above common conditions) Basic enable conditions met No pending or confirmed DTCs	<0.04(s) >10(s) =FALSE =TRUE =see sheet enable tables =see sheet inhibit tables	4(events)	2 Trip

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P2235	Heater Coupling- Short Circuit	Difference of the present and the previous output voltage of 02 sensor	>2.001953(V)	Time frame for checking heater coupling is active (<0.04(s)	4(events)	2 Trip
		Counter for Heater turn off events	>6(events)	Dew point end is reached for time Sensor heating is turned on) Enable conditions for operating readiness of 02 sensor 2 bank 2 (refer above common conditions) Basic enable conditions met No pending or confirmed DTCs	>10(s) =FALSE =TRUE =see sheet enable tables =see sheet inhibit tables		
22. HO2S HEATER DIAGNOSIS	P0141	Compares the measured Secondary HO2S sensor internal resistance with a calibrated threshold*	Internal resistance of Secondary HO2S sensor bank 1 (see Look-Up-Table #45)	>500 to 10000(0hm)		6(s)	2 Trip
					(
					Filtered normalized heating power for Secondary HO2S sensor bank 1	>0.6	
					engine stop time copied at the time of first engine start in the driving cycle	>120(s)	
					state of variable TiEngOff_tiFirstStrt (formerly tengszlst)	=True	
					intake air temperature	>-39.8(°C)	
					state of start temperatures in dew point end calculated for Secondary HO2S sensor bank 1	=True	
					Battery Voltage	<16.1(V)	
					Battery Voltage	>10.7(V)	
					state for end of start	= True	
		calibrated threshold* = the criteria required to be met by the component vendor for heater circuit performance at high mileage			engine speed	>40(rpm)	
					engine speed for normal, non-repeated, key starts (see Look-Up-Table #84)	>600 to 700(rpm)	
)		
					(
					Filtered-modeled exhaust gas temperature for Secondary HO2S sensor bank 1 heating	<700(°C)	

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Filtered-modeled exhaust gas temperature for Secondary HO2S sensor bank 1 heating	>350(°C)
Bit heater power stage diagnostics	=True
enable condition for heater performance diagnosis after stop-phase	=True
state for end of start for time	=False
state for end of start for time	>0(s)
state for end of start for time	=True
state for end of start for time	>0(s)
internal resistance measurement valid if the following conditions are met:	=True
Number of calculations of the internal resistance	>10(counts)
((
Secondary HO2S sensor voltage bank 1	<0.41 (V)
Secondary HO2S sensor voltage bank 1	>0(V)
Or	
Secondary HO2S sensor voltage bank 1	>0.49(V)
)	
absolute sensor voltage difference: ABS((a) - (b))	<0.025(V)
(a) Secondary HO2S sensor voltage bank 1	
(b) Prior Secondary HO2S sensor voltage bank 1	
Secondary HO2S sensor bank 1 heater control on	=True
for time	>30(s)
Internal resistance measurement active of Secondary HO2S sensor bank 1	=True
with	
Absolute Secondary HO2S sensor bank 1 voltage difference: ABS((a) - (b))	<0.2(V)
(a) Secondary HO2S sensor bank 1 voltage after freeze for measurement of the internal resistance	
(b) Secondary HO2S sensor bank 1 voltage without load for the measurement of the internal	

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			Absolute Secondary HO2S sensor bank 1 voltage difference: ABS((a) - (b))	>0.0(V)		
			(a) Secondary HO2S sensor bank 1 voltage with load for the measurement of the internal resistance			
			(b) Secondary HO2S sensor bank 1 voltage without load for the measurement of the internal resistance			
			no electrical sensor diagnostic faults of implausible high internal resistance	=True		
			no DFCO	=True		
			Minimum heater performance	>120(s)		
			Filtered-modeled exhaust gas temperature for Secondary HO2S sensor bank 1 heating	>630(°C)		
			Internal resistance of Secondary	<10000(0hm)		
			No pending or confirmed DTCs	=see sheet inhibit table		
			Basic enable conditions met	=see sheet enable tables		
P0161	Compares the measured Secondary HO2S sensor internal resistance with a calibrated threshold*	Internal resistance of Secondary HO2S sensor bank 2 (see Look-Up-Table #46)	>■500 to 10000(0hm)		6(s)	2 Trip
			(Filtered normalized heating power for Secondary HO2S sensor bank 2 engine stop time copied at the time of first engine start in the driving cycle	>120(s)		
			state of variable TiEngOff_tiFirstStrt (formerly tengszlst)	=True		
			state of start temperatures in dew point end calculated for Secondary HO2S sensor bank 2			
			Battery Voltage	<16.1(V)		
			Battery Voltage	>10.7(V)		
			state for end of start	= True		
			engine speed	>40(rpm)		

calibrated threshold* = the criteria required to be met by the component vendor for heater circuit performance at high mileage

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engine speed for normal, non-repeated, key starts (see Look-Up-Table #84)	>600 to 700(rpm)
)	
(
Filtered-modeled exhaust gas temperature for Secondary HO2S sensor bank 2 heating	<700(°C)
Filtered-modeled exhaust gas temperature for Secondary HO2S sensor bank 2 heating	>350(°C)
enable condition for heater performance diagnosis after stop-phase	=True
state for end of start for time	=False
state for end of start for time	>0(s)
state for end of start for time	=True
state for end of start for time	>0(s)
internal resistance measurement valid if the following conditions are met:	=True
Number of calculations of the internal resistance	>10(counts)
((
Secondary HO2S sensor voltage bank 2	<0.41 (V)
Secondary HO2S sensor voltage bank 2	>0(V)
Or	
Secondary HO2S sensor voltage bank 2	>0.49(V)
)	
absolute sensor voltage difference: ABS((a) - (b))	<0.025(V)
(a) Secondary HO2S sensor voltage bank 2	
(b) Prior Secondary HO2S sensor voltage bank 2	
Secondary HO2S sensor bank 2 heater control on	=True
for time	>30(s)
Internal resistance measurement active of Secondary HO2S sensor bank 2	=True
with	

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					Absolute Secondary HO2S sensor bank 2 voltage difference: ABS((a) - (b))	<0.2(V)		
					(a) Secondary HO2S sensor bank 2 voltage after freeze for measurement of the internal resistance			
					(b) Secondary HO2S sensor bank 2 voltage without load for the measurement of the internal resistance			
					Absolute Secondary HO2S sensor bank 2 voltage difference: ABS((a) - (b))	>0.0(V)		
					(a) Secondary HO2S sensor bank 2 voltage with load for the measurement of the internal resistance			
					(b) Secondary HO2S sensor bank 2 voltage without load for the measurement of the internal resistance			
					no electrical sensor diagnostic faults of implausible high internal resistance	=True		
					no DFCO	=True		
					Minimum heater performance	>120(s)		
					Filtered-modeled exhaust gas temperature for Secondary HO2S sensor bank 2 heating	>630(°C)		
					Internal resistance of Secondary	<10000(0hm)		
					No pending or confirmed DTCs	=see sheet inhibit table		
					Basic enable conditions met	=see sheet enable tables		
23. HO2S HEATER CONTROL CIRCUIT DIAGNOSIS	P0036	Diagnoses the HO2S Heater Control Bank 1 Sensor 2 low side driver circuit for open circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuits 200 K Q impedance between ECU pin and load	General enabling condition for powerstage diagnosis	=TRUE	0.1(s)	2 Trip
					(Battery voltage	<25.5(V)		
					Battery voltage	>8.9(V)		
					Engine speed	>80(rpm)		
					) Conditions for enabling sensor heating for O2 sensor	=TRUE		
					(

ECU is not in POST DRIVE state	=TRUE
and	
Battery Voltage	<16.5(V)
and	
Engine start is completed	=TRUE
)	
and	
(
(
Dew point end is reached	=TRUE
(
(
Integrated heat release since engine start	>(b)*(((c)*(d)) + 1)
(b) Downstream O2 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #15)	=200 to 2200(kJ)
(c) Instance of dew point end class of sensor 2 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #16)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 4)	
)	
and	
Dew point end is reached at upstream of catalyst	
(
Integrated heat release since engine start	>(b) * (((c) * (d)) + 1)
(b) Upstream O2 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #11)	=10 to 500(kJ)
(c) Instance of dew point end class of sensor 1 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #12)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 3)	
)	

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) for time	>10(s)		
) OR			
				(Battery voltage	<15(V)		
				OR			
				(Environmental temperature and Ignition is ON	>3003(°C)		
				for time	=TRUE >0(s)		
)			
				) for time	>0(s)		
				) Basic enable conditions met	=see sheet enable tables		
				No Pending or Confirmed DTCs	=see sheet inhibit tables		
P0037	Diagnoses the HO2S Heater Control Bank 1 Sensor 2 low side driver circuit for circuit low faults	Voltage low during driver off state (indicates short-to-ground)	Short-to-ground: < 0.5 Q impedance between signal and controller ground(-)	General enabling condition for powerstage diagnosis	=TRUE	0.1(s)	2 Trip
				(Battery voltage	<25.5(V)		
				Battery voltage	>8.9(V)		
				Engine speed	>80(rpm)		
				) Conditions for enabling sensor heating for O2 sensor	=TRUE		
				(ECU is not in POST DRIVE state	=TRUE		
				and Battery Voltage	<16.5(V)		
				and Engine start is completed	=TRUE		
				) and			
				((Dew point end is reached	=TRUE		
				((Integrated heat release since engine start	>(b)'(((c)'(d)) + 1)		
				(b) Downstream O2 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #15)	200 to 2200(kJ)		

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(c) Instance of dew point end class of sensor 2 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #16)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 4)) and Dew point end is reached at upstream of catalyst (Integrated heat release since engine start	>(b)*(((c)*(d)) + 1)
(b) Upstream O2 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #11)	=10 to 500(kJ)
(c) Instance of dew point end class of sensor 1 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #12)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 3))) for time	>10(s)
) OR (Battery voltage	<15(V)
OR { Environmental temperature and Ignition is ON for time	>3003(°C) =TRUE >0(s)
)) for time	>0(s)
) Basic enable conditions met	=see sheet enable tables
No Pending or Confirmed DTCs	=see sheet inhibit tahlp.q

P0038	Diagnoses the HO2S Heater Control Bank 1 Sensor 2 low side driver circuit for circuit high faults	Voltage high during driver on state (indicates short-to-power)	Short-to-power: < 0.5 Q impedance between signal and controller power	General enabling condition for powerstage diagnosis	=TRUE	0.1(s)	2 Trip
				(Battery voltage Battery voltage Engine speed)	<25.5(V) >8.9(V) >80(rpm)		
				Conditions for enabling sensor heating for 02 sensor	=TRUE		
				{ ECU is not in POST DRIVE state and Battery Voltage and Engine start is completed }	=TRUE <16.5(V) =TRUE		
				and ((Dew point end is reached ((Integrated heat release since engine start	=TRUE >(b)'(((c)'(d)) + 1)		
				(b) Downstream 02 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #15)	=200 to 2200(kJ)		
				(c) Instance of dew point end class of sensor 2 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #16)	=0 to 0.5		
				(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 4)) and Dew point end is reached at upstream of catalyst (Integrated heat release since engine start	>(b)'(((c)'(d)) + 1)		

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				(b) Upstream O2 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #11)	=10 to 500(kJ)		
				(c) Instance of dew point end class of sensor 1 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #12)	=0 to 0.5		
				(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 3)			
)			
				) for time	>10(s)		
				) OR			
				(Battery voltage	<15(V)		
				OR			
				(Environmental temperature and Ignition is ON	>3003(°C)		
				for time	=TRUE		
				)	>0(s)		
)			
				) for time	>0(s)		
)			
				Basic enable conditions met	=see sheet enable tables		
				No Pending or Confirmed DTCs	=see sheet inhibit tables		
P0056	Diagnoses the HO2S Heater Control Bank 2 Sensor 2 low side driver circuit for open circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuits 200 K Q impedance between ECU pin and load	General enabling condition for powerstage diagnosis	=TRUE	0.1(s)	2 Trip
				(Battery voltage	<25.5(V)		
				Battery voltage	>8.9(V)		
				Engine speed	>80(rpm)		
)			
				Conditions for enabling sensor heating for O2 sensor	=TRUE		
				(ECU is not in POST DRIVE state and	=TRUE		
				Battery Voltage	<16.5(V)		

and	
Engine start is completed	=TRUE
)	
and	
(
(
Dew point end is reached	=TRUE
(
(
Integrated heat release since engine start	$>(b)*(((c)*(d)) + 1)$
(b) Downstream 02 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #17)	=200 to 2200(kJ)
(c) Instance of dew point end class of sensor 2 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #18)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 4)	
)	
and	
Dew point end is reached at upstream of catalyst	
(
Integrated heat release since engine start	$>(b)*(((c)*(d)) + 1)$
(b) Downstream 02 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #13)	=10 to 500(kJ)
(c) Instance of dew point end class of sensor 1 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #14)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor	
)	
)	
for time	>10(s)

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) OR V Battery voltage OR (Environmental temperature and Ignition is ON for time)) for time) Basic enable conditions met No Pending or Confirmed DTCs	<15(V) >3003(°C) =TRUE >0(s) >0(s) =see sheet enable tables =see sheet inhibit tables		
P0057	Diagnoses the HO2S Heater Control Bank 2 Sensor 2 low side driver circuit for circuit low faults	Voltage low during driver off state (indicates short-to-ground)	Short-to-ground: <0.5 Q impedance between signal and controller ground	General enabling condition for powerstage diagnosis	=TRUE	0.1(s)	2 Trip
				(Battery voltage Battery voltage Engine speed) Conditions for enabling sensor heating for O2 sensor (ECU is not in POST DRIVE state and Battery Voltage and Engine start is completed) and ((Dew point end is reached ((Integrated heat release since engine start	<25.5(V) >8.9(V) >80(rpm) =TRUE =TRUE <16.5(V) =TRUE >(b)'(((c)'(d)) + 1)		
				(b) Downstream O2 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #17)	=200 to 2200(kJ)		

(c) Instance of dew point end class of sensor 2 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #18)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 4)) and Dew point end is reached at upstream of catalyst (Integrated heat release since engine start	>(b) * (((c) * (d)) + 1)
(b) Downstream O2 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #13)	=10to500(kJ)
(c) Instance of dew point end class of sensor 1 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #14)	=0 to 0.5
(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 3))) for time	>10(s)
) OR (Battery voltage OR (Environmental temperature and Ignition is ON for time	<15(V) >3003(°C) =TRUE >0(s)
)) for time	>0(s)
) Basic enable conditions met	=see sheet enable tables

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				No Pending or Confirmed DTCs	=see sheet inhibit tables		
P0058	Diagnoses the HO2S Heater Control Bank 2 Sensor 2 low side driver circuit for circuit high faults	Voltage high during driver on state (indicates short-to-power)	Short-to-power: < 0.5 Qimpedance between signal and controller power	General enabling condition for powerstage diagnosis	=TRUE	0.1(s)	2 Trip
				(Battery voltage Battery voltage Engine speed)	<25.5(V) >8.9(V) >80(rpm)		
				Conditions for enabling sensor heating for O2 sensor	=TRUE		
				(ECU is not in POST DRIVE state and Battery Voltage and Engine start is completed) and	=TRUE <16.5(V) =TRUE		
				((Dew point end is reached ((Integrated heat release since engine start	=TRUE >(b)'(((c)'(d)) + 1)		
				(b) Downstream O2 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #17)	=200 to 2200(kJ)		
				(c) Instance of dew point end class of sensor 2 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #18)	=0 to 0.5		
				(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 4)) and Dew point end is reached at upstream of catalyst (

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					Integrated heat release since engine start	>(b)*(((c)*(d)) + 1)		
					(b) Downstream 02 sensor heat threshold for release of heating (kJ) (see Look-Up-Table #13)	=10 to 500(kJ)		
					(c) Instance of dew point end class of sensor 1 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature (see Look-Up-Table #14)	=0 to 0.5		
					(d) Number of drive cycles without reaching dew point end of downstream sensor (limited to max of 3))) for time	>10(s)		
					) OR (Battery voltage	<15(V)		
					OR (Environmental temperature and Ignition is ON for time	>3003(°C) =TRUE >0(s)		
					) ) for time	>0(s)		
					) Basic enable conditions met	=see sheet enable tables		
					No Pending or Confirmed DTCs	=see sheet inhibit tables		
24. ENGINE COOLING SYSTEM	P0128	Compares the measured engine coolant temperature with the modeled engine coolant temperature during engine warm-up	Engine coolant temperature difference between the model and the measured: (a) - (b) (a) the modeled engine coolant temperature (b) the measured engine coolant temperature	>5(°C)	measured engine coolant temperature	<59.86(°C)	20(s)	2 Trip
					Ignition key on	=True		
					Time since engine running	>5(s)		
					Minium engine coolant temperature for the current trip	<39.06(°C)		
					measured ambient temperature	>-7.04(°C)		
					Engine running time	<2400(s)		

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Regulating engine coolant
temperature : 70 degC

monitoring delay time since engine start (see Look-Up-Table #10)	>10 to 60(s)
Engine coolant temperature increase	>0.3(°C)
PT1 filtered average vehicle speed PT1 time constant	>6.22(mph) =100(s)
Heat to engine coolant	>6(°C)
calculation of the model temperature: $((a) + ((b) * (c)) + (d))$	$= ((a) + ((b) * (c)) + (d))$
(a) temperature increment depending on inner torque and ambient temperature (see Look-Up-Table #8)	=0 to 0.27(deg C/s)
(b) Correction factor dependent on vehicle speed and ambient temperature (see Look-Up-Table #9)	=1 to 1.16
(c) correction factor for temperature difference over the radiator (see Look-Up-Table #7)	=0 to 0.1(deg C/s)
(d) temperature model correction during DFCO	$= (d1) * (d2)$
(d1) temperatue model correction dependent on vehicle speed and ambient temperature (see Look-Up-Table #6)	= -0.081 to -0.0000488(deg C/s)
(d2) correction factor	=1

Or

Continuously compares the measured engine coolant temperature with the modeled engine coolant temperature after warm-up monitoring	Engine coolant temperature difference between the model and the measured: (a) - (b)	>5(°C)	measured engine coolant temperature	<59.86(°C)
	(a) the modeled engine coolant temperature		Ignition key on	=True
	(b) the measured engine coolant temperature		Time since engine running	>5(s)
			Minium engine coolant temperature for the current trip	<39.06(°C)

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Regulating engine coolant
temperature : 70 degC

measured ambient temperature	>-7.04(°C)
monitoring delay time since engine start (see Look-Up-Table #10)	>10 to 60(s)
PT1 filtered average vehicle speed	>6.22(mph)
PT1 time constant	=100(s)
Heat to engine coolant	>6(°C)
calculation of the model	= ((a) + ((b) * (c)) + (d))
(a) temperature increment depending on inner torque and ambient temperature (see Look-Up-Table #8)	=0 to 0.27(deg C/s)
(b) Correction factor dependent on vehicle speed and ambient temperature (see Look-Up-Table #9)	=1 to 1.16
(c) correction factor for temperature difference over the radiator (see Look-Up-Table #7)	=0 to 0.1(deg C/s)
(d) temperature model correction during DFCO	=(d1)*(d2)
(d1) temperatue model correction dependent on vehicle speed and ambient temperature (see Look-Up-Table #6)	=-0.081 to - 0.0000488(deg C/s)
(d2) correction factor	=1
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable tables

P0118	Detects if the measured Engine Coolant Temperature sensor voltage is greater than a calibrated threshold for calibrated time.	Engine Coolant Temperature sensor voltage	>4.9142(V)	Ignition is ON	=TRUE	2(s)	2 Trip
		Same as		Basic enable conditions met	see sheet enable tables		
		Engine Coolant Temperature	<-46.6(°C)				

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P0117	Detects if the measured Engine Coolant Temperature sensor voltage is less than a calibrated threshold for calibrated time.	Engine Coolant Temperature sensor voltage	<0.103(V)	Ignition is ON	=TRUE	2(s)	2 Trip
		Same as		Basic enable conditions met	=see sheet enable tables		
		Engine Coolant Temperature	>156(°C)				
P0119	Engine Coolant Temperature Sensor 1 - Circuit continuity check - loose contact detection	Difference between raw sensor value and low-pass filtered raw sensor value of engine coolant temperature sensor 1	>0.2(V)	Engine Coolant Temperature Sensor 1 Circuit Low	=FALSE	20(s)	2 Trip
				Engine Coolant Temperature Sensor 1 Circuit High and Basic enable conditions are met	=FALSE =see sheet enable tables		
P0116	Detects if the difference between mean valve and filtered valve of engine coolant temperature sensor during cold start is greater than a calibrated threshold for a	Difference between mean value and filtered value of engine coolant temperature sensor 1	>14.96(°C)	Ignition is on	=TRUE	1(s)	1 Trip
				for time Combustion engine is running	>1(s) =TRUE		
				(Engine is in synchronised state and engine is rotating	=TRUE		
				for time (Measured engine stop time	=1(s) >28800(s)		
				(Calculated engine stop time is exact value	=TRUE		
				OR			
				Minimum engine off time is calculated)	=TRUE		
				for time)	<3(s)		
				((Block heater is activated	=FALSE		
				Diagnosis is inhibited by other temperature sensor errors)	=FALSE		
				for time)	>0(s)		
				No pending or confirmed DTCs	=see sheet Inhibit tables		

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				Basic enable conditions are met	=see sheet enable tables		
P0116	Detects if the difference between filtered valve and mean valve of engine coolant temperature sensor during cold start greater than calibrated threshold for an calibrated time	Difference between filtered value and mean value of engine coolant temperature sensor 1	>14.96(°C)	Ignition is on	=TRUE	1(s)	1 Trip
				for time	>1(s)		
				Combustion engine is running	=TRUE		
				(
				Engine is in synchronised state and engine is rotating	=TRUE		
				for time	=1(s)		
)			
				(
				(Measured engine stop time	>28800(s)		
				(	=TRUE		
				Calculated engine stop time is exact value			
				OR			
				Minimum engine off time is calculated	=TRUE		
)			
)			
				for time	<3(s)		
				(
				Block heater is activated	=FALSE		
				Diagnosis is inhibited by other temperature sensor errors	=FALSE		
)			
				for time	>0(s)		
				No pending or confirmed DTCs	=see sheet Inhibit tables		
				Basic enable conditions are met	=see sheet enable tables		
)			
P01E7	Monitoring ECT Sensor 3 for circuit Intermittent	Loss connection error for Coolant Temperature counter	>5(s)	Ignition is ON	=TRUE	0.1(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
				Max Error in Signal Range Check diagnosis	=FALSCH		
				Max Healing in Signal Range Check	=FALSCH		

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					Auxiliary coolant temperature sensor Signal Availability	=TRUE		
	P01E6	Monitoring ECT Sensor 3 for circuit High	Sensor voltage value of coolant upstream temperature at Auxiliary Radiator Outlet	>4.96(V)	Ignition is ON	=TRUE	0.1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P01E5	Monitoring ECT Sensor 3 for circuit Low	Sensor voltage value of coolant upstream temperature at Auxiliary Radiator Outlet	<0.079(V)	Ignition is ON	=TRUE	0.1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P2186	Monitoring ECT Sensor 3 for circuit Intermittent	Loss connection error for Coolant Tempeture counter	>5(s)	Ignition is ON	=TRUE	0.1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
					Max Error in Signal Range Check diagnosis	=FALSCH		
					Max Healing in Signal Range Check diagnosis	=FALSCH		
					Auxiliary coolant temperature sensor Signal Availability	=TRUE		
	P2185	Monitoring ECT Sensor 3 for circuit High	Sensor voltage value of coolant upstream temperature at Auxiliary Radiator Outlet	>4.96(V)	Ignition is ON	=TRUE	0.1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P2184	Monitoring ECT Sensor 3 for circuit Low	Sensor voltage value of coolant upstream temperature at Auxiliary Radiator Outlet	<0.079(V)	Ignition is ON	=TRUE	0.1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
25. COLD START STRATEGY	P050A	Path 1: Monitoring of idle control for overspeed during catalyst heating	Deviation of idle speed precontrol (set point - current)	<-200(rpm)	ECU Sub-State in DRIVE	=TRUE	10(s)	2 Trip
			OR		Engine start has finished	=TRUE		
			Number of fuel cut-out phases	>255(counts)	(No external torque demand (engine is running in idle))	=TRUE		
					for time	>0(s)		
					Catalyst heating request by cold engine	=TRUE		
					((Condition: Request of catalyst heating in case of first start of combustion engine - Initialisation phase (	=TRUE		

First start of combustion in driving cycle	=FALSE
Engine is not running	=TRUE
Desired value for integrated air mass by catalyst heating by cold engine	>0
Intake air temperature in manifold	> -48.04(°C)
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
Release of catalyst heating request by ambient temperature)	=TRUE
Condition: Request catalyst heating by cold engine (calculation till end of start is reached)	=TRUE
(
(Off time of start-end recognition for customer	=TRUE
OR	
(
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
)	
)	
(
End of start is reached	=FALSE
Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE
Difference between desired value for integrated air mass by catalyst heating by cold engine and residual heat inside catalyst by start of combustion engine	>200.18(g)
)	
OR	
(

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Condition for evaluation of temperature in first brick of front catalyst for catalyst heating	=TRUE
{	
End of start is reached	=FALSE
Off time of start-end recognition for customer	=TRUE
}	
Time counter at end of start from last driving cycle	>0(s)
Engine off time based on start-end recognition	<300(s)
/	
Temperature inside first brick of front catalyst during start (see Look-Up-Table #64)	<400 to 440(°C)
)	
Altitude correction factor	>0.71
)	
Limp-home operation is not active	=TRUE
Safety fuel cut off is not active	=TRUE
Valid crankshaft signal is present	=TRUE
Altitude correction factor	>0.688
Vehicle speed	=0(mph)
Engine coolant temperature	<66(°C)
Engine coolant temperature	>-12(°C)
Time after end of start	>2(s)
Difference between idle speed during catalyst heating and idle speed without catalyst heating	>0(rpm)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enabling conditions are met	=see sheet enable tables

P050A	Path 2: Monitoring of idle control for underspeed during catalyst heating	Deviation of idle speed precontrol (set point - current)	>100(rpm)	ECU Sub-State in DRIVE	=TRUE	10(s)	2 Trip
				Engine start has finished	=TRUE		
				(	=TRUE		
				No external torque demand (engine is running in idle)			
)			
				for time	>0(s)		
				Catalyst heating request by cold engine	=TRUE		
				(
				(

Condition: Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE
(
First start of combustion in driving cycle	=FALSE
Engine is not running	=TRUE
Desired value for integrated air mass by catalyst heating by cold engine	>0.0
Intake air temperature in manifold	> -48.04(°C)
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
Release of catalyst heating request by ambient temperature	=TRUE
)	
Condition: Request catalyst heating by cold engine (calculation till end of start is reached)	=TRUE
(
(
Off time of start-end recognition for customer	=TRUE
OR	
(
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
)	
)	
(
End of start is reached	=FALSE
Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE

Difference between desired value for integrated air mass by catalyst heating by cold engine and residual heat inside catalyst by start of combustion engine	>200.18(g)
)	
OR	
(
Condition for evaluation of temperature in first brick of front catalyst for catalyst heating	=TRUE
{	
End of start is reached	=FALSE
Off time of start-end recognition for customer	=TRUE
)	
Time counter at end of start from last driving cycle	>0(s)
Engine off time based on start-end recognition	<300(s)
^	
Temperature inside first brick of front catalyst during start (see Look-Up-Table #64)	<400 to 440(°C)
)	
Altitude correction factor	>0.71
)	
Limp-home operation is not active	=TRUE
Safety fuel cut off is not active	=TRUE
)	
Valid crankshaft signal is present	=TRUE
Altitude correction factor	>0.688
Vehicle speed	=0(mph)
Engine coolant temperature	<66(°C)
Engine coolant temperature	>-12(°C)
Time after end of start	>2(s)
Difference between idle speed during catalyst heating and idle speed without catalyst heating	>0(rpm)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enabling conditions are met	=see sheet enable tables

P050B	Path 1 : Diagnosis of Cold Start Ignition Timing Performance in Engine Idle Mode	mean deviation of actual ignition efficiency and desired catalyst heating ignition efficiency during idle current time for catalyst heating during cold start during idle	calculated value	Catalyst heating activated	=TRUE	2(s)	2 Trip
			>10(s)	(

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End of start is reached	=TRUE
Homogenous mode of operation is activated	=TRUE
Robust engine run after initial fuelling	=FALSE
(Engine coolant temperature	>39.8(°C)
OR	
Time counter at end of start	>120(s)
OR	
(Absolute value of fuel rail pressure	>4(MPa)
Engine is running	=TRUE
for time	=25.5(s)
)	
OR	
Vehicle speed	>0(mph)
OR	
Initial fuelling stopped	=TRUE
)	
(Catalyst heating request for end of line test	=TRUE
OR	
Catalyst heating request by cold engine	=TRUE
(
(Condition: Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE
(
First start of combustion in driving cycle	=FALSE
Engine is not running	=TRUE
Desired value for integrated air mass by catalyst heating by cold engine	>0.0
Intake air temperature in manifold	> -48.04(°C)
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
Release of catalyst heating request by ambient temperature	=TRUE

Condition: Request catalyst heating by cold engine (calculation till end of start is reached)	=TRUE
(
(
Off time of start-end recognition for customer	=TRUE
OR	
(
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
)	
)	
(
End of start is reached	=FALSE
Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE
Difference between desired value for integrated air mass by catalyst heating by cold engine and residual heat inside catalyst by start of combustion engine	>200.18(g)
)	
OR	
(
Condition for evaluation of temperature in first brick of front catalyst for catalyst heating	=TRUE
(
End of start is reached	=FALSE
Off time of start-end recognition for customer	=TRUE
)	
Time counter at end of start from last driving cycle	>0(s)
Engine off time based on start-end recognition	<300(s)
)	
Temperature inside first brick of front catalyst during start (see Look-Up-Table #64)	<400 to 440(°C)
)	
Altitude correction factor	>0.71

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Reset request for catalyst heating by cold engine	=FALSE
(
Catalyst heating activated	=TRUE
Catalyst heating request by cold engine	=TRUE
(
Relative amount of integrated air mass at catalyst heating	>0.4
OR	
Duration of catalyst heating during cold start	>A * B
(A * B) where in	
(A) maximum time for active catalyst heating in dependence from altitude and engine start temperature	=60(s)
(B) weighing map for consideration of catalyst heating for finishing catalyst heating	=1
OR	
(
Catalyst heating break off in case of permanent idle	=FALSE
Catalyst heating activated	=FALSE
Idle speed	=TRUE
for time	>60(s)
)	
OR	
(
Catalyst heating request by cold engine	=TRUE
Catalyst heating request by cold engine (calculation till end of start is reached)	=FALSE
)	
)	
Engine is running	=TRUE
for time	=1(s)
)	
(
(
Catalyst heating activated	=FALSE
OR	
Terminating factor for catalyst heating	>0.0
)	
Terminating factor for catalyst	>0

)	
)	
)	
OR	
Catalyst heating request in case of warming catalyst	=TRUE
(
Engine operates in catalyst warming mode	=TRUE
Factor for weighting catalyst heating request for catalysator warming	>0.01
(
Engine is running	=TRUE
Engine speed	<A - B
(A - B) where in	
(A) maximum engine speed for catalyst warming	=3000(rpm)
(B) hysteresis for engine speed for the release of catalyst warming	=0(rpm)
Catalyst heating request by cold engine	=FALSE
Time counter at first end of start in cycle	>0(s)
Lambda for component protection is active	=FALSE
(
Lambda closed loop control (upstream catalyst), bank 1	=TRUE
Engine coolant temperature	>-273.04(°C)
)	
OR	
(
Lambda closed loop control (upstream catalyst), bank 1	=FALSE
Engine coolant temperature	>-273.04(°C)
)	
Relative air mass	<A - B
(A - B) where in	
(A) maximum relative air charge for the release of catalyst warming	=1535(%)
(B) hysteresis for maximum relative air charge for the release of catalyst warming	=0(%)

)	
(
Maximum of two catalyst temperatures in Bank 2	<A- B
(A - B) where in	
(A) maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required	=3003(°C)
(B) hysteresis of maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required	=0(°C)
OR	
Maximum of two catalyst temperatures in Bank 1	<A- B
(A - B) where in	
(A) maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required	=3003(°C)
(B) hysteresis of maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required	=0(°C)
)	
Catalyst heating request by cold engine	=TRUE
(
(
Condition: Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE
(
First start of combustion in driving cycle	=FALSE
Engine is not running	=TRUE
Desired value for integrated air mass by catalyst heating by cold engine	>0.0
Intake air temperature in manifold	> -48.04(°C)
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)

Release of catalyst heating request by ambient temperature)	=TRUE
Condition: Request catalyst heating by cold engine (calculation till end of start is reached) (	=TRUE
Off time of start-end recognition for customer)	=TRUE
OR (
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start)	<3277(°C)
)	
End of start is reached	=FALSE
Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE
Difference between desired value for integrated air mass by catalyst heating by cold engine and residual heat inside catalyst by start of combustion engine	>200.18(g)
)	
OR (
Condition for evaluation of temperature in first brick of front catalyst for catalyst heating (	=TRUE
End of start is reached	=FALSE
Off time of start-end recognition for customer	=TRUE
Time counter at end of start from last driving cycle	>0(s)
Engine off time based on start-end recognition)	<300(s)
Temperature inside first brick of front catalyst during start (see Look-Up-Table #64)	<400 to 440(°C)

)	
Altitude correction factor	>0.71
)	
Reset request for catalyst heating by cold engine	=FALSE
{	
Catalyst heating activated	=TRUE
Catalyst heating request by cold engine	=TRUE
{	
Relative amount of integrated air mass at catalyst heating	>0.4
OR	
Duration of catalyst heating during cold start	> A * B
(A * B) where in	
(A) maximum time for active catalyst heating in dependence from altitude and engine start temperature	=60(s)
(B) weighing map for consideration of catalyst heating for finishing catalyst heating	=1
OR	
{	
Catalyst heating break off in case of permanent idle	=FALSE
Catalyst heating activated	=FALSE
Idle speed	=TRUE
for time	>60(s)
)	
OR	
{	
Catalyst heating request by cold engine	=TRUE
Catalyst heating request by cold engine (calculation till end of start is reached)	=FALSE
)	
)	
Engine is running	=TRUE
for time	=1(s)
)	
{	
{	
Catalyst heating activated	=FALSE
OR	
Terminating factor for catalyst	>0.0

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) Terminating factor for catalyst heating	>0		
))))) No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enabling conditions are met	=see sheet enable tables		
P2C20	Detects if High Pressure fuel system control deviation of rail pressure during cold start is less than maximum threshold for calibrated period of time	Filtered value of rail pressure control deviation	<-3(MPa)	Conditions for Plausibility check of Fuel supply system (	=TRUE	7(s)	1 Trip
P32AB				Airbag is activated Rail pressure sensor voltage is not plausible Battery voltage Mean value of effective relative volumetric injected fuel mass Mean value of effective relative volumetric injected fuel mass Initial fueling mode is active) Time counter at end of start Conditions for reset of high-pressure regulation ((((Actual number of cylinders with injection cut-off Desired number of cylinders with injection cut-off OR End of start is reached) OR Difference between the actual rail pressure and filtered rail pressure setpoint (A+B) where in: (A) rail pressure offset during fuel cutoff for activation demand control	=FALSE =FALSE <655.34(V) >7.734(%) <3072(%) =FALSE >2(s) =FALSE <8 <8 =FALSE >(A+B)(MPa) =1(MPa)	7(s)	1 Trip

(B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cut off is active	=1(MPa)
)	
(
(
High pressure pump is active	=TRUE
(
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
(
High pressure pump is not active	=FALSE
End of start is reached	=TRUE
))	
{	
Start of injection enabled	=TRUE
(
(
Engine start is in pre-injection mode	=TRUE
Injection counter	>(A+B)
(A+B) where in:	
(A) Number of injections for enabling high-pressure controller	=2
(B) Number of cylinders	=8
)	
OR	
{	
Engine start is not in pre-injection mode	=FALSE
Injection counter	>2
))	
)	
(
Engine state of synchronisation for rail pressure control activation	>30
{	
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
,	

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)	
for time	=7(s)
Conditions for high pressure fuel system diagnosis during cold start	
(
(
Rail pressure setpoint	<36(MPa)
Rail pressure setpoint	>6(MPa)
)	
for time	=0.2(s)
Absolute of difference between rail pressure set point and its filtered value	<15(MPa)
for time	=0.2(s)
Engine speed	>0(rpm)
Coolant temperature at engine output	>-3550(°C)
)	
Catalyst heating activated	=TRUE
(
End of start is reached	=TRUE
Homogenous mode of operation is activated	=TRUE
Robust engine run after initial fuelling	=FALSE
(
Engine coolant temperature	>39.8(°C)
OR	
Time counter at end of start	>120(s)
OR	
(
Absolute value of fuel rail pressure	>4(MPa)
Engine is running	=TRUE
)	
for time	=25.5(s)
OR	
Vehicle speed	>0(mph)
OR	
Initial fuelling stopped	=TRUE
)	
(
Catalyst heating request for end of line test	=TRUE
OR	
Catalyst heating request by cold engine	=TRUE
(
(

Condition: Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE
(
First start of combustion in driving cycle	=FALSE
Engine is not running	=TRUE
Desired value for integrated air mass by catalyst heating by cold engine	>0.0
Intake air temperature in manifold	> -48.04(°C)
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
Release of catalyst heating request by ambient temperature	=TRUE
)	
Condition: Request catalyst heating by cold engine (calculation till end of start is reached)	=TRUE
(
(
Off time of start-end recognition for customer	=TRUE
OR	
(
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
)	
)	
(
End of start is reached	=FALSE
Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE

Difference between desired value for integrated air mass by catalyst heating by cold engine and residual heat inside catalyst by start of combustion engine	>200.18(g)
)	
OR	
(
Condition for evaluation of temperature in first brick of front catalyst for catalyst heating	=TRUE
{	
End of start is reached	=FALSE
Off time of start-end recognition for customer	=TRUE
)	
Time counter at end of start from last driving cycle	>0(s)
Engine off time based on start-end recognition	<300(s)
)	
Temperature inside first brick of front catalyst during start (see Look-Up-Table #64)	<400 to 440(°C)
)	
Altitude correction factor	>0.71
)	
Reset request for catalyst heating by cold engine	=FALSE
{	
Catalyst heating activated	=TRUE
Catalyst heating request by cold engine	=TRUE
{	
Relative amount of integrated air mass at catalyst heating	>0.4
OR	
Duration of catalyst heating during cold start	>A * B
(A * B) where in	
(A) maximum time for active catalyst heating in dependence from altitude and engine start temperature	=60(s)
(B) weighing map for consideration of catalyst heating for finishing catalyst heating	=1
OR	
(

Catalyst heating break off in case of permanent idle	=FALSE
Catalyst heating activated	=FALSE
Idle speed for time	=TRUE >60(s)
)	
OR	
(Catalyst heating request by cold engine	=TRUE
Catalyst heating request by cold engine (calculation till end of start is reached)	=FALSE
)	
) Engine is running	=TRUE
for time	=1(s)
)	
(
(Catalyst heating activated	=FALSE
Terminating factor for catalyst heating	>0.0
)	
Terminating factor for catalyst heating	>0
)	
)	
OR	
Catalyst heating request in case of warming catalyst	=TRUE
(
Engine operates in catalyst warming mode	=TRUE
Factor for weighting catalyst heating request for catalysator warming	>0.01
(
Engine is running	=TRUE
Engine speed (A - B) where in (A) maximum engine speed for catalyst warming	<A - B =3000(rpm)
(B) hysteresis for engine speed for the release of catalyst warming	=0(rpm)

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Catalyst heating request by cold engine	=FALSE
Time counter at first end of start in cycle	>0(s)
Lambda for component protection is active	=FALSE
(
(
Lambda closed loop control (upstream catalyst), bank 1	=TRUE
Engine coolant temperature	>-273(°C)
)	
OR	
(
Lambda closed loop control (upstream catalyst), bank 1	=FALSE
Engine coolant temperature	>-273(°C)
)	
)	
Relative air mass	<A - B
(A - B) where in	
(A) maximum relative air charge for the release of catalyst warming	=1535(%)
(B) hysteresis for maximum relative air charge for the release of catalyst warming	=0(%)
)	
)	
)	
Maximum of two catalyst temperatures in Bank 2	<A - B
(A - B) where in	
(A) maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required	=3003(°C)
(B) hysteresis of maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required	=0(°C)
OR	
Maximum of two catalyst temperatures in Bank 1	<A - B
(A - B) where in	

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(A) maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required =3003(°C)

(B) hysteresis of maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required =0(°C)

)

)

No pending or confirmed DTCs =see sheet inhibit table

Basic enable conditions met =see sheet enable table

P2C1F	Detects if High Pressure fuel system control deviation of rail pressure during cold start is greater than minimum threshold for calibrated period of time	Filtered value of rail pressure control deviation	>■3(MPa)	Airbag is activated	=FALSE	5(s)	1 Trip
P32AA				Rail pressure sensor voltage is not plausible	=FALSE	5(s)	1 Trip
				Battery voltage	<655.34(V)		
				Mean value of effective relative volumetric injected fuel mass	>7.734(%)		
				Mean value of effective relative volumetric injected fuel mass	<3072(%)		
				Initial fueling mode is active	=FALSE		
				Time counter at end of start	>2(s)		
				Conditions for reset of high-pressure regulation	=FALSE		
				(
				(
				(
				(
				Actual number of cylinders with injection cut-off	<8		
				Desired number of cylinders with injection cut-off	<8		
)			
				OR			
				End of start is reached	=FALSE		
)			
				OR			
				Difference between the actual rail pressure and filtered rail pressure setpoint	>(A+B)(MPa)		
				(A+B) where in:			

(A) rail pressure offset during fuel cutoff for activation demand control	=1(MPa)
(B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cut off is active	=1(MPa)
)	
(
(
High pressure pump is active	=TRUE
(
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
High pressure pump is not active	=FALSE
End of start is reached	=TRUE
)	
{	
Start of injection enabled	=TRUE
{	
Engine start is in pre-injection mode	=TRUE
Injection counter	>(A+B)
(A+B) where in:	=2
(A) Number of injections for enabling high-pressure controller	
(B) Number of cylinders	=8
OR	
Engine start is not in pre-injection mode	=FALSE
Injection counter	>2
)	
)	
(
Engine state of synchronisation for rail pressure control activation	>30
{	
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
,	

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)	
for time	=7(s)
Conditions for high pressure fuel system diagnosis during cold start	
(
(
Rail pressure setpoint	<36(MPa)
Rail pressure setpoint	>6(MPa)
)	
for time	=0.2(s)
Absolute of difference between rail pressure set point and its filtered value	<15(MPa)
for time	=0.2(s)
Engine speed	>0(rpm)
Coolant temperature at engine output	>-3550(°C)
)	
Catalyst heating activated	=TRUE
(
End of start is reached	=TRUE
Homogenous mode of operation is activated	=TRUE
Robust engine run after initial fuelling	=FALSE
(
Engine coolant temperature	>39.8(°C)
OR	
Time counter at end of start	>120(s)
OR	
(
Absolute value of fuel rail pressure	>4(MPa)
Engine is running	=TRUE
)	
for time	=25.5(s)
OR	
Vehicle speed	>0(mph)
OR	
Initial fuelling stopped	=TRUE
)	
(
Catalyst heating request for end of line test	=TRUE
OR	
Catalyst heating request by cold engine	=TRUE
(
(

Condition: Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE
(
First start of combustion in driving cycle	=FALSE
Engine is not running	=TRUE
Desired value for integrated air mass by catalyst heating by cold engine	>0.0
Intake air temperature in manifold	> -48.04(°C)
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
Release of catalyst heating request by ambient temperature	=TRUE
)	
Condition: Request catalyst heating by cold engine (calculation till end of start is reached)	=TRUE
(
(
Off time of start-end recognition for customer	=TRUE
OR	
(
Difference between engine coolant temperatures in downstream and at engine stop	>-3277(°C)
Absolute difference between intake air temperature in manifold and engine coolant temperature in downstream during start	<3277(°C)
)	
)	
(
End of start is reached	=FALSE
Request of catalyst heating in case of first start of combustion engine - Initialisation phase	=TRUE

Difference between desired value for integrated air mass by catalyst heating by cold engine and residual heat inside catalyst by start of combustion engine	>200.18(g)
)	
OR	
(
Condition for evaluation of temperature in first brick of front catalyst for catalyst heating	=TRUE
{	
End of start is reached	=FALSE
Off time of start-end recognition for customer	=TRUE
)	
Time counter at end of start from last driving cycle	>0(s)
Engine off time based on start-end recognition	<300(s)
)	
Temperature inside first brick of front catalyst during start (see Look-Up-Table #64)	<400 to 440(°C)
)	
Altitude correction factor	>0.71
)	
Reset request for catalyst heating by cold engine	=FALSE
{	
Catalyst heating activated	=TRUE
Catalyst heating request by cold engine	=TRUE
{	
Relative amount of integrated air mass at catalyst heating	>0.4
OR	
Duration of catalyst heating during cold start	>A * B
(A * B) where in	
(A) maximum time for active catalyst heating in dependence from altitude and engine start temperature	=60(s)
(B) weighing map for consideration of catalyst heating for finishing catalyst heating	=1
OR	
(

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Catalyst heating break off in case of permanent idle	=FALSE
Catalyst heating activated	=FALSE
Idle speed for time	=TRUE >60(s)
)	
OR	
(Catalyst heating request by cold engine	=TRUE
Catalyst heating request by cold engine (calculation till end of start is reached)	=FALSE
)	
) Engine is running	=TRUE
for time	=1(s)
)	
(
(Catalyst heating activated	=FALSE
Terminating factor for catalyst heating	>0.0
)	
Terminating factor for catalyst heating	>0
)	
)	
)	
OR	
Catalyst heating request in case of warming catalyst	=TRUE
(
Engine operates in catalyst warming mode	=TRUE
Factor for weighting catalyst heating request for catalysator warming	>0.01
(
Engine is running	=TRUE
Engine speed (A - B) where in (A) maximum engine speed for catalyst warming	<A - B =3000(rpm)
(B) hysteresis for engine speed for the release of catalyst warming	=0(rpm)

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Catalyst heating request by cold engine	=FALSE
Time counter at first end of start in cycle	>0(s)
Lambda for component protection is active	=FALSE
Lambda closed loop control (upstream catalyst), bank 1	=TRUE
Engine coolant temperature	>-273(°C)
)	
OR	
(
Lambda closed loop control (upstream catalyst), bank 1	=FALSE
Engine coolant temperature	>-273(°C)
)	
Relative air mass	<A - B
(A - B) where in	
(A) maximum relative air charge for the release of catalyst warming	=1535(%)
(B) hysteresis for maximum relative air charge for the release of catalyst warming	=0(%)
)	
)	
Maximum of two catalyst temperatures in Bank 2	<A - B
(A - B) where in	
(A) maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required	=3003(°C)
(B) hysteresis of maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required	=0(°C)
OR	
Maximum of two catalyst temperatures in Bank 1	<A - B
(A - B) where in	
(A) maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required	=3003(°C)

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				(B) hysteresis of maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required)) No pending or confirmed DTCs	=0(°C) =see sheet inhibit table		
				Basic enable conditions met	=see sheet enable table		
P2B95	Path1: Detection of faulty injection output while catalyst heating with multiple injections	Ratio of the number of faulty combustions under catalyst heating condition to the number of combustions under catalyst heating condition with multiple injections active	>0.1	ECU is in drive state	=TRUE	0.02(s)	2 Trip
				((Catalyst heating activated (see parameter definition) OR Catalyst heating request by cold engine (see parameter definition) / Condition catalyst heating with desired operation mode for Cold start emission reduction strategy diagnosis Number of combustions under condition catalyst heating with multiple injection) Monitor has not completed this drive cycle (i.e. monitor runs once per trip) No pending or confirmed DTCs Basic enable conditions are met	=FALSE =FALSE =FALSE >100(counts) =TRUE =see sheet Inhibit tables =see sheet enable tables		
P2B95	Path 2: Detecting abnormal injector closing time delay	Error ratio calculated with correctly measured injector closing event per injection for diagnosis of catalyst heating with multiple injections	>0.15	ECU is in drive state	=TRUE	0.02(s)	2 Trip
				((

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injector closing delay of last CVO measurement	>0.00062(s)	Catalyst heating activated	=FALSE
injector closing delay of last CVO measurement	<0.0002(s)	OR	
		Catalyst heating request by cold engine	=FALSE
)	
		Condition catalyst heating with desired operation	=FALSE
		mode for Cold start emission reduction strategy diagnosis	
		time with status of catalyst heating with multiple injections	>9(s)
)	
		Counter of CVO-measurements during catalyst heating	>400(counts)
		Monitor has not completed this drive cycle (i.e. monitor runs once per trip)	=TRUE
		No pending or confirmed DTCs	=see sheet Inhibit tables
		Basic enable conditions are met	=see sheet enable tables

P2B96	Detection of number of injection output while catalyst heating with multiple injections	Ratio of total number of faulty combustion over total number of combustion (during CSERS)	>0.5	ECU is in drive state	=TRUE	0.02(s)	2 Trip
				(
				(
				Catalyst heating activated (see parameter definition)	=FALSE		
				OR			
				Catalyst heating request by cold engine (see parameter definition)	=FALSE		
)			
				Condition catalyst heating with desired operation	=FALSE		
				mode for Cold start emission reduction strategy diagnosis			
				Number of combustions under condition catalyst heating with multiple injection	>100(counts)		
)			

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				Monitor has not completed this drive cycle (i.e. monitor runs once per trip)	=TRUE		
				No pending or confirmed DTCs	=see sheet Inhibit tables		
				Basic enable conditions are met	=see sheet enable tables		
26. VVT SYSTEM	P0011	Monitoring of intake camshaft bank 1 position - Target error	(Actual angle has not reached target value threshold for allowed time within running monitoring cycle	=TRUE	Ignition is on	=TRUE	2 Trip
			For time to reach setpoint	>1(s)	(Oil temperature cylinder head	>-20.04(°C)	
			and		Oil temperature cylinder head	<180(°C)	
			Absolute deviation between the highest (max) / lowest (min) camshaft position and the stored setpoint value at the beginning of the monitoring	<3(deg CrS)	Engine speed (see Look-Up-Table #43)	>16383.5 to 520(rpm)	
			)		Engine speed	<10200(rpm)	
			for a number of events	>4(events)	) ( State governor intake camshaft bank1 is working in closed loop operation	=TRUE	
					Diagnosis is released after engine start for time	>0(s)	
					Battery voltage	>10.9(V)	
					) No pending or confirmed DTCs	=see sheet inhibit tables	
					Basic enable conditions met	=see sheet enable tables	
	P0014	Monitoring of outlet camshaft bank 1 position - Target error	(Actual angle has not reached target value threshold within running monitoring cycle	=TRUE	Ignition is on	=TRUE	2 Trip
			For time to reach setpoint	>1(s)	(Oil temperature cylinder head	>-20.04(°C)	
			AND		Oil temperature cylinder head	<180(°C)	

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		Absolute deviation between the highest (max) / lowest (min) camshaft position and the stored setpoint value at the beginning of the monitoring	<3(deg CrS)	Engine speed (see Look-Up-Table #44)	>16383.5 to 520(rpm)	
		)		Engine speed	<10200(rpm)	
		for a number of events	>4(events)	) ( State governor outlet camshaft bank1 is working in closed loop operation	=TRUE	
				Diagnosis is released after engine start for time	>0(s)	
				Battery voltage	>10.9(V)	
				) No pending or confirmed DTCs	=see sheet inhibit tables	
				Basic enable conditions met	=see sheet enable tables	
P0021	Monitoring of intake camshaft bank 2 position - Target error	(Actual angle has not reached target value threshold within running monitoring cycle	=TRUE	Ignition is on	=TRUE	2 Trip
		For time to reach setpoint	>1(s)	(Oil temperature cylinder head	>-20.04(°C)	
		AND		Oil temperature cylinder head	<180(°C)	
		Absolute deviation between the highest (max) / lowest (min) camshaft position and the stored setpoint value at the beginning of the monitoring	<3(deg CrS)	Engine speed (see Look-Up-Table #43)	>16383.5 to 520(rpm)	
		)		Engine speed	<10200(rpm)	
		for a number of events	>4(events)	) ( State governor intake camshaft bank2 is working in closed loop operation	=TRUE	
				Diagnosis is released after engine start for time	>0(s)	
				Battery voltage	>10.9(V)	
				) No pending or confirmed DTCs	=see sheet inhibit tables	
				Basic enable conditions met	=see sheet enable tables	

P0024	Monitoring of outlet camshaft bank 2 position - Target error	(Actual angle has not reached target value threshold within running monitoring cycle For time to reach setpoint AND Absolute deviation between the highest (max) / lowest (min) camshaft position and the stored setpoint value at the beginning of the monitoring) for a number of events	=TRUE >1(s) <3(deg CrS) >4(events)	Ignition is on (Oil temperature cylinder head Oil temperature cylinder head Engine speed (see Look-Up-Table #44) Engine speed) (State governor outlet camshaft bank2 is working in closed loop operation Diagnosis is released after engine start for time Battery voltage / No pending or confirmed DTCs Basic enable conditions met	=TRUE >-20.04(°C) <180(°C) >16383.5 to 520(rpm) <10200(rpm) =TRUE >0(s) >10.9(V) =see sheet inhibit tables =see sheet enable tables	2 Trip
P000A	Monitoring of intake camshaft bank 1 position - slow response fault	(Actual angle has not reached target value threshold for allowed time within running monitoring cycle For time to reach setpoint and Absolute deviation between the highest (max) / lowest (min) camshaft position and the stored setpoint value at the beginning of the monitoring)	=TRUE >1(s) >3(deg CrS)	Ignition is on (Oil temperature cylinder head Oil temperature cylinder head Engine speed (see Look-Up-Table #43) Engine speed)	=TRUE >-20.04(°C) <180(°C) >16383.5 to 520(rpm) <10200(rpm)	2 Trip

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		for a number of events	>4(events)	(State governor intake camshaft bank1 is working in closed loop operation Diagnosis is released after engine start for time Battery voltage) No pending or confirmed DTCs Basic enable conditions met	=TRUE >0(s) >10.9(V) =see sheet inhibit tables =see sheet enable tables	
P000B	Monitoring of outlet camshaft bank 1 position - slow response fault	(Actual angle has not reached target value threshold within running monitoring cycle For time to reach setpoint AND Absolute deviation between the highest (max) / lowest (min) camshaft position and the stored setpoint value at the beginning of the monitoring) for a number of events	=TRUE >1(s) >3(deg CrS) >4(events)	Ignition is on (Oil temperature cylinder head Oil temperature cylinder head Engine speed (see Look-Up-Table #44) Engine speed) (State governor outlet camshaft bank1 is working in closed loop operation and Diagnosis is released after engine start for time Battery voltage) No pending or confirmed DTCs Basic enable conditions met	=TRUE >-20.04(°C) <180(°C) >16383.5 to 520(rpm) <10200(rpm) =TRUE >0(s) >10.9(V) =see sheet inhibit tables =see sheet enable tables	2 Trip
P000C	Monitoring of intake camshaft bank 2 position - slow response fault	(Actual angle has not reached target value threshold within running monitoring cycle For time to reach setpoint AND	=TRUE >1(s) 	Ignition is on (Oil temperature cylinder head Oil temperature cylinder head	=TRUE >-20.04(°C) <180(°C)	2 Trip

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		Absolute deviation between the highest (max) / lowest (min) camshaft position and the stored setpoint value at the beginning of the monitoring	>3(deg CrS)	Engine speed (see Look-Up-Table #43)	>16383.5 to 520(rpm)	
		)		Engine speed	<10200(rpm)	
		for a number of events	>4(events)	) ( State governor intake camshaft bank2 is working in closed loop operation Diagnosis is released after engine start for time Battery voltage	=TRUE >0(s) >10.9(V)	
				) No pending or confirmed DTCs	=see sheet inhibit tables	
				Basic enable conditions met	=see sheet enable tables	
P000D	Monitoring of outlet camshaft bank 2 position - slow response fault	(Actual angle has not reached target value threshold within running monitoring cycle For time to reach setpoint	=TRUE	Ignition is on	=TRUE	2 Trip
		AND		(Oil temperature cylinder head Oil temperature cylinder head	>-20.04(°C) <180(°C)	
		Absolute deviation between the highest (max) / lowest (min) camshaft position and the stored setpoint value at the beginning of the monitoring	>3(deg CrS)	Engine speed (see Look-Up-Table #44)	>16383.5 to 520(rpm)	
		)		Engine speed	<10200(rpm)	
		for a number of events	>4(events)	) ( State governor outlet camshaft bank2 is working in closed loop operation Diagnosis is released after engine start for time Battery voltage	=TRUE >0(s) >10.9(V)	
) No pending or confirmed DTCs	=see sheet inhibit tables	
				Basic enable conditions met	=see sheet enable tables	

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27. COM - CIRCUIT DIAGNOSIS OF MAF SENSORS - AIRFLOW	P0103	Path 1: Signal range check - out of range high	High range SENT data	>16375	Ignition is on	=TRUE	1.5(s)	2 Trip
					Battery voltage	>9(V)		
					Battery voltage	<655.34(V)		
					Error in the sensor self diagnosis	=FALSE		
					Error in the electric line diagnosis	=FALSE		
					Error in the electric line diagnosis	=FALSE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P010D	Path 1: Signal range check - out of range high	High range SENT data	>16375	Ignition is on	=TRUE	1.5(s)	2 Trip
					Battery voltage	>9(V)		
					Battery voltage	<655.34(V)		
					Error in the sensor self diagnosis	=FALSE		
					Error in the electric line diagnosis	=FALSE		
					Error in the electric line diagnosis	=FALSE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P0102	Path 2: Signal range check - out of range low	Low range SENT data	<2	Ignition is on	=TRUE	1.5(s)	2 Trip
					Battery voltage	>9(V)		
					Battery voltage	<655.34(V)		
					Error in the electric line diagnosis	=FALSE		
					Error in the sensor self diagnosis	=FALSE		
					Error in the sensor self diagnosis	=FALSE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P010C	Path 2: Signal range check - out of range low	Low range SENT data	<2	Ignition is on	=TRUE	1.5(s)	2 Trip

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			Battery voltage	>9(V)				
			Battery voltage	<655.34(V)				
			Error in the sensor self diagnosis	=FALSE				
			Error in the electric line diagnosis	=FALSE				
			Error in the electric line diagnosis	=FALSE				
			No pending or confirmed DTCs	=see sheet inhibit tables				
			Basic enable conditions met	=see sheet enable tables				
	U1319	Path 3: Sensor self diagnosis - MAF frequency in default range which indicates MAF has detected an internal error	Data value of the SENT Fast channel	>Number of bits in SENT	Ignition is on	=TRUE	0.5(s)	1 Trip
			or Data value of the SENT Fast channel	=0	Battery voltage Battery voltage	>9(V) <655.34(V)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	U131A	Path 3: Sensor self diagnosis - MAF frequency in default range which indicates MAF has detected an internal error	Data value of the SENT Fast channel	>Number of bits in SENT	Ignition is on	=TRUE	1.5(s)	1 Trip
			or Data value of the SENT Fast channel	=0	Battery voltage Battery voltage	>9(V) <655.34(V)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
28. MAF SENORS LOW SIDE SWITCH DIAGNOSIS	P0F51	MAF sensor low side switch controlled by chip heating / standby function (Bank 1)	Line low is detected (Bank 1)	=FALSCH	Ignition is ON	=TRUE	0.5(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
					Battery Voltage	>9(V)		
					Line high is detected (Bank 1)	=TRUE		

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P0F54	MAF sensor low side switch controlled by chip heating / standby function (Bank 2)	Line low is detected (Bank 2)	=FALSCH			0.5(s)	2 Trip
P0F51	MAF sensor low side switch controlled by chip heating / standby function (Bank 1)	Open Load error of low side switch detected (Bank1)	=TRUE			0.5(s)	2 Trip
P0F54	MAF sensor low side switch controlled by chip heating / standby function (Bank 2)	Open Load error of low side switch detected (Bank2)	=TRUE			0.5(s)	2 Trip
P0F53	Diagnosis of Short Circuit to Battery error of low side switch controlled by chip heating or standby function for Bank1	Low side switch short to battery detected (Bank1)	=TRUE			0.5(s)	2 Trip
P0F56	Diagnosis of Short Circuit to Battery error of low side switch controlled by chip heating or standby function for Bank2	Low side switch short to battery detected (Bank2)	=TRUE			0.5(s)	2 Trip

29. MAF SENSORS CIRCUIT CONTINUITY DIAGNOSIS	U1319	Monitoring of MAF sensor signal - MAF sensor signal permanently low	(Time overflow error reported by MAF sensor OR Maximum period violation error reported by MAF sensor)	=TRUE	Ignition is on	=TRUE	1(s)	1 Trip
			Pinpointing Current level of the PWM signal	=TRUE =LOW	Battery voltage Battery voltage No pending or confirmed DTCs Basic enable conditions met	>9(V) <655.34(V) =see sheet inhibit tables =see sheet enable tables		
	U131A	Monitoring of MAF sensor signal - MAF sensor signal permanently low	(Time overflow error reported by MAF sensor OR	=TRUE	Ignition is on Battery voltage	=TRUE >9(V)	1-5(s)	1 Trip

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			Maximum period violation error reported by MAF sensor)	=TRUE	Battery voltage	<655.34(V)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
			Pinpointing		Basic enable conditions met	=see sheet enable tables		
			Current level of the PWM signal	=LOW				
	U060F	Monitoring of MAF sensor signal - MAF sensor signal permanently low	(Time overflow error reported by MAF sensor	=TRUE	Ignition is on	=TRUE	1.5(s)	2 Trip
			OR		Battery voltage	>9(V)		
			Maximum period violation error reported by MAF sensor)	=TRUE	Battery voltage	<655.34(V)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
			Pinpointing		Basic enable conditions met	=see sheet enable tables		
			Current level of the PWM signal	=HIGH				
	U0610	Monitoring of MAF sensor signal - MAF sensor signal permanently low	(Time overflow error reported by MAF sensor	=TRUE	Ignition is on	=TRUE	1.5(s)	2 Trip
			OR		Battery voltage	>9(V)		
			Maximum period violation error reported by MAF sensor)	=TRUE	Battery voltage	<655.34(V)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
			Pinpointing		Basic enable conditions met	=see sheet enable tables		
			Current level of the PWM signal	=HIGH				
30. CCM - RATIONAILITY DIAGNOSIS OF MAF SENSORS - AIRFLOW	P0101	Path 4: Comparison of Maximum Modelled and actual Air Mass Flow (Plausibility Check)	Measured MAF from bank 1 sensor	>(A)/(B)(g/s)	Engine is rotating forwards	=TRUE	10(s)	1 Trip
			with		and			
			(A) Maximum modelled MAF at calculated parameter throttle body		Measured air mass flow sensor signal is invalid	=FALSE		

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		(B) Factor MAF sensor tolerance for min value	=0.920013	and			
				Delta mass flow between compressor and DK through Delta pressure is valid for bank1	=TRUE		
				and			
				Air mass flow through throttle valve for MAF diagnosis is valid	=TRUE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P010B	Path 4: Comparison of Maximum Modelled and actual Air Mass Flow (Plausibility Check)	Measured MAF from bank 2 sensor	>(A)/(B)(g/s)	Engine is rotating forwards	=TRUE	10(s)	1 Trip
		with (A) Maximum modelled MAF at throttle body (B) Factor MAF sensor tolerance for min value	calculated parameter(g/s) =0.920013	and Measured air mass flow sensor signal at bank 2 is invalid	=FALSE		
				Delta mass flow between compressor and DK through Delta pressure is valid for bank2	=TRUE		
				and			
				Air mass flow through throttle valve for MAF diagnosis is valid for bank 2	=TRUE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0101	Path 5: Comparison of Minimum Modelled and actual Air Mass Flow (Plausibility Check)	Measured MAF from bank 1 sensor	<(C)/(D)(g/s)	Engine is rotating forwards	=TRUE	10(s)	1 Trip
		with (A) Minimum modelled MAF at throttle body	calculated parameter(g/s)	and Measured air mass flow sensor signal is invalid	=FALSE		

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			(B) Factor MAF sensor tolerance for max value	=1.079987	and			
						Delta mass flow between compressor and DK through Delta pressure is valid for bank1	=TRUE	
					and	Air mass flow through throttle valve for MAF diagnosis is valid	=TRUE	
						No pending or confirmed DTCs	=see sheet inhibit tables	
						Basic enable conditions met	=see sheet enable tables	
	P010B	Path 5: Comparison of Minimum Modelled and actual Air Mass Flow (Plausibility Check)	Measured MAF from bank 2 sensor	<(C)/(D)(g/s)	Engine is rotating forwards		=TRUE	10(s) 1 Trip
			with (A) Minimum modelled MAF at throttle body	calculated parameter(g/s)	and Measured air mass flow sensor signal at bank 2 is invalid		=FALSE	
			(B) Factor MAF sensor tolerance for max value	=1.08	and			
						Delta mass flow between compressor and DK through Delta pressure is valid for bank2	=TRUE	
					and	Air mass flow through throttle valve for MAF diagnosis is valid for bank 2	=TRUE	
31. BAROMETRIC PRESSURE SENSOR DIAGNOSIS						No pending or confirmed DTCs	=see sheet inhibit tables	
						Basic enable conditions met	=see sheet enable tables	
	P222D	Monitoring of Barometric Pressure Sensor for Signal range Check - High	Raw value of pressure upstream throttle valve sensor 2	>115(kPa)	(Condition for pressure sensor signal upstream throttle valve valid. Bank 2)		=TRUE	2(s) 2 Trip
					for time	No pending or confirmed DTCs	>0.2(s) =see sheet inhibit tables	
						Basic enable conditions met	=see sheet enable tables	

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P222C	Monitoring of Barometric Pressure Sensor for Signal range Check - Low	Raw value of pressure upstream throttle valve sensor 2	<50(kPa)	(Condition for pressure sensor signal upstream throttle valve valid. Bank 2) for time No pending or confirmed DTCs Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	2(s)	2 Trip
P222B	Path 1: Monitoring of Barometric Pressure Sensor for Plausability Check - Engine running - Max	pressure upstream throttle valve raw value - Ambient pressure where A: upper tolerance limit of pressure upstream of throttle B: Delta modelled pressure upstream throttle from ambient pressure and measured pressure upstream throttle	>A+B =2(kPa) =20(kPa)	(Condition for pressure sensor signal upstream throttle valve valid. Bank 2) for time Barometric Pressure Sensor Signal High error is False Basic enable conditions met Engine speed	=TRUE =FALSCH =see sheet enable tables >0(rpm)	2(s)	1 Trip
	Path 2: Monitoring of Barometric Pressure Sensor for Plausability Check - Engine not running - Max	pressure upstream throttle valve raw value - Ambient pressure where C: upper tolerance limit of pressure upstream of throttle D: TKU-tolerance incl. temperature dependance of environment-pressure-sensor + delta for robustness	>C+D =2(kPa) =3(kPa)	(Condition for pressure sensor signal upstream throttle valve valid. Bank 2) for time Barometric Pressure Sensor Signal High error is False Basic enable conditions met Engine speed	=TRUE =FALSCH =see sheet enable tables >0(rpm)		

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P222B	Path 1: Monitoring of Barometric Pressure Sensor for Plausability Check - Engine running - Min	pressure upstream throttle valve raw value - Ambient pressure	>A+B	(Condition for pressure sensor signal upstream throttle valve valid. Bank 2)	=TRUE	2(s)	1 Trip
		where		for time	>0.2(s)		
		A: upper tolerance limit of pressure upstream of throttle	=2(kPa)	Barometric Pressure Sensor Signal Low error is False	=FALSCH		
		B: max pressure loss at air filter for diagnosis of pressure upstream throttle	=10(kPa)	Basic enable conditions met	=see sheet enable tables		
				Engine speed	>0(rpm)		
	Path 2: Monitoring of Barometric Pressure Sensor for Plausability Check - Engine not running - Min	pressure upstream throttle valve raw value - Ambient pressure	>C+D	(Condition for pressure sensor signal upstream throttle valve valid. Bank 2)	=TRUE	2(s)	
		where		for time	>0.2(s)		
		C: upper tolerance limit of pressure upstream of throttle	=2(kPa)	Barometric Pressure Sensor Signal Low error is False	=FALSCH		
		D: TKU-tolerance incl. temperature dependance of environment-pressure-sensor + delta for robustness	=3(kPa)	Basic enable conditions met	=see sheet enable tables		
				Engine speed	=0(rpm)		
P227D	Monitoring of Barometric Pressure Sensor for Signal range Check - High	Raw value of pressure upstream throttle valve sensor 1	>115(kPa)	(Condition for pressure sensor signal upstream throttle valve valid. Bank 1)	=TRUE	2(s)	2 Trip
				for time	>0.2(s)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P227C	Monitoring of Barometric Pressure Sensor for Signal range Check - Low	Raw value of pressure upstream throttle valve sensor 1	<50(kPa)	(Condition for pressure sensor signal upstream throttle valve valid. Bank 1)	=TRUE	2(s)	2 Trip
				for time	>0.2(s)		
				No pending or confirmed DTCs	=see sheet inhibit tables		

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				Basic enable conditions met	=see sheet enable tables		
P227B	Path 1: Monitoring of Barometric Pressure Sensor for Plausability Check - Engine running - Max	pressure upstream throttle valve raw value - Ambient pressure	>A+B	(Condition for pressure sensor signal upstream throttle valve valid. Bank 2) for time	=TRUE	2(s)	1 Trip
		where			>0.2(s)		
		A: upper tolerance limit of pressure upstream of throttle	=2(kPa)	Barometric Pressure Sensor Signal High error is False	=FALSCH		
		B: Delta modelled pressure upstream throttle from ambient pressure and measured pressure upstream throttle	=20(kPa)	Basic enable conditions met	=see sheet enable tables		
				Engine speed	>0(rpm)		
	Path 2: Monitoring of Barometric Pressure Sensor for Plausability Check - Engine not running - Max	pressure upstream throttle valve raw value - Ambient pressure	>C+D	(Condition for pressure sensor signal upstream throttle valve valid. Bank 2) for time	=TRUE		
		where			>0.2(s)		
		C: upper tolerance limit of pressure upstream of throttle	=2(kPa)	Barometric Pressure Sensor Signal High error is False	=FALSCH		
		D: TKU-tolerance incl. temperature dependance of environment-pressure-sensor + delta for robustness	=3(kPa)	Basic enable conditions met	=see sheet enable tables		
				Engine speed	=0(rpm)		
P227B	Path 1: Monitoring of Barometric Pressure Sensor for Plausability Check - Engine running - Min	pressure upstream throttle valve raw value - Ambient pressure	>A+B	(Condition for pressure sensor signal upstream throttle valve valid. Bank 2) for time	=TRUE	2(s)	1 Trip
		where			>0.2(s)		
		A: upper tolerance limit of pressure upstream of throttle	=2(kPa)	Barometric Pressure Sensor Signal Low error is False	=FALSCH		
		B: max pressure loss at air filter for diagnosis of pressure upstream throttle	=10(kPa)	Basic enable conditions met	=see sheet enable tables		
				Engine speed	>0(rpm)		

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Path 2: Monitoring of pressure upstream throttle valve raw value - Ambient pressure

Barometric Pressure Sensor for Plausability Check - Engine not running - Min

>C+D

(Condition for pressure sensor signal upstream throttle valve valid. Bank 2)

=TRUE

where

C: upper tolerance limit of pressure upstream of throttle =2(kPa)

D: TKU-tolerance incl. temperature dependance of environment-pressure-sensor + delta for robustness =3(kPa)

Barometric Pressure Sensor Signal Low error is False =FALSCH

Basic enable conditions met =see sheet enable tables

Engine speed =0(rpm)

111373	Barometric pressure sensor powerstage diagnosis Bank 1	Barometric pressure sensor powerstage Bank1 fault via SENT	=TRUE	Ignition is ON	=TRUE	0.05(s)	2 Trip
--------	--	--	-------	----------------	-------	---------	--------

Battery Voltage >9(V)

111371	Barometric pressure sensor powerstage diagnosis Bank 2	Barometric pressure sensor powerstage Bank2 fault via SENT	=TRUE	Basic enable conditions are met	=see sheet enable tables	0.05(s)	2 Trip
--------	--	--	-------	---------------------------------	--------------------------	---------	--------

LI068A	Detects when the frame "PThrVlvUsLineHiBI" is not received from Barometric Pressure Sensor 2	Wrong data length code received by the frame PThrVlvUsLineHiBI from Barometric Pressure Sensor 2	=TRUE			1.5(s)	2 Trip
--------	--	--	-------	--	--	--------	--------

U068A	Detects when the frame "PThrVlvUsLineLoBT" is not received from Barometric Pressure Sensor 2	Wrong data length code received by the frame PThrVlvUsLineLoBI from Barometric Pressure Sensor 2	=TRUE			1.5(s)	2 Trip
-------	--	--	-------	--	--	--------	--------

U0680	Detects when the frame "PThrVlvUsLineHiB2" is not received from Barometric Pressure Sensor Bank 2	Wrong data length code received by the frame PThrVlvUsLineHiB2 from Barometric Pressure Sensor Bank 2	=TRUE			1.5(s)	2 Trip
-------	---	---	-------	--	--	--------	--------

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110680	Detects when the frame "PThrVlvUsLineLoB2" is not received from Barometric Pressure Sensor Bank 2	Wrong data length code received by the frame PThrVlvUsLineLoB2 from Barometric Pressure Sensor Bank 2	=TRUE			1-5(s)	2 Trip
POOAE	Monitoring maximum error of the Gradient-Check for the intake air temperature sensor before throttle, Bank 2	Absolute difference between raw and filtered temperature values from Intake air temperature sensor 3	>10(°C)	Battery Voltage	>9(V)	3(s)	2 Trip
		for a time of	>A+B(s)	Basic enable conditions met	=see sheet enable tables		
		where:					
		A: Debounce time for the temporary error of the intake air temperature sensor 3	=5(s)				
		B: Debounce time for the permanent error of the intake air temperature sensor 3	=20(s)				
POOAD	Monitoring maximum error of the Physical Range Check for the intake air temperature sensor before throttle, Bank 2	Filtered Temperature value of the Intake Air Temperature sensor	>122.76(°C)	Battery Voltage	>9(V)	3(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
POOAC	Monitoring minimum error of the Physical Range Check for the intake air temperature sensor before throttle, Bank 2	Filtered Temperature value of the Intake Air Temperature sensor	<-42.04(°C)	Battery Voltage	>9(V)	3(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P0114	Monitoring maximum error of the Gradient-Check for the intake air temperature sensor before throttle, Bank 1	Absolute difference between raw and filtered temperature values from Intake air temperature sensor 1.	>10(°C)	Battery Voltage	>9(V)		2 Trip
		for a time of	>A+B(s)	Basic enable conditions met	=see sheet enable tables		

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where:

A: Debounce time for the temporary error of the intake air temperature sensor 1 =5(s)

B: Debounce time for the permanent error of the intake air temperature sensor 1 =20(s)

P0113	Monitoring maximum error of the Physical Range Check for the intake air temperature sensor bank 1 before throttle	Filtered Temperature value of the Intake Air Temperature sensor	>122.76(°C)	Battery Voltage	>9(V)	2(s)	2 Trip
-------	---	---	-------------	-----------------	-------	------	--------

Basic enable conditions met	=see sheet enable tables
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P0112	Monitoring minimum error of the Physical Range Check for the intake air temperature sensor before throttle, Bank 1	Filtered Temperature value of the Intake Air Temperature sensor	<-42.04(°C)	Battery Voltage	>9(V)	2(s)	2 Trip
-------	--	---	-------------	-----------------	-------	------	--------

Basic enable conditions met	=see sheet enable tables
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33. INTAKE AIR TEMPERATURE SENSORS CROSS CHECK AND STUCK DIAGNOSIS	P0111	Cross check of Intake Air Temperature sensor during Cold start when difference between the intake air temperature and mean temperature value exceeding the minimum threshold	Difference between the minimum intake air temperature from start and mean temperature value from the temperature sensors	>14.96(°C)	First engine start has happened	=FALSCH	2 Trip
--	-------	--	--	------------	---------------------------------	---------	--------

Ignition is on for time	=TRUE >1(s)
-------------------------	----------------

Combustion engine is running	=TRUE
------------------------------	-------

(Engine is in synchronised state and engine is rotating for time	=TRUE >1(s)
---	----------------

End of start is reached and engine is running	=TRUE
---	-------

(Ignition ON for time	=TRUE >1(s)
------------------------	----------------

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(
Measured engine stop time	>28800(s)	
(=TRUE
Engine stop time is calculated and is correct		
)		
for time	<3(s)	
)		
Block heater is activated	=FALSCH	
Diagnosis is inhibited by other temperature sensor errors	=FALSCH	
(
(
Combustion engine is running	=FALSCH	
or		
Combustion engine end of start is reached	=FALSCH	
for time	>5(s)	
)		
(
Difference between engine coolant temperature and mean temperature value from temperature sensors	>14.96(°C)	
OR		
Difference between mean temperature value from temperature sensors and engine coolant temperature	<14.96(°C)	
)		
Engine coolant temperature sensor value	>49.96(°C)	
)		
for time	<0(s)	
)		
or		
Combustion engine is running	=TRUE	
for time	>0(s)	
)		
No pending or confirmed DTCs	=see sheet inhibit table	
Basic enable conditions met	=see sheet enable	

P0111	Cross check of Intake Air Temperature sensor during Cold start when difference between the mean temperature value and intake air temperature exceeding the minimum threshold	Difference between mean temperature value from the temperature sensors and the minimum intake air temperature from start	>14.96(°C)	First engine start has happened	=FALSCH	2 Trip
				Ignition is on for time	=TRUE >1(s)	
				Combustion engine is running	=TRUE	
				(Engine is in synchronised state and engine is rotating for time	=TRUE >1(s)	
				) End of start is reached and engine is running	=TRUE	
				(Ignition ON for time	=TRUE >1(s)	
)		
				((Measured engine stop time	>28800(s)	
				(Engine stop time is calculated and is correct	=TRUE	
				) for time	<3(s)	
				) Block heater is activated	=FALSCH	
				Diagnosis is inhibited by other temperature sensor errors	=FALSCH	
				{		
				(
				(Combustion engine is running	=FALSCH	
				or		
				Combustion engine end of start is reached for time	=FALSCH >5(s)	
)		
				(
				Difference between engine coolant temperature and mean temperature value from temperature sensors	>14.96(°C)	
				OR		

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Difference between mean
 temperature value from temperature
 sensors and engine coolant
 temperature
)
 Engine coolant temperature
 sensor value
)
 for time
)
 or
 Combustion engine is running
 for time
)
 No pending or confirmed DTCs
 Basic enable conditions met

<14.96(°C)
 >49.96(°C)
 <0(s)
 =TRUE
 >0(s)
 =see sheet inhibit table
 =see sheet enable
 tables

P0111	Detection of stuck error of Intake Air Temperature sensor when the difference between the maximum and the minimum intake air temperature, since engine start is less than the calibrated threshold	Difference between the maximum and the minimum intake air temperature values (see Look-Up-Table #56)	<0.36 to 1.56(°C)	Engine coolant downstream temperature during the first engine start of the driving cycle	<100.96(°C)	2 Trip
				Counter for high-phases of intake air Temperature sensor Conditions for intake air temperature sensor (high phases): ((Cylinder air mass flow Vehicle speed Engine coolant temperature Integrated Air mass flow (see Look-Up-Table #54)	>3(counts) <39.78(mph) <18.65(mph) >58(°C) >460 to 20020(g)	
) for time) Counter for low-phases of intake air temperature sensor Conditions for low intake air temperature (low phases): ((Vehicle speed	>35(s) >2(counts) >29.83(mph)	

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Cylinder air mass flow <97.78(g/s)
) for time >64(s)
) No pending or confirmed DTCs =see sheet inhibit table
Basic enable conditions met =see sheet enable tables

POOAB	Cross check of Intake Air Temperature sensor during Cold start when difference between the Intake air Temperature and mean temperature value exceeding the minimum threshold	Difference between the minimum intake air temperature from start and mean temperature value from the temperature sensors	>14.96(°C)	First engine start has happened	=FALSCH	2 Trip
				Ignition is on for time	=TRUE >1(s)	
				Combustion engine is running	=TRUE	
				(Engine is in synchronised state and engine is rotating for time	=TRUE =1(s)	
				) End of start is reached and engine is running	=TRUE	
				(Ignition ON for time	=TRUE >1(s)	
)		
				(Measured engine stop time	>28800(s)	
				(Engine stop time is calculated and is correct	=TRUE	
)		
				) for time	<3(s)	
)		
				Block heater is activated	=FALSCH	
				Diagnosis is inhibited by other temperature sensor errors	=FALSCH	
				(
				(
				(Combustion engine is running	=FALSCH	
				or		

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				Combustion engine end of start is reached for time	=FALSCH >5(s)	
) (=TRUE	
				Difference between engine coolant temperature and mean temperature value from temperature sensors	>14.96(°C)	
				OR		
				Difference between mean temperature value from temperature sensors and engine coolant temperature	<14.96(°C)	
				/		
				Engine coolant temperature sensor value	>49.96(°C)	
				) for time	<0(s)	
				) or		
				Combustion engine is running	=TRUE	
				for time	>0(s)	
				) No pending or confirmed DTCs	=see sheet inhibit table	
				Basic enable conditions met	=see sheet enable tables	
POOAB	Cross check of Intake Air Temperature sensor during Cold start when difference between the mean temperature value and Intake air temperature exceeding the minimum threshold	Difference between mean temperature value from the temperature sensors and the minimum intake air temperature from start	>14.96(°C)	First engine start has happened	=FALSCH	2 Trip
				Ignition is on for time	=TRUE >1(s)	
				Combustion engine is running	=TRUE	
				{		
				Engine is in synchronised state and engine is rotating for time	=TRUE =1(s)	
) End of start is reached and engine is running	=TRUE	

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(=TRUE
Ignition ON	
for time	>1(s)
)	
{	
Measured engine stop time	>28800(s)
(Engine stop time is calculated	=TRUE
and is correct	
)	
)	
for time	<3(s)
)	
Block heater is activated	=FALSCH
Diagnosis is inhibited by other	=FALSCH
temperature sensor errors	
V	
(
(
Combustion engine is running	=FALSCH
or	
Combustion engine end of start	=FALSCH
is reached	
for time	>5(s)
)	
(
Difference between engine	>14.96(°C)
coolant temperature and mean	
temperature value from temperature	
sensors	
OR	
Difference between mean	<14.96(°C)
temperature value from temperature	
sensors and engine coolant	
temperature	
)	
Engine coolant temperature	>49.96(°C)
sensor value	
)	
for time	<0(s)
)	
or	
Combustion engine is running	
for time	>0(s)
)	
No pending or confirmed DTCs	=see sheet inhibit table

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				Basic enable conditions met	=see sheet enable tables		
	POOAB	Detection of stuck error of Intake Air Temperature sensor when the difference between the maximum and the minimum Intake air Temperature, since engine start is less than the calibrated threshold	Difference between the maximum and the minimum intake air temperature values (see Look-Up-Table #57)	<0.36 to 1.56(°C)	Engine coolant downstream temperature during the first engine start of the driving cycle	<100.96(°C)	2 Trip
					Counter for high-phases of intake air Temperature sensor	>3(counts)	
					Conditions for intake air temperature sensor (high phases):	=TRUE	
					(
					(
					Cylinder air mass flow	<39.78(mph)	
					Vehicle speed	<18.65(mph)	
					Engine coolant temperature	>58(°C)	
					Integrated Air mass flow (see Look-Up-Table #55)	>460 to 20020(g)	
)		
					for time	>35(s)	
)		
					Counter for low-phases of intake air temperature sensor	>2(counts)	
					Conditions for low intake air temperature (low phases)		
					(
					(
					Vehicle speed	>29.83(mph)	
					Cylinder air mass flow	≥7.78(g/s)	
					Cylinder air mass flow	<97.78(g/s)	
)		
					for time	>64(s)	
)		
					No pending or confirmed DTCs	=see sheet inhibit table	
					Basic enable conditions met	=see sheet enable tables	
34. COM - BRAKE PEDAL POSITION SENSOR - POWER STAGE	P057D	Detects if the brake pedal position sensor voltage is higher than calibrated threshold for calibrated amount of time	Brake pedal position sensor voltage	>4.75(V)	Ignition is on	=TRUE	0.5(s) 1 Trip
					Basic enable conditions met	=see sheet enable tables	

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35. COM - BRAKE PEDAL POSITION SENSOR - PERFORMANCE	P057C	Detects if the brake pedal position sensor voltage is lower than calibrated threshold for calibrated amount of time	Brake pedal position sensor voltage	<0.25(V)	Ignition is on	=TRUE	0.5(s)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
	P057B	Path 1: Detects when brake pedal position ratio is higher than calibrated threshold for calibrated amount of time	Brake pedal ratio	>110(%)	Ignition is on	=TRUE	1(s)	1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P057B	Path 2: Detects when brake pedal position ratio is lower than calibrated threshold for calibrated amount of time	Brake pedal ratio	<-18(%)	Ignition is on	=TRUE	1(s)	1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P057B	Path 3: Detects when brake pedal switch EWMA(Exponentially Weighted Moving Average) factor is less than calibrated threshold	EWMA filtered test result based on the difference of |(a) - (b)|	<0.4	Battery voltage	>10.9(V)	2(events)	1 Trip
		where (a) maximum analog brake sensor raw voltage during test	calculated parameter(V)		Control for starter powerstage for time	>0.04(s)		
		(b) minimum analog brake sensor raw voltage during test	calculated parameter(V)		Conditions for fast test scheduler			
		where difference of the brake sensor voltage corresponds to a corrected value (see Look-Up-Table #2)	=0 to 1		(Number of reference voltage samples considered for fast EWMA calculation	>50(events)		
					Absolute difference between maximum and minimum voltage obtained during the EWMA calculation in fast test scheduler	>0.051(s)		

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				Conditions for slow test scheduler			
				(
				Slow test completion cycle	=FALSE		
				Vehicle is in parking state	=TRUE		
				(
				Gear position in case of automatic transmission system is in parking	=TRUE		
				/			
				Number of reference voltage samples considered for slow EWMA	>200		
				Gear position in case of automatic transmission system is not in parking	=TRUE		
				Vehicle speed	>4.35(mph)		
				Accelerator pedal position	<5(%)		
)			
				Number of successful EWMA test completed	>2(events)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P138B	Checks if the voltage of the released brake pedal is within the zero point range	Brake pedal position sensor voltage	>1.55(V)	Conditions for first zero point learning		1.5(s)	1 Trip
		OR		(
		Brake pedal position sensor voltage	<0.575(V)	Brake pedal released (Detection through pedal switch)	=TRUE		
)			
				OR			
				Brake stroke sensor learning	=TRUE		
				Continuous zero point learning conditions			
				(
				Accelerator pedal position	<70(%)		
				Accelerator pedal position	>10(%)		
				Vehicle speed	<74.58(mph)		
				Vehicle speed	>7.46(mph)		
				Vehicle acceleration	<2(m/s ²)		
				Vehicle acceleration	>1.3(m/s ²)		
				Absolute difference between filtered brake pedal voltage and raw value	<0.03(V)		
				brake pedal position voltage			
				Engine is in running state	=TRUE		
				Starter is not engaged	=TRUE		

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) No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P057B	Monitoring of main brake pedal switch	Value of the main brake switch changes	=FALSCH	Battery voltage	>10.9(V)	1(s)	1 Trip
		(for time (when brake pedal is pressed)	3600(s)	Control for starter powerstage for time	>0.04(s)		
		or for time (when brake pedal is not pressed))	36000(s)	Conditions for fast test scheduler (Number of reference voltage samples considered for fast EWMA calculation Absolute difference between maximum and minimum voltage obtained during the EWMA calculation in fast test scheduler) Conditions for slow test scheduler (Slow test completion cycle Vehicle is in parking state (Gear position in case of automatic transmission system is in parking Number of reference voltage samples considered for slow EWMA Gear position in case of automatic transmission system is not in parking Vehicle speed Accelerator pedal position) Number of successful EWMA test completed No pending or confirmed DTCs	>50(events) 		

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					Basic enable conditions met	=see sheet enable tables		
36. CCM - AMBIENT AIR TEMPERATURE AND HUMIDITY SENSORS	P0073	Detection of ambient temperature sensor voltage exceeding the maximum threshold	Raw voltage of the Ambient temperature sensor	>4.87(V)	Ignition is ON	=TRUE	2(s)	2 Trip
			Same as:		No pending or confirmed DTCs	=see sheet inhibit tables		
			Ambient air temperature	<-40(°C)	Basic enable conditions met	=see sheet enable tables		
	P0072	Detection of ambient temperature sensor voltage falling below the minimum threshold	Raw voltage of the Ambient temperature sensor	<0.102(V)	Ignition is ON	=TRUE	2(s)	2 Trip
			Same as:		No pending or confirmed DTCs	=see sheet inhibit tables		
			Ambient air temperature	>150(°C)	Basic enable conditions met	=see sheet enable tables		
	P0071	Plausibility check of Ambient Temperature sensor when compared with model temperature value higher than maximum threshold	Difference between ambient temperature sensor value and model temperature	>19.96(°C)	Errors with ambient temperature sensor (	=FALSCH	5(s)	2 Trip
					Signal Range check : out of range low error for ambient air temperature sensor (P0072)	=FALSCH		
					Signal Range check : out of range high error for ambient air temperature sensor (P0073)	=FALSCH		
)			
					(
					Ambient temperature model released and updated on the current drive cycle)			
					Basic enable conditions met	=see sheet enable tables		
					No pending or confirmed DTCs	=see sheet inhibit tables		

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P0071	Plausibility check of Ambient Temperature sensor when compared with model temperature value higher than minimum threshold	Difference between model temperature and ambient temperature sensor value	<19.96(°C)	Errors with ambient temperature sensor (Signal Range check : out of range low error for ambient air temperature sensor (P0072) Signal Range check : out of range high error for ambient air temperature sensor (P0073)) (Ambient temperature model released and updated on the current drive cycle) Basic enable conditions met No pending or confirmed DTCs	=FALSCH =FALSCH =FALSCH =see sheet enable tables =see sheet inhibit tables	5(s)	2 Trip
P0074	Detects Environment Air Temperature implausible / Environmental temperature signal erratic	Absolute difference between measured and filtered ambient temperatures for time	>10.06(°C) >20(s)	Ignition ON No pending or confirmed DTCs Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	5(s)	2 Trip
P00F5	Humidity sensor short to power (Bank 1)	Raw sensor value indicating relative humidity of fresh air	>110.5(%)	Ignition is on Battery Voltage Basic enable conditions met	=TRUE >9.0(V) =see sheet enable tables	1(s)	2 Trip
P00F4	Humidity sensor short to ground (Bank 1)	Raw sensor value indicating relative humidity of fresh air				1(s)	2 Trip
P00F6	Humidity sensor intermittent check (Bank 1)	Absolute differences between 2 consecutive measurements	>75(%)	Ignition is on	=TRUE	1(s)	2 Trip

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		Number of differences between the current and previous value	>25(count)	Battery Voltage	>9.0(V)		
		Window width - maximum number of events in window	>16(count)	Basic enable conditions met	=see sheet enable tables		
				Circuit fault	P00F4=FALSCH		
				Circuit fault	P00F5=FALSCH		
P0098	Air temperature sensor short to ground (Bank 1)	Air temperature indicated by sensor	>124.96(°C)	Ignition is on	=TRUE	1(s)	2 Trip
				Battery Voltage	>9.0(V)		
				Basic enable conditions met	=see sheet enable tables		
P0097	Air temperature sensor short to ground (Bank 1)	Air temperature indicated by sensor	<-40.04(°C)			1(s)	2 Trip
U0693	Sensor's max error reported via SENT (Bank1)		=TRUE	Ignition is on	=TRUE	1(s)	2 Trip
				Battery Voltage	>9.0(V)		
				Basic enable conditions met	=see sheet enable tables		
U0693	Sensor's min error reported via SENT (Bank1)		=TRUE			1(s)	2 Trip
U13D5	Invalid data received from humidity sensor		=TRUE			1(s)	2 Trip
	and						
U13D4	Invalid data received from air temperature sensor						

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	LI13D5	Invalid data received from air temperature sensor		=TRUE			1(s)	2 Trip
	and							
	U13D4	Invalid data received from air temperature sensor						
	P0099	Loose connection error of humidity sensor temperature	Absolute differences between air temperature at the sensor and filtered air temperature at the sensor	>29.96(°C)	Ignition is on	=TRUE	0.1(s)	2 Trip
			for time	>2(s)	Battery Voltage	>9.0(V)		
			for time	>5(s)	Basic enable conditions met	=see sheet enable tables		
					Circuit fault	P0098=FALSCH		
					Circuit fault	P0097=FALSCH		
	P0096	Diagnostic fault Check for reference sensor of humidity sensor temperature	Temperature difference between intake air temperature and temperature at humidity sensor	>50(°C)	Ignition is on	=TRUE	0.1(s)	2 Trip
					Battery Voltage	>9.0(V)		
					Basic enable conditions met	=see sheet enable tables		
					Integrated air mass	>555.6(g/s)		
37. CCM - BAROMETRIC PRESSURE SENSOR DIAGNOSIS	P2229	Monitoring of Barometric Pressure Sensor for Signal range check - High	Error information message A from digital ambient air pressure sensor returns a CRC (Cyclical Redundancy Checking) error	=TRUE	Reading message A from digital ambient air pressure sensor has been successful and has delivered valid values	=TRUE	2(s)	1 Trip
			or		Ambient pressure sensor boot is done	=TRUE		

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			Error information message A from digital ambient air pressure sensor returns a short circuit to VDD	=TRUE	ECU is in drive state	=TRUE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P2228	Monitoring of Barometric Pressure Sensor for Signal range check - Low	Error information message A from digital ambient air pressure sensor returns a short circuit to ground	=TRUE	Reading message A from digital ambient air pressure sensor has been successful and has delivered valid values	=TRUE	2(s)	1 Trip
					Ambient pressure sensor boot is done	=TRUE		
					ECU is in drive state	=TRUE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
38. CCM - BAROMETRIC PRESSURE SENSOR DIAGNOSIS	P2227	Path1: Continuity check - positive deviation too high	Difference between filtered ambient air pressure raw value and its delayed value (20s)	>5(kPa)	Ambient pressure sensor valid, which is the following condition:	=TRUE	2(s)	1 Trip
					(Ambient pressure sensor raw value exceeded for time	=TRUE >0.2(s)		
					) No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
			Difference between measured ambient air pressure raw value and maximum modeled ambient pressure	>1.5(kPa)	Threshold model for ambient pressure valid, which is the following condition for time	>2.6(s)	2(s)	2 Trip
					((Throttle valve/actuator position Engine speed	<8.01(%) <1000(rpm)		
					) OR Engine speed	=0(rpm)		
					ECU is in DRIVE state	=TRUE		

Measured pressure upstream throttle valve is valid	=TRUE
)	
Ambient pressure sensor valid, which is the following condition:	=TRUE
(
Ambient pressure sensor raw value exceeded	=TRUE
for time	>0.2(s)
)	
Error suspicion from continuous check, which is the following condition:	=TRUE
(
Difference between measured ambient air pressure raw value and its delayed value (20s)	>5(kPa)
OR	
Fault suspicion from continuity check between the drives, which is the following condition:	=TRUE
(
(
Absolute value of difference between ambient pressure from actual driving cycle and ambient pressure from last driving cycle	<10(kPa)
Zyklus flag for diagnosis by comparing actual and last driving cycle ambient pressure	=TRUE
(
Ambient pressure from last driving cycle valid	=TRUE
Cycle flag ambient pressure from current driving cycle adopted	=TRUE
)	
)	
OR	
Healing of continuity check with additional value	=TRUE
(
Condition threshold models for ambient pressure valid	=TRUE
Difference between ambient air pressure raw value measured and maximum modelled ambient pressure	<1.5(kPa)
Difference between minimal modelled ambient pressure and ambient air pressure raw value measured	<1.5(kPa)
)	
OR	

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				Condition deadlock threshold models for ambient pressure valid	=TRUE		
				(Condition for error suspicion from continuous check	=TRUE		
				Validity of the pressure sensor of the intake manifold - bank 1	=TRUE		
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P2227	Path 2: Continuity check - negative deviation too high	Difference between delayed (20s) ambient air pressure and measured ambient air pressure raw value	>5(kPa)	Ambient pressure sensor valid, which is the following condition:	=TRUE	2(s)	1 Trip
				(Ambient pressure sensor raw value exceeded for time	=TRUE >0.2(s)		
				) No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
				Difference between minimum modeled ambient pressure and measured ambient air pressure raw value	>1.5(kPa)	Threshold model for ambient pressure valid, which is the following condition for time	>2.6(s) 2(s) 2 Trip
				(
				(Throttle valve/actuator position Engine speed	<8.01 (%) <1000(rpm)		
				) OR			
				Engine speed ECU is in DRIVE state	=0(rpm) =TRUE		
				Measured pressure upstream throttle valve is valid	=TRUE		
				) Ambient pressure sensor valid, which is the following condition:	=TRUE		
				(Ambient pressure sensor raw value exceeded for time	=TRUE >0.2(s)		

)	
Error suspicion from continuous check, which is the following condition:	=TRUE
(
Difference between measured ambient air pressure raw value and its delayed value (20s)	>5(kPa)
OR	
Fault suspicion from continuity check between the drives, which is the following condition:	=TRUE
(
(
Absolute value of difference between ambient pressure from actual driving cycle and ambient pressure from last driving cycle	<10(kPa)
Zyklus flag for diagnosis by comparing actual and last driving cycle ambient pressure	=TRUE
(
Ambient pressure from last driving cycle valid	=TRUE
Cycle flag ambient pressure from current driving cycle adopted	=TRUE
)	
)	
OR	
Healing of continuity check with additional value	=TRUE
(
Condition threshold models for ambient pressure valid	=TRUE
Difference between ambient air pressure raw value measured and maximum modelled ambient pressure	<1.5(kPa)
Difference between minimal modelled ambient pressure and ambient air pressure raw value measured	<1.5(kPa)
)	
OR	
Condition deadlock threshold models for ambient pressure valid	=TRUE
(
Condition for error suspicion from continuous check	=TRUE
Validity of the pressure sensor of the intake manifold - bank 1	=TRUE
)	
)	

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No pending or confirmed DTCs

=see sheet inhibit tables

Basic enable conditions met

=see sheet enable tables

P2227	Path 3: Rationality check - out of range high	Difference between measured ambient pressure and the maximal reference pressure for delta pressure sensor diagnosis	>2.23(kPa)	ECU is in DRIVE state	=TRUE	2(s)	1 Trip
-------	---	---	------------	-----------------------	-------	------	--------

(
Engine is not running

=TRUE

for time

>5(s)

)

(

(

(

Condition ambient pressure sensor valid

=TRUE

Condition ambient pressure from sensor valid

=TRUE

)

for time

>0.2(s)

)

OR

(

(

Condition ambient pressure sensor valid

=TRUE

Condition ambient pressure from sensor valid

=TRUE

)

for time

=0.2(s)

)

Ambient pressure sensor reference for delta pressure sensor is stable

=FALSE

)

Ambient pressure sensor measured is valid

=TRUE

No pending or confirmed DTCs

=see sheet inhibit tables

Basic enable conditions met

=see sheet enable tables

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P2227	Path 4: Rationality check - out of range low	Difference between the minimal reference pressure for delta pressure sensor diagnosis and the measured ambient pressure	>2.23(kPa)	ECU is in DRIVE state	=TRUE	2(s)	1 Trip
				(Engine is not running	=TRUE		
				for time	>5(s)		
)			
				(
				(
				Condition ambient pressure sensor valid	=TRUE		
				Condition ambient pressure from sensor valid	=TRUE		
)			
				for time	>0.2(s)		
)			
				OR			
				(
				(
				Condition ambient pressure sensor valid	=TRUE		
				Condition ambient pressure from sensor valid	=TRUE		
)			
				for time	=0.2(s)		
)			
				Ambient pressure sensor reference for delta pressure sensor is stable	=FALSE		
)			
				Ambient pressure sensor measured is valid	=TRUE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P2227	Path 5: Sensor plausibility check	Information from digital ambient pressure sensor for QUEUE FULL	=TRUE	Sensor reset is triggered	=TRUE	2(s)	1 Trip
		OR		(

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			Information from digital ambient pressure sensor for SENSOR DEFECT OR	=TRUE	Ambient pressure sensor boot done	=TRUE		
			Information from digital ambient pressure sensor for VALUE TOO LOW OR	=TRUE	)	=TRUE		
			Information from digital ambient pressure sensor for VALUE TOO HIGH	=TRUE	No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
39. COM - FUEL RAIL PRESSURE SENSOR - DUAL PRESSURE - PRIMARY VALUE (SENT)	P128A	Diagnosis of Fuel Rail Pressure Sensori Bankl - Out of Range Error	Raw pressure data of SENT rail pressure sensor channel 1	>4087	Ignition is on	=FALSCH	0.5(s)	1 Trip
			OR		Loss due to high level on SENT sensor signal line of SENT Rail	=FALSCH		
			Raw pressure data of SENT rail pressure sensor channel 1	<2	Loss due to low level on SENT sensor signal line of SENT Rail pressure sensor	=FALSE		
					Error in SENT rail pressure sensor	=FALSE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions are met	=see sheet enable tables		
	U101B	Path1: Diagnosis of message loss due to sensor signal line on high level (Bank 1)	Loss due to high level on SENT sensor signal line of SENT rail pressure sensor	=TRUE	Ignition is on	=FALSCH	0.5(s)	1 Trip
	and				Loss due to low level on SENT sensor signal line of SENT rail	=FALSCH		
	U0625				No pending or confirmed DTCs	=see sheet inhibit tables		1 Trip
					Basic enable conditions are met	=see sheet enable tables		
	U101B	Path2: Diagnosis of message loss due to sensor signal line on low level (Bank 1)	Loss due to low level on SENT sensor signal line of SENT rail pressure sensor	=TRUE	Ignition is on	=FALSCH	0.5(s)	1 Trip
	and				Loss due to high level on SENT sensor signal line of SENT rail	=FALSCH		
	U0625				No pending or confirmed DTCs	=see sheet inhibit tablas		1 Trip

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				Basic enable conditions are met	=see sheet enable tables		
U1374	Diagnosis of Fuel Rail Pressure Protocol Error (Sensor 1)	Protocol error for SENT rail pressure sensor detected	TRUE	Ignition is on	=FALSE	0.5(s)	1 Trip
and				Loss due to high level on SENT sensor signal line of SENT Rail pressure sensor	=FALSE		
U1375				Loss due to low level on SENT sensor signal line of SENT Rail pressure sensor	=FALSCH		1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions are met	=see sheet enable tables		
P312B	Diagnosis of Fuel Rail Pressure Sensor Bank2 - Out of Range Error	Raw pressure data of SENT rail pressure sensor channel 1	>4087	Ignition is on	=FALSCH	0.5(s)	1 Trip
		OR		Loss due to high level on SENT sensor signal line of SENT Rail	=FALSCH		
		Raw pressure data of SENT rail pressure sensor channel 1	<2	Loss due to low level on SENT sensor signal line of SENT Rail pressure sensor	=FALSE		
				Error in SENT rail pressure sensor	=FALSE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions are met	=see sheet enable tables		
U101C	Path1: Diagnosis of message loss due to sensor signal line on high level (Bank 2)	Loss due to high level on SENT sensor signal line of SENT rail pressure sensor	TRUE	Ignition is on	=FALSCH	0.5(s)	1 Trip
and				Loss due to low level on SENT sensor signal line of SENT rail	=FALSCH		
U0665				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions are met	=see sheet enable tables		

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	LI101C	Path2: Diagnosis of message loss due to sensor signal line on low level (Bank 2)	Loss due to low level on SENT sensor signal line of SENT rail pressure sensor	TRUE	Ignition is on	=FALSCH	0.5(s)	1 Trip
	and				Loss due to high level on SENT sensor signal line of SENT rail	=FALSCH		
	U0665				No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions are met	=see sheet enable tables		
	U13D2	Diagnosis of Fuel Rail Pressure Protocol Error Bank 2	Protocol error for SENT rail pressure sensor detected	TRUE	Ignition is on	=FALSE	0.5(s)	1 Trip
	and				Loss due to high level on SENT sensor signal line of SENT Rail pressure sensor	=FALSE		1 Trip
	U13D3				Loss due to low level on SENT sensor signal line of SENT Rail pressure sensor	=FALSCH		1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions are met	=see sheet enable tables		
40. CCM - RATIONALITY DIAGNOSIS OF FUEL RAIL PRESSURE SENSOR	P0191	Path1: Rationality Diagnosis of Fuel Rail Pressure Sensor	The low-pass filtered absolute value of the difference of the two rail pressure data values (see Look-Up-Table #42)	>241 to 290	Raw data for rail pressure from SENT	<2	1(s)	1 Trip
					Raw data for rail pressure from SENT	>4087		
					Raw data for rail pressure from SENT sensor channel 2	<2		
					Raw data for rail pressure from SENT sensor channel 2	>4087		
					Message loss due to high level on SENT sensor signal line of SENT Rail pressure sensor	=FALSCH		
					Message loss due to low level on SENT sensor signal line of SENT Rail pressure sensor	=FALSE		
					Protocol error of SENT rail pressure sensor	=FALSE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions are met	=see sheet enable tables		

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P0191	Path 2: High pressure sensor digital raw value is lesser than calibrated threshold for a calibrated period of time	High pressure sensor digital raw value	<-1.5(MPa)	Fuel pre-supply pump is ON	=TRUE	1(s)	1 Trip
				(Rail pressure sensor voltage is not plausible	=TRUE		
				((Condition error in stuck check, no voltage difference, which is the following conditions	=FALSE		
				(Rail pressure sensor voltage difference between minimum and maximum value over one cycle	>4		
				(Number of injections ECU is in drive state	<8 =FALSE		
)			
				) Rail pressure sensor voltage is plausible	=TRUE		
				(Pressure from SENT is not plausible	=FALSE		
				(Raw data for rail pressure from SENT	<4087		
				Raw data for rail pressure from SENT	>2		
)			
				OR			
				Pressure from SENT is not plausible, channel 2	=FALSE		
				(Data for rail pressure from SENT Sensor channel 2	<4087		
				Data for rail pressure from SENT Sensor channel 2	>2		
)			
)			
)			
)			
) Condition for initial fuelling of fuel supply system is active	=FALSE		

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				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0191	Path 3: Signal stuck check	Rail pressure sensor voltage difference between minimum and maximum value over one cycle	≤4	Condition error in stuck check, no voltage difference, which is the following conditions (Number of injections ECU is in drive state) Rail pressure sensor voltage is plausible (Pressure from SENT is not plausible) Raw data for rail pressure from SENT Raw data for rail pressure from SENT) OR Pressure from SENT is not plausible, channel 2 (Data for rail pressure from SENT, channel 2 Data for rail pressure from SENT, channel 2)) No pending or confirmed DTCs Basic enable conditions met	=TRUE <		

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Message loss due to high level on SENT sensor signal line of SENT Rail pressure sensor =FALSCH
 Message loss due to low level on SENT sensor signal line of SENT Rail pressure sensor =FALSE
 Protocol error of SENT rail pressure sensor =FALSE
 No pending or confirmed DTCs =see sheet inhibit tables
 Basic enable conditions are met =see sheet enable tables

P01BF	Path 2: High pressure sensor digital raw value is lesser than calibrated threshold for a calibrated period of time	High pressure sensor digital raw value	<-1.5(MPa)	Fuel pre-supply pump is ON	=TRUE	1(s)	1 Trip
				(Rail pressure sensor voltage is not plausible	=TRUE		
				((Condition error in stuck check, no voltage difference, which is the following conditions	=FALSE		
				(Rail pressure sensor voltage difference between minimum and maximum value over one cycle	>4		
				{ Number of injections ECU is in drive state	<8(count) =FALSE		
				) Rail pressure sensor voltage is plausible	=TRUE		
				{ Pressure from SENT is not plausible	=FALSE		
				(Raw data for rail pressure from SENT	<4087		
				Raw data for rail pressure from SENT	>2		
) OR			
				Pressure from SENT is not plausible, channel 2	=FALSE		
				(

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				Data for rail pressure from SENT Sensor channel 2	<4087		
				Data for rail pressure from SENT Sensor channel 2	>2		
)			
)			
)			
)			
				Condition for initial fuelling of fuel supply system is active	=FALSE		
				/			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P01BF	Path 3: Signal stuck check	Rail pressure sensor voltage difference between minimum and maximum value over one cycle	≤4	Condition error in stuck check, no voltage difference, which is the following conditions	=TRUE	2(s)	1 Trip
				(Number of injections ECU is in drive state	>8(count) =TRUE		
)			
				Rail pressure sensor voltage is plausible	=TRUE		
				(Pressure from SENT is not plausible	=FALSE		
)			
				Raw data for rail pressure from SENT	<4087		
				Raw data for rail pressure from SENT	>2		
)			
				OR			
				Pressure from SENT is not plausible, channel 2	=TRUE		
				(Data for rail pressure from SENT, channel 2	<4087		
				Data for rail pressure from SENT, channel 2	>2		
)			
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		

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					Basic enable conditions met	=see sheet enable tables		
41. FUEL RAIL SENSORS' SENT SIGNALS DIAGNOSIS	P312B	Monitoring the range of the Raw Presure Data	Raw pressure data of SENT rail pressure sensor channel 1 bank 2 or Raw pressure data of SENT rail pressure sensor channel 1 bank 2	>4087 <2	Sensor supply voltage error is not reported. Basic enable conditions met Message loss due high level on sensor signal line is not reported. Message loss due to low level on sensor signal line is not reported. Error in received data (e.g. wrong checksum) or an error in SENT Protocol is not reported.	=False =see sheet enable tables =False =False =False	0.5(s)	1 Trip
	P128B	Monitoring the range of the Raw Presure Data	Raw pressure data of SENT rail pressure sensor channel 2 bank 1 or Raw pressure data of SENT rail pressure sensor channel 2 bank 1	>4087 <2	Sensor supply voltage error is not reported. Basic enable conditions met Message loss due high level on sensor signal line is not reported. Message loss due to low level on sensor signal line is not reported. Error in received data (e.g. wrong checksum) or an error in SENT Protocol is not reported.	=False =see sheet enable tables =False =False =False	0.5(s)	1 Trip
	P312C	Monitoring the range of the Raw Presure Data	Raw pressure data of SENT rail pressure sensor channel 2 bank 2 or Raw pressure data of SENT rail pressure sensor channel 2 bank 2	>4087 <2	Sensor supply voltage error is not reported. Basic enable conditions met Message loss due high level on sensor signal line is not reported. Message loss due to low level on sensor signal line is not reported. Error in received data (e.g. wrong checksum) or an error in SENT Protocol is not reported.	=False =see sheet enable tables =False =False =False	0.5(s)	1 Trip
	U13D2 and U13D3	Monitoring the protocol error of the Fuel Supply System Gasoline Bank 2.	An error in received data (e.g. wrong checksum) or an error in SENT Protocol is reported (Sensor 1) An error in received data (e.g. wrong checksum) or an error in SENT Protocol is reported (Sensor 2)	=TRUE	Sensor supply voltage error is not reported. Basic enable conditions met Message loss due high level on sensor signal line is not reported. Message loss due to low level on sensor signal line is not reported.	=False =see sheet enable tables =False =False	0.5(s)	1 Trip 1 Trip

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42. COM - DIAGNOSIS OF FUEL TANK PRESSURE SENSOR	P0453	Detects if the fuel tank pressure sensor voltage is higher than a calibrated threshold for a calibrated period of time	Fuel tank pressure sensor voltage	>4.8486(V)	(Engine start is finished	=TRUE	10(s)	2 Trip
			same as Fuel tank pressure	<-4.2(kPa)	means: (Engine speed / Engine speed	>200(rpm) =0(rpm)		
					ECU is in pre-drive state No pending or confirmed DTCs Basic enable conditions met	=FALSE =See sheet inhibit tables =See sheet enable tables		
	P0452	Detects if the fuel tank pressure sensor voltage is lower than a calibrated threshold for a calibrated period of time	Fuel tank pressure sensor voltage	<0.1514(V)	(Engine start is finished	=TRUE	10(s)	2 Trip
			same as Fuel tank pressure	>1.63(kPa)	means: (Engine speed / Engine speed	>200(rpm) =0(rpm)		
					ECU is in pre-drive state No pending or confirmed DTCs Basic enable conditions met	=FALSE =See sheet inhibit tables =See sheet enable tables		
	P0451	Absolute value of Pressure difference for check of tank pressure sensor for drift is greater than the threshold for a calibrated period of time	Absolute value of Pressure difference for check of tank pressure sensor for drift	>0.81(kPa)	Tank pressure sensor for start check for drift is fulfilled, which is the following conditions for time	>3(s)	7(s)	2 Trip
					(Canister vent valve (CVV) commanded open	=TRUE		
					(EVAP purge flow (Vehicle speed (Vehicle speed	<0.0005(g/s) <0(mph) >0(mph)		

font-size: 10pt; text-align: right;">\$ 200/-

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```

)
(
  Ambient pressure >70(kPa)
  =FALSE
(
  Condition maximum fuel level for
diagnostic
function
(
  fuel level <63(l)
)
  Condition minimum fuel level for
diagnostic
function
(
  fuel level <7(l)
)
)
)
Fuel level <63(l)
<35.26(°C)
  Ambient air temperature
  Ambient air temperature >-7.04(°C)
)

Reference value for check of tank
pressure
sensor for drift stored in this driving
cycle
(
  Engine not stopped after first start >5(s)
)

Ambient air temperature sensor
model is error
free
  Temperature difference for cold
start detection <9.86(°C)
  for check of tank pressure sensor
for drift
)
)
)
No pending or confirmed DTCs =See sheet inhibit
tables

Basic enable conditions met =See sheet enable
tables

```

P0451	Absolute value of tank pressure filtered for offset-diagnosis tank pressure sensor is greater than calibrated threshold	Absolute fuel tank pressure filtered for offset-diagnosis tank pressure sensor	>1(kPa)	Tank pressure sensor start check for offset is fulfilled, which is the following conditions for time (>2(s)	0.1(s)	2 Trip
-------	---	--	---------	--	-------	--------	--------

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Ambient pressure for offset diagnosis is fulfilled	=TRUE
(<35.26(°C)
Ambient air temperature	
Ambient air temperature	>-7.04(°C)
)	
(
Ambient pressure	>70(kPa)
(	=FALSE
Condition maximum fuel level for diagnostic function	
(
fuel level	<63(l)
)	
Condition minimum fuel level for diagnostic function	=FALSE
(
fuel level	<7(l)
)	
)	
Vehicle speed conditions are fulfilled for offset diagnosis	=TRUE
(	<1.997(m/s^2)
Absolute vehicle acceleration for offset-diagnosis of tank pressure sensor	
(	<0(mph)
Vehicle speed	
Vehicle speed	>0(mph)
)	
)	
Tank pressure is stable for offset diagnosis	=TRUE
Fuel tank ventilation adaption factor	<5
(	>34.987(g)
Integrated mass flow for release of offset check tank pressure sensor	
Engine not stopped after first start	
)	
(
(	=FALSE
Condition refueling is detected	
(=FALSE
Condition refueling possible	
OR	

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Difference between unfiltered fuel volume and stopped fuel level	<6(l)
)	
)	
OR	
(=FALSE
Condition refueling bit valid	
(	=TRUE
Condition refueling possible	
OR	
Refuel indication is active	=TRUE
Difference between unfiltered fuel volume and stopped fuel level	>6(1)
)	
)	
Internal error flag CCV error	=FALSE
(
Difference between filtered tank pressure for offset diagnosis and filtered tank pressure due to no mass flow	>0
)	
)	
)	
CPV plausibility check is successful	=TRUE
<i>i</i> t	
(
(	<1.997(m/s^2)
Absolute vehicle acceleration for offset-diagnosis tank pressure sensor	
Canister vent valve (CVV) commanded open	=TRUE
Low manifold ambient pressure	
Internal error flag CCV error	=FALSE
)	
for time	>5(s)
)	
Timer for calculation of reference tank pressure	>3(s)
(	<5(counts)
Counter CPV-plausibility-checks	
(	=FALSE
CPV active for plausibility check	
Pressure from open CPV	=TRUE

max. deviation 1. reference value	<0.05(kPa)
to 2.	
reference value tank pressure	
minimum change for pressure	>0.05(kPa)
because of	
CPV open and close	
)	
)	
)	
No pending or confirmed DTCs	=See sheet inhibit tables
Basic enable conditions met	=See sheet enable tables

P0451	Difference between Max and Min purge mass flow for incremental check of tank pressure sensor greater than a calibrated threshold	Difference between Max and Min purge mass flow for incremental check of tank pressure sensor	>0.42(g/s)	Condition start increment check of tank pressure sensor (	0.1(s)	2 Trip
		and Difference between Max and Min fuel tank pressure during incremental check of tank pressure sensor	<0(kPa)	Vehicle speed (Ambient air temperature Ambient air temperature } Ambient pressure (Condition maximum fuel level for diagnostic function (Fuel level) Condition minimum fuel level for diagnostic function (Fuel level) / EVAP purge flow Manifold ambient pressure (Measured tank pressure Measured tank pressure)	>0(mph) <50(°C) >-7.04(°C) >70(kPa) =FALSE <63(l) =FALSE <7(l) >0 <0.08(kPa) <1.3(kPa) >-1.2(kPa)	

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				No pending or confirmed DTCs	=See sheet inhibit tables		
				Basic enable conditions met	=See sheet enable tables		
P0454	Tank pressure difference in tank leak diagnosis greater than a calibrated threshold for a calibrated period of time	Tank pressure difference in tank leak diagnosis	>1(kPa)	(Canister vent valve (CVV) commanded open for time) Vehicle idle speed control condition ((Engine speed deviation OR Vehicle is in idle condition which is the following conditions for time ((Difference between propulsion torque of cruise control and driver torque propulsion after step limitation OR Coordinated status of acceleration request) Difference between minimum wheel torque with internal combustion engine firing and driver torque value after limitation)) Overrun fuel cutoff is released) (Ambient air temperature Ambient air temperature) Vehicle speed No pending or confirmed DTCs Basic enable conditions met	=TRUE >4(s) =TRUE >0.5(s) <3(Nm) =FALSE >0(Nm) =FALSE <50(°C) >-7.04(°C) <3.11(mph) =See sheet inhibit tables =See sheet enable tables	20(s)	2 Trip

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43. FAUL LEVEL SENSOR DIAGNOSIS	P0461	Diagnosis for the Fuel Level Sender Performance	Calculated fuel consumption (based on injected fuel) since start of test	>9(l)	Distance traveled	>0(m)	0.6(s)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
					Enable condition for zone2 stuck diagnosis	=True		
	U2200	Monitoring when there is no reception of Fuel Level.	Ultrasonic Fuel Level Data Received	=FALSCH	Ignition is ON	=TRUE	0.6(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P0463	Monitoring when there is no error either in ADC module or supply voltage of Fault level - Circuit High.	Ultrasonic Fuel Level Raw Value	>600(mm)	Ignition is ON	=TRUE	2(s)	1 Trip
44. COM - FUEL PRESSURE SENSOR					Basic enable conditions met	=see sheet enable tables		
	P0462	Monitoring when there is no error either in ADC module or supply voltage of Fault level - Circuit Low.	Ultrasonic Fuel Level Raw Value	<10(mm)	Ignition is ON	=TRUE	2(s)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
	P018D	Detects Fuel Pressure Sensor Signal range check - High	Average raw voltage value of low pressure fuel pressure sensor	>4.75(V)	Ignition ON	=TRUE	1(S)	2 Trip
			Same as:		Basic enable conditions met	=see sheet enable tables		
			Low fuel pressure value	>843(kPa)				
	P018C	Detects Fuel Pressure Sensor Signal range check - Low	Average raw voltage value of low pressure fuel pressure sensor	<0.25(V)	Ignition ON	=TRUE	1(s)	2 Trip
			Same as:		Basic enable conditions met	=see sheet enable tables		
			Low pressure fuel value	<7.05(kPa)				

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P018B	Filtered governor low pressure output of fuel system is greater than calibrated threshold for calibrated period of time	Filtered governor low pressure output of fuel system	>250(kPa)	Electrical fuel pump operational mode is in closed loop control	TRUE	10(s)	2 Trip
				(Fuel flow demand of electrical fuel pump Engine is running state Pre-Supply pump is ON) No pending or confirmed DTCs Basic enable conditions met	>0.1(l/h) =TRUE =TRUE =see sheet inhibit tables =see sheet enable tables		
P018B	Filtered governor low pressure output of fuel system is lesser than calibrated threshold for calibrated period of time	Filtered governor low pressure output of fuel system	<-250(kPa)	Electrical fuel pump operational mode is in closed loop control		10(s)	2 Trip
				(Fuel flow demand of electrical fuel pump Engine is running state Pre-Supply pump is ON) No pending or confirmed DTCs Basic enable conditions met	>0.1(l/h) =TRUE =TRUE =see sheet inhibit tables =see sheet enable tables		
P018B	Fuel pressure sensor stuck check	Max raw sensor value - Min raw sensor value	<4(kPa)	Electrical fuel pump operational mode is in closed loop control		10(s)	2 Trip
				Time since end of engine start Fuel flow Fuel flow Fuel level Fuel pressure deviation No pending or confirmed DTCs	>15(s) >1(l/h) <100(l/h) >2(l) >20(kPa) =see sheet inhibit tables		

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					Basic enable conditions met	=see sheet enable tables	
45. COM - DIAGNOSIS OF CAMSHAFT POSITION SENSOR	P0343	Camshaft sensor signal circuit high - Detects no signal error - high level at the inlet camshaft sensor at bank 1 by monitoring camshaft revolutions when there is no new edges detected and the signal level during transition to no signal state is high	Crankshaft signals	>4(revs)	Ignition ON	=TRUE	1 Trip
			Camshaft signal level when there is a transition to no signal state	=permanently high	Crankshaft signal with gap is detected	=TRUE	
					Back rotating engine is not detected	=TRUE	
					No pending or confirmed DTCs	=See sheet inhibit tables	
					Basic enable conditions met	=See sheet enable tables	
	P0342	Camshaft sensor signal circuit low - Detects no signal error - low level at the inlet camshaft sensor at bank 1 by monitoring camshaft revolutions when	Crankshaft signals	>4(revs)	Ignition ON	=TRUE	1 Trip
			Camshaft signal level when there is a transition to no signal state	=permanently low	Crankshaft signal with gap is detected	=TRUE	
					Back rotating engine is not detected	=TRUE	
					No pending or confirmed DTCs	=See sheet inhibit tables	
					Basic enable conditions met	=See sheet enable tables	
	P0341	Camshaft sensor signal rationality check - Detection of implausible crankshaft sensor operation by detecting incorrect camshaft sensor signal patterns - inlet camshaft sensor bank 1	(Length of the acquired camshaft segment is wrong	=TRUE	Ignition ON	=TRUE	1 Trip
			OR		Crankshaft signal with gap is detected	=TRUE	

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		No matching of camshaft signal table and reference table found because of disturbances	=TRUE	Back rotating engine is not detected	=TRUE	
		OR		No pending or confirmed DTCs	=See sheet inhibit tables	
		Sequence of entries in the signal table does not match with the reference table	=TRUE	Basic enable conditions met	=See sheet enable tables	
		OR Number of erroneous edge positions has exceeded the maximum tolerance) AND Defect counter	=TRUE >20(revs)			
P0348	Camshaft sensor signal circuit high - Detects no signal error - high level at the inlet camshaft sensor at bank 2 by monitoring camshaft revolutions when there is no new edges detected and the signal level during transition to no signal state is high	Crankshaft signals	>4(revs)	Ignition ON	=TRUE	1 Trip
		Camshaft signal level when there is a transition to no signal state	=permanently high	Crankshaft signal with gap is detected	=TRUE	
				Back rotating engine is not detected	=TRUE	
				No pending or confirmed DTCs	=See sheet inhibit tables	
				Basic enable conditions met	=See sheet enable tables	
P0347	Camshaft sensor signal circuit low - Detects no signal error - low level at the inlet camshaft sensor at bank 2 by monitoring camshaft revolutions when there is no new edges detected onrl thn cinnol loVol rliirinn	Crankshaft signals	>4(revs)	Ignition ON	=TRUE	1 Trip
		Camshaft signal level when there is a transition to no signal state	=permanently low	Crankshaft signal with gap is detected	=TRUE	
				Back rotating engine is not detected	=TRUE	

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				No pending or confirmed DTCs	=See sheet inhibit tables	
				Basic enable conditions met	=See sheet enable tables	
P0346	Camshaft sensor signal rationality check - Detection of implausible crankshaft sensor operation by detecting incorrect camshaft sensor signal patterns - inlet camshaft sensor bank 2	(Length of the acquired camshaft segment is wrong	=TRUE	Ignition ON	=TRUE	1 Trip
		OR		Crankshaft signal with gap is detected	=TRUE	
		No matching of camshaft signal table and reference table found because of disturbances	=TRUE	Back rotating engine is not detected	=TRUE	
		OR		No pending or confirmed DTCs	=See sheet inhibit tables	
		Sequence of entries in the signal table does not match with the reference table	=TRUE	Basic enable conditions met	=See sheet enable tables	
		OR				
		Number of erroneous edge positions has exceeded the maximum tolerance	=TRUE			
)				
		AND				
		Defect counter	>20(revs)			
P0368	Camshaft sensor signal circuit high - Detects no signal error - high level at the outlet camshaft sensor at bank 1 by monitoring camshaft revolutions when there is no new edges detected and the signal level during transition to no signal state is high	Crankshaft signals	>4(revs)	Ignition ON	=TRUE	1 Trip
		Camshaft signal level when there is a transition to no signal state	=permanently high	Crankshaft signal with gap is detected	=TRUE	
				Back rotating engine is not detected	=TRUE	
				No pending or confirmed DTCs	=See sheet inhibit tables	
				Basic enable conditions met	=See sheet enable tables	

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P0367	Camshaft sensor signal circuit low - Detects no signal error - low level at the outlet camshaft sensor at bank 1 by monitoring camshaft revolutions when there is no new edges detected and the signal level during transition to no signal state is low	Crankshaft signals	>4(revs)	Ignition ON	=TRUE	1 Trip
		Camshaft signal level when there is a transition to no signal state	=0	Crankshaft signal with gap is detected	=TRUE	
				Back rotating engine is not detected	=TRUE	
				No pending or confirmed DTCs	=See sheet inhibit tables	
				Basic enable conditions met	=See sheet enable tables	
P0366	Camshaft sensor signal rationality check - Detection of implausible crankshaft sensor operation by detecting incorrect camshaft sensor signal patterns - outlet camshaft sensor bank 1	(Length of the acquired camshaft segment is wrong	=TRUE	Ignition ON	=TRUE	1 Trip
		OR		Crankshaft signal with gap is detected	=TRUE	
		No matching of camshaft signal table and reference table found because of disturbances	=TRUE	Back rotating engine is not detected	=TRUE	
		OR		No pending or confirmed DTCs	=See sheet inhibit tables	
		Sequence of entries in the signal table does not match with the reference table	=TRUE	Basic enable conditions met	=See sheet enable tables	
		OR				
		Number of erroneous edge positions has exceeded the maximum tolerance	=TRUE			
)				
		AND				
		Counter for signal disturbance error after pattern matching	>20(revs)			

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P0393	Camshaft sensor signal circuit high - Detects no signal error - high level at the outlet camshaft sensor at bank 2 by monitoring camshaft revolutions when there is no new edges detected and the signal level during transition to no signal state is high	Crankshaft signals	>4(revs)	Ignition ON	=TRUE	1 Trip
		Camshaft signal level when there is a transition to no signal state	=permanently high	Crankshaft signal with gap is detected	=TRUE	
				Back rotating engine is not detected	=TRUE	
				No pending or confirmed DTCs	=See sheet inhibit tables	
				Basic enable conditions met	=See sheet enable tables	
P0392	Camshaft sensor signal circuit low - Detects no signal error - low level at the outlet camshaft sensor at bank 2 by monitoring camshaft revolutions when there is no new edges detected and the signal level during transition to no signal state is low	Crankshaft signals	>4(revs)	Ignition ON	=TRUE	1 Trip
		Camshaft signal level when there is a transition to no signal state		Crankshaft signal with gap is detected	=TRUE	
				Back rotating engine is not detected	=TRUE	
				No pending or confirmed DTCs	=See sheet inhibit tables	
				Basic enable conditions met	=See sheet enable tables	
P0391	Camshaft sensor signal rationality check - Detection of implausible crankshaft sensor operation by detecting incorrect camshaft sensor signal patterns - outlet camshaft sensor bank 2	(Length of the acquired camshaft segment is wrong	=TRUE	Ignition ON	=TRUE	1 Trip
		OR		Crankshaft signal with gap is detected	=TRUE	

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			No matching of camshaft signal table and reference table found because of OR Sequence of entries in the signal table does not match with the reference table OR Number of erroneous edge positions has exceeded the maximum tolerance) AND Defect counter	TRUE TRUE =TRUE >20(revs)	Back rotating engine is not detected No pending or confirmed DTCs Basic enable conditions met	=TRUE =See sheet inhibit tables =See sheet enable tables		
46. COM - CRANKSHAFT POSITION SENSOR	P0335	Crankshaft signal rationality check - monitoring of crankshaft missing signal against camshaft signal	Crankshaft signal is not available	TRUE	Engine speed based on camshaft is above the lower plausible limit Engine speed based on camshaft is below the higher plausible limit Engine speed based on camshaft is below maximum engine speed Camshaft signal is valid (V (Vehicle speed Vehicle speed) OR \ Engine speed) ((Engine speed Synchronization check is completed) OR (Engine speed OR Engine is ready and waiting for engine speed))) OR	=FALSCH =FALSCH =FALSE =TRUE <0.62(mph) >15.5(mph) >550(rpm) >550(rpm) =TRUE =0(rpm) =TRUE	3(camshaft revolutions)	1Trip-200ms

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Starter is active and starter signal is available

)
No pending or confirmed DTCs

=see sheet inhibit tables

Basic enable conditions met

=see sheet enable tables

P0336	Path 1: Crankshaft signal rationality check - detection of implausible crankshaft sensor operation by detecting incorrect crank sensor signal patterns.	Gap found in crankshaft signal	=FALSCH	(		20(events)	1Trip-200ms
		Crankshaft signal disturbance is found	=TRUE	(
		Engine is in backup crankshaft mode	=TRUE	(
				Vehicle speed	>0.62(mph)		
				Vehicle speed	<15.5(mph)		
)			
				OR			
				\			
				Engine speed	>550(rpm)		
)			
)			
				(
				(
				Engine speed	>550(rpm)		
				Synchronization check is completed	=TRUE		
)			
				OR			
				{			
				Engine speed	=0(rpm)		
				OR			
				Engine is ready and waiting for engine speed	=TRUE		
)			
)			
)			
				OR			
				Starter is active and starter signal is available			
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		

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	P0336	Path 2: Crankshaft signal rationality check - Range check of DGI pulse width	Error detected in the range of pulse width from DGI sensor	=TRUE	Ignition is ON	=TRUE	10(events)	1Trip-200ms
					Basic enable conditions met	=see sheet enable tables		
	P2619	Replicated Crank short circuit to battery	Powerstage reported short circuit to battery	=TRUE	Ignition is ON	=TRUE	1(s)	2 Trip
					Battery Voltage	>9(V)		
	P2618	Replicated Crank short circuit to ground	Powerstage reported short circuit to ground	=TRUE	Basic enable conditions are met	=see sheet enable tables	1(s)	2 Trip
47. CCM - CRANKSHAFT TO CAMSHAFT - INTAKE / EXHAUST / BANK 1 / 2 CORRELATION	P0016	Rationality check: Crankshaft position - intake camshaft position allocation Bank 1	(Average of angular offset between camshaft and crankshaft	>12.59(deg CrS)	Number of camshaft revolutions	>2(counts)	2(CaS revs)	1 Trip
			OR		Back rotating engine	=FALSCH		
			Average of angular offset between camshaft and crankshaft)	<-8.79(deg CrS)	NOTE: Pulse length indicates the direction of rotation:			
					45ps forward rotating shaft, 90ps backward rotating shaft			
					Four crankshaft revolutions are complete without any error on crankshaft or camshaft signal and no sync lost	=TRUE		
					Monitoring is calibrated as active	=TRUE		
					No signal loss failure or signal disturbance is stored for the camshaft in question	=TRUE		
					Intake camshaft: Edge adaptation request	=TRUE		
	P0018	Rationality check: Crankshaft position - intake camshaft position allocation Bank 2	(Average of angular offset between camshaft and crankshaft	>12.59(deg CrS)	Number of camshaft revolutions	>2(counts)	2(CaS revs)	1 Trip
			OR		Back rotating engine	=FALSCH		

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		Average of angular offset between camshaft and crankshaft)	<-8.79(deg CrS)	NOTE: Pulse length indicates the direction of rotation: 45ps forward rotating shaft, 90ps backward rotating shaft Four crankshaft revolutions are complete without any error on crankshaft or camshaft signal and no sync lost Monitoring is calibrated as active No signal loss failure or signal disturbance is stored for the camshaft in question Intake camshaft: Edge adaptation request	=TRUE =TRUE =TRUE		
P0017	Rationality check: Crankshaft position - exhaust camshaft position allocation Bank 1	(Average of angular offset between camshaft and crankshaft	>12.59(deg CrS)	Number of camshaft revolutions	>2(counts)	2(CaS revs)	1 Trip
		OR		Back rotating engine	=FALSCH		
		Average of angular offset between camshaft and crankshaft)	<-8.79(deg CrS)	NOTE: Pulse length indicates the direction of rotation: 45ps forward rotating shaft, 90ps backward rotating shaft Four crankshaft revolutions are complete without any error on crankshaft or camshaft signal and no sync lost Monitoring is calibrated as active No signal loss failure or signal disturbance is stored for the camshaft in question Exhaust camshaft: Edge adaptation request	=TRUE =TRUE =TRUE		
PO019	Rationality check: Crankshaft position - exhaust camshaft position allocation Bank 2	(Average of angular offset between camshaft and crankshaft	>12.59(deg CrS)	Number of camshaft revolutions	>2(counts)	2(CaS revs)	1 Trip
		OR		Back rotating engine	=FALSCH		

			Average of angular offset between camshaft and crankshaft)	<-8.79(deg CrS)	NOTE: Pulse length indicates the direction of rotation: 45ps forward rotating shaft, 90ps backward rotating shaft Four crankshaft revolutions are complete without any error on crankshaft or camshaft signal and no sync lost Monitoring is calibrated as active	=TRUE =TRUE		
					No signal loss failure or signal disturbance is stored for the camshaft in question Exhaust camshaft: Edge adaptation request	=TRUE =TRUE		
48. COM-IGNITION COIL SUPPLY VOLTAGE FEEDBACK - B1 / B2	P135A	Diagnoses Ignition Coil External Fuse open circuit Bank 1	Voltage at ignition coil side of fuse	=0(V)	Ignition is ON	=TRUE	40(events)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
	P135B	Diagnoses Ignition Coil External Fuse open circuit Bank 2	Voltage at ignition coil side of fuse	=0(V)	Ignition is ON	=TRUE	40(events)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
49. CCM - DIAGNOSIS OF KNOCK SENSOR 1 Z2 -BANK 1/2	P0328	Knock sensor 1 short circuit to battery	Filtered knock sensor output	>4.7(V)	Engine speed	>500(rpm)	3(events)	2 Trip
		Runs every 15-120 sec (as a function of Engine Speed)	Where Low pass filter gain - Integration result for short circuit to battery diagnosis	=0.047				
	P0327	Knock sensor 1 short circuit to ground	Filtered knock sensor output	<0.2(V)	Engine speed	>500(rpm)	3(events)	2 Trip
		Runs every 15-120 sec (as a function of Engine Speed)	Where Low pass filter gain - Integration result for short circuit to ground diagnosis	=0.047				

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P0325	Knock sensor 1 open circuit	Integration result for open load detection	>2147483647	Knock sensor PWM duty cycle applied	>50(%)	30(events)	2 Trip
	Runs every 15-120 sec (as a function of Engine Speed)	Where Low pass filter gain - Integration result for open load diagnosis	0.047	Engine speed	>600(rpm)		
				Engine speed	<3000(rpm)		
				Engine load	>13.008(%)		
				Engine load SCG & SCB diagnostic enabled	<100(%) =TRUE		
P0326	Knock sensor 1 reference signal rationality check	Normalized reference level of knock control (see Look-Up-Table #48)	>0.67109 to 3(V*ms)	Engine coolant temperature at engine start	>39.96(°C)	0.1(s)	2 Trip
		Debounce counter for knock sensor diagnosis	>30(Counts)	Knock control active ((Relative charge of air in the cylinder (see Look-Up-Table #53)	=TRUE >34.99 to 40.0(%)		
				OR			
P1982	Knock sensor 1 reference signal rationality check	Normalized reference level of knock control (see Look-Up-Table #47)	<0.00156 to 0.00586(V*ms)	(Engine load dynamic for knock detection active (*)	=FALSE	0.1(s)	2 Trip
		Debounce counter for knock sensor diagnosis	>30(Counts)	maintained active for time (Knock control: time for dynamic adaptation) (see Look-Up-Table #52)	>0.29 to 0.5(s)		
)) Engine Speed Engine start is finished for number of combustions to deactivate knock control after start end Fuel Cut off)	>550(rpm) =TRUE >20(Counts) =FALSE		

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GDI mode stratified is active	=FALSE
} for time	>0(s)
)	=TRUE
Enable knock sensor diagnosis	
{ Knock control synchronization error at phase error	=FALSE
OR	
State of EPM operation mode should not have valid crankshaft signal present	=FALSE
)	
Engine load dynamic for knock detection active	=FALSE
(Intake manifold pressure	>11 to40(kPa)
(see Look-Up-Table #49)	
Delay for dynamic detection	
Engine in idle condition	=FALSE
)	
maintained active for time (Knock control: time for load-dynamic action on knock detection) (see Look-Up-Table #51)	>0.29 to 0.44(s)
Engine speed dynamic for knock detection active	=FALSE
{ Engine speed gradient averaged during one working cycle (see Look-Up-Table #50)	>4500 to 12700(1 /min/s)
for time	>0.15(s)
/	
Engine Speed	>1600(rpm)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P032D	Knock sensor 3 short circuit to battery	Filtered knock sensor output	>4.7(V)	Engine speed	>500(rpm)	3(events)	2 Trip
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Runs every 15-120 sec (as a function of Engine Speed)
Where Low pass filter gain - Integration result for short circuit to battery diagnosis
=0.046875

P032C Knock sensor 3 short circuit to ground
Filtered knock sensor output
<0.2(V)
Engine speed
>500(rpm)
3(events)
2 Trip

Runs every 15-120 sec (as a function of Engine Speed)
Where Low pass filter gain - Integration result for short circuit to ground diagnosis
=0.047

P032A Knock sensor 3 open circuit
Integration result for open load detection
>2147483647
Knock sensor PWM duty cycle applied
>50(%)
30(events)
2 Trip

Runs every 15-120 sec (as a function of Engine Speed)
Where Low pass filter gain - Integration result for open load diagnosis
=0.047
Engine speed
>600(rpm)
Engine speed
<3000(rpm)
Engine load
>13(%)
Engine load
<100(%)
SCG & SCB diagnostic enabled
=TRUE

P032B Knock sensor 3 reference signal rationality check
Normalized reference level of knock control
>0.67109 to 3(V*ms)
Engine coolant temperature at engine start
>39.96(°C)
0.1(s)
2 Trip

(see Look-Up-Table #48)

Debounce counter for knock sensor diagnosis
>30(Counts)
Knock control active
=TRUE
(
(
(
(
Relative charge of air in the cylinder
(see Look-Up-Table #53)
>34.99 to 40.0(%)

OR

P1984 Knock sensor 3 reference signal rationality check
Normalized reference level of knock control
<0.00156 to 0.00586(V*ms)
(
Engine load dynamic for knock
=FALSE
0.1(s)
2 Trip

(see Look-Up-Table #47)

detection active (*)

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Debounce counter for knock sensor diagnosis	>30(Counts)	maintained active for time	>0.29 to 0.5(s)
		(Knock control: time for dynamic adaptation) (see Look-Up-Table #52)	
)	
)	
		Engine Speed	>550(rpm)
		Engine start is finished	=TRUE
		for	
		number of combustions to deactivate	>20(Counts)
		knock control after start end	
		Fuel Cut off	=FALSE
)	
		GDI mode stratified is active	=FALSE
)	
		for time	>0(s)
		Enable knock sensor diagnosis	=TRUE
		{	
		Knock control synchronization error at	=FALSE
		phase error	
		OR	
		State of EPM operation mode should not	=FALSE
		have valid crankshaft signal present	
)	
		Engine load dynamic for knock detection active	=FALSE
		(
		Intake manifold pressure	>11 to40(kPa)
		(see Look-Up-Table #49)	
		Delay for dynamic detection	
		Engine in idle condition	=FALSE
)	
		maintained active for time	>0.29 to 0.44(s)
		(Knock control: time for load-dynamic action on knock detection) (see Look-Up-Table #51)	
		Engine speed dynamic for knock detection active	=FALSE
		(

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				Engine speed gradient averaged during one working cycle (see Look-Up-Table #50)	>4500 to 12700(1 /min/s)		
				for time	>0.15(s)		
				/			
				Engine Speed	>1600(rpm)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0333	Knock sensor 2 short circuit to battery	Filtered knock sensor output	>4.7(V)	Engine speed	>500(rpm)	3(events)	2 Trip
	Runs every 15-120 sec (as a function of Engine Speed)	Where Low pass filter gain - Integration result for short circuit to battery diagnosis	=0.047				
P0332	Knock sensor 2 short circuit to ground	Filtered knock sensor output	<0.2(V)	Engine speed	>500(rpm)	3(events)	2 Trip
	Runs every 15-120 sec (as a function of Engine Speed)	Where Low pass filter gain - Integration result for short circuit to ground diagnosis	=0.047				
P0330	Knock sensor 2 open circuit	Integration result for open load detection	>2147483647	Knock sensor PWM duty cycle applied	>50(%)	30(events)	2 Trip
	Runs every 15-120 sec (as a function of Engine Speed)	Where Low pass filter gain - Integration result for open load diagnosis	=0.047	Engine speed	>600(rpm)		
				Engine speed	<3000(rpm)		
				Engine load	>13(%)		
				Engine load SCG & SCB diagnostic enabled	<100(%) =TRUE		
P0331	Knock sensor 2 reference signal rationality check	Normalized reference level of knock control (see Look-Up-Table #48)	>0.67109 to 3(V*ms)	Engine coolant temperature at engine start	>39.96(°C)	0.1(s)	2 Trip

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		Debounce counter for knock sensor diagnosis	>30(Counts)	Knock control active ((((Relative charge of air in the cylinder (see Look-Up-Table #53)	=TRUE >34.99 to 40.0(%)		
				OR			
P1983	Knock sensor 2 reference signal rationality check	Normalized reference level of knock control (see Look-Up-Table #47)	<0.00156 to 0.00586(V*ms)	(Engine load dynamic for knock detection active (*)	=FALSE	0.1(s)	2 Trip
		Debounce counter for knock sensor diagnosis	>30(Counts)	maintained active for time (Knock control: time for dynamic adaptation) (see Look-Up-Table #52)	>0.29 to 0.5(s)		
				) ) Engine Speed Engine start is finished	>550(rpm) =TRUE		
				for number of combustions to deactivate knock control after start end Fuel Cut off	>20(Counts) =FALSE		
				) GDI mode stratified is active	=FALSE		
				) for time	>0(s)		
				) Enable knock sensor diagnosis	=TRUE		
				\ Knock control synchronization error at phase error	=FALSE		
				OR State of EPM operation mode should not have valid crankshaft signal present	=FALSE		
				/ Engine load dynamic for knock detection active	=FALSE		
				(

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Intake manifold pressure	>11 to 40(kPa)
(see Look-Up-Table #49)	
Delay for dynamic detection	
Engine in idle condition	=FALSE
) maintained active for time	>0.29 to 0.44(s)
(Knock control: time for load-dynamic action on knock detection)	
(see Look-Up-Table #51)	
Engine speed dynamic for knock detection active	=FALSE
(Engine speed gradient averaged during one working cycle	>4500 to 12700(1/min/s)
(see Look-Up-Table #50)	
for time	>0.15(s)
) Engine Speed	>1600(rpm)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P033D	Knock sensor 3 short circuit to battery	Filtered knock sensor output	>4.7(V)	Engine speed	>500(rpm)	3(events)	2 Trip
	Runs every 15-120 sec (as a function of Engine Speed)	Where Low pass filter gain - Integration result for short circuit to battery diagnosis	=0.047				
P033C	Knock sensor 3 short circuit to ground	Filtered knock sensor output	<0.2(V)	Engine speed	>500(rpm)	3(events)	2 Trip
	Runs every 15-120 sec (as a function of Engine Speed)	Where Low pass filter gain - Integration result for short circuit to ground diagnosis	=0.047				
P033A	Knock sensor 3 open circuit	Integration result for open load detection	>2147483647	Knock sensor PWM duty cycle applied	>50(%)	30(events)	2 Trip
	Runs every 15-120 sec (as a function of Engine Speed)	Where Low pass filter gain - Integration result for open load diagnosis	=0.047	Engine speed	>600(rpm)		

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				Engine speed	<3000(rpm)		
				Engine load	>13(%)		
				Engine load	<100(%)		
				SCG & SCB diagnostic enabled	=TRUE		
P033B	Knock sensor 4 reference signal rationality check	Normalized reference level of knock control (see Look-Up-Table #48)	>0.67109 to 3(V*ms)	Engine coolant temperature at engine start	>39.96(°C)	0.1(s)	2 Trip
				Debounce counter for knock sensor diagnosis	>30(Counts)		
				Knock control active ((((Relative charge of air in the cylinder (see Look-Up-Table #53)	=TRUE >34.99 to 40.0(%)		
				OR			
P1985	Knock sensor 4 reference signal rationality check	Normalized reference level of knock control (see Look-Up-Table #47)	>0.00156 to 0.00586(V*ms)	(Engine load dynamic for knock detection active (*)	=FALSE	0.1(s)	2 Trip
				Debounce counter for knock sensor diagnosis	>30(Counts)		
				maintained active for time (Knock control: time for dynamic adaptation) (see Look-Up-Table #52)	>0.29 to 0.5(s)		
				) ) Engine Speed Engine start is finished for number of combustions to deactivate knock control after start end Fuel Cut off) GDI mode stratified is active) for time)	>550(rpm) =TRUE >20(Counts) =FALSE =FALSE >0(s) =TRUE		
				Enable knock sensor diagnosis (

						Knock control synchronization error at phase error OR State of EPM operation mode should not have valid crankshaft signal present / Engine load dynamic for knock detection active (Intake manifold pressure (see Look-Up-Table #49) Delay for dynamic detection Engine in idle condition) maintained active for time (Knock control: time for load-dynamic action on knock detection) (see Look-Up-Table #51) Engine speed dynamic for knock detection active (Engine speed gradient averaged during one working cycle (see Look-Up-Table #50) for time / Engine Speed No pending or confirmed DTCs Basic enable conditions met	=FALSE =FALSE =FALSE >11 to40(kPa) =0 =FALSE >0.29 to 0.44(s) =FALSE >4500 to 12700(1/min/s) >0.15(s) >1600(rpm) =see sheet inhibit tables =see sheet enable tables			
50. COM - INJECTION VALVE FLYBACK VOLTAGE - CYLINDER 1 TO 8	P02EE	Plausibility check of injector ADC signal buffer (ADC buffer signal from beginning of Controlled Valve Operation signal evaluation OR ADC buffer signal from end of Controlled Valve Operation signal evaluation)	<15000(counts)		Ignition is ON	No pending or confirmed DTCs	Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	20(events)	2 Trip

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P02EF	Plausibility check of injector ADC signal buffer	(ADC buffer signal from beginning of Controlled Valve Operation signal evaluation OR ADC buffer signal from end of Controlled Valve Operation signal evaluation)	<15000(counts) >5000(counts)	Ignition is ON No pending or confirmed DTCs Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	20(events)	2 Trip
P02F0	Plausibility check of injector ADC signal buffer	(ADC buffer signal from beginning of Controlled Valve Operation signal evaluation OR ADC buffer signal from end of Controlled Valve Operation signal evaluation)	<15000(counts) >5000(counts)	Ignition is ON No pending or confirmed DTCs Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	20(events)	2 Trip
P02F1	Plausibility check of injector ADC signal buffer	(ADC buffer signal from beginning of Controlled Valve Operation signal evaluation OR ADC buffer signal from end of Controlled Valve Operation signal evaluation)	<15000(counts) >5000(counts)	Ignition is ON No pending or confirmed DTCs Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	20(events)	2 Trip
P02F2	Plausibility check of injector ADC signal buffer	(ADC buffer signal from beginning of Controlled Valve Operation signal evaluation OR ADC buffer signal from end of Controlled Valve Operation signal evaluation)	<15000(counts) >5000(counts)	Ignition is ON No pending or confirmed DTCs Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	20(events)	2 Trip

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		OR		Basic enable conditions met	=see sheet enable tables		
		ADC buffer signal from end of Controlled Valve Operation signal evaluation)	>5000(counts)				
P02F3	Plausibility check of injector ADC signal buffer	(		Ignition is ON	=TRUE	20(events)	2 Trip
		ADC buffer signal from beginning of Controlled Valve Operation signal evaluation	<15000(counts)	No pending or confirmed DTCs	=see sheet inhibit tables		
		OR		Basic enable conditions met	=see sheet enable tables		
		ADC buffer signal from end of Controlled Valve Operation signal evaluation)	>5000(counts)				
P02F4	Plausibility check of injector ADC signal buffer	(		Ignition is ON	=TRUE	20(events)	2 Trip
		ADC buffer signal from beginning of Controlled Valve Operation signal evaluation	<15000(counts)	No pending or confirmed DTCs	=see sheet inhibit tables		
		OR		Basic enable conditions met	=see sheet enable tables		
		ADC buffer signal from end of Controlled Valve Operation signal evaluation)	>5000(counts)				
P02F5	Plausibility check of injector ADC signal buffer	(		Ignition is ON	=TRUE	20(events)	2 Trip
		ADC buffer signal from beginning of Controlled Valve Operation signal evaluation	<15000(counts)	No pending or confirmed DTCs	=see sheet inhibit tables		
		OR		Basic enable conditions met	=see sheet enable tables		
		ADC buffer signal from end of Controlled Valve Operation signal evaluation)	>5000(counts)				

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51. COM - ENGINE OIL TEMPERATURE SENSORS CIRCUIT DIAGNOSIS sump	P01BC	Monitoring Maximum error Signal Range Check for oil temperature sensor 2 in sump	ADC-voltage of the oil temperature sensor 2 in sump	>4.95(V)	Battery Voltage	>9(V)	1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P01BB	Monitoring Minimum error Signal Range Check for oil temperature sensor 2 in sump	ADC-voltage of the oil temperature sensor 2 in sump	<0.2(V)	Battery Voltage	>9(V)	1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P0198	Monitoring Maximum error Signal Range Check for oil temperature sensor 2 in sump	ADC-voltage of the oil temperature sensor	>4.95(V)	Battery Voltage	>9(V)	1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P0197	Monitoring Minimum error Signal Range Check for oil temperature sensor 2 in sump	ADC-voltage of the oil temperature sensor	<0.2(V)	Battery Voltage	>9(V)	1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		

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P2C21	Check the deviation between oil temperature sensor 1 and the sensor 2	The absolute value of the difference between the oil temperature sensors in the sump	>15(°C)	Battery Voltage	>9(V)	0.1(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P0196	Coldstart CrossCheck Max Error for engine oil temperature sensor	Average temperature of other sensors - Sensor temperature	>14.96(°C)	Battery Voltage	>9(V)	1(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P0196	Coldstart CrossCheck Max Error for engine oil temperature sensor	Sensor temperature - Average temperature of other sensors	<14.96(°C)	Sensor signal is valid	=TRUE	1(s)	2 Trip
				Engine off time	>28800(s)		
				Mean value calculation out of reference temperature sensors is finished.	=TRUE		
P0199	Engine Oil Temperature Sensor (EOT) Circuit Intermittent	Absolute value (Sensed value of sump Temperature - Filtered sensor value of the I-temperature -sensor 2 in sump)	>9.96(°C)	Battery Voltage	>9(V)	1(s)	2 Trip
		for time	>A+B(s)	Basic enable conditions met	=see sheet enable tables		
		where					
		A: debounce time error detection Jitter-Check Oil temperature sensor2	=5(s)				
		B: debounce time error Jitter-Check Oil temperature sensor2	=20(s)				
P01BD	Engine Oil Temperature Sensor (EOT) Circuit Intermittent (Sensor B)	Absolute value (Sensed value of sump Temperature - Filtered sensor value of the I-temperature -sensor 2 in sump)	>9.96(°C)			1(s)	2 Trip
		for time	>A+B(s)				
		where					

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A: debounce time error
detection Jitter-Check Oil
temperature sensor2

=5(s)

B: debounce time error
Jitter-Check Oil temperature
sensor2

=20(s)

52. COM - DIAGNOSIS OF ENGINE OIL PRESSURE SENSOR	P0523	Monitoring of Engine Oil Pressure Sensor for Signal range check - High	Engine oil pressure sensor voltage	>4.5(V)	Ignition is ON	=TRUE	1(s)	2 Trip
			Same as:		No pending or confirmed DTCs	=see sheet inhibit tables		
			Engine Oil Pressure (see Look-Up-Table #85)	>0 to 1049.8(kPa)	Basic enable conditions met	=see sheet enable tables		
	P0522	Monitoring of Engine Oil Pressure Sensor for Signal range check - Low/Open	Engine oil pressure sensor voltage	<0.25(V)	Ignition is ON	=TRUE	1(s)	2 Trip
			Same as:		No pending or confirmed DTCs	=see sheet inhibit tables		
			Engine Oil Pressure (see Look-Up-Table #85)	<0 to 1049.8(kPa)	Basic enable conditions met	=see sheet enable tables		
	P0521	Error: oil pressure sensor is not plausible	Fail Case #1 Engine Running:		Fail Case #1 Engine Running Enable Conditions:		3(s)	2 Trip
			Relative Oil Pressure	>500(kPa)	Engine speed Oil temperature in the oil sump The high-side switch must be the Closed oil pressure control Status CrCtl request exceeds driver's request Status of forward drive request by driver request No active faults associated with the oil pressure sensor	=TRUE P0523=FALSCH		
			OR Relative Oil Pressure	<50(kPa)	Engine speed Time after engine start Basic enable conditions met	P0522=FALSCH >1520(rpm) >4.96(s) =see sheet enable tables		

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			Fail Case #2 After Run: Absolute value of the Relative Oil Pressure	>100(kPa)	Fail Case #2 Engine Off Enable Conditions: (Current system / ECU substate is in POSTDRIVE Time since the status SYC-POSTDRIVE was reached) Oil temperature in the oil sump No active faults associated with the oil pressure sensor Basic enable conditions met	=TRUE >10(s) >60(°C) P0523=FALSCH P0522=FALSCH =see sheet enable tables	3(s)	
			Fail Case #3 Before Engine Start: Absolute value of the Relative Oil Pressure	>80(kPa)	Fail Case #3 Engine Off Enable Conditions: Engine off time Engine speed Oil temperature in the oil sump Motor status is cranking No active faults associated with the oil pressure sensor Basic enable conditions met	>100(s) =0(rpm) >60(°C) =TRUE P0523=FALSCH P0522=FALSCH =see sheet enable tables	3(s)	
53. COM - ACCELERATOR PEDAL - SIGNAL 1 / 2	P2123	Circuit continuity - circuit high	Accelerator pedal position sensor 1 voltage	>4.775(V)	Ignition is ON	=TRUE	0.2(s)	1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P2122	Circuit continuity - circuit low	Accelerator pedal position sensor 1 voltage	<0.28(V)	Ignition is ON	=TRUE	0.2(s)	1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		

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P2138	Synchronization check	Absolute difference between accelerator pedal position sensor 1 voltage (a) and sensor 2 voltage (b)	>0.12 to 0.18(V)	Ignition is ON	=TRUE	0.25(s)	1 Trip
		(see Look-Up-Table #1) where		No pending or confirmed DTCs	=see sheet inhibit tables		
		(a) Maximum Value between accelerator pedal position sensor 1 voltage divided by (d) and (c)	=Max(sensor 1 raw voltage/d,c)(V)	Basic enable conditions met	=see sheet enable tables		
		(b) Maximum value between accelerator pedal position sensor 2 voltage and (c)	=Max(sensor 2 raw voltage,c)(V)				
		(c) Minimum voltage to enable synchronization check	=0.424(V)				
		(d) Factor between sensor values	=2				
P2128	Circuit continuity - circuit high	Accelerator pedal position sensor 2 voltage	>4.775(V)	Ignition is ON	=TRUE	0.2(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P2127	Circuit continuity - circuit low	Accelerator pedal position sensor 2 voltage	<0.28(V)	Ignition is ON	=TRUE	0.2(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0123	Diagnosis of Throttle Position Sensori BankI for Signal Range Check-High	Raw voltage value of Throttle Position Sensori BankI	>4.805(V)	ECU is in DRIVE state	=TRUE	0.14(s)	1 Trip
				OR ECU is in POSTDRIVE state	=TRUE		
				Request safety fuel cut off SKA bank 1, following condition: (=FALSE		

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```

Request reversible safety fuel cut off
SKA bank 1, which has following
condition:
(
    (
        Battery voltage for throttle valve
        OR
        Engine speed
    )
    Limp home position not reached bank
)
Irreversible safety fuel cut off SKA
)
No pending or confirmed DTCs

```

```

=FALSE
=TRUE
>2000(rpm)
=FALSE
=FALSE
=see sheet inhibit
tables

```

```

Basic enable conditions met
=see sheet enable
tables

```

P0122	Diagnosis of Throttle Position Sensor1 Bank1 for Signal Range Check-Low	Raw voltage value of Throttle Position Sensor1 Bank1	<0.195(V)	ECU is in DRIVE state	=TRUE	0.14(s)	1 Trip
-------	---	--	-----------	-----------------------	-------	---------	--------

```

OR
ECU is in POSTDRIVE state
Request safety fuel cut off SKA bank
1, following condition:
(
    Request reversible safety fuel cut off
    SKA bank 1, which has following
    condition:
    (
        (
            Battery voltage for throttle valve
            operation sufficient bank 1
            OR
            Engine speed
        )
        Limp home position not reached bank
        1
    )
    Irreversible safety fuel cut off SKA
    bank 1
)

```

```

=TRUE
=FALSE
=FALSE
=TRUE
>2000(rpm)
=FALSE
=FALSE

```

			)	No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0121	Synchronization check for Throttle Position Sensor Bank1 - rationality check against modelled air charge value	(		( ECU is in DRIVE state	=TRUE	0.14(s)	1 Trip
	Deviation of relative actual angle from Throttle Position Sensors	(	>5 to 6.25(%)	OR			
		Absolute difference between relative actual angle calculated based on voltages from sensor 1 and sensor 2 (see Look-Up-Table #93)					
		)	>0.14(s)	ECU is in POSTDRIVE state	=TRUE		
		for time)			
		(	>9.02(%)	Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
		Absolute difference between relative actual angle calculated based on voltage from sensor 1 and relative air charge signal		(
)					
		for time	>0.28(s)	(
		)		Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
		OR		(
		(		Battery voltage for throttle valve operation sufficient bank 1	=TRUE		
		)		OR			
	Deviation of relative actual angle from Throttle Position Sensors wrt relative air charge signal	(	>0(%)				
		Absolute difference between relative actual angle calculated based on voltage from sensor 1 and sensor 2 and relative air charge signal					
)					
		for time	>0.36(s)	Engine speed	>2000(rpm)		
))			

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Error in the main charge sensor	OR		Limp home position not reached bank 1	=FALSE
	Main charge sensor error, following conditions:	=TRUE)	
	(		Irreversible safety fuel cut off SKA bank 1	=FALSE
	Condition for error of main filling sensor	=TRUE)	
	(		Flag for throttle angle calculated from main charge sensor is unthrottled, following condition:	=FALSE
	Validity of the pressure sensor of the intake manifold bank 1	=FALSCH	(
	Condition for HFM error (without debounce)	=TRUE	Difference between throttle angle calculated from unthrottled mass flow of main charging sensor and throttle valve angle at which the 95 charge is through minimum tolerance for bank1	<0(%)
	()	
	Flag Variant Diagnosis Error bank 1	=TRUE	No pending or confirmed DTCs	=see sheet inhibit tables
	OR		Basic enable conditions met	=see sheet enable tables
	Error flag of the signal variation check of the HFM sensor (Bank 2)	=TRUE		
	OR			
	Flag plausible diagnosis error	=TRUE		
	OR			
	Flag to display a physical HFM range error bank 1	=TRUE		
	OR			
	Flag to display a physical HFM range error bank 2	=TRUE		
	OR			
	(
	Validity flag of the measured air mass flow sensor signal for bank 1	=TRUE		
	OR			
	Validity flag of the measured air mass flow sensor signal for bank 2	=TRUE		
)			
	Release of the HFM diagnosis of the electrical signal	=TRUE		
)			
)			

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		for time	>0.14(s)				
)					
U0606	Diagnosis of Throttle Position Sensor 1 Bank 1 for SENT data - Communication Check	Communication error from the SENT Channel of Throttle Position Sensor 1 Bank 1, following conditions:	=TRUE	(ECU is in DRIVE state	=TRUE	0.13(s)	1 Trip
and U0607	Diagnosis of Throttle Position Sensor 2 Bank 1 for SENT data - Communication Check	(No signal on the line	=TRUE	OR ECU is in POSTDRIVE state	=TRUE		1 Trip
		OR		Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
		Pulse length of SENT message is out of range	=TRUE	(
		OR		(Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
		Calibration pulse of SENT message is out of range	=TRUE	(
		)		Battery voltage for throttle valve operation sufficient bank 1	=TRUE		
				OR			
				Engine speed	>2000(rpm)		
)			
				Limp home position not reached bank 1	=FALSE		
)			
				Irreversible safety fuel cut off SKA bank 1	=FALSE		
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
U136C	Invalid data from SENT device (Sensor 1)	No valid data from the SENT Channel of Throttle Position Sensor 1 Bank 1, following conditions:	=TRUE	(ECU is in DRIVE state	=TRUE	0.12(s)	1 Trip
and U136D	Invalid data from SENT device (Sensor 2)	(Error in the monitoring status of SENT driver Bank 1	=TRUE	OR ECU is in POSTDRIVE state	=TRUE		1 Trip
))			

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)	Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
				((
					Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
				)	Battery voltage for throttle valve operation sufficient bank 1	=TRUE		
				OR	Engine speed	>2000(rpm)		
				)	Limp home position not reached bank 1	=FALSE		
				)	Irreversible safety fuel cut off SKA bank 1	=FALSE		
				)	No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
55. COM - THROTTLE POSITION SENSOR - SENSOR 2 B1 DIAGNOSIS	P0223	Diagnosis of Throttle Position Sensor2 BankI for Signal Range Check-High	Raw voltage value of Throttle Position Sensor2 BankI	>4.805(V)	ECU is in DRIVE state	=TRUE	0.14(s)	1 Trip
					OR			
					ECU is in POSTDRIVE state	=TRUE		
					Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
					(
					Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
					(
					(
					Battery voltage for throttle valve operation sufficient bank 1	=TRUE		
					OR			
					Engine speed	>2000(rpm)		
)			
					Limp home position not reached bank 1	=FALSE		
)			
					Irreversible safety fuel cut off SKA bank 1	=FALSE		

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) No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0222	Diagnosis of Throttle Position Sensor2 Bank1 for Signal Range Check-Low	Raw voltage value of Throttle Position Sensor2 Bank1	<0.195(V)	ECU is in DRIVE state	=TRUE	0.14(s)	1 Trip
				OR ECU is in POSTDRIVE state	=TRUE		
				Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
				(Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
				((Battery voltage for throttle valve operation sufficient bank 1	=TRUE		
				OR Engine speed	>2000(rpm)		
				) Limp home position not reached bank 1	=FALSE		
				) Irreversible safety fuel cut off SKA bank 1	=FALSE		
) No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		

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P0221	Synchronization check for Throttle Position Sensor2 Bank1 - rationality check against modelled air charge value	((ECU is in DRIVE state	=TRUE	0.14(s)	1 Trip
	Deviation of relative actual angle from Throttle Position Sensors	(	>5 to 6.25(%)	OR				
		Absolute difference between relative actual angle calculated based on voltage from sensor 1 and relative actual angle calculated based on voltage from sensor 2 (see Look-Up-Table #93)						
		Absolute difference between relative actual throttle angle calculated based on voltage from sensor 2 and throttle angle calculated from the main charge sensor (intake manifold pressure sensor	>9.0234(%)		ECU is in POSTDRIVE state)	=TRUE		
		) for time	>0.28(s)		Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
		) OR			(Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
	Deviation of relative actual angle from Throttle Position Sensors wrt relative air charge signal	Absolute difference between relative actual angle calculated based on voltage from sensor 1 and sensor 2 and relative air charge signal	<0(%)		(
		for time	>0.36(s)		Battery voltage for throttle valve operation sufficient bank 1	=TRUE		
	Error in the main charge sensor	OR Main charge sensor error, following conditions:	=TRUE		OR Engine speed	>2000(rpm)		
		(Condition for error of main filling sensor	=TRUE		) Limp home position not reached bank 1	=FALSE		
		(Validity of the pressure sensor of the intake manifold bank 1	=FALSCH		) Irreversible safety fuel cut off SKA bank 1	=FALSE		
		Condition for HFM error (without debounce)	=TRUE)			
		(			Flag for throttle angle calculated from main charge sensor is unthrottled,	=FALSE		

		Flag Variant Diagnosis Error bank 1 OR	=TRUE	(Difference between throttle angle calculated from unthrottled mass flow of main charging sensor and throttle valve angle at which the 95 charge is through minimum tolerance for bank1	<0(%)		
		Error flag of the signal variation check of the HFM sensor (Bank 2) OR	=TRUE) No pending or confirmed DTCs	=see sheet inhibit tables		
		Flag plausible diagnosis error OR	=TRUE	Basic enable conditions met	=see sheet enable tables		
		Flag to display a physical HFM range error bank 1 OR	=TRUE				
		Flag to display a physical HFM range error bank 2 OR	=TRUE				
		(Validity flag of the measured air mass flow sensor signal for bank 1 OR	=TRUE				
		Validity flag of the measured air mass flow sensor signal for bank 2)	=TRUE				
		Release of the HFM diagnosis of the electrical signal	=TRUE				
)) for time	>0.14(s)				
		}					
LI0606	Diagnosis of Throttle Position Sensor 1 Bank 1 for SENT data - Communication Check	Communication error from the SENT Channel of Throttle Position Sensor 2 Bank 1, following conditions:	=TRUE	(ECU is in DRIVE state	=TRUE	0.13(s)	1 Trip
and		(OR			

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110607	Diagnosis of Throttle Position Sensor 2 Bank 1 for SENT data - Communication Check	No signal on the line	=TRUE	ECU is in POSTDRIVE state)	=TRUE		1 Trip
		OR		Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
		Pulse length of SENT message is out of range	=TRUE	(
		OR		(Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
		Calibration pulse of SENT message is out of range)	=TRUE	(
				Battery voltage for throttle valve operation sufficient bank 1	=TRUE		
				OR			
				Engine speed	>2000(rpm)		
)			
				Limp home position not reached bank 1	=FALSE		
U136C and U136D	Invalid data from SENT device	No valid data from the SENT Channel of Throttle Position Sensor 2 Bank 1, following conditions:	=TRUE	(	=TRUE	0.12(s)	1 Trip
		(		ECU is in DRIVE state			
		Error in the monitoring status of SENT driver Bank 1	=TRUE	OR			
		)		ECU is in POSTDRIVE state)	=TRUE		1 Trip
				Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
				(
				(
				Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
				(
				Battery voltage for throttle valve operation sufficient bank 1	=TRUE		
				OR			

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				Engine speed	>2000(rpm)			
)				
				Limp home position not reached bank 1	=FALSE			
)				
				Irreversible safety fuel cut off SKA bank 1	=FALSE			
)				
				No pending or confirmed DTCs	=see sheet inhibit tables			
				Basic enable conditions met	=see sheet enable tables			
56. COM - THROTTLE POSITION SENSOR - SENSOR 1 B2 DIAGNOSIS	P0228	Diagnosis of Throttle Position Sensor1 Bank2 for Signal Range Check-High	Raw voltage value of Throttle Position Sensor1 Bank2	>4.805(V)	ECU is in DRIVE state	=TRUE	0.14(s)	1 Trip
					OR			
					ECU is in POSTDRIVE state	=TRUE		
					Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
					(
					Irreversible safety fuel cut off SKA bank 2	=FALSE		
					Request reversible safety fuel cut off SKA bank 2, following conditions:	=FALSE		
					(
					(
					Battery voltage for throttle valve operation sufficient bank 2	=TRUE		
					OR			
					Engine speed	>2000(rpm)		
)			
					Limp home position not reached bank 2	=FALSE		
)			
)			
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		

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P0227	Diagnosis of Throttle Position Sensori Bank2 for Signal Range Check-Low	Raw voltage value of Throttle Position Sensori Bank2	<0.195(V)	ECU is in DRIVE state	=TRUE	0.14(s)	1 Trip
				OR			
				ECU is in POSTDRIVE state	=TRUE		
				Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
				(
				Irreversible safety fuel cut off SKA bank 2	=FALSE		
				Request reversible safety fuel cut off SKA bank 2, following conditions:	=FALSE		
				(
				(
				Battery voltage for throttle valve operation sufficient bank 2	=TRUE		
				OR			
				Engine speed	>2000(rpm)		
)			
				Limp home position not reached bank 2	=FALSE		
)			
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0226	Synchronization check for Throttle Position Sensori Bank2 - rationality check against modelled air charge value	(		(	=TRUE	0.14(s)	1 Trip
				ECU is in DRIVE state			
	Deviation of relative actual angle from Throttle Position Sensors	Absolute difference between relative actual angle calculated based on voltages from sensor 1 and sensor 2 (see Look-Up-Table #94)	>5 to 6.25(%)	OR			
		for time	>0.14(s)	ECU is in POSTDRIVE state	=TRUE		
)			

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Deviation of relative actual angle from Throttle Position Sensors wrt relative air charge signal	Absolute difference between relative actual angle calculated based on voltage from sensor 1 and relative air charge signal	>9.02(%)	Request safety fuel cut off SKA bank 2, following condition:	=FALSE
	for time	>0.28(s)	(
	)		Irreversible safety fuel cut off SKA bank 2	=FALSE
	OR		and	
	(		Request reversible safety fuel cut off SKA bank 2, following conditions:	=FALSE
	Absolute difference between relative actual angle calculated based on voltage from sensor 1 and sensor 2 and relative air charge signal	>0(%)	(
	for time	>0.36(s)	(
	)		Battery voltage for throttle valve operation sufficient bank 2	=TRUE
	OR)	
	Error main charge sensor, following conditions:	=TRUE	Limp home position not reached bank 2	=FALSE
Error in the main charge sensor	(		Flag for throttle angle calculated from main charge sensor is unthrottled, following condition:	=FALSE
	Condition for error of main filling sensor	=TRUE	(
	(		Difference between throttle angle calculated from unthrottled mass flow of main charging sensor and throttle valve angle at which the 95 charge is through minimum tolerance for bank1	<0(%)
	Validity of the pressure sensor of the intake manifold bank 1	=FALSCH)	
	Condition for HFM error (without debounce)	=TRUE)	
	()	
	Flag Variant Diagnosis Error bank 1	=TRUE	No pending or confirmed DTCs	=see sheet inhibit tables
	OR		Basic enable conditions met	=see sheet enable tables
	Error flag of the signal variation check of the HFM sensor (Bank 2)	=TRUE		
	OR			

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		Flag plausible diagnosis error	=TRUE				
		OR					
		Flag to display a physical HFM range error bank 1	=TRUE				
		OR					
		Flag to display a physical HFM range error bank 2	=TRUE				
		OR					
		(
		Validity flag of the measured air mass flow sensor signal for bank 1	=TRUE				
		OR					
		Validity flag of the measured air mass flow sensor signal for bank 2	=TRUE				
)					
		Release of the HFM diagnosis of the electrical signal	=TRUE				
)					
)					
		for time	>0.14(s)				
)					
LI0608	Diagnosis of Throttle Position Sensor 1 Bank 2 for SENT data - Communication Check	Communication error from the SENT Channel of Throttle Position Sensor 1 Bank 2, following conditions:	=TRUE	(	ECU is in DRIVE state	=TRUE	0.13(s) 1 Trip
and LI0688	Diagnosis of Throttle Position Sensor 2 Bank 2 for SENT data - Communication Check	(		OR			
		No signal on the line	=TRUE	ECU is in POSTDRIVE state	=TRUE		1 Trip
))			
		OR					
		Pulse length of SENT message is out of range	=TRUE		Request safety fuel cut off SKA bank 2, following condition:	=FALSE	
				(
					Irreversible safety fuel cut off SKA bank 2	=FALSE	
		OR			Request reversible safety fuel cut off SKA bank 2, following conditions:	=FALSE	
		Calibration pulse of SENT message is out of range	=TRUE	(
)		(
				Battery voltage for throttle valve operation sufficient bank 2	=TRUE		
)			

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					Limp home position not reached bank 2)) No pending or confirmed DTCs	=FALSE =see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	U136E	Invalid data from SENT device (Sensor 1)	No valid data from the SENT Channel of Throttle Position Sensor 1 Bank 2, following conditions:	=TRUE	(ECU is in DRIVE state	=TRUE	0.12(s)	1 Trip
	and U136F	Invalid data from SENT device (Sensor 2)	(Error in the monitoring status of SENT driver Bank 2)	=TRUE	OR ECU is in POSTDRIVE state) Request safety fuel cut off SKA bank 2, following condition: (Irreversible safety fuel cut off SKA bank 2 and Request reversible safety fuel cut off SKA bank 2, following conditions: ((Battery voltage for throttle valve operation sufficient bank 2))) Limp home position not reached bank 2)) No pending or confirmed DTCs	=TRUE =FALSE =FALSE =FALSE =TRUE =FALSE =see sheet inhibit tables		1 Trip
					Basic enable conditions met	=see sheet enable tables		
57. COM - THROTTLE POSITION SENSOR - SENSOR 2 B2 DIAGNOSIS	P212D	Diagnosis of Throttle Position Sensor2 Bank2 for Signal Range Check-High	Raw voltage value of Throttle Position Sensor2 Bank2	>4.805(V)	ECU is in DRIVE state OR ECU is in POSTDRIVE state	=TRUE TRUE	0.14(s)	1 Trip

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				Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
				(
				Irreversible safety fuel cut off SKA bank 2	=FALSE		
				Request reversible safety fuel cut off SKA bank 2, following conditions:	=FALSE		
				(
				(
				Battery voltage for throttle valve	=TRUE		
				OR			
				Engine speed	>2000(rpm)		
)			
				Limp home position not reached bank 2	=FALSE		
)			
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P212C	Diagnosis of Throttle Position Sensor2 Bank2 for Signal Range Check-Low	Raw voltage value of Throttle Position Sensor2 Bank2	<0.195(V)	ECU is in DRIVE state	=TRUE	0.14(s)	1 Trip
				OR			
				ECU is in POSTDRIVE state	=TRUE		
				Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
				(
				Irreversible safety fuel cut off SKA bank 2	=FALSE		
				Request reversible safety fuel cut off SKA bank 2, following conditions:	=FALSE		
				(
				(
				Battery voltage for throttle valve operation sufficient bank 2	=TRUE		
				OR			
				Engine speed	>2000(rpm)		
)			
				Limp home position not reached bank 2	=FALSE		
)			

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) No pending or confirmed DTCs		=see sheet inhibit tables	
			Basic enable conditions met		=see sheet enable tables	
P212B	Synchronization check for Throttle Position Sensor2 Bank2 - rationality check against modelled air charge value	(	(	ECU is in DRIVE state	=TRUE	0.14(s) 1 Trip
	Deviation of relative actual angle from Throttle Position Sensors	(	>5 to 6.25(%)	OR		
		Absolute difference between relative actual angle calculated based on voltage from sensor 1 and relative actual angle calculated based on voltage from sensor 2 (see Look-Up-Table #94)				
		Absolute difference between relative actual throttle angle calculated based on voltage from sensor 2 and throttle angle calculated from the main charge sensor (intake manifold pressure sensor	>9.0234(%)	ECU is in POSTDRIVE state)	=TRUE	
		) for time	>0.28(s)	Request safety fuel cut off SKA bank 2, following condition:	=FALSE	
		) OR		(Irreversible safety fuel cut off SKA bank 2	=FALSE	
	Deviation of relative actual angle from Throttle Position Sensors wrt relative air charge signal	Absolute difference between relative actual angle calculated based on voltage from sensor 1 and sensor 2 and relative air charge signal	<0(%)	Request reversible safety fuel cut off SKA bank 2, following conditions:	=FALSE	
		for time	>0.36(s)	(
	Error in the main charge sensor	OR Error main charge sensor, following conditions:	=TRUE	(Battery voltage for throttle valve operation sufficient bank 2	=TRUE	
		(Condition for error of main filling sensor	=TRUE	/ Limp home position not reached bank 2	=FALSE	

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(Flag for throttle angle calculated from main charge sensor is unthrottled, following condition:	=FALSE
Validity of the pressure sensor of the intake manifold bank 1	=FALSCH	(
Condition for HFM error (without debounce)	=TRUE	Difference between throttle angle calculated from unthrottled mass flow of main charging sensor and throttle valve angle at which the 95 charge is through minimum tolerance for bank1	<0(%)
()	
Flag Variant Diagnosis Error bank 1	=TRUE)	
OR)	
Error flag of the signal variation check of the HFM sensor (Bank 2)	=TRUE	No pending or confirmed DTCs	=see sheet inhibit tables
OR		Basic enable conditions met	=see sheet enable tables
Flag plausible diagnosis error	=TRUE		
OR			
Flag to display a physical HFM range error bank 1	=TRUE		
OR			
Flag to display a physical HFM range error bank 2	=TRUE		
OR			
(
Validity flag of the measured air mass flow sensor signal for bank 1	=TRUE		
OR			
Validity flag of the measured air mass flow sensor signal for bank 2	=TRUE		
)			
Release of the HFM diagnosis of the electrical signal	=TRUE		
)			
)			
for time	>0.14(s)		
)			

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U0608	Diagnosis of Throttle Position Sensor 1 Bank 2 for SENT data - Communication Check	Communication error from the SENT Channel of Throttle Position Sensor 2 Bank 2, following conditions:	=TRUE	(ECU is in DRIVE state	=TRUE	0.13(s)	1 Trip
and U0688	Diagnosis of Throttle Position Sensor 2 Bank 2 for SENT data - Communication Check	(No signal on the line	=TRUE	OR ECU is in POSTDRIVE state)	=TRUE		1 Trip
		OR		Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
		Pulse length of SENT message is out of range	=TRUE	(
				Irreversible safety fuel cut off SKA bank 2	=FALSE		
		OR		Request reversible safety fuel cut off SKA bank 2, following conditions:	=FALSE		
		Calibration pulse of SENT message is out of range	=TRUE	(
				(Battery voltage for throttle valve operation sufficient bank 2	=TRUE		
				/			
				Limp home position not reached bank 2	=FALSE		
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
U136E	Invalid data from SENT device (Sensor 1)	No valid data from the SENT Channel of Throttle Position Sensor 2 Bank 2, following conditions:	=TRUE	(ECU is in DRIVE state	=TRUE	0.12(s)	1 Trip
and U136F	Invalid data from SENT device (Sensor 2)	(Error in the monitoring status of SENT driver Bank 2	=TRUE	OR ECU is in POSTDRIVE state)	=TRUE		1 Trip
)		Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
				(Irreversible safety fuel cut off SKA bank 2	=FALSE		
				and			

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					Request reversible safety fuel cut off SKA bank 2, following conditions:	=FALSE		
					((Battery voltage for throttle valve operation sufficient bank 2) Limp home position not reached bank 2)) No pending or confirmed DTCs	=TRUE =FALSE =see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
58. COM - MANIFOLD ABSOLUTE PRESSURE SENSOR - B1	P0108	Monitoring of Intake manifold pressure sensor bankI for Signal range check-High	Raw voltage from Intake manifold pressure sensor bankI	>4.499966(V)	No pending or confirmed DTCs	=see sheet inhibit tables	1.5(s)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
	P0107	Monitoring of Intake manifold pressure sensor bankI for Signal range check-Low	Raw voltage from Intake manifold pressure sensor bankI	<0.500005(V)	No pending or confirmed DTCs	=see sheet inhibit tables	1.5(s)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
	P0106	Path 1: Rationality check against reference pressure - high	Difference between raw pressure during initialization before engine start - Bank 1 and maximal reference pressure for delta pressure sensor diagnoses	>A+B(kPa)	(Engine speed	=0(rpm)	5(s)	1 Trip
			where A: Tolerance manifold pressure sensor to ambient pressure during start B: Delta Intake manifold pressure to ambient pressure during start	4(kPa) 0(kPa)	ECU is in drive-state) For number of events	=TRUE >2(counts)		
					Condition manifold pressure sensor reference for delta pressure sensor	=FALSE		

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				Unfiltered raw voltage of manifold pressure sensor	<0.5(V)		
				Unfiltered raw voltage of manifold pressure sensor	>4.5(V)		
				No pending or confirmed DTCs	=See sheet inhibit tables		
				Basic enable conditions met	=See sheet enable tables		
P0106	Path 2: Rationality check against reference pressure - low	Difference between of raw pressure during initialization before engine start - Bank 1 and minimal reference pressure for delta pressure sensor diagnoses	:A-B(kPa)	(Engine speed	=0(rpm)	5(s)	1 Trip
		where					
		A: Tolerance manifold pressure sensor to ambient pressure during start	4(kPa)	ECU is in drive-state)	=TRUE		
		B: Delta Intake manifold pressure to ambient pressure during start	0(kPa)	For number of events	>2(counts)		
				Condition manifold pressure sensor reference for delta pressure sensor	=FALSE		
				Unfiltered raw voltage of manifold pressure sensor	<0.5(V)		
				Unfiltered raw voltage of manifold pressure sensor	>4.5(V)		
				No pending or confirmed DTCs	=See sheet inhibit tables		
				Basic enable conditions met	=See sheet enable tables		
P0106	Path 3: Rationality check high - comparison of measured intake manifold pressure with modelled intake manifold pressure	Difference between maximum intake manifold pressure and maximum modeled manifold pressure	■2(kPa)	Engine speed	>0(rpm)	2.5(s)	1 Trip
				Model-based manifold pressure diagnosis released from icing detection (sensor not frozen), which is the following condition:	=TRUE		
				Difference between maximum and minimum manifold pressure from sensor signal wobble check	>10(kPa)		
				((Raw voltage of manifold pressure sensor	>0.5(V)		

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Raw voltage of manifold pressure sensor	<4.5(V)
)	
for time	>0.2(s)
(Inflow into the MAP sensor is valid	=TRUE
Outflow from the MAP sensor is valid	=TRUE
)	
for time	>0.14(s)
Request safety fuel cut off	=FALSE
Suspicion of a throttle valve sensor fai	=FALSE
No pending or confirmed DTCs	=See sheet inhibit tables
Basic enable conditions met	=See sheet enable tables

P0106	Path 4: Rationality check low - comparison of measured intake manifold pressure with modelled intake manifold pressure	Difference between minimum modeled manifold pressure and minimum intake manifold pressure	>2(kPa)	Engine speed	>0(rpm)	2.5(s)	1 Trip
				Model-based manifold pressure diagnosis released from icing detection (sensor not frozen), which is the following condition: Difference between current maximum and minimum manifold pressure from sensor signal wobble check	=TRUE >10(kPa)		
				((Raw voltage of manifold pressure sensor	>0.5(V)		
				Raw voltage of manifold pressure sensor	<4.5(V)		
)			
				for time	>0.2(s)		
				(Inflow into the MAP sensor is valid	=TRUE		
				Outflow from the MAP sensor is valid	=TRUE		
)			
				for time	>0.14(s)		
				Request safety fuel cut off	=FALSE		

Suspicion of a throttle valve sensor fai	=FALSE
No pending or confirmed DTCs	=See sheet inhibit tables
Basic enable conditions met	=See sheet enable tables

Path 5: Rationality check low during startup- Raw pressure is less than maximum value of minimum ambient pressure and difference of ambient pressure, offset voltage and tolerance	Raw pressure before engine start in the intake manifold	$<\max[a, (b-c)-d](\text{kPa})$	Time counter for valid raw pressure after engine start	$<25(\text{s})$
	where	50(kPa)	Engine speed	$<300(\text{rpm})$
	(a) minimum ambient pressure for intake manifold pressure diagnosis			
	(b) Ambient pressure		Engine speed calculated in 10ms	$<0(\text{rpm})$
	(c) Offset-voltage for ambient pressure sensor		(Raw voltage of manifold pressure sensor	$>0.5(\text{V})$
	(d) tolerances between pressure raw value before engine start in the intake manifold and ambient pressure	15(kPa)	Raw voltage of manifold pressure sensor	$<4.5(\text{V})$
)	
			for time	$>0.2(\text{s})$
			Counter for number of raw values for averaging	$>5(\text{counts})$
			Calculation of raw-pressure during initialization is finished for bank 1	=FALSE
			Engine speed	$>80(\text{rpm})$
			Difference between raw pressure before engine start in the intake manifold and absolute intake manifold pressure	$<30(\text{kPa})$
			(Inflow into the MAP sensor is valid	=TRUE
			Outflow from the MAP sensor is valid	=TRUE
)	
			for time	$>0.14(\text{s})$
			Request safety fuel cut off	=FALSE

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				Suspicion of a throttle valve sensor failure	=FALSE		
) No pending or confirmed DTCs	=See sheet inhibit tables		
				Basic enable conditions met	=See sheet enable tables		
P0106	Signal variation check: checks if the sensor is frozen, by comparing the difference of maximum and minimum manifold pressure against calibration threshold for sensor signal wobble check	Difference between maximum and minimum manifold pressure from sensor signal wobble check	<10(kPa)	(Engine coolant downstream temperature during the first engine start of the driving cycle.	>-5.3(°C)	2.5(s)	2 Trip
				OR			
				(Engine coolant temperature for time	>30(°C)		
				)	>100(s)		
				((Raw voltage of manifold pressure sensor	>0.5(V)		
				Raw voltage of manifold pressure sensor	<4.5(V)		
)			
				for time	>0.2(s)		
				(Inflow into the MAP sensor is valid	=TRUE		
				Outflow from the MAP sensor is valid	=TRUE		
)			
				for time	>0.14(s)		
				Request safety fuel cut off (*)	=FALSE		
				Suspicion of a throttle valve sensor fai	=FALSE		
				(Engine speed	>1500(rpm)		
				Minimum throttle valve position (Bank 1)	<10.001(%)		
)			
				(Engine speed	<1000(rpm)		
				Maximum throttle valve position (Bank 1)	>19.9951(%)		
)			
)			
				for time	>1(s)		
				No pending or confirmed DTCs	=See sheet inhibit tables		

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					Basic enable conditions met	=See sheet enable tables		
59. COM - MANIFOLD ABSOLUTE PRESSURE SENSOR - B2	P2A0D	Monitoring of Intake manifold pressure sensor bank2 for Signal range check-High	Raw voltage from Intake manifold pressure sensor bank2	>4.5(V)	No pending or confirmed DTCs	=see sheet inhibit tables	1.5(s)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
	P2A0C	Monitoring of Intake manifold pressure sensor bank2 for Signal range check-Low	Raw voltage from Intake manifold pressure sensor bank2	<0.5(V)	No pending or confirmed DTCs	=see sheet inhibit tables	1.5(s)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
	P2A0B	Path 1: Rationality check against reference pressure - high	Difference between raw manifold pressure during initialization - Bank 2 and maximal reference pressure for delta pressure sensor diagnoses	>A+B(kPa)	(Engine speed	=0(rpm)	5(s)	1 Trip
			where	4(kPa)	ECU is in drive-state)	=TRUE		
			A: Tolerance manifold pressure sensor to ambient pressure during start					
			B: Delta Intake manifold pressure to ambient pressure during start	0(kPa)	For number of events	>2(events)		
					Condition manifold pressure sensor reference for delta pressure sensor	=FALSE		
					Unfiltered raw voltage of manifold pressure sensor Bank 2	<0.5(V)		
					Unfiltered raw voltage of manifold pressure sensor Bank 2	>4.5(V)		
					No pending or confirmed DTCs	=See sheet inhibit tables		
					Basic enable conditions met	=See sheet enable tables		
	P2A0B	Path 2: Rationality check against reference pressure - low	Difference between raw manifold pressure during initialization - Bank 2 and minimal reference pressure for delta pressure sensor diagnoses	:A-B(kPa)	(Engine speed	=0(rpm)	5(s)	1 Trip
			where	4(kPa)	ECU is in drive-state)	=TRUE		
			A: Tolerance manifold pressure sensor to ambient pressure during start					

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		B: Delta Intake manifold pressure to ambient pressure during start	O(kPa)	for number of events	>2(events)		
				Condition manifold pressure sensor reference for delta pressure sensor	=FALSE		
				Unfiltered raw voltage of manifold pressure sensor Bank 2	<0.5(V)		
				Unfiltered raw voltage of manifold pressure sensor Bank 2	>4.5(V)		
				No pending or confirmed DTCs	=See sheet inhibit tables		
				Basic enable conditions met	=See sheet enable tables		
P2A0B	Path 3: Rationality check - comparison of measured intake manifold pressure with modelled intake manifold pressure	Difference between maximum intake manifold pressure and maximum modeled manifold pressure	-2(kPa)	Model-based manifold pressure diagnosis released from icing detection (sensor not frozen), which is the following condition:	=TRUE	2.5(s)	1 Trip
				Difference between current minimum and its maximum manifold pressure from sensor signal wobble check	>10(kPa)		
				(maximum voltage threshold for electrical diagnosis for time)	>4.5(V) >0.2(s)		
				(Inflow into the MAP sensor is valid	=TRUE		
				Outflow from the MAP sensor is valid)	=TRUE		
				for time	>0.14(s)		
				Request safety fuel cut off (*)	=FALSE		
				Suspicion of a throttle valve sensor fa	=FALSE		
				No pending or confirmed DTCs	=See sheet enable tables		
				Basic enable conditions met	=See sheet enable tables		
P2A0B	Path 4: Rationality check - comparison of measured intake manifold pressure with modelled intake manifold pressure	Difference between minimum intake manifold pressure and minimum modeled manifold pressure	>2(kPa)	Model-based manifold pressure diagnosis released from icing detection (sensor not frozen), which is the following condition:	=TRUE	2.5(s)	1 Trip

			Difference between current minimum and its maximum manifold pressure from sensor signal wobble check	>10(kPa)
			(maximum voltage threshold for electrical diagnosis for time)	>4.5(V) >0.2(s)
			(Inflow into the MAP sensor is valid	=TRUE
			Outflow from the MAP sensor is valid)	=TRUE
			for time	>0.14(s)
			Request safety fuel cut off	=FALSE
			Suspicion of a throttle valve sensor fa	=FALSE
			No pending or confirmed DTCs (se inhibit conditions table)	=See sheet enable tables
			Basic enable conditions met	=See sheet enable tables
Path 5:	Raw pressure before engine start in the intake manifold	<max[a,(b-c)-d](kPa)	Time counter for valid raw pressure after engine start	<25(s)
Rationality check low during startup- Raw pressure is less than maximum value of minimum ambient pressure and difference of ambient pressure, offset voltage and tolerance				
	where	50(kPa)	Engine speed	<300(rpm)
	(a) minimum ambient pressure for intake manifold pressure diagnosis			
	(b) Ambient pressure		Engine speed calculated in 10ms	<0(rpm)
	(c) Offset-voltage for ambient pressure sensor		(Raw voltage of manifold pressure sensor	>0.5(V)
	(d) tolerances between pressure raw value before engine start in the intake manifold and ambient pressure	15(kPa)	Raw voltage of manifold pressure sensor)	<4.5(V)
			for time	>0.2(s)
			Counter for number of raw values for averaging	>5(counts)
			Calculation of raw-pressure during initialization is finished for bank 1	
			Enaine speed	>80frnm1

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				Difference between raw pressure before engine start in the intake manifold and absolute intake manifold pressure (Inflow into the MAP sensor is valid)	<30(kPa)		
				Outflow from the MAP sensor is valid)	=TRUE		
				for time	>0.14(s)		
				Request safety fuel cut off	=FALSCH		
				Suspicion of a throttle valve sensor failure)	=FALSCH		
				No pending or confirmed DTCs	=See sheet inhibit tables		
				Basic enable conditions met	=See sheet enable tables		
P2A0B	Signal variation check: checks if the sensor is frozen, by comparing the difference of maximum and minimum manifold pressure against calibration threshold for sensor signal wobble check	Difference between maximum and minimum manifold pressure from sensor signal wobble check bank 2	<10(kPa)	(Engine coolant downstream temperature during the first engine start of the driving cycle.	>-5.3(°C)	2.5(s)	2 Trip
				OR			
				(Engine coolant temperature for time)	>30(°C) >100(s)		
				((Raw voltage of manifold pressure sensor Bank2	>0.5(V)		
				Raw voltage of manifold pressure sensor Bank2	<4.5(V)		
				) for time	>0.2(s)		
				(Inflow into the MAP sensor is valid	=TRUE		
				Outflow from the MAP sensor is valid)	=TRUE		
				for time	>0.14(s)		
				Request safety fuel cut off			
				Suspicion of a throttle valve sensor failure)			
				(Engine Speed	>1500(rDm)		

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					Minimum throttle valve position (Bank 2)) (Engine Speed Maximum throttle valve position (Bank 2))) for time No pending or confirmed DTCs Basic enable conditions met	<10.01(%) <1000(rpm) >19.995(%) >1(s) =See sheet inhibit tables =See sheet enable tables		
60. COM - ENGINE OFF TIMER	P262B	Rationality check of control module power off timer	At least one bit of the counter value in the counter device RAM doesn't change it's value OR	=TRUE	Ignition is ON	=TRUE	1(event)	2 Trip
			Communication error is reported by counter device OR	=TRUE	Basic enable conditions are met	=see sheet enable tables		
			Difference between counter steps compared to ECU system time is out of tolerance	=TRUE				
61. COM - ECM INTERNAL FAILURES	P062B	Path1: Electrical failure with high pressure injection valve powerstage for bank 1	Electrical fault is detected for the control bank 1 (	=TRUE	Diagnosis inhibited by statistical function	=FALSCH	5(s)	2 Trip
			Number of misfire counter for cylinder 0	>100	Engine speed	<6000(rpm)		
			Number of misfire counter for cylinder 4) and	>100	Engine speed	>1520(rpm)		
			relative air charge No pending or confirmed DTCs		<100(%) =see sheet inhibit tables			
		Rail pressure control minimum error is set	=TRUE	Basic enable conditions met	=see sheet enable tables			
	P062B	Path 2: Electrical failure with high pressure injection valve powerstage for bank 2	Electrical fault is detected for the control bank 2 (	=TRUE	Diagnosis inhibited by statistical function	=FALSCH	5(s)	2 Trip
			Number of misfire counter for cylinder 1	>100	Engine speed	<6000(rpm)		
			Number of misfire counter for cylinder 5)	>100	Engine speed	>1520(rpm)		
			relative air charge		<100(%)			

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		and		No pending or confirmed DTCs	=see sheet inhibit tables		
		Rail pressure control minimum error is set	=TRUE	Basic enable conditions met	=see sheet enable tables		
P062B	Path 3: Electrical failure with high pressure injection valve powerstage for bank 3	Electrical fault is detected for the control bank 3 (	=TRUE	Diagnosis inhibited by statistical function	=FALSCH	5(s)	2 Trip
		Number of misfire counter for cylinder 2	>100	Engine speed	<6000(rpm)		
		Number of misfire counter for cylinder 6)	>100	Engine speed	>1520(rpm)		
		and		relative air charge	<100(%)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
		Rail pressure control minimum error is set		Basic enable conditions met	=see sheet enable tables		
P062B	Path 4: Electrical failure with high pressure injection valve powerstage for bank 4	Electrical fault is detected for the control bank 3 (	=TRUE	Diagnosis inhibited by statistical function	=FALSCH	5(s)	2 Trip
		Number of misfire counter for cylinder 3	>100	Engine speed	<6000(rpm)		
		Number of misfire counter for cylinder 7)	>100	Engine speed	>1520(rpm)		
		and		relative air charge	<100(%)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
		Rail pressure control minimum error is set	=TRUE	Basic enable conditions met	=see sheet enable tables		
P062B	Path 5: Detects if the booster voltage of Dc-Dc convertor is too low	Output voltage of DcDc converter	<20(V)	Battery voltage	>9(V)	2(events)	2 Trip
				Battery voltage	<6553.5(V)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P08FF	Path 6: Error check in CVO diagnosis for all cylinders	Number of tested cylinders against min or max error for Controlled Valve Operation diagnosis and	>8	Ignition is ON	=TRUE	0.1(s)	2 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		

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		Number of cylinders in error state due to minimum or maximum error in Controlled Valve Operation diagnose	>8	Basic enable conditions met	=see sheet enable tables		
P0606	Detects error of ignition power stage diagnosis ASIC Bank 1	Device information error from the powerstage ASIC	TRUE	Battery voltage	>9(V)	20(events)	1 Trip
				Battery voltage Engine synchronization Engine speed Difference between new and old ignition counter ensuring that all cylinder were fired at least once Basic enable conditions met	<655.34(V) =TRUE >1400(rpm) >9(counts) =see sheet enable tables		
P0606	Detects error of ignition power stage diagnosis ASIC Bank 2	Device information error from the powerstage ASIC	TRUE	Battery voltage	>9(V)	20(events)	1 Trip
				Battery voltage Engine synchronization Engine speed Difference between new and old ignition counter ensuring that all cylinder were fired at least once Basic enable conditions met	<655.34(V) =TRUE >1400(rpm) >9(counts) =see sheet enable tables		
P0606	Detects when the last activity detected for the CAN Communication Hardware has been greater than the limit for a calibrated period of time	Time since last activity detected for the CAN Communication Hardware is greater than limit	TRUE	Ignition is ON	=TRUE	0.02(s)	1 Trip
				Basic enable conditions are met	=see sheet enable tables		
P0606	Detects when the last activity detected for the LIN Communication Hardware has been greater than the limit for a calibrated period of time	Time since last activity detected for the LIN Communication Hardware is greater than limit	TRUE			0.02(s)	1 Trip
P0606	Internal monitoring of main processor controller: Monitoring of hardware error management	Error management module (EMM) / Safety management unit (SMU) reports alarm	TRUE	Ignition is on	=TRUE	0.01(s)	1 Trip
				Basic enable conditions are met	TRUE		

P06D1	Detects communication error with ignition power stage diagnosis ASIC Bank 1	SPI information error from the powerstage ASIC	=TRUE	Battery voltage	>9(V)	20(events)	1 Trip
				Battery voltage	<655.34(V)		
				Engine synchronization	=TRUE		
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P06D1	Detects communication error with ignition power stage diagnosis ASIC Bank 2	SPI information error from the powerstage ASIC	=TRUE	Battery voltage	>9(V)	20(events)	1 Trip
				Battery voltage	<655.34(V)		
				Engine synchronization	=TRUE		
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P060B	Function monitoring - Pedal potentiometer signal 2 voltage check - The measured ADC voltage pulled to low level is compared with a threshold.	Measured voltage at the ADC for the acceleration pedal signal 2	>0.215(V)	Ignition is on	=TRUE	0.1(s)	1 Trip
				AD-input to low-level (Short Circuit to Ground)	=TRUE		
				Basic enable conditions are met	=TRUE		

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P060B	Function monitoring - Test voltage range check - The measured ADC test voltage channel voltage is compared with thresholds.	Measured voltage at the ADC test voltage input	>4.83(V)	Ignition is on	=TRUE	0.15(s)	1 Trip
		OR Measured voltage at the ADC test voltage input	<4.73(V)	Basic enable conditions are met	=TRUE		
P060A	Path 1: CAN and Flexray shut-off path test	Detects if CAN and Flexray transmission is disabled in case of an error	=TRUE	Shut-Off path test is completed	=TRUE	0.01(s)	1 Trip
				Ignition ON Basic enable conditions are met	=TRUE =see sheet enable tables		
	Path 2: Power stage shut-off path test	Detects if power stages is disabled in case of an error	=TRUE	Shut-Off path test is completed	=TRUE		
		OR The entire power stage shut-off path test has not been completed for time where A - Maximum number of repetitions of shut-off path test	=TRUE >A*2.2ms() =450	Ignition ON Basic enable conditions are met	=TRUE =see sheet enable tables		
P060D	Path1: Detects if the absolute difference between the accelerator pedal signal 1 voltage and the accelerator pedal signal 2 voltage exceeds with a threshold (part pedal).	(		Ignition ON	=TRUE	0.026(s)	1 Trip
		Absolute difference of accelerator pedal position sensor voltages, calculated by the following formula: $| \max[ (a);(b)] - \max[(b);(c) ] |$	>0.36(V)	(		0.026(s)	
		where:		maximum value between the accelerator pedal position sensor 1 raw voltage (from ADC) and the voltage threshold for start of plausibility check of the accelerator signal OR	<4.061(V)		

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(a) Accelerator pedal position sensor 1 current voltage (from ADC)	=measured parameter	maximum value between the voltage threshold for start of plausibility check of the accelerator signal and the accelerator pedal position sensor 2 raw voltage (from ADC)	<4.061(V)
(b) Voltage threshold for start of plausibility check of the accelerator signal	=0.85(V))	
(c) Accelerator pedal position sensor 2 current voltage (from ADC)	=measured parameter	Null load test impulse check in ADC monitoring is not active	=TRUE
)		Basic enable conditions are met	=TRUE
		No accelerator pedal fault	=TRUE

Path 2: Detects if the absolute difference between the accelerator pedal signal 1 voltage and the accelerator pedal signal 2 voltage exceeds with a threshold (full pedal).	(	Ignition ON	=TRUE	0.026(s)	1 Trip
Absolute difference of accelerator pedal position sensor voltages, calculated by the following formula: $| \max[ (a);(b)] - \max[(b);(c) ] |$	>0.36(V)	(
		maximum value between the accelerator pedal position sensor 1 raw voltage (from ADC) and the voltage threshold for start of plausibility check of the accelerator signal	>4.061(V)		
where:		maximum value between the voltage threshold for start of plausibility check of the accelerator signal and the accelerator pedal position sensor 2 raw voltage (from ADC)	>4.061(V)		
(a) Accelerator pedal position sensor 1 current voltage (from ADC)	=measured parameter)			
(b) Voltage threshold for start of plausibility check of the accelerator signal	=0.85(V)	Null load test impulse check in ADC monitoring is not active	=TRUE		

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(c) Accelerator pedal position sensor 2 current voltage (from ADC)	=measured parameter	Basic enable conditions are met	=TRUE
)		No accelerator pedal fault	=TRUE

Path 3: For accelerator pedal sensor 1 and 2 separately, detects if the learned normalized accelerator pedal voltage of Level 2 is greater than the learned normalized accelerator pedal voltage of Level 1.	Difference between the minimum learned normalized accelerator pedal voltage L2 and the minimum learned normalized pedal voltage L1 - accelerator pedal sensor 1, calculated by the following formula: (d) > (e) where (d) Minimum learned normalized pedal voltage L2 - accelerator pedal sensor 1 (e) Minimum learned normalized pedal voltage L1 - accelerator pedal sensor 1 OR Difference between the minimum learned normalized accelerator pedal voltage L2 and the minimum learned normalized pedal voltage L1 - accelerator pedal sensor 2, calculated by the following formula: (f) > (g) where (f) Minimum learned normalized pedal voltage L2 - accelerator pedal sensor 2 (g) Minimum learned normalized pedal voltage L1 - accelerator pedal sensor 2	>0	Ignition ON	=TRUE		1 Trip
			Basic enable conditions are met	=TRUE		
			=measured parameter			
			=measured parameter			
			>0			
			=measured parameter			
			=measured parameter			
P061C Engine speed plausibility check - The difference between calculated (function monitoring) and measured engine speed is greater than a calibrated threshold for a calibrated period of time	Difference between calculated engine speed from function monitoring and measured engine speed	>320(rpm)	Engine synchronization is active	=TRUE	0.08(s)	1 Trip
			Engine speed signal is valid (angle counter difference >0)	=TRUE		

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				Synchronization is not lost Calculated high resolution engine speed in function monitoring Basic enable conditions are met	=TRUE >520(rpm) =TRUE		
		Detects if minimum engine speed is reached and debounced for a calibrated period of time	Engine speed gradient	>520(rpm)	Engine synchronization is active	=TRUE	
			Debounce time for engine speed gradient in function monitoring	>0.52(s)	Engine speed signal is not valid (angle counter difference < 0)	=TRUE	
				Synchronization is not lost Basic enable conditions are met	=TRUE =TRUE		
P0607	Path 1: Monitoring ABE activation	ABE line active	=TRUE	Shut-off path test active	=FALSE	0.05(s)	1 Trip
				ECU is in DRIVE state			
				(Battery voltage	>8(V)		
				) For time Basic enable conditions are met	>0.1(s) =see sheet enable tables		
P0607	Path 2: Monitoring shut-off by query-response communication	WDA line active	=TRUE	Shut-off path test active	=FALSE	0.05(s)	1 Trip
				ECU is in DRIVE state			
				Basic enable conditions are met	=see sheet enable tables		
P0607	Path 3: Monitoring shut-off by error pin activation	Error pin line active	=TRUE	Shut-off path test active	=FALSE	0.05(s)	1 Trip
				ECU is in DRIVE state			
				Basic enable conditions are met	=see sheet enable tables		
P0607	Path 4: Monitoring ABE activation at overvoltage detection	ABE line active	=TRUE	Shut-off path test active	=FALSE	0.05(s)	1 Trip
		Latching of overvoltage detection is activated	=TRUE	ECU is in DRIVE state			
				Basic enable conditions are met	=see sheet enable tables		

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P0603	Detects KeepAlive error during runtime at an external device	Any of the peripheral monitoring function reports a keep alive error such as memory errors, incorrect init state, unexpected resets of the external device during runtime	=TRUE	Ignition is ON	=TRUE	0.1(s)	1 Trip
				Basic enable conditions met	=see sheet enable tables		
P0603	Detects KeepAlive error during initialization phase at an external device	Any of the peripheral monitoring function reports a keep alive error such as memory errors, incorrect init state, unexpected resets of the external device during initialization phase	=TRUE	Ignition is ON	=TRUE	0.1(s)	1 Trip
				Basic enable conditions met	=see sheet enable tables		
P0604	Read diagnosis for non volatile memory	A memory block could not be read successfully	=TRUE	Ignition is ON	=TRUE	0.1(s)	1 Trip
				Basic enabling conditions are met	=see sheet enable tables		
P0604	Write diagnosis for non volatile memory	A memory block could not be stored successfully	=TRUE	Ignition is ON	=TRUE	0.1(s)	1 Trip
				Basic enabling conditions are met	=see sheet enable tables		
P30D6	Digital output communication loss/errors. Irregular operation of the SPI for Throttle actuator motor control circuit Bank 1	SPI error read out from power stage diagnostics of Throttle actuator motor control circuit Bank 1	=TRUE	(ECU is in DRIVE state OR ECU is in POSTDRIVE state) The powerstage of the actuator is switched on, following conditions: { State of the throttle valve powerstage bank 1 } Release of adaptation Actual position is valid	=TRUE =TRUE =TRUE >0 =FALSE =TRUE	0.1(s)	1 Trip

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				Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
				(Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
				(Battery voltage for throttle valve operation sufficient bank 1	>7.5(V)		
				OR Engine speed	>2000(rpm)		
				) Limp home position not reached bank 1	=FALSE		
				) No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P30D7	Digital output communication loss/errors. Irregular operation of the SPI for Throttle actuator motor control circuit Bank 2	SPI error read out from power stage diagnostics of Throttle actuator motor control circuit Bank 2	=TRUE	(ECU is in DRIVE state	=TRUE	0.1(s)	1 Trip
				OR ECU is in POSTDRIVE state	=TRUE		
				) The powerstage of the actuator is switched on, following conditions:	=TRUE		
				(State of the throttle valve powerstage bank 2	>0		
				) Release of adaptation Actual position is valid	=FALSE =TRUE		
				Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
				(Request reversible safety fuel cut off SKA bank 2, which has following condition:	=FALSE		
				(Battery voltage for throttle valve operation sufficient bank 2	>7.5(V)		
				OR Engine speed	>2000(rpm)		

				Limp home position not reached bank 2	=FALSE		
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P060C	Path 2: Cylinder individual fuel correction rationality check in function monitoring.	(		Ignition is ON	=TRUE	4.16(s)	1 Trip
		Cylinder individual fuel correction where	$>(a*b) + c(\%)$	Engine Speed	$>1200(\text{rpm})$		
		a : Relative fuel mass for individual cylinder		Injection cut off (ICO) is not requested	=TRUE		
		b : Factor maximum tolerance in check of cylinder-individual fuel in function monitoring	1.1	Injection cut off (ICO) is not requested from function monitoring	=TRUE		
		c : Offset tolerance in check of cylinder-individual fuel in function monitoring	10.5(%)	System voltage exceeds 8V	=TRUE		
		)		Limp home mode is not requested from function monitoring	=TRUE		
		OR		No loss of Synchronisation during function monitoring	=TRUE		
		((
		Cylinder individual fuel correction where	$<(a*b) - c(\%)$	ECU is not in pre-drive state	=TRUE		
		a : Relative fuel mass for individual cylinder		OR			
		b : Factor maximum tolerance in check of cylinder-individual fuel in function monitoring	0.9	ECU is not in post-drive state	=TRUE		
		c : Offset tolerance in check of cylinder-individual fuel in function monitoring	10.5(%))			
		)		Air-Fuel check is disabled for function monitoring	=FALSE		
				Basic enable conditions are met	=see sheet enable tables		
	Path 3: The complement check of cylinder counter for homogeneous injection, stratified injection and calculation of post injection at dynamic load.	The complement of cylinder counter is not equal to the redundant counter for homogenous injection in function monitoring	=TRUE	Ignition is ON	=TRUE	4.16(s)	1 Trip

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	OR		Engine Speed	>1200(rpm)		
	The complement of cylinder counter is not equal to the redundant counter for stratified injection in function monitoring	=TRUE	Injection cut off (ICO) is not requested	=TRUE		
	OR		Injection cut off (ICO) is not requested from function monitoring	=TRUE		
	The complement of cylinder counter is not equal to the redundant counter for calculation of post-injection at dynamic load in function monitoring	=TRUE	System voltage exceeds 8V	=TRUE		
	OR		Limp home mode is not requested from function monitoring	=TRUE		
	Cylinder counter for homogeneous injection	>8	No loss of Synchronisation during function monitoring	=TRUE		
	OR		(
	Cylinder counter for stratified injection	>8	ECU is not in pre-drive state	=TRUE		
	OR		OR			
	Cylinder counter for calculation of post-injection at dynamic load	>8	ECU is not in post-drive state	=TRUE		
)			
			Air-Fuel check is disabled for function monitoring	=FALSE		
			Basic enable conditions are met	=see sheet enable tables		
Path 4:	Average value for cylinder	>1.03	Ignition is ON	=TRUE	4.16(s)	1 Trip
Plausibility check : Average value for cylinder individual fuel correction in function monitoring is greater than a calibrated threshold for a calibrated period of time	individual fuel correction in function monitoring					
			Engine Speed	>1200(rpm)		
			Injection cut off (ICO) is not requested	=TRUE		
			Injection cut off (ICO) is not requested from function monitoring	=TRUE		
			System voltage exceeds 8V	=TRUE		
			Limp home mode is not requested from function monitoring	=TRUE		
			No loss of Synchronisation during function monitoring	=TRUE		
			(
			ECU is not in pre-drive state	=TRUE		

			OR			
			ECU is not in post-drive state		=TRUE	
)			
			Air-Fuel check is disabled for function monitoring		=FALSE	
			Basic enable conditions are met		=see sheet enable tables	
P060C	Path 5: Detects plausibility check of air/fuel ratio in function	(	Engine Speed	>1200(rpm)	0.52(s)	1 Trip
	Complement of mode of operation in gasoline direct injection (GDI) for monitoring where:	!=A	Injection cut off (ICO) is not requested		=TRUE	
	A: Mode of operation in gasoline direct injection (GDI) for monitoring		Injection cut off (ICO) is not requested from function monitoring		=TRUE	
	)		System voltage exceeds 8V		=TRUE	
			Limp home mode is not requested from function monitoring		=TRUE	
			No loss of Synchronisation during function monitoring		=TRUE	
			(
			ECU is not in pre-drive state		=TRUE	
			ECU is not in post-drive state		=TRUE	
)			
			Air-Fuel check is disabled for function monitoring		=FALSE	
			No pending or confirmed DTCs		=see sheet enable tables	
			Basic enable conditions are met		=see sheet inhibit tables	
	Path 6: Checks the operation mode of ECU in function monitoring	(	Engine Speed	>1200(rpm)	0.52(s)	1 Trip
	Gasoline direct injection for monitoring is not in homogeneous operation mode	TRUE	Injection cut off (ICO) is not requested		=TRUE	
	Gasoline direct injection (GDI) for monitoring is not in homogeneous split mode	TRUE	Injection cut off (ICO) is not requested from function monitoring		=TRUE	
	Gasoline direct injection (GDI) for monitoring is not in homogeneous knock protection mode	TRUE	System voltage exceeds 8V		=TRUE	
)		Limp home mode is not requested		TRUE	

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No loss of Synchronisation during function monitoring	=TRUE
(
ECU is not in pre-drive state	=TRUE
ECU is not in post-drive state	=TRUE
)	
Air-Fuel check is disabled for function monitoring	=FALSE
No pending or confirmed DTCs	=see sheet enable tables
Basic enable conditions are met	=see sheet inhibit tables

Path 7: The Lambda setpoint is checked against the range of permissible values for bank 1 and bank 2 systems	Desired lambda limitation for Bank 1 for monitoring	<0.71	Engine Speed	>1200(rpm)	0.52(s)	1 Trip
	OR		Injection cut off (ICO) is not requested	=TRUE		
	Desired lambda limitation for Bank 2 for monitoring	<0.71	Injection cut off (ICO) is not requested from function monitoring	=TRUE		
	OR		System voltage exceeds 8V	=TRUE		
	Desired lambda limitation for Bank 1 for monitoring	>1.2	Limp home mode is not requested from function monitoring	=TRUE		
	OR		No loss of Synchronisation during function monitoring	=TRUE		
	Desired lambda limitation for Bank 2 for monitoring	>1.2	(
			ECU is not in pre-drive state	=TRUE		
			ECU is not in post-drive state	=TRUE		
)			
			Air-Fuel check is disabled for function monitoring	=FALSE		
			No pending or confirmed DTCs	=see sheet enable tables		
			Basic enable conditions are met	=see sheet inhibit tables		
P060C	Path 8: Ignition angle plausibility check in function monitoring	Ignition angle value	!=A(degrees)	Ignition is ON	=TRUE	0.16(s) 1 Trip
	where: A: complement of "the complement of the ignition angle value"		Engine Speed	>1200(rpm)		
			Injection cut off (ICO) is not requested	=TRUE		

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P060C	Path 10: The injection cut-off pattern total is evaluated by compared with the expected and actual injection cut-off pattern.	The complement of injection cut-off pattern total is not equal to the injection cut-off pattern	=TRUE	Ignition is ON	=TRUE	0.52(s)	1 Trip
				Engine Speed	>1200(rpm)		
				Injection cut off (ICO) is not requested	=TRUE		
				Injection cut off (ICO) is not requested from function monitoring	=TRUE		
				System voltage exceeds 8V	=TRUE		
				Limp home mode is not requested from function monitoring	=TRUE		
				No loss of Synchronisation during function monitoring	=TRUE		
				(ECU is not in pre-drive state	=TRUE		
				OR ECU is not in post-drive state	=TRUE		
				) Air-Fuel check is disabled for function monitoring	=FALSE		
				Basic enable conditions are met	=see sheet inhibit tables		
	Path 11: The complement check of driver injection demand for homogeneous injection, stratified injection and calculation of post injection at dynamic load.	The complement of driver injection demand is not equal to the redundant driver injection demand for homogenous injection in function monitoring	=TRUE	Ignition is ON	=TRUE	0.52(s)	1 Trip
		OR The complement of driver injection demand is not equal to the redundant driver injection demand for stratified injection in function monitoring	=TRUE	and Engine Speed	>1200(rpm)		
		OR The complement of driver injection demand is not equal to the redundant driver injection demand for calculation of post injection at dynamic in function monitoring	=TRUE	Injection cut off (ICO) is not requested	=TRUE		
				Injection cut off (ICO) is not requested from function monitoring	=TRUE		
				System voltage exceeds 8V	=TRUE		

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			Limp home mode is not requested from function monitoring	=TRUE		
			No loss of Synchronisation during function monitoring	=TRUE		
			(
			ECU is not in pre-drive state	=TRUE		
			OR			
			ECU is not in post-drive state	=TRUE		
)			
			Air-Fuel check is disabled for function monitoring	=FALSE		
			Basic enable conditions are met	=see sheet inhibit tables		
Path 12:	The complement of injection timing is not equal to the redundant injection timing in function monitoring.	TRUE	Ignition is ON	=TRUE	0.52(s)	1 Trip
			Engine Speed	>1200(rpm)		
			Injection cut off (ICO) is not requested	=TRUE		
			Injection cut off (ICO) is not requested from function monitoring	=TRUE		
			System voltage exceeds 8V	=TRUE		
			Limp home mode is not requested from function monitoring	=TRUE		
			No loss of Synchronisation during function monitoring	=TRUE		
			(
			ECU is not in pre-drive state	=TRUE		
			OR			
			ECU is not in post-drive state	=TRUE		
)			
			Air-Fuel check is disabled for function monitoring	=FALSE		
			Basic enable conditions are met	=see sheet inhibit tables		
Path 13:	Injection cut off mask is not equal to the injection cut off pattern total in the cylinder individual cut off array at the cylinder for homogeneous injection	TRUE	Ignition is ON	=TRUE	0.52(s)	1 Trip
	Complement check to ensure the stored injection cut off information for all cylinders for homogeneous injection, stratified injection and calculation of post injection at dynamic load.					
	OR		Engine Speed	>1200(rpm)		

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	Injection cut off pattern total is not equal to the complement of injection cut off pattern total in the cylinder individual cut off array at position of stratified injection	=TRUE	Injection cut off (ICO) is not requested	=TRUE		
	OR		Injection cut off (ICO) is not requested from function monitoring	=TRUE		
	Injection cut off pattern total is not equal to the complement of injection cut off pattern total in the cylinder individual cut off array at position of calculation of post injection at dynamic load	=TRUE	System voltage exceeds 8V	=TRUE		
			Limp home mode is not requested from function monitoring	=TRUE		
			No loss of Synchronisation during function monitoring	=TRUE		
			(
			ECU is not in pre-drive state	=TRUE		
			OR			
			ECU is not in post-drive state	=TRUE		
)			
			Air-Fuel check is disabled for function monitoring	=FALSE		
			Basic enable conditions are met	=see sheet inhibit tables		
Path 14:	(		All the partial injections are calculated in SO	=TRUE	0.52(s)	1 Trip
Injection cut-off pattern total is checked against the injections currently demanded from the driver for homogeneous and calculation of post injection at dynamic load						
	Driver injection demand for homogeneous injection mode	>0	OR			
	(		All the partial injections are calculated in SO and S1 (mixed timing)	=TRUE		
	Injection is allowed	=FALSE	Engine Speed	>1200(rpm)		
	OR		Injection cut off (ICO) is not requested	=TRUE		
	Injection cut-off pattern total is performed individually for homogeneous injection mode	=TRUE	Injection cut off (ICO) is not requested from function monitoring	=TRUE		
)		System voltage exceeds 8V	=TRUE		

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)		Limp home mode is not requested from function monitoring	=TRUE		
	OR		No loss of Synchronisation during function monitoring	=TRUE		
	((
	Driver injection demand for calculation of post injection mode	>0	ECU is not in pre-drive state	=TRUE		
	(		OR			
	Injection is allowed	=FALSE	ECU is not in post-drive state	=TRUE		
	OR)			
	Injection cut-off pattern total is performed individually for calculation of post injection mode	=TRUE	Air-Fuel check is disabled for function monitoring	=FALSE		
	)		Basic enable conditions are met	=see sheet inhibit tables		
)					
Path 15:						
Injection cut-off pattern total is checked against the injections currently demanded from the driver for stratified injection modes.	(		All the partial injections are calculated in SO and S1	=TRUE	0.52(s)	1 Trip
	Driver injection demand for stratified injection mode	>0	Engine Speed	>1200(rpm)		
	(		Injection cut off (ICO) is not requested	=TRUE		
	Injection is allowed	=FALSE	Injection cut off (ICO) is not requested from function monitoring	=TRUE		
	OR		System voltage exceeds 8V	=TRUE		
	Injection cut-off pattern total is performed individually for stratified injection mode	=TRUE	Limp home mode is not requested from function monitoring	=TRUE		
	)		No loss of Synchronisation during function monitoring	=TRUE		
)		(
			ECU is not in pre-drive state	=TRUE		
			OR			
			ECU is not in post-drive state	=TRUE		
)			
			Air-Fuel check is disabled for function monitoring	=FALSE		
			Basic enable conditions are met	=see sheet inhibit tables		

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P060C	Path 16: Fault check of ECU signal input monitoring Air and fuel	Compliment of synchronous counter SO is not equal to redundant synchronous counter SO in function monitoring	TRUE	Ignition is ON	TRUE	0.52(s)	1 Trip
		OR		Engine Speed	>400(rpm)		
		Compliment of synchronous counter S1 is not equal to redundant synchronous counter S1 in function monitoring	TRUE	Injection cut off (ICO) is not requested	=TRUE		
		OR		Injection cut off (ICO) is not requested from function monitoring	=TRUE		
		Difference between expected values for the number of calls of synchronous counter SO frames in function monitoring based on the course of engine speed and previous synchronous counter SO	>1(count)	System voltage exceeds 8V	=TRUE		
		OR		Limp home mode is not requested from function monitoring	=TRUE		
		Difference between expected values for the number of calls of synchronous counter S1 frames in function monitoring based on the course of engine speed and previous synchronous counter S1	> 1(count)	No loss of Synchronisation during function monitoring	=TRUE		
				(ECU is not in pre-drive state	=TRUE		
				OR ECU is not in post-drive state	=TRUE		
				) Air-Fuel check is disabled for function monitoring	=FALSE
				Basic enable conditions are met	=TRUE		
P060C	Path 17: This function performs a plausibility check of the mixture control for GDI systems and safeguards the fuel mass.	Expected value for relative fuel mass in function monitoring (GDI)	>(A*B) + C(%)	Ignition is ON	=TRUE	0.26(s)	1 Trip
		where		Engine Speed	>1200(rpm)		
		A: Relative fuel mass		Injection cut off (ICO) is not requested	=TRUE		

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		B: Factor maximum tolerance in check of bank selective fuel in function monitoring (GDI)	=1.1	Injection cut off (ICO) is not requested from function monitoring	=TRUE		
		C : Offset tolerance in check of fuel in function monitoring (GDI) OR	=10.5(%)	System voltage exceeds 8V	=TRUE		
		Expected value for relative fuel mass in function monitoring (GDI) where A: Relative fuel mass	$\leq (A*B) - C(\%)$	Limp home mode is not requested from function monitoring No loss of Synchronisation during function monitoring	=TRUE		
		B : Factor minimum tolerance in check of bank selective fuel in function monitoring (GDI)	0.9	(ECU is not in pre-drive state	=TRUE		
		C : Offset tolerance in check of fuel in function monitoring (GDI)	10.5(%)	OR ECU is not in post-drive state	=TRUE		
				) Air-Fuel check is disabled for function monitoring Basic enable conditions are met	=FALSE =see sheet enable tables		
P060C	Path 18: Control fault check of mixture management for GDI.	After start adaption factor in function monitoring	>1.01(°C)	Ignition is ON	=TRUE	0.26(s)	1 Trip
		OR		Engine Speed	>1200(rpm)		
		(Additive adaptive correction of the relative fuel amount on GDI path in function monitoring	>8.1(%)	Injection cut off (ICO) is not requested Injection cut off (ICO) is not requested from function monitoring	=TRUE =TRUE		
		OR Additive adaptive correction of the relative fuel amount on GDI path bank 2 in function monitoring	>8.1(%)	System voltage exceeds 8V Limp home mode is not requested from function monitoring	=TRUE =TRUE		
) OR (No loss of Synchronisation during function monitoring (ECU is not in pre-drive state	=TRUE =TRUE		
		lambda collector output in function monitoring	>1.28	OR			

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OR		ECU is not in post-drive state	TRUE
lambda collector output bank 2 in function monitoring	>1.28)	
)		Air-Fuel check is disabled for function monitoring	=FALSE
OR		Basic enable conditions are met	=see sheet enable tables
(
Fuel mixture adaption for GDI injection path in function monitoring	>1.35(rpm)		
OR			
Fuel mixture adaption for GDI injection path bank 2 in function monitoring	>1.35(rpm)		
)			
OR			
(
(
Relative fuel part of the purge control in function monitoring	<(a*b)-c()		
where:			
a : Relative fuel mass on GDI in function monitoring			
c : Factor tolerance in check of canister purge in function monitoring	-0.091		
d : Offset tolerance in check of canister purge in function monitoring	6(%)		
)			
OR			
(
Relative fuel part of the purge control bank 2 in function monitoring	<(a*b)-c()		
where:			
a : Relative fuel mass on GDI in function monitoring for Bank 2			
b : Factor tolerance in check of canister purge in function monitoring	-0.091		
c : Offset tolerance in check of canister purge in function monitoring	6(%)		
)			
)			
OR			

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		((Engine Speed >1400(rpm) Fuel evaporated mass of the engine oil in function monitoring <-0.094(%)) OR (Engine Speed <1400(rpm) Fuel evaporated mass of the engine oil in function monitoring <-0.609(%))) OR The complement of cylinder individual Atkinson fuel amount is not equal to the redundant cylinder individual Atkinson fuel amount in function monitoring =TRUE OR Mixture adaption factor for Atkinson gasoline backflow in function monitoring >1					
P060C	Path 19: Monitoring of the electronic transmission range select (ETRS) system (with irreversible error reaction of Level 2)	Level 1 request to apply EPB invalid	=TRUE	Ignition is ON	=TRUE	0.04(s)	1 Trip
		for counts >50		(
		means:		ECU is not in pre-drive state	=TRUE		
		(Level 1 request to apply EPB	=TRUE	OR ECU is not in post-drive state	=TRUE		
		Vehicle speed >4.69(mph) for counts >5		) Basic enable conditions are met	=see sheet enable tables		
) OR Change of direction request from level 1 invalid	=TRUE				
		for counts >50					
		OR Missed level 1 request to apply EPB	=TRUE				

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		for counts	>50				
		means:					
		(
		Level 1 request to apply EPB	=FALSCH				
		Level 2 request to apply EPB	=TRUE				
)					
		OR					
		Park engagement and EPB	=TRUE				
		engagement error set					
		for counts	>10				
		means:					
		(
		Valid park range request	=TRUE				
		Park engaged by TCU	=FALSCH				
		Level 1 request to apply EPB	=FALSCH				
)					
		for counts	>150				
		OR					
		'Shift away from park range'	=TRUE				
		request from level 1 invalid					
		for counts	>50				
P17DB	Path 20: Monitoring of the electronic transmission range select (ETRS) system (with reversible error reaction of Level 1)	Change of direction request from level 1 invalid	=TRUE	Ignition is ON	=TRUE	0.04(s)	1 Trip
		OR		(
		'Shift away from park range'	=TRUE	ECU is not in pre-drive state	=TRUE		
		request from level 1 invalid		OR			
				ECU is not in post-drive state	=TRUE		
)			
				Basic enable conditions are met	=see sheet enable tables		
P060C	Fault status of Level 1 Level2 comparison for accelerator effective position CAN Tx signal in function monitoring	Difference between level2 and level1 accelerator effective position	>18.99(%)	Ignition is on	=TRUE	0.04(s)	1 Trip
		and		Battery Voltage	>9.0(V)		

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Difference between level2 and level1 accelerator effective position

<100(%)

Basic enable conditions met

see sheet enable tables

P060C	Fault status of Level 1 Level2 comparison for Automatic Braking Request CAN Tx signal in function monitoring	Automatic Braking Request Type extracted from Level1 CAN buffer is compared against all the values stored in the Level2 ring buffer. The comparison is valid, if the Automatic Braking Request Type from Level1 CAN buffer is equal to "Hold Allow Driver Release" or is equal to "Hold Deny Driver Release" or matches at least one of the values in the Level2 ring buffer	=FALSCH	0.04(s)	1 Trip
P060C	Fault status of Level 1 Level2 comparison for primay range command CAN Tx signal in function monitoring	The range command value extracted from Level1 CAN buffer is compared against all the values stored in the Level2 ring buffer If the range from Level 1 CAN buffer is equal to "Park" or matches at least one of the values in the Level2 ring buffer or "Neutral" and not all values in the Level2 ring buffer are "Park"	=FALSCH	0.04(s)	1 Trip

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P060C	Fault status of Level 1 Level2 comparison for primary range display CAN Tx signal in function monitoring	Range Display value extracted from Level1 CAN buffer is compared against all the values stored in the Level2 ring buffer. The comparison is valid, if the Range Display value from Level1 CAN buffer is not equal to "Park" or matches at least one of the values in the Level2 ring buffer	=FALSCH	0.04(s)	1 Trip
P060C	Fault status of Level 1 Level2 comparison for secondary range display CAN Tx signal in function monitoring	Range Display value extracted from Level1 CAN buffer is compared against all the values stored in the Level2 ring buffer. The comparison is valid, if the Range Display value from Level1 CAN buffer is not equal to "Park" or matches at least one of the values in the Level2 ring buffer	=FALSCH	0.04(s)	1 Trip
P060C	Fault status of Level 1 Level2 comparison for accelerator actual position CAN Tx signal in function monitoring	Difference between level2 and level1 accelerator actual position and Difference between level2 and level1 accelerator actual position	>18.99(%) <100(%)	0.04(s)	1 Trip
P060C	Plausibility check Accelerator Pedal signals from ASW (L1) and Monitoring (L2)	(Position of accelerator pedal in high resolution) - (Standardized accelerator pedal position) or	>100(%)	50(events)	1 Trip

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			(Standardized accelerator pedal position) - (Position of accelerator pedal in high resolution)	<18.9941(%)				
	P060C	Level1 Level2 comparison for driver demand torque CAN Tx signal in function monitoring	Abs (Physical value of driver demand torque extracted from Level1 CAN buffer in function monitoring) - (Driver demand torque output value from ring buffer in function monitoring)	<10to 300(Nm)			50(events)	1 Trip
			(see Look-Up-Table #83)					
	P060C	Comparison of the two Virtual Accelerator Pedal signals from ASW (L1) and Monitoring (L2)	(Handshake signal for the virtual accelerator pedal with level 1) - (Accelerated pedal virtual cruise control)	>100(%)			50(events)	1 Trip
			or					
			(Accelerated pedal virtual cruise control) - (Handshake signal for the virtual accelerator pedal with level 1)	<15.0024(%)				
62. COM - ECM PROGRAMMING ERRORS	P0602	Diagnosis of Code Variation of Start Calibration	Dataset is not valid	=TRUE	Ignition is ON	=TRUE	0.2(s)	1Trip-200ms
					Counter for proc to be executed alternatively Basic enable conditions are met	=FALSE =see sheet enable tables		
	P0630	Monitoring of Vehicle Identification Number	VIN Not programmed : VIN contains 0xFF in all the 17 bytes	=TRUE	Ignition is ON	=TRUE	0.2(s)	1 Trip
					VIN buffer is read successfully from EEP Counter for proc to be executed alternatively Basic enable conditions are met	=TRUE =FALSE =see sheet enable tables		
	P0630		Status of controller transfer detected	=TRUE	Ignition is ON	=TRUE	1(s)	1 Trip

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			for time	>5(s)	Basic enable conditions met	=see sheet enable tables		
63. COM - DIAGNOSIS REPORTED VIA CAN COMMUNICATION	U1960	Monitoring the empty key status	Empty key status reported	=TRUE	Ignition is ON	=TRUE	1(event)	1Trip-200ms
					Battery Voltage	>9(V)		
	P2535	Monitoring Ignition Switch Run/Start Position - Circuit High	Ignition Switch Run/Start Position Circuit High	=TRUE	Basic enable conditions are met	=see sheet enable tables	1(event)	1 Trip
	P2534	Monitoring Ignition Switch Run/Start Position - Circuit Low	Ignition Switch Run/Start Position Circuit Low	=TRUE			1(event)	1 Trip
	P064F	Unauthorized Software/Calibration Detected	Invalid / Incompatible Configuration detected	=TRUE			1(event)	1 Trip
64. CCM - TARGET WHEEL ADAPTATION FOR MISFIRE DETECTION	P0315	Indicates that the engine has experienced a problem with the crankshaft position sensor and/or the crankshaft sensor wheel by monitoring the adapted crankshaft segment time value against a calibrated threshold	Method 1: Median segment time adaptation value from test frame	>1.2(deg CrS)	Engine speed	>2050(rpm)		1 Trip
			OR		Engine speed	<3200(rpm)		
			Method 1: Median segment time adaptation value in the alternative segment position (catalyst heating) from test frame	>1.8(deg CrS)	Engine coolant temperature	>39.96(°C)		
			where		Rough road detection is not active	=TRUE		
			[One test frame defined by: Segment time adaptation sample counts	=11(counts)	(means: Average wheel acceleration rear axle	<55.55(m/(s ²))		
			(sample means: Current segment time adaptation value	measured parameter	OR Average wheel acceleration front axle)	<55.55(m/(s ²))		

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(means:		Traction or electronic stability control torque intervention is not active	=TRUE
Segment time ratio	=[A]/[B]	Calculated EPM segment time is valid	=TRUE
where			
[A] Modelled segment time	=measured parameter(ps)		
[B] Measured segment time	=measured parameter(ps)	Overrun/fuel cut-off is active	=TRUE
Filtered for		Segment time adaptation is not complete	=TRUE
N camshaft revolutions		No pending or confirmed DTCs	=see sheet inhibit tables
where		Basic enable conditions met	=see sheet enable tables
(N	=((ln([A]/[B]))/(ln[C]))(Camshaft revolutions)		
where			
[A] Filter factor lower limit	=0.05		
[B] Filter factor upper limit	=0.2		
[C] Filter factor slope))))	=0.9		
for			
Maximum adaptation value threshold exceedance counter	>1(events)		
<hr/>			
Method 2: Difference between the maximum and minimum filtered ratios of the modelled to measured segment time during one sample	>0.4(deg CrS)		
OR			
Method 2: Difference between the maximum and minimum filtered ratios of the modelled to measured segment time in the alternative segment position (catalyst heating) during one sample	1.8(deg CrS)		
where			
(sample means:			
Current segment time adaptation value	measured parameter		
(means:			
Segment time ratio	=[A]/[B]		
where			
[A] Modelled segment time	=measured parameter(s)		
[B] Measured segment time	=measured parameter(s)		

Filtered for
N camshaft revolutions
where
(N $= (\ln([A]/[B])) / (\ln[C])$ (Camshaft revolutions))

where
[A] Filter factor lower limit = 0.05
[B] Filter factor upper limit = 0.2
[C] Filter factor slope)))] = 0.9
for
Segment time ratio difference > 3 (events)
threshold exceedance counter

Method 3: Difference between the maximum and minimum segment time adaptation values of the inner five OR

Method 3: Difference between the maximum and minimum segment time adaptation values of the inner five adaptation samples in the alternative segment position (catalyst heating) where

[A] Maximum spread threshold of the inner five adaptation values in the standard segment position 0.12(deg CrS)

[B] Standard segment position length 90(deg CrS)

[C] Alternative segment position length and 60(deg CrS)

(sample means:
Current segment time adaptation value measured parameter

(means:
Segment time ratio $= [A]/[B]$

where
[A] Modelled segment time = measured parameter(ps)
[B] Measured segment time = measured parameter(ps)

Filtered for
N camshaft revolutions
where
(N $= (\ln([A]/[B])) / (\ln[C])$ (Camshaft revolutions))

where
[A] Filter factor lower limit = 0.05
[B] Filter factor upper limit = 0.2

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[C] Filter factor slope)))]
 =0.9
 for
 Inner five segment time >3(events)
 adaptation value difference
 threshold exceedance counter

65. TRANSMISSION RANGE SELECTOR CONTROL MODULE MESSAGE DIAGNOSIS	U0404	Detects when wrong data length code received by the frame SIB_General_Info_2_S1 from Transmission Range Selector Control Module	Wrong data length code received by the frame SIB_General_Info_2_S1 from Transmission Range Selector Control Module	=TRUE	Ignition is ON	=TRUE	1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	U0404	Detects when wrong data length code received by the frame SIB_General_Info_S1 from Transmission Range Selector Control Module	Wrong data length code received by the frame SIB_General_Info_S1 from Transmission Range Selector Control Module	=TRUE	Ignition is ON	=TRUE	1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	U18D2	Detects when the time since the last message from the Transmission Range Selector Control Module on Powertrain Sensor CAN Bus for the frame SIB_General_Info_2_S1 was received is greater than the Supervision timeout value for a calibrated period of time	Time since last message from the Transmission Range Selector Control Module on Powertrain Sensor CAN Bus was received is greater than a supervision timeout value	=TRUE	Ignition is ON	=TRUE	1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	U18D2	Detects when the time since the last message from the Transmission Range Selector Control Module on Powertrain Sensor CAN Bus for the frame SIB_General_Info_S1 was received is greater than the Supervision timeout value for a calibrated period of time	Time since last message from the Transmission Range Selector Control Module on Powertrain Sensor CAN Bus was received is greater than a supervision timeout value	=TRUE	Ignition is ON	=TRUE	1(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		

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U0404	Detects when the frame DscrInSnsrPri_MSG_DLC is not received Engine ECU Module	DscrInSnsrPri_MSG_DLC message is not being received from Engine ECU Module	=TRUE	0.69(s)	2 Trip
U18D2	Detects when the frame DscrInSnsrPri_MSG_TO is not received Engine ECU Module	DscrInSnsrPri_MSG_TO message is not being received from Engine ECU Module	=TRUE	0.69(s)	2 Trip
U0404	Detects when the frame DscrInSnsrSec_Prtctd_MSG_DLC is not received Engine ECU Module	DscrInSnsrSec_Prtctd_MSG. DLC message is not being received from Engine ECU Module	=TRUE	0.63(s)	2 Trip
U18D3	Detects when the frame DscrInSnsrSec_Prtctd_MSG_TO is not received Engine ECU Module	DscrInSnsrSec_Prtctd_MSG. TO message is not being received from Engine ECU Module	=TRUE	0.63(s)	2 Trip
and					
U163C	Lost Communication with Transmission Range Selector Control Module on CAN Bus 1				
U0404	Detects when the frame ExtrnALUChkPri_Prtctd_MSG_DLC is not received Engine ECU Module	ExtrnALUChkPri_Prtctd_MSG. DLC message is not being received from Engine ECU Module	=TRUE	0.5(s)	2 Trip

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U18D2	Detects when the frame ExtrnALUChkPri_Prtctd_MSG_ TO is not received Engine ECU Module	ExtrnALUChkPri_Prtctd_MSG_ TO message is not being received from Engine ECU Module	=TRUE	0.5(s)	2 Trip
U0404	Detects when the frame ExtrnALUChkSec_Prtctd_MSG_ _DLC is not received Engine ECU Module	ExtrnALUChkSec_Prtctd_MSG_ _DLC message is not being received from Engine ECU Module	=TRUE	0.63(s)	2 Trip
U18D3	Detects when the frame ExtrnALUChkSec_Prtctd_MSG_ _TO is not received Engine ECU Module	ExtrnALUChkSec_Prtctd_MSG_ _TO message is not being received from Engine ECU Module	=TRUE	0.63(s)	2 Trip
and					
U163C	Lost Communication with Transmission Range Selector Control Module on CAN Bus 1				
U1609	Detects when the frame MSG_3017_TO is not received Engine ECU Module	MSG_3017_TO message is not being received from Engine ECU Module	=TRUE	10(s)	2 Trip
U0404	Checking ARC error in the frame 0x1E4	Frame Counter Error	=TRUE	3(events)	2 Trip

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	U0404	Checking Checksum error in the frame 0x1E4	Checksum Error	=TRUE			3(events)	2 Trip
66. TIMEOUT DETECTION OF FRAMES FROM ENGINE ECU	U0632	Detects when the frame ECM_LIN1_CFM1_RSP_MSG is not received Engine ECU	ECM_LIN1_CFM1_RSP_MSG message is not being received from Engine ECU Module	=TRUE	Ignition is ON	=TRUE	3(events)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	U0633	Detects when the frame ECM_LIN1_CFM2_RSP_MSG is not received Engine ECU Module	ECM_LIN1_CFM2_RSP_MSG message is not being received from Engine ECU Module	=TRUE			3(events)	2 Trip
	U1600	Detects when the frame ECM_LIN1_TCM_Rsp_MSG is not received Engine ECU Module	ECM_LIN1_TCM_Rsp_MSG message is not being received from Engine ECU Module	=TRUE			3(events)	2 Trip
	U112A	Detects when the frame ECM_LIN3_CFM3_RSP_MSG is not received Engine ECU Module	ECM_LIN3_CFM3_RSP_MSG message is not being received from Engine ECU Module	=TRUE			3(events)	2 Trip
	U112B	Detects when the frame ECM_LIN3_CFM4_RSP_MSG is not received Engine ECU Module	ECM_LIN3_CFM4_RSP_MSG message is not being received from Engine ECU Module	=TRUE			3(events)	2 Trip
	U0402	Detects when the frame TCMGnrlInfo1_Prtctd_MSG is not received Engine ECU Module	TCMGnrlInfo1_Prtctd_MSG message is not being received from Engine ECU Module	=TRUE			0.42(s)	1 Trip

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U0101	Detects when the frame TCMGnrlInfo1_Prtctd_MSG is not received Engine ECU Module	TCMGnrlInfo1_Prtctd_MSG message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip
U0402	Detects when the frame ECM_TCM_CAN2_MSG_DLC is not received Engine ECU Module	ECM_TCM_CAN2_MSG_DLC message is not being received from Engine ECU Module	=TRUE	1(s)	1 Trip
U0101	Detects when the frame ECM_TCM_CAN2_MSG_TO is not received Engine ECU Module	ECM_TCM_CAN2_MSG_TO message is not being received from Engine ECU Module	=TRUE	1(s)	1 Trip
U0402	Detects when the frame ECM_TCM_CAN2_MSG02_D LC is not received Engine ECU Module	ECM_TCM_CAN2_MSG02_D LC message is not being received from Engine ECU Module	=TRUE	1(s)	1 Trip
U0101	Detects when the frame ECM_TCM_CAN2_MSG02_T 0 is not received Engine ECU Module	ECM_TCM_CAN2_MSG02_T 0 message is not being received from Engine ECU Module	=TRUE	1(s)	1 Trip
U0402	Detects when the frame SrlDat79_Prtctd_MSG_DLC is not received Engine ECU Module	SrlDat79_Prtctd_MSG_DLC message is not being received from Engine ECU Module	=TRUE	1(s)	1 Trip
U0101	Detects when the frame SrlDat79_Prtctd_MSG_TO is not received Engine ECU Module	SrlDat79_Prtctd_MSG_TO message is not being received from Engine ECU Module	=TRUE	1(s)	1 Trip

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U1105	Detects when the frame SrlDat43_Prtctd_MSG_TO is not received Engine ECU Module	SrlDat43_Prtctd_MSG_TO message is not being received from Engine ECU Module	=TRUE	0.33(s)	2 Trip
U0402	Detects when the frame TransOutRotSts_Prtctd_MSG_DLC is not received Engine ECU Module	TransOutRotSts_Prtctd_MSG_DLC message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip
U0101	Detects when the frame TransOutRotSts_Prtctd_MSG_TO is not received Engine ECU Module	TransOutRotSts_Prtctd_MSG_TO message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip
U0402	Detects when the frame TrnsEstGr_Prtctd_MSG_DLC is not received Engine ECU Module	TrnsEstGr_Prtctd_MSG_DLC message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip
U0101	Detects when the frame TrnsEstGr_Prtctd_MSG_TO is not received Engine ECU Module	TrnsEstGr_Prtctd_MSG_TO message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip
and					
U1643	Lost Communication with Transmission Control Module on CAN Bus 2				
U0402	Detects when the frame TrnsGnrInfo_Prtctd_MSG_DL C is not received Engine ECU Module	TrnsGnrInfo_Prtctd_MSG_DL C message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip

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U0101	Detects when the frame TrnsGnrInfo_Prtctd_MSG_TO is not received Engine ECU Module	TrnsGnrInfo_Prtctd_MSG_TO message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip
U0402	Detects when the frame TrnsGnrInfo2_Prtctd_MSG_DL C is not received Engine ECU Module	TrnsGnrInfo2_Prtctd_MSG_DL C message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip
U0101	Detects when the frame TrnsGnrInfo2_Prtctd_MSG_T 0 is not received Engine ECU Module	TrnsGnrInfo2_Prtctd_MSG_T 0 message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip
and					
U1643	Lost Communication with Transmission Control Module on CAN Bus 2				
U0402	Detects when wrong data length code received by the frame TCM_CAN2_MSG01 from Engine ECU Module	Wrong data length code received by the frame TCM_CAN2_MSG01 from Engine ECU Module	=TRUE	1(s)	1 Trip
U0101	Detects when the frame TCM_CAN2_MSG01 is not received Engine ECU Module	TCM_CAN2_MSG01 message is not being received from Engine ECU Module	=TRUE	1(s)	1 Trip
U0402	Detects when wrong data length code received by the frame TCM_CAN2_MSG02 from Engine ECU Module	Wrong data length code received by the frame TCM_CAN2_MSG02 from Engine ECU Module	=TRUE	0.36(s)	1 Trip

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U0101	Detects when the frame TCM_CAN2_MSG02 is not received Engine ECU Module	TCM_CAN2_MSG02 message is not being received from Engine ECU Module	=TRUE	0.36(s)	1 Trip
U0402	Detects when wrong data length code received by the frame TCM_CAN2_MSG03 from Engine ECU Module	Wrong data length code received by the frame TCM_CAN2_MSG03 from Engine ECU Module	=TRUE	2(s)	1 Trip
U0101	Detects when the frame TCM_CAN2_MSG03 is not received Engine ECU Module	TCM_CAN2_MSG03 message is not being received from Engine ECU Module	=TRUE	2(s)	1 Trip
U0402	Detects when wrong data length code received by the frame TCM_CAN2_MSG05 from Engine ECU Module	Wrong data length code received by the frame TCM_CAN2_MSG05 from Engine ECU Module	=TRUE	0.42(s)	1 Trip
U0101	Detects when the frame TCM_CAN2_MSG05 is not received Engine ECU Module	TCM_CAN2_MSG05 message is not being received from Engine ECU Module	=TRUE	0.42(s)	1 Trip
U0402	Detects when wrong data length code received by the frame TCM_CAN2_MSG06 from Engine ECU Module	Wrong data length code received by the frame TCM_CAN2_MSG06 from Engine ECU Module	=TRUE	9.89(s)	1 Trip
U0101	Detects when the frame TCM_CAN2_MSG06 is not received Engine ECU Module	TCM_CAN2_MSG06 message is not being received from Engine ECU Module	=TRUE	9.89(s)	1 Trip

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U0422	Detects when wrong data length code received by the frame BCM_CAN2_MSG01_DLC" from Body Control Module	Wrong data length code received by the frame BCM_CAN2_MSG01_DLC from Body Control Module	=TRUE	1(s)	2 Trip
U0140	Detects when the frame "BCM_CAN2_MSG01_TO" is not received from Body Control Module	Wrong data length code received by the frame BCM_CAN2_MSG01_TO from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame BCM_CAN2_MSG02_DLC" from Body Control Module	Wrong data length code received by the frame BCM_CAN2_MSG02_DLC from Body Control Module	=TRUE	1(s)	2 Trip
U0140	Detects when the frame "BCM_CAN2_MSG02_TO" is not received from Body Control Module	Wrong data length code received by the frame BCM_CAN2_MSG02_TO from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame BCM_CAN2_MSG04_DLC" from Body Control Module	Wrong data length code received by the frame BCM_CAN2_MSG04_DLC from Body Control Module	=TRUE	1(s)	2 Trip
U0140	Detects when the frame "BCM_CAN2_MSG04_TO" is not received from Body Control Module	Wrong data length code received by the frame BCM_CAN2_MSG04_TO from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame BCMGnrlInfo1_Prtctd_MSG_D LC" from Body Control Module	Wrong data length code received by the frame BCMGnrlInfo1_Prtctd_MSG_D LC from Body Control Module	=TRUE	2(s)	2 Trip
U0140	Detects when the frame "BCMGnrlInfo1_Prtctd_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame BCMGnrlInfo1_Prtctd_MSG_T O from Body Control Module	=TRUE	2(s)	2 Trip

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U0422	Detects when wrong data length code received by the frame BdyGenInfo1_Prtctd_MSG_DL C" from Body Control Module	Wrong data length code received by the frame BdyGenInfo1_Prtctd_MSG_DL C from Body Control Module	=TRUE	0.7(s)	2 Trip
U0140	Detects when the frame "BdyGenInfo1_Prtctd_MSG_T 0" is not received from Body Control Module	Wrong data length code received by the frame BdyGenInfo1_Prtctd_MSG_TO from Body Control Module	=TRUE	0.7(s)	2 Trip
U0422	Detects when wrong data length code received by the frame BdyGenInfo3_Prtctd_MSG_DL C" from Body Control Module	Wrong data length code received by the frame BdyGenInfo3_Prtctd_MSG_DL C from Body Control Module	=TRUE	0.43(s)	2 Trip
U0140	Detects when the frame "BdyGenInfo3_Prtctd_MSG_T 0" is not received from Body Control Module	Wrong data length code received by the frame BdyGenInfo3_Prtctd_MSG_TO from Body Control Module	=TRUE	0.43(s)	2 Trip
U0422	Detects when wrong data length code received by the frame BdyVehSpdCtl_Prtctd_MSG_D LC" from Body Control Module	Wrong data length code received by the frame BdyVehSpdCtl_Prtctd_MSG_D LC from Body Control Module	=TRUE	0.33(s)	2 Trip
U0140	Detects when the frame "BdyVehSpdCtl_Prtctd_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame BdyVehSpdCtl_Prtctd_MSG_T 0 from Body Control Module	=TRUE	0.33(s)	2 Trip
U0422	Detects when wrong data length code received by the frame BkupSysPwrMode_Prtctd_MS G_DLC" from Body Control Module	Wrong data length code received by the frame BkupSysPwrMode_Prtctd_MS G_DLC from Body Control Module	=TRUE	0.33(s)	2 Trip

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U0140	Detects when the frame "BkupSysPwrMode_Prtctd_MS G_TO" is not received from Body Control Module	Wrong data length code received by the frame BkupSysPwrMode_Prtctd_MS G_TO from Body Control Module	=TRUE	0.33(s)	2 Trip
U0422	Detects when the frame "DrvDoorOpenSwtVirtDevErr" is not received from Body Control Module	Wrong data length code received by the frame DrvDoorOpenSwtVirtDevErr from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame DrvDoorOpenVld" from Body Control Module	Wrong data length code received by the frame DrvDoorOpenVld from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when the frame "DrvDoorAjarSwtActvMask" is not received from Body Control Module	Wrong data length code received by the frame DrvrDoorAjarSwtActvMask from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame GWCGM_06_MSG_DLC" from Body Control Module	Wrong data length code received by the frame GWCGM_06_MSG_DLC from Body Control Module	=TRUE	1(s)	2 Trip
U0140	Detects when the frame "GWCGM_06_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame GWCGM_06_MSG_TO from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame GWCGM_34_MSG_DLC" from Body Control Module	Wrong data length code received by the frame GWCGM_34_MSG_DLC from Body Control Module	=TRUE	1(s)	2 Trip
U0140	Detects when the frame "GWCGM_34_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame GWCGM_34_MSG_TO from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame GWCGM_94_MSG_DLC" from Body Control Module	Wrong data length code received by the frame GWCGM_94_MSG_DLC from Body Control Module	=TRUE	1(s)	2 Trip

U0140	Detects when the frame "GWCGM_94_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame GWCGM_94_MSG_TO from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame ReImblz_Prtctd_MSG_DLC" from Body Control Module	Wrong data length code received by the frame ReImblz_Prtctd_MSG_DLC from Body Control Module	=TRUE	1(s)	2 Trip
U0140	Detects when the frame "RelImblz_Prtctd_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame RelImblz_Prtctd_MSG_TO from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame SysPwrMode_Prtctd_MSG_DLC" from Body Control Module	Wrong data length code received by the frame SysPwrMode_Prtctd_MSG_DLC from Body Control Module	=TRUE	0.33(s)	2 Trip
U0140	Detects when the frame "SysPwrMode_Prtctd_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame SysPwrMode_Prtctd_MSG_TO from Body Control Module	=TRUE	0.33(s)	2 Trip
U0422	Detects when wrong data length code received by the frame VehIdNmDig10_17_MSG_DLC" from Body Control Module	Wrong data length code received by the frame VehIdNmDig10_17_MSG_DLC from Body Control Module	=TRUE	1(s)	2 Trip
U0140	Detects when the frame "VehIdNmDig10_17_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame VehIdNmDig10_17_MSG_TO from Body Control Module	=TRUE	1(s)	2 Trip
U0422	Detects when wrong data length code received by the frame VehOdoDispVal_Prtctd_MSG_DLC" from Body Control Module	Wrong data length code received by the frame VehOdoDispVal_Prtctd_MSG_DLC from Body Control Module	=TRUE	1(s)	2 Trip

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110140	Detects when the frame "VehOdoDispVal_Prtctd_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame VehOdoDispVal_Prtctd_MSG_TO from Body Control Module	TRUE	1(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "BrkSysInfoReqs3_Prtctd_MS G_DLC" from Brake System Control Module	Wrong data length code received by the frame BrkSysInfoReqs3_Prtctd_MSG_DLC from Brake System Control Module	TRUE	0.33(s)	1 Trip
111639	Detects when the frame "BrkSysInfoReqs3_Prtctd_MS G_TO" is not received from Brake System Control Module	Wrong data length code received by the frame BrkSysInfoReqs3_Prtctd_MSG_TO from Brake System Control Module	TRUE	0.33(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "BrkSysInfoSts_Prtctd_M SG. DLC" from Brake System Control Module	Wrong data length code received by the frame BrkSysInfoSts_Prtctd_MSG_D LC from Brake System Control Module	TRUE	0.5(s)	1 Trip
111610	Detects when the frame "BrkSysInfoSts_Prtctd_MSG_T O" is not received from Brake System Control Module	Wrong data length code received by the frame BrkSysInfoSts_Prtctd_MSG_T O from Brake System Control Module	TRUE	0.5(s)	2 Trip
110418	Detects when wrong data length code received by the frame "BrkSysInfoSts2_Prtctd_MSG_ DLC" from Brake System Control Module	Wrong data length code received by the frame BrkSysInfoSts2_Prtctd_MSG_ DLC from Brake System Control Module	TRUE	0.48(s)	1 Trip
U1610	Detects when the frame "BrkSysInfoSts2_Prtctd_MSG_ TO" is not received from Brake System Control Module	Wrong data length code received by the frame BrkSysInfoSts2_Prtctd_MSG_ TO from Brake System Control Module	TRUE	0.48(s)	2 Trip

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U0418	Detects when wrong data length code received by the frame "BrkSysStsInfo_Prtctd_MSG. DLC" from Brake System Control Module	Wrong data length code received by the frame BrkSysStsInfo_P rtctd_MSG_D LC from Brake System Control Module	=TRUE	10(s)	1 Trip
U1610	Detects when the frame "BrkSysStsInfo_Prtctd_MSG_T O" is not received from Brake System Control Module	Wrong data length code received by the frame BrkSysStsInfo_Prtctd_MSG_T O from Brake System Control Module	=TRUE	10(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "ChsSysBrkTrq_Prtctd_MSG. DLC" from Brake System Control Module	Wrong data length code received by the frame ChsSysBrkTrq_Prtctd_MSG_D LC from Brake System Control Module	=TRUE	0.43(s)	1 Trip
U1610	Detects when the frame "ChsSysBrkTrq_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame ChsSysBrkTrq_Prtctd_MSG_T O from Brake System Control Module	=TRUE	0.43(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "EBCM_CAN2_MSG02_DLC" from Brake System Control Module	Wrong data length code received by the frame EBCM_CAN2_MSG02_DLC from Brake System Control Module	=TRUE	10(s)	1 Trip
U1610	Detects when the frame "EBCM_CAN2_MSG02_TO" is not received from Brake System Control Module	Wrong data length code received by the frame EBCM_CAN2_MSG02_TO from Brake System Control Module	=TRUE	10(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "EBCM_CAN2_MSG04_DLC" from Brake System Control Module	Wrong data length code received by the frame EBCM_CAN2_MSG04_DLC from Brake System Control Module	=TRUE	10(s)	1 Trip

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111610	Detects when the frame "EBCM_CAN2_MSG04_TO" is not received from Brake System Control Module	Wrong data length code received by the frame EBCM_CAN2_MSG04_TO from Brake System Control Module	=TRUE	10(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "EBCMGnrlInfo1_Prtctd_MSG_DLC" from Brake System Control Module	Wrong data length code received by the frame EBCMGnrlInfo1_Prtctd_MSG_DLC from Brake System Control Module	=TRUE	0.43(s)	1 Trip
U1610	Detects when the frame "EBCMGnrlInfo1_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame EBCMGnrlInfo1_Prtctd_MSG_TO from Brake System Control Module	=TRUE	0.43(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "EBCMGnrlInfo3_Prtctd_MSG_DLC" from Brake System Control Module	Wrong data length code received by the frame EBCMGnrlInfo3_Prtctd_MSG_DLC from Brake System Control Module	=TRUE	0.33(s)	1 Trip
U1610	Detects when the frame "EBCMGnrlInfo3_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame EBCMGnrlInfo3_Prtctd_MSG_TO from Brake System Control Module	=TRUE	0.33(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "ElecPrkBrkSts_Prtctd_MSG_DLC" from Brake System Control Module	Wrong data length code received by the frame ElecPrkBrkSts_Prtctd_MSG_DLC from Brake System Control Module	=TRUE	0.7(s)	1 Trip
U1610	Detects when the frame "ElecPrkBrkSts_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame ElecPrkBrkSts_Prtctd_MSG_TO from Brake System Control Module	=TRUE	0.7(s)	2 Trip

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U0418	Detects when wrong data length code received by the frame "FrntAngVel_Prtctd_MSG_DL C" from Brake System Control Module	Wrong data length code received by the frame FrntAngVel_Prtctd_MSG_DLC from Brake System Control Module	=TRUE	0.43(s)	1 Trip
U1610	Detects when the frame "FrntAngVel_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame FrntAngVel_Prtctd_MSG_TO from Brake System Control Module	=TRUE	0.43(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "FrtWhlDistEdgeCnt_Prtctd_M SG_DLC" from Brake System Control Module	Wrong data length code received by the frame FrtWhlDistEdgeCnt_Prtctd_MS G_DLC from Brake System Control Module	=TRUE	1(s)	1 Trip
U1610	Detects when the frame "FrtWhlDistEdgeCnt_Prtctd_M SG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame FrtWhlDistEdgeCnt_Prtctd_MS G_TO from Brake System Control Module	=TRUE	1(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "RearAngVel_Prtctd_MSG_DL C" from Brake System Control Module	Wrong data length code received by the frame RearAngVel_Prtctd_MSG_DL C from Brake System Control Module	=TRUE	0.43(s)	1 Trip
U1610	Detects when the frame "RearAngVel_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame RearAngVel_Prtctd_MSG_TO from Brake System Control Module	=TRUE	0.43(s)	2 Trip
U0418	Detects when wrong data length code received by the frame "RrWhlDistEdgeCnt_Prtctd_M SG_DLC" from Brake System Control Module	Wrong data length code received by the frame RrWhlDistEdgeCnt_Prtctd_MS G_DLC from Brake System Control Module	=TRUE	10(s)	1 Trip

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U1610	Detects when the frame "RrWhlDistEdgeCnt_Prtctd_M SG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame RrWhlDistEdgeCnt_Prtctd_MS G_TO from Brake System Control Module	=TRUE			10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "CGM_CAN2_MSG01_DLC" from Gateway Module	Wrong data length code received by the frame CGM_CAN2_MSG01_DLC from Gateway Module	TRUE	Ignition is ON	=TRUE	10(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
U1608	Detects when the frame "CGM_CAN2_MSG01_TO" is not received from Gateway Module	Wrong data length code received by the frame CGM_CAN2_MSG01_TO from Gateway Module	TRUE			10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "CGM_CAN2_MSG02_DLC" from Gateway Module	Wrong data length code received by the frame CGM_CAN2_MSG02_DLC from Gateway Module	TRUE			10(s)	2 Trip
U1608	Detects when the frame "CGM_CAN2_MSG02_TO" is not received from Gateway Module	Wrong data length code received by the frame CGM_CAN2_MSG02_TO from Gateway Module	TRUE			10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "CGM_CAN2_MSG03_DLC" from Gateway Module	Wrong data length code received by the frame CGM_CAN2_MSG03_DLC from Gateway Module	TRUE			10(s)	2 Trip
U1608	Detects when the frame "CGM_CAN2_MSG03_TO" is not received from Gateway Module	Wrong data length code received by the frame CGM_CAN2_MSG03_TO from Gateway Module	TRUE			10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "CGM_CAN3_MSG01_DLC" from Gateway Module	Wrong data length code received by the frame CGM_CAN3_MSG01_DLC from Gateway Module	TRUE			10(s)	2 Trip

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U1609	Detects when the frame "CGM_CAN3_MSG01_TO" is not received from Gateway Module	Wrong data length code received by the frame CGM_CAN3_MSG01_TO from Gateway Module	=TRUE	10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "CGM_CAN3_MSG02_DLC" from Gateway Module	Wrong data length code received by the frame CGM_CAN3_MSG02_DLC from Gateway Module	=TRUE	10(s)	2 Trip
U1609	Detects when the frame "CGM_CAN3_MSG02_TO" is not received from Gateway Module	Wrong data length code received by the frame CGM_CAN3_MSG02_TO from Gateway Module	=TRUE	10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "CGM_CAN3_MSG04_DLC" from Gateway Module	Wrong data length code received by the frame CGM_CAN3_MSG04_DLC from Gateway Module	=TRUE	10(s)	2 Trip
U1609	Detects when the frame "CGM_CAN3_MSG04_TO" is not received from Gateway Module	Wrong data length code received by the frame CGM_CAN3_MSG04_TO from Gateway Module	=TRUE	10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "CGM_CAN3_MSG10_DLC" from Gateway Module	Wrong data length code received by the frame CGM_CAN3_MSG10_DLC from Gateway Module	=TRUE	10(s)	2 Trip
U1609	Detects when the frame "CGM_CAN3_MSG10_TO" is not received from Gateway Module	Wrong data length code received by the frame CGM_CAN3_MSG10_TO from Gateway Module	=TRUE	10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "Infotainment_Group_C_CAN2_MSG01_DLC" from Gateway Module	Wrong data length code received by the frame Infotainment_Group_C_CAN2_MSG01_DLC from Gateway Module	=TRUE	10(s)	2 Trip

U1608	Detects when the frame "Infotainment_Group_C_CAN2_MSG01_TO" is not received from Gateway Module	Wrong data length code received by the frame Infotainment_Group_C_CAN2_MSG01_TO from Gateway Module	=TRUE			10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "NodeStatus_CAN2_MSG01_DLC" from Gateway Module	Wrong data length code received by the frame NodeStatus_CAN2_MSG01_DLC from Gateway Module	=TRUE			10(s)	2 Trip
U1608	Detects when the frame "NodeStatus_CAN2_MSG01_TO" is not received from Gateway Module	Wrong data length code received by the frame NodeStatus_CAN2_MSG01_T0 from Gateway Module	=TRUE			10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "NodeStatus_CAN2_MSG02_DLC" from Gateway Module	Wrong data length code received by the frame NodeStatus_CAN2_MSG02_DLC from Gateway Module	=TRUE			10(s)	2 Trip
U1608	Detects when the frame "NodeStatus_CAN2_MSG02_TO" is not received from Gateway Module	Wrong data length code received by the frame NodeStatus_CAN2_MSG02_T0 from Gateway Module	=TRUE			10(s)	2 Trip
U0447	Detects when wrong data length code received by the frame "NodeStatus_CAN3_MSG01_DLC" from Gateway Module	Wrong data length code received by the frame NodeStatus_CAN3_MSG01_DLC from Gateway Module	=TRUE			10(s)	2 Trip
U1609	Detects when the frame "NodeStatus_CAN3_MSG01_TO" is not received from Gateway Module	Wrong data length code received by the frame NodeStatus_CAN3_MSG01_T0 from Gateway Module	=TRUE			10(s)	2 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_1_S1_ARC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_1_S1_ARC from Fuel Tank Zone Module	=TRUE	Ignition is ON	=TRUE	3(events)	1 Trip

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U131D	Detects when wrong data length code received by the frame "FTZM_Information_1_S1_Chk s" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_1_S1_Chk s from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_1_S1_DL C" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_1_S1_DLC from Fuel Tank Zone Module	=TRUE	10(s)	1 Trip
U18A2	Detects when the frame "FTZM_Information_1_S1_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_1_S1_TO from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_11_S1_ARC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_11_S1_ARC from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_11_S1_Chks" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_11_S1_Chks from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_11_S1_DLC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_11_S1_DLC from Fuel Tank Zone Module	=TRUE	10(s)	1 Trip
U18A2	Detects when the frame "FTZM_Information_11_S1_T0" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_11_S1_T0 from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip

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U131D	Detects when wrong data length code received by the frame "FTZM_Information_12_S1_A RC" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_12_S1_AR C from ECM/PCM	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_12_S1_Ch ks" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_12_S1_Ch ks from ECM/PCM	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_12_MSG_ DLC" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_12_MSG_ DLC from ECM/PCM	=TRUE	10(s)	1 Trip
U18A2	Detects when the frame "FTZM_Information_12_MSG_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_12_MSG_TO from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_13_S1_A RC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_13_S1_AR C from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_13_S1_Ch ks" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_13_S1_Ch ks from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_13_S1_MS G_DLC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_13_S1_MS G_DLC from Fuel Tank Zone Module	=TRUE	10(s)	1 Trip

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U18A2	Detects when the frame "FTZM_Information_13_S1_M SG_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_13_S1_MS G_TO from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_16_MSG_ ARC" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_16_MSG_ ARC from ECM/PCM	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_16_MSG_ Chks" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_16_MSG_ Chks from ECM/PCM	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_16_MSG_ DLC" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_16_MSG_ DLC from ECM/PCM	=TRUE	10(s)	1 Trip
U18A2	Detects when the frame "FTZM_Information_16_MSG_ TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_16_MSG_ TO from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_2_S1_AR C" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_2_S1_ARC from ECM/PCM	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_2_S1_Chk s" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_2_S1_Chk s from ECM/PCM	=TRUE	3(events)	1 Trip

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U131D	Detects when wrong data length code received by the frame "FTZM_Information_2_S1_DL C" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_2_S1_DLC from ECM/PCM	=TRUE	10(s)	1 Trip
U18A2	Detects when the frame "FTZM_Information_2_S1_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_2_S1_TO from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_5_S1_AR C" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_5_S1_ARC from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_5_S1_Chk s" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_5_S1_Chk s from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_5_S1_DL C" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_5_S1_DLC from Fuel Tank Zone Module	=TRUE	10(s)	1 Trip
U18A2	Detects when the frame "FTZM_Information_5_S1_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_5_S1_TO from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_6_S1_AR C" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_6_S1_ARC from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip

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U131D	Detects when wrong data length code received by the frame "FTZM_Information_6_S1_Chk s" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_6_S1_Chk s from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_6_S1_DLC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_6_S1_DLC from Fuel Tank Zone Module	=TRUE	10(s)	1 Trip
U18A2	Detects when the frame "FTZM_Information_6_S1_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_6_S1_TO from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_7_S1_ARC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_7_S1_ARC from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_7_S1_Chk s" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_7_S1_Chk s from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_7_S1_DLC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_7_S1_DLC from Fuel Tank Zone Module	=TRUE	10(s)	1 Trip
U18A2	Detects when the frame "FTZM_Information_7_S1_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_7_S1_TO from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip

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U131D	Detects when wrong data length code received by the frame "FTZM_Information_8_S1_ARC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_8_S1_ARC from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_8_S1_Chk s" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_8_S1_Chk s from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_8_S1_DL C" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_8_S1_DLC from Fuel Tank Zone Module	=TRUE	10(s)	1 Trip
U18A2	Detects when the frame "FTZM_Information_8_S1_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_8_S1_TO from Fuel Tank Zone Module	=TRUE	10(s)	2 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_9_S1_ARC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_9_S1_ARC from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_9_S1_Chk s" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_9_S1_Chk s from Fuel Tank Zone Module	=TRUE	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_9_S1_DL C" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_9_S1_DLC from Fuel Tank Zone Module	=TRUE	10(s)	1 Trip

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U18A2	Detects when the frame "FTZM_Information_9_S1_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_9_S1_TO from Fuel Tank Zone Module	=TRUE			10(s)	2 Trip
U13CE	Detects when wrong data length code received by the frame "FTZMcmdFrmX" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZMcmdFrmX from Fuel Tank Zone Module	=TRUE			40(events)	2 Trip
U1370	Detects when wrong data length code received by the frame "IntkAirTThrVlvlsSnsrInt" from Intake Air Temperature Sensor	Wrong data length code received by the frame IntkAirTThrVlvlsSnsrInt from Intake Air Temperature Sensor	=TRUE	Ignition is ON	=TRUE		2 Trip
				Basic enable conditions met	=see sheet enable tables		
U1370	Detects when wrong data length code received by the frame "IntkAirTThrVlvlsSnsrInt" from Intake Air Temperature Sensor	Wrong data length code received by the frame IntkAirTThrVlvlsSnsrInt from Intake Air Temperature Sensor	=TRUE				2 Trip
U1372	Detects when wrong data length code received by the frame "IntkAirTThrVlvlsB2SnsrInt" from Intake Air Temperature Sensor Bank 2	Wrong data length code received by the frame IntkAirTThrVlvlsB2SnsrInt from Intake Air Temperature Sensor Bank 2	=TRUE				2 Trip
U1372	Detects when wrong data length code received by the frame "IntkAirTThrVlvlsB2SnsrInt" from Intake Air Temperature Sensor Bank 2	Wrong data length code received by the frame IntkAirTThrVlvlsB2SnsrInt from Intake Air Temperature Sensor Bank 2	=TRUE				2 Trip
U0611	Detects when the frame "IntkAirTThrVlvlsCom" is not received from Intake Air Temperature Sensor	Wrong data length code received by the frame IntkAirTThrVlvlsCom from Intake Air Temperature Sensor	=TRUE				2 Trip
and							
U0613							

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U0611	Detects when the frame "IntkAirTThrVlvsLineHi" is not received from Intake Air Temperature Sensor	Wrong data length code received by the frame IntkAirTThrVlvsLineHi from Intake Air Temperature Sensor	=TRUE					2 Trip
and								
U0613								
U0611	Detects when the frame "IntkAirTThrVlvUsLineLo" is not received from Intake Air Temperature Sensor	Wrong data length code received by the frame IntkAirTThrVlvUsLineLo from Intake Air Temperature Sensor	=TRUE					2 Trip
and								
U0613								
U0612	Detects when the frame "IntkAirTThrVlvUsB2Com" is not received from Intake Air Temperature Sensor Bank 2	Wrong data length code received by the frame IntkAirTThrVlvUsB2Com from Intake Air Temperature Sensor Bank 2	=TRUE					2 Trip
U0612	Detects when the frame "IntkAirTThrVlvUsB2LineHi" is not received from Intake Air Temperature Sensor Bank 2	Wrong data length code received by the frame IntkAirTThrVlvUsB2LineHi from Intake Air Temperature Sensor Bank 2	=TRUE					2 Trip
U0612	Detects when the frame "IntkAirTThrVlvUsB2LineLo" is not received from Intake Air Temperature Sensor Bank 2	Wrong data length code received by the frame IntkAirTThrVlvUsB2LineLo from Intake Air Temperature Sensor Bank 2	=TRUE					2 Trip
U0607	Detects when the frame "SemiAtvDmpgSysVhTpSpdLim_Prtctd_MSG_TO" is not received from Suspension Control Module B	Wrong data length code received by the frame SemiAtvDmpgSysVhTpSpdLim_Prtctd_MSG_TO from Suspension Control Module B	=TRUE	Ignition is ON	=TRUE	0.33(s)	1 Trip	
				Basic enable conditions met	see sheet enable tables			

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67. COM - ENGINE CONTROL MODULE LIN BUS OFF MONITORING	P1911	Validity of the Transmission Control Data Received Via LIN	Mismatch between the transmitted range command received from the Gearshift Co- ordinator module and Echo Range Command from Transmission Control Module through LIN	=TRUE	Current Range Command value is equal to Previous Range Command Value	=TRUE	400(s)	2 Trip
					System is not in PARK mode and system power is used by accessories or system wakeup	=TRUE		
					Ignition ON /	=TRUE		
					Current range of gear lever is in PARK position	=FALSE		
					Initialization of gear selection in progress is active)	=FALSE		
					OR \			
					Current range command is in parking range	=FALSE		
					Current range command is in power mode OFF range	=FALSE		
					) Engine Transmission Range Selection brake command is in deny driver override command	=FALSE
					Engine Transmission Range Selection brake command is in allow driver override command	=FALSE		
					Manufacturer Enable Counter used to automatically arm Seed & Key LIN diagnostics enabled	=0 =TRUE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enabling conditions are met	=see sheet enable tables		

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68. ELECTRONIC TRANSMISSION ON PLAUSIBILITY DIAGNOSTICS	P16F4	Range Selection Monitoring Ring shall set the Transmission Range Control Performance upon failure of any of the following daignostic failures: Park Exit Monitor, Park Acknowledgement Monitor, Neutral Acknowledgement Monitor, Transition to Drive Monitor, Transition to Reverse Monitor	Transmission Range Control fault reported	=TRUE	Park Exit Monitor	=TRUE	0(s)	2 Trip
					Park Acknowledgement Monitor	=TRUE		
					Neutral Acknowledgement Monitor	=TRUE		
					Transition to Drive Monitor	=TRUE		
					Transition to Reverse Monitor	=TRUE		
					Battery Voltage Basic enable conditions met	>9(V) =see sheet enable tables		
	P18E9	In Drive Button Diagnosis, if atleast one of the switch is stuck ON for the enough time then the Transmission Range Selector Switchs A-B-C Stuck On is set to Faulty.	Switch 1 stuck on error	=TRUE	Battery Voltage	>9(V)	0.04(s)	2 Trip
			Switch 2 stuck on error	=TRUE	Basic enable conditions met	=see sheet enable tables		
			Switch 3 stuck on error	=TRUE				
	P18CD	For drive button diagnosis, If position of switch 1 is in different status than other two for longer time. Then switch correlation A is set to Fault	Switch A status is different from B & C	=TRUE	Battery Voltage	>9(V)	0(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P18CF	For drive button diagnosis, If position of switch 2 is in different status than other two for longer time. Then switch correlation B is set to Fault	Switch B status is different from A & C	=TRUE			0(s)	2 Trip

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P18D1	For drive button diagnosis, If position of switch 3 is in different status than other two for longer time. Then switch correlation C is set to Fault	Switch C status is different from A & B	=TRUE			0(s)	2 Trip
P18EA	In Neutral Button Diagnosis, if atleast one of the switch is stuck ON for the enough time then the Transmission Range Selector Switchs D-E-F Stuck On is set to Faulty.	Switch 1 stuck on error	=TRUE	Battery Voltage	>9(V)	0.04(s)	2 Trip
		Switch 2 stuck on error	=TRUE	Basic enable conditions met	=see sheet enable tables		
		Switch 3 stuck on error	=TRUE				
P18D3	For neutral button diagnosis, If position of switch 1 is in different status than other two for longer time. Then switch correlation D is set to Fault	Switch D status is different from E & F	=TRUE	Battery Voltage	>9(V)	0(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P18D5	For neutral button diagnosis, If position of switch 2 is in different status than other two for longer time. Then switch correlation E is set to Fault	Switch E status is different from D & F	=TRUE			0(s)	2 Trip
P18D7	For neutral button diagnosis, If position of switch 3 is in different status than other two for longer time. Then switch correlation F is set to Fault	Switch F status is different from D & E	=TRUE			0(s)	2 Trip
P18EB	In Neutral Button Diagnosis, if atleast one of the switch is stuck ON for the enough time then the Transmission Range Selector Switchs G-H-J Stuck On is set to Faulty.	Switch 1 stuck on error	=TRUE	Battery Voltage	>9(V)	0.04(s)	2 Trip

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		Switch 2 stuck on error	=TRUE	Basic enable conditions met	=see sheet enable tables		
		Switch 3 stuck on error	=TRUE				
P18D9	For reverse button diagnosis, If position of switch 1 is in different status than other two for longer time. Then switch correlation G is set to Fault	Switch set G stuckopen failure detection calculation	=TRUE	Battery Voltage	>9(V)	0(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P18DB	For reverse button diagnosis, If position of switch 2 is in different status than other two for longer time. Then switch correlation H is set to Fault	Switch set H stuckopen failure detection calculation	=TRUE			0(s)	2 Trip
P18DD	For reverse button diagnosis, If position of switch 3 is in different status than other two for longer time. Then switch correlation J is set to Fault	Switch set J stuckopen failure detection calculation	=TRUE			0(s)	2 Trip
P18E1	For manual button diagnosis, If manual switch position is activated then Transmission Range Selector Switch L Correlation is set to fault	Transmission range selector switch L circuit correlation fault is reported	=TRUE	Manual button diagnostics enable	=TRUE	60(s)	2 Trip
				flag manual switch 2 position error active	=FALSE		
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
P07BE	Transmission Park Position Sensor Switch A/B Correlation	Both positions are set at the same time	=TRUE	Ignition is ON	=TRUE	60(s)	2 Trip
P189D	Park Position switch stuck at open fault path	Transmission park stuck at open evaluation	=TRUE	Basic enable conditions are met	=see sheet enable tables	0(s)	2 Trip

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	P17F3	Park position switch Stuck Open Check	Park button stuck in open position. for time	=TRUE >1(s)	Ignition is ON Battery Voltage Basic enable conditions met (ESDR Park 1 Position ESDR Park 2 Position for time)	=TRUE >9.00(V) =see sheet enable tables =TRUE =TRUE =TRUE >1.0(s)	60(s)	2 Trip
	U0402	Frame \$36 - Transmission Engine Speed Extended Range Intervention Type	Invalid data message reported	=TRUE	Battery Voltage	>9(V)	2(events)	1 Trip
		or			Basic enable conditions met	=see sheet enable tables		
		Frame \$02E - Transmission Actual Range, Immediate Directional Torque Intervention, Predicted Torque Intervention Type, Transmission Engine Speed Control Response, etc.						
		or						
69. SIGNAL PROCESSING OF AUTOSAR COMMUNICATIONS FOR OTHER MODULES		Frame \$26 - Transmission Output Rotational Status						
		or						
		Frame \$31 - Transmission Estimated Gear Protected : Transmission Estimated Gear						
		or						
		Frame \$27 - Transmission General Information Protected						
		or						
		Frame \$1E - Transmission General Information 2 Protected : Transmission Output Shaft Angular Velocity						

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U0404	Frame \$C1 - Discrete Input Sensor Secondary Protected : Input 1-14 Circuit Fault Active	Invalid Data Received From Gear Shift Control Module "A"	=TRUE	Battery Voltage	>9(V)	2(events)	2 Trip
	or			Basic enable conditions met	=see sheet enable tables		
	Frame \$32D - External ALU Check Primary Protected : Seed and Test Valid Flag Authenticated						
	or						
	Frame \$CF - External ALU Check Secondary Protected : External ALU Check Secondary Seed Index Array and test valid Authenticated						
U0418	Frame \$287 - Braking System Secondary Vehicle Top Speed Limit Value	Invalid Data Received From Brake System Control Module "A"	=TRUE	Battery Voltage	>9(V)	2(events)	1 Trip
	or			Basic enable conditions met	=see sheet enable tables		
	Frame \$210 - Brake System Information Status Protected : Electronic Stability Control Active, ETRS Hydraulic Braking Status, Traction Control System Active						
	or						
	Frame \$12 - Brake System Information Status 2 Protected : Antilock Brake System Active, Brake Pedal Driver Applied Pressure, Brake System Torque Overlay Delta Torque Command						
	or						
	Frame \$1A - DCT Launch Control Active, Engine Speed Control Response, Intervention Type, value, Axle Torque Request Type						
	or						

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Frame \$21B - Braking System
Vehicle Top Speed Limit
Request

or

Frame \$415 - Electric Park
Brake Status Protected : Brake
System Brake Lights
Requested, Trailer Braking
System Brake Lights
Requested

or

Frame \$15 - Front Angular
Velocity Protected : Wheel
Angular Velocity Right/left
Front

or

Frame \$17 - Rear Angular
Velocity Protected : Wheel
Angular Velocity Left/Right
Rear

U0422	Frame \$4EB - Brake Applied Sensor Home Position Learned, Air Deflector off, Automatic Shutdown, Tire Pressure	Invalid Data Received From Body Control Module	=TRUE	Battery Voltage	>9(V)	2(events)	1 Trip
	or			Basic enable conditions met	=see sheet enable tables		
	Frame \$404 - Driver door status, Outside ambient light level status, Remote start status						
	or						
	Frame \$10 - Brake Pedal Position, Cruise Secondary Switch, Cruise and Speed Limiter Switch Status						
	or						
	Frame \$203 - Body Control Top Speed Limit Request						
	or						

Frame \$20D - Backup System
Power Mode Protected :
Secondary Run Crank
Command

or

Frame \$204 - Release
Immobilize Protected : Electric
Steering Column Unlock, Front
Compartment Release, New
Fob Transmitter Learned
Notification, Remote Ignition
Block Immobilization Customer
Clear, Remote Vehicle Start
Backup Time, Start/Stop
Ignition Switch Pressed

or

Frame \$284 - System Power
Mode Protected : Primary Run
Crank Command Active

or

Frame \$40C - Vehicle
Odometer Display Value

U1961	Frame \$16 - Actual Axle Torque Protected : Actual Axle Torque, Accelerator Effective Position.	Security Peripheral Performance Failure reported	=TRUE	Battery Voltage	>9(V)	2(events)	1 Trip
	or			Basic enable conditions met	=see sheet enable tAhIAS		
	Frame \$222 - Body Vehicle Speed Control Response Protected : Adaptive Cruise Control Axle Torque Command Limiting Status, daptive Cruise Control Axle Torque Command Request Status, Clutch Pedal Actual Position, Collision Preparation System Axle Torque Command Limiting Status, Cruise Control Enabled						
	or						

Frame \$84 - Driver Intended
Axle Torque Minimum
Protected : Driver Intended
Axle Torque Minimum

or

Frame \$85 - Driver Intended
Axle Torque Maximum
Protected : Driver Intended
Axle Torque Maximum

or

Frame \$86 - Driver Intended
Torque Protected : Driver
Intended Axle, crankshaft
Torque

or

Frame \$21D - ECM General
Information 1 Protected :
Distance Rolling Count
Average Driven, Powertrain
Run Aborted, Particle Filter
Cleaning Algorithm, Electronic
Shift Automatic Braking
Requested, Hill Descent
Control Switch Status,
Powertrain Automatic Braking

or

Frame \$1D - ECM General
Information 2 Protected :
Engine Controller Determined
Internal Range Sensor Pulse
Width, Engine Stall Saver
Active, Driver Intended
Crankshaft Torque Minimum,
Driver Intended Crankshaft
Torque Raw, Engine Actual
Steady State Torque, Engine
Non-Transmission Regulated
Steady State Torque,
Electronic Shift Advanced Park
Assist Control Status.
Crankshaft Non-Transmission
Regulated Commanded
Torque

or

Frame \$301 - Electronic Shift
Range Primary Display
Protected : Electronic Shift
Range Primary Display

or

Frame \$41C - Electronic Shift
Range Secondary Display
Protected : Electronic Shift
Range Secondary Display

or

Security Peripheral
Performance - Performance or
Incorrect Operation

or

Frame \$41D - Outside Air
Temperature Protected :
Outside Air Temperature

or

Frame \$227 - Propulsion State
Protected : Clutch Bottom of
Travel Achieved, Engine
Running, Park Neutral Switch
State

or

Frame \$87 - Vehicle Motion
Information 1 Protected :
Accelerator Actual Position,
Accelerator Pedal Override,
Vehicle Top Speed Limit
Arbitrated Value

or

Frame \$229 - Vehicle Speed
Average Driven Protected :
Fuel Mode Status, Reduced
Power Indication On

or

Frame \$22A - Vehicle Speed
Average Non Driven Protected
: Vehicle Speed Average
NonDriven

or

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Frame \$41F - Wheel Distance
Protected : Wheel Distance
Per Revolution Front, rear

U1962	Central Gateway Module Key Table evaluation	Central Gateway Module Key Table Not Provisioned	=TRUE	Battery Voltage	>9(V)	2(events)	1 Trip
				Basic enable conditions met	=see sheet enable tables		
P1986	Remote start request evaluation	Engine Rotation Detected without Starter Activation	=TRUE	Battery Voltage	>9(V)	0(s)	1 Trip
				Basic enable conditions met	=see sheet enable tables		

70. CAN BUS OFF DIAGNOSIS	U0073	Diagnosis of Bus A off error for High Speed CAN controller	Bus off error is detected at High Speed CAN controller "A"	=TRUE	Ignition is ON	=TRUE	2(s)	1 Trip
	U0074	Diagnosis of Bus B off error for High Speed CAN controller	Bus off error is detected at High Speed CAN controller "B"	=TRUE	Battery Voltage	>9(V)		2 Trip
	U0076	Diagnosis of Bus D off error for High Speed CAN controller	Bus off error is detected at High Speed CAN controller "D"	=TRUE	Basic enable conditions are met	=see sheet enable tables		1 Trip

71. DIAGNOSIS OF ECM PROGRAMMING AND VIN	U2A90	Vehicle VIN Programming Status	VIN is programmed	=FALSCH	Ignition is ON	=TRUE	1(s)	1 Trip
					Battery Voltage	>9(V)		
					Basic enable conditions met	=see sheet enable tables		
	U2A91	Normal VIN and ECM ODO Vehicle VIN Comparison	Normal VIN and ECM ODO Vehicle mismatch	=TRUE	Ignition is ON	=TRUE	1(s)	1 Trip
					Battery Voltage	>9(V)		
						Basic enable conditions met	=see sheet enable tables	

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	U1978	VIN Of The Very First Vehicle Programming Status	VIN of the very first vehicle programmed	=FALSCH	Ignition is ON	=TRUE	1(s)	1 Trip
					Battery Voltage Basic enable conditions met	>9(V) =see sheet enable tables		
72. COM - EVAP SYSTEM VENTILATION VALVE CIRCUIT DIAGNOSIS	P0449	Diagnosis of EVAP System Vent Valve Control Circuit- Open Load fault	EVAP powerstage reports open load fault through CAN communication message	=TRUE	Ignition is ON	=TRUE	2(s)	2 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met			
	P0498	Diagnosis of EVAP System Vent Valve Control Circuit- Circuit Low	EVAP powerstage reports short circuit to ground fault through CAN communication message	=TRUE	Ignition is ON	=TRUE	2(s)	2 Trip
					No pending or confirmed FIDs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P0499	Diagnosis of EVAP System Vent Valve Control Circuit- Circuit High	EVAP powerstage reports short circuit to battery fault through CAN communication message	=TRUE	Ignition is ON	=TRUE	2(s)	2 Trip
					No pending or confirmed FIDs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
73. CCM - SENSOR SUPPLY RELAY (FTZM VOLTAGE SUPPLY)	P16D9	Circuit Check - Short circuit to Battery	Power stage feedback voltage	>4.5(V)	Ignition is ON	=TRUE	20(event)	2 Trip
					(Battery Voltage Battery Voltage Power stage off-diaagnosis enable	>8(V) <655.34(V) <2(s)		

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) Power stage output signal Timeout after which the state No pending or confirmed DTCs	=FALSCH <1(s) =see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
P16D8	Circuit Check - Short circuit to Ground	Power stage feedback voltage (see Look-Up-Table #100)	<1.95 to 4.5(V)	Ignition is ON		=TRUE	5(event)	2 Trip
					(Battery Voltage Battery Voltage Power stage off-diagnosis enable)	>8(V) <655.34(V) <2(s)		
					Power stage output signal No pending or confirmed DTCs	=TRUE =see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
P16D7	Circuit Check - Open Load	Power stage feedback voltage	>1.5(V)	Ignition is ON		=TRUE	20(event)	2 Trip
		Power stage feedback voltage	<2(V)	(	Battery Voltage Battery Voltage Power stage off-diagnosis enable timer)	>8(V) <655.34(V) <2(s)		
					Power stage output signal Timeout after which the state machine leaves the off-diagnosis state No pending or confirmed DTCs	=FALSCH <1(s) =see sheet inhibit tables		
74. CCM - FUEL CONTROL ENABLE WIRE (FTZM) DIAGNOSIS	P0629	Digital output stage - Circuit HigPre Supply Pump output voltage	>4.7(V)	(ECU is in POSTDRIVE state OR Airbag is activated	=TRUE =TRUE	0.2(s)	2 Trip

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)			
			OR			
			(Fuel pressure actual value	>600(kPa)	
			OR			
				Fuel System Priming Timer is active	=TRUE	
)			
				Battery voltage	>9(V)	
				No pending or confirmed DTCs	=see sheet inhibit tables	
				Basic enable conditions met	=see sheet enable tables	
P0628	Digital output stage - Circuit Lo	Pre Supply Pump output voltage (see Look-Up-Table #90)	<1.95 to 4.5(V)		0.05(s)	2 Trip
			(	Engine is in running state	=TRUE	
			OR			
				Validity bit of fuel low pressure value	=TRUE	
				Fuel pressure actual value	<10(kPa)	
)			
				Fuel pressure actual value	<10(kPa)	
				Fuel System Priming Timer is not active	=FALSCH	
				Battery voltage	>9(V)	
				No pending or confirmed DTCs	=see sheet inhibit tables	
				Basic enable conditions met	=see sheet enable tables	
P0627	Digital output stage - Open	Pre Supply Pump output voltage	(		1(s)	2 Trip
				ECU is in POSTDRIVE state	=TRUE	
				OR		
				Airbag is activated	=TRUE	
)			
			OR			
			(Fuel pressure actual value	>60(kPa)	
			OR			
				Fuel System Priming Timer is active	=TRUE	

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75. COM - IGNITION COIL POWERSTAGE E ELECTRICAL DIAGNOSIS)	Battery voltage	>9(V)		
				No pending or confirmed DTCs		=see sheet inhibit tables		
				Basic enable conditions met		=see sheet enable tables		
	P2301	Diagnoses the Ignition Coil "A" Primary low side driver circuit for circuit high faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Battery voltage	>9(V)	0.4(s)	2 Trip
					Battery voltage	<655.34(V)		
					Ignition synchronized			
					Engine speed	>1400(rpm)		
					Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
					Basic enable conditions met	=see sheet enable tables		
	P2300	Diagnoses the Ignition Coil "A" Primary low side driver circuit for circuit low faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Battery voltage	>9(V)	0.4(s)	2 Trip
					Battery voltage	<655.34(V)		
					Ignition synchronized			
					Engine speed	>1400(rpm)		
					Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
					Basic enable conditions met	=see sheet enable tables		
	P0351	Diagnoses the Ignition Coil "A" Primary low side driver circuit for open circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Battery voltage	>9(V)	0.4(s)	2 Trip
					Battery voltage	<655.34(V)		
					Ignition synchronized			
					Engine speed	>1400(rpm)		
					Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
					Basic enable conditions met	=see sheet enable tables		

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P2304	Diagnoses the Ignition Coil "H" low side driver circuit for circuit high faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
P2303	Diagnoses the Ignition Coil "H" Primary low side driver circuit for circuit low faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)	=see sheet enable tables	
				Basic enable conditions met			
				Battery voltage	>9(V)		
				Battery voltage	<655.34(V)		
P0352	Diagnoses the Ignition Coil "H" Primary low side driver circuit for open circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Ignition synchronized		=see sheet enable tables	
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met			
P2307	Diagnoses the Ignition Coil "D" low side driver circuit for circuit high faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		

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				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P2306	Diagnoses the Ignition Coil "D" low side driver circuit for circuit low faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: < 0.5 Q impedance between signal and controller ground	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P0353	Diagnoses the Ignition Coil "D" Primary low side driver circuit for open circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P2310	Diagnoses the Ignition Coil "C" low side driver circuit for circuit high faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		

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P2309	Diagnoses the Ignition Coil "C" low side driver circuit for circuit low faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P0354	Diagnoses the Ignition Coil "C" Primary low side driver circuit for open circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P2313	Diagnoses the Ignition Coil "B" Primary low side driver circuit for circuit high faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P2312	Diagnoses the Ignition Coil "B" Primary low side driver circuit for circuit low faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		

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				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P0355	Diagnoses the Ignition Coil "B" Primary low side driver circuit for open circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage Ignition synchronized Engine speed Difference between new and old ignition counter ensuring that all cylinder were fired at least once	<655.34(V) >1400(rpm) >9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P2316	Diagnoses the Ignition Coil "E" low side driver circuit for circuit high faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage Ignition synchronized Engine speed Difference between new and old ignition counter ensuring that all cylinder were fired at least once	<655.34(V) >1400(rpm) >9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P2315	Diagnoses the Ignition Coil "E" low side driver circuit for circuit low faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage Ignition synchronized Engine speed Difference between new and old ignition counter ensuring that all cylinder were fired at least once	<655.34(V) >1400(rpm) >9(counts)		
				Basic enable conditions met	=see sheet enable tables		

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P0356	Diagnoses the Ignition Coil "E" Primary low side driver circuit for open circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P2319	Diagnoses the Ignition Coil "G" low side driver circuit for circuit high faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P2318	Diagnoses the Ignition Coil "G" Primary low side driver circuit for circuit low faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		
P0357	Diagnoses the Ignition Coil "G" Primary low side driver circuit for open circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Battery voltage	>9(V)	0.4(s)	2 Trip
				Battery voltage	<655.34(V)		
				Ignition synchronized			
				Engine speed	>1400(rpm)		
				Difference between new and old ignition counter ensuring that all cylinder were fired at least once	>9(counts)		
				Basic enable conditions met	=see sheet enable tables		

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	P2322	Diagnoses the Ignition Coil "F" low side driver circuit for circuit high faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Battery voltage	>9(V)	0.4(s)	2 Trip
					Battery voltage Ignition synchronized Engine speed Difference between new and old ignition counter ensuring that all cylinder were fired at least once Basic enable conditions met	<655.34(V) >1400(rpm) >9(counts) =see sheet enable tables		
	P2321	Diagnoses the Ignition Coil "F" low side driver circuit for circuit low faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Battery voltage	>9(V)	0.4(s)	2 Trip
					Battery voltage Ignition synchronized Engine speed Difference between new and old ignition counter ensuring that all cylinder were fired at least once Basic enable conditions met	<655.34(V) >1400(rpm) >9(counts) =see sheet enable tables		
	P0358	Diagnoses the Ignition Coil "F" Primary low side driver circuit for open circuit faults.	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Battery voltage	>9(V)	0.4(s)	2 Trip
					Battery voltage Ignition synchronized Engine speed Difference between new and old ignition counter ensuring that all cylinder were fired at least once Basic enable conditions met	<655.34(V) >1400(rpm) >9(counts) =see sheet enable tables		
76. COM - FUEL INJECTION VALVE - LOW SIDE DIAGNOSIS	P1248	Diagnoses the Cylinder 1 Injector "A" for short circuit fault between high side and low side of driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage	>9(V)	2(events)	1 Trip
					Battery Voltage Basic enable conditions met	<655.34(V) =see sheet enable tables		
					No pending or confirmed DTCs	=see sheet inhibit tables		

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P029D	Detects mechanical failure open high pressure injection valve 1	Number of misfire counter for cylinder 1	>100	Diagnosis inhibited by statistical function	=FALSCH	5(s)	2 Trip
		Rail pressure control minimum error is set	=TRUE	Engine speed	<6000(rpm)		
				Engine speed	>1520(rpm)		
				relative air charge	<100(%)		
				Electrical failure with high pressure injectors	=FALSCH		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0201	Diagnoses the Cylinder 1 Injector "A" low side of driver circuit for open circuit faults	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<655.34(V)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P0201	Diagnoses the Cylinder 1 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground) OR Voltage high during driver ON state (indicates short circuit to battery)	Short to ground: <0.5 Q impedance between ECU pin and ground Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<655.34(V)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P1249	Diagnoses the Cylinder 2 Injector "A" for short circuit fault between high side and low side of driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<655.34(V)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P02A1	Detects mechanical failure open high pressure injection valve 2	Number of misfire counter for cylinder 2	>100	Diagnosis inhibited by statistical function	=FALSCH	5(s)	2 Trip
		Rail pressure control minimum error is set	=TRUE	Engine speed	<6000(rpm)		
				Engine speed	>1520(rpm)		

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				relative air charge Electrical failure with high pressure injectors No pending or confirmed DTCs Basic enable conditions met	<100(%) =FALSCH =see sheet inhibit tables =see sheet enable tables		
P0202	Diagnoses the Cylinder 2 Injector "A" low side of driver circuit for open circuit faults	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage Basic enable conditions met No pending or confirmed DTCs	<655.34(V) =see sheet enable tables =see sheet inhibit tables		
P0202	Diagnoses the Cylinder 2 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground) OR Voltage high during driver ON state (indicates short circuit to battery)	Short to ground: <0.5 Q impedance between ECU pin and ground Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Battery Voltage Basic enable conditions met No pending or confirmed DTCs	>9(V) <655.34(V) =see sheet enable tables =see sheet inhibit tables	2(events)	1 Trip
P124A	Diagnoses the Cylinder 3 Injector "A" for short circuit fault between high side and low side of driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Battery Voltage Basic enable conditions met No pending or confirmed DTCs	>9(V) <655.34(V) =see sheet enable tables =see sheet inhibit tables	2(events)	1 Trip
P02A5	Detects mechanical failure open high pressure injection valve 3	Number of misfire counter for cylinder 3 Rail pressure control minimum error is set	>100 =TRUE	Diagnosis inhibited by statistical function Engine speed Engine speed relative air charge Electrical failure with high pressure injectors No pending or confirmed DTCs	=FALSCH <6000(rpm) >1520(rpm) <100(%) =FALSCH =see sheet inhibit tables	5(s)	2 Trip

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				Basic enable conditions met	=see sheet enable tables		
P0208	Diagnoses the Cylinder 3 Injector "A" low side of driver circuit for open circuit faults	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<655.34(V)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P0208	Diagnoses the Cylinder 3 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: <0.5 Q impedance between ECU pin and ground	Battery Voltage	>9(V)	2(events)	1 Trip
		OR		Battery Voltage	<655.34(V)		
		Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P124B	Diagnoses the Cylinder 4 Injector "A" for short circuit fault between high side and low side of driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<655.34(V)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P02A9	Detects mechanical failure open high pressure injection valve 4	Number of misfire counter for cylinder 4	>100	Diagnosis inhibited by statistical function	=FALSCH	5(s)	2 Trip
		Rail pressure control minimum error is set	=TRUE	Engine speed	<6000(rpm)		
				Engine speed	>1520(rpm)		
				relative air charge	<100(%)		
				Electrical failure with high pressure injectors	=FALSCH		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		

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P0203	Diagnoses the Cylinder 4 Injector "A" low side of driver circuit for open circuit faults	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage Basic enable conditions met	<655.34(V) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P0203	Diagnoses the Cylinder 4 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground) OR Voltage high during driver ON state (indicates short circuit to battery)	Short to ground: <0.5 Q impedance between ECU pin and ground Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage Basic enable conditions met	<6553.5(V) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P124C	Diagnoses the Cylinder 5 Injector "A" for short circuit fault between high side and low side of driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage	>9(V)	2(events)	1 Trip
				and Battery Voltage and Basic enable conditions met	<6553.5(V) =see sheet enable tables		
				and No pending or confirmed DTCs	=see sheet inhibit tables		
P02AD	Detects mechanical failure open high pressure injection valve 5	Number of misfire counter for cylinder 5	>100	Diagnosis inhibited by statistical function	=FALSCH	5(s)	2 Trip
		Rail pressure control minimum error is set	=TRUE	Engine speed	<6000(rpm)		
				Engine speed relative air charge Electrical failure with high pressure injectors	>1520(rpm) <100(%) =FALSCH		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		

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P0204	Diagnoses the Cylinder 5 Injector "A" low side of driver circuit for open circuit faults.	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage Basic enable conditions met	<6553.5(V) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P0204	Diagnoses the Cylinder 5 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground) OR Voltage high during driver ON state (indicates short circuit to battery)	Short to ground: <0.5 Q impedance between ECU pin and ground Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage Basic enable conditions met	<6553.5(V) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P124D	Diagnoses the Cylinder 6 Injector "A" for short circuit fault between high side and low side of driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage Basic enable conditions met	<6553.5(V) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P02B1	Detects mechanical failure open high pressure injection valve 6	Number of misfire counter for cylinder 6 Rail pressure control minimum error is set	>100 =TRUE	Diagnosis inhibited by statistical function Engine speed Engine speed relative air charge Electrical failure with high pressure injectors No pending or confirmed DTCs Basic enable conditions met	=FALSCH <6000(rpm) >1520(rpm) <100(%) =FALSCH =see sheet inhibit tables =see sheet enable tables	5(s)	2 Trip
P0207	Diagnoses the Cylinder 6 Injector "A" low side of driver circuit for open circuit faults	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<6553.5(V)		

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				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P0207	Diagnoses the Cylinder 6 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground) OR Voltage high during driver ON state (indicates short circuit to battery)	Short to ground: < 0.5 Q impedance between ECU pin and ground Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Battery Voltage Basic enable conditions met No pending or confirmed DTCs	>9(V) <6553.5(V) =see sheet enable tables =see sheet inhibit tables	2(events)	1 Trip
P124E	Diagnoses the Cylinder 7 Injector "A" for short circuit fault between high side and low side of driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Battery Voltage Basic enable conditions met No pending or confirmed DTCs	>9(V) <6553.5(V) =see sheet enable tables =see sheet inhibit tables	2(events)	1 Trip
P02B5	Detects mechanical failure open high pressure injection valve 7	Number of misfire counter for cylinder 7 Rail pressure control minimum error is set	>100 =TRUE	Diagnosis inhibited by statistical function Engine speed Engine speed relative air charge Electrical failure with high pressure injectors No pending or confirmed DTCs Basic enable conditions met	=FALSCH <6000(rpm) >1520(rpm) <100(%) =FALSCH =see sheet inhibit tables =see sheet enable tables	5(s)	2 Trip
P0205	Diagnoses the Cylinder 7 Injector "A" low side of driver circuit for open circuit faults	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	Battery Voltage Battery Voltage Basic enable conditions met No pending or confirmed DTCs	>9(V) <6553.5(V) =see sheet enable tables =see sheet inhibit tables	2(events)	1 Trip

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P0205	Diagnoses the Cylinder 7 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between ECU pin and ground	Battery Voltage	>9(V)	2(events)	1 Trip
		OR		Battery Voltage	<6553.5(V)		
		Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P124F	Diagnoses the Cylinder 8 Injector "A" for short circuit fault between high side and low side of driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<6553.5(V)		
				Basic enable conditions met	=see sheet enable tables		
P02B9	Detects mechanical failure open high pressure injection valve 8	Number of misfire counter for cylinder 8	>100	Diagnosis inhibited by statistical function	=FALSCH	5(s)	2 Trip
				Engine speed	<6000(rpm)		
				Engine speed	>1520(rpm)		
				relative air charge	<100(%)		
				Electrical failure with high pressure injectors	=FALSCH		
P0206	Diagnoses the Cylinder 8 Injector "A" low side of driver circuit for open circuit faults	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0206	Diagnoses the Cylinder 8 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between ECU pin and ground	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<6553.5(V)		
				Basic enable conditions met	=see sheet enable tables		
P0206	Diagnoses the Cylinder 8 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between ECU pin and ground	No pending or confirmed DTCs	=see sheet inhibit tables		
P0206	Diagnoses the Cylinder 8 Injector "A" low side of driver circuit for short circuit faults (short circuit to battery or short	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between ECU pin and ground	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<6553.5(V)		

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		Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P2146	Diagnoses the Cylinder 1 Injector "A" for short circuit (short circuit to battery or short circuit to ground) at high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: <0.5 Q impedance between ECU pin and ground	Battery Voltage	>9(V)	2(events)	1 Trip
		OR Voltage high during driverON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Basic enable conditions met	<6553.5(V) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P2149	Diagnoses the Cylinder 2 Injector "B" for short circuit (short circuit to battery or short circuit to ground) at high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: <0.5 Q impedance between ECU pin and ground	Battery Voltage	>9(V)	2(events)	1 Trip
		OR Voltage high during driverON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Basic enable conditions met	<6553.5(V) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P2152	Diagnoses the Cylinder 3 Injector "C" for short circuit (short circuit to battery or short circuit to ground) at high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: <0.5 Q impedance between ECU pin and ground	Battery Voltage	>9(V)	2(events)	1 Trip
		OR Voltage high during driverON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Basic enable conditions met	<6553.5(V) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P2155	Diagnoses the Cylinder 4 Injector "D" for short circuit (short circuit to battery or short circuit to ground) at high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: <0.5 Q impedance between ECU pin and ground	Battery Voltage	>9(V)	2(events)	1 Trip

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		Voltage high during driverON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Basic enable conditions met No pending or confirmed DTCs	=see sheet enable tables =see sheet inhibit tables		
P216A	Diagnoses the Cylinder 5 Injector "E" for short circuit (short circuit to battery or short circuit to ground) at high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground) OR Voltage high during driverON state (indicates short circuit to battery)	Short to ground: <0.5 Q impedance between ECU pin and ground Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Battery Voltage Basic enable conditions met No pending or confirmed DTCs	>9(V) <6553.5(V) =see sheet enable tables =see sheet inhibit tables	2(events)	1 Trip
P216D	Diagnoses the Cylinder 6 Injector "F" for short circuit (short circuit to battery or short circuit to ground) at high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground) OR Voltage high during driverON state (indicates short circuit to battery)	Short to ground: <0.5 Q impedance between ECU pin and ground Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Battery Voltage Basic enable conditions met No pending or confirmed DTCs	>9(V) <6553.5(V) =see sheet enable tables =see sheet inhibit tables	2(events)	1 Trip
P217A	Diagnoses the Cylinder 7 Injector "G" for short circuit (short circuit to battery or short circuit to ground) at high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground) OR Voltage high during driverON state (indicates short circuit to battery)	Short to ground: <0.5 Q impedance between ECU pin and ground Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Battery Voltage Basic enable conditions met No pending or confirmed DTCs	>9(V) <6553.5(V) =see sheet enable tables =see sheet inhibit tables	2(events)	1 Trip

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P217D	Diagnoses the Cylinder 8 Injector "H" for short circuit (short circuit to battery or short circuit to ground) at high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between ECU pin and ground	Battery Voltage	>9(V)	2(events)	1 Trip
		OR Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery Voltage Basic enable conditions met No pending or confirmed DTCs	<6553.5(V) =see sheet enable tables =see sheet inhibit tables		

77. COM - FUEL PRESSURE REGULATOR CONTROL CIRCUIT - HIGH/LOW SIDE - B1/B2	P0089	Path 1a: Plausibility check of High Pressure fuel system where controller output is compared with maximum threshold for calibrated period of time	Filtered value of the High pressure controller output	>7.5(MPa)	Common Conditions	10(s)	2 Trip							
													Conditions for Plausibility check of Fuel supply system	
													(
													Airbag is activated	=FALSCH
													Rail pressure sensor voltage is not plausible	=FALSCH
													Battery voltage	<655.34(V)
													Mean value of effective relative volumetric injected fuel mass	>7.734(%)
													Mean value of effective relative volumetric injected fuel mass	<3072(%)
													Initial fueling mode is active	=FALSCH
)	
													Time counter at end of start	>7(s)
													Conditions for reset of high-pressure regulation	=FALSCH
													(
													(
													(
													(
													Actual number of cylinders with injection cut-off	<8(counts)
													Desired number of cylinders with injection cut-off	<8(counts)
)	
													OR	
													End of start is reached	=FALSCH
)	
													OR	
													Difference between the actual rail pressure and filtered rail pressure setpoint	
													(A+B) where in:	

(A) rail pressure offset during fuel cutoff for activation demand control	=1(MPa)
(B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cut off is active	=1(MPa)
)	
(
(High pressure pump is active	=TRUE
(Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
High pressure pump is not active	=FALSCH
End of start is reached	=TRUE
)	
(Start of injection enabled	=TRUE
(Engine start is in pre-injection mode	=TRUE
Injection counter	>(A+B)
(A+B) where in:	=2(counts)
(A) Number of injections for enabling high-pressure controller	
(B) Number of cylinders	=8
OR	
Engine start is not in pre-injection mode	=FALSCH
Injection counter	>2(counts)
)	
)	
(Engine state of synchronisation for rail pressure control activation	>30
(Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	

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				for time No pending or confirmed DTCs	=7(s) =see sheet inhibit table	
				Basic enable conditions met	=see sheet enable table	
	Path 1b: Plausibility check of High Pressure fuel system where controller output is compared with maximum threshold for calibrated period of time	Filtered value of the High pressure controller output pressure	>7.5(MPa)	Common Conditions		6(s) 2 Trip
				Fuel tank is empty or reserve	=TRUE	
P0089	Path 2: Plausibility check of High Pressure fuel system where controller output is compared with minimum threshold for calibrated period of time	Filtered value of the High pressure controller output pressure	<-7.5(MPa)	Conditions for Plausibility check of Fuel supply system (Airbag is activated Rail pressure sensor voltage is not plausible Battery voltage Mean value of effective relative volumetric injected fuel mass Mean value of effective relative volumetric injected fuel mass Initial fueling mode is active) Time counter at end of start Conditions for reset of high-pressure regulation ((((Actual number of cylinders with injection cut-off Desired number of cylinders with injection cut-off) OR End of start is reached) OR Difference between the actual rail pressure and filtered rail pressure setpoint (A+B) where in:	=FALSCH =FALSCH <655.34(V) >7.734(%) <3072(%) =FALSCH >7(s) =FALSCH =FALSCH =FALSCH =FALSCH	10(s) 2 Trip

(A) rail pressure offset during fuel cutoff for activation demand control	=1(MPa)
(B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cut off is active	=1(MPa)
)	
(
(High pressure pump is active	=TRUE
(Engine is in running state	=TRUE
OR	
Crankshaft signal detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
High pressure pump not active	=FALSCH
End of start is reached	=TRUE
)	
(Start of injection is enabled	=TRUE
(Engine start is in pre-injection mode	=TRUE
Injection counter	>(A+B)
(A+B) where in:	=2(counts)
(A) Number of injections for enabling high-pressure controller	
(B) Number of cylinders	=8
OR	
Engine start is not in pre-injection mode	=FALSCH
Injection counter	>2(counts)
)	
)	
(Engine state of synchronisation for rail pressure control activation	>30
(Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	

for time
No pending or confirmed DTCs =7(s)
see sheet inhibit table

Basic enable conditions met =see sheet enable table

P2C01	Path 1a: Plausibility check of High Pressure fuel system where controller output is compared with maximum threshold for calibrated period of time	Filtered value of the High pressure controller output	>7.5(MPa)	Common Conditions	10(s)	2 Trip
				Conditions for Plausibility check of Fuel supply system		
				(
				Airbag is activated	=FALSCH	
				Rail pressure sensor voltage is not plausible	=FALSCH	
				Battery voltage	<655.34(V)	
				Mean value of effective relative volumetric injected fuel mass	>7.734(%)	
				Mean value of effective relative volumetric injected fuel mass	<3072(%)	
				Initial fueling mode is active	=FALSCH	
)		
				Time counter at end of start	>7(s)	
				Conditions for reset of high-pressure regulation	=FALSCH	
				(
				(
				(
				(
				Actual number of cylinders with injection cut-off	<8(counts)	
				Desired number of cylinders with injection cut-off	<8(counts)	
)		
				OR		
				End of start is reached	=FALSCH	
)		
				OR		
				Difference between the actual rail pressure and filtered rail pressure setpoint		
				(A+B) where in:		
					=1(MPa)	
				(A) rail pressure offset during fuel cutoff for activation demand control		
				(B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cutt off is active	=1(MPa)	

)	
(
(
High pressure pump is active	=TRUE
(
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
High pressure pump is not active	=FALSCH
End of start is reached	=TRUE
}	
Start of injection enabled	=TRUE
(
Engine start is in pre-injection mode	=TRUE
Injection counter	>(A+B)
(A+B) where in:	=2(counts)
(A) Number of injections for enabling high-pressure controller	
(B) Number of cylinders	=8
OR	
Engine start is not in pre-injection mode	=FALSCH
Injection counter	>2(counts)
)	
)	
(
Engine state of synchronisation for rail pressure control activation	>30
(
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
)	
for time	=7(s)
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	see sheet enable table

Path 1b: Plausibility check of High Pressure fuel system where controller output is compared with maximum threshold for calibrated period of time	Filtered value of the High pressure controller output pressure	>7.5(MPa)	Common Conditions	6(s)	2 Trip	
			Fuel tank is empty or reserve	=TRUE		
Path 2: Plausibility check of High Pressure fuel system where controller output is compared with minimum threshold for calibrated period of time	Filtered value of the High pressure controller output pressure	<-7.5(MPa)	Conditions for Plausibility check of Fuel supply system (Airbag is activated Rail pressure sensor voltage is not plausible Battery voltage Mean value of effective relative volumetric injected fuel mass Mean value of effective relative volumetric injected fuel mass Initial fueling mode is active) Time counter at end of start Conditions for reset of high-pressure regulation ((((Actual number of cylinders with injection cut-off Desired number of cylinders with injection cut-off) OR End of start is reached) OR Difference between the actual rail pressure and filtered rail pressure setpoint (A+B) where in: (A) rail pressure offset during fuel cutoff for activation demand control (B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cutt off is active	<655.34(V) >7.734(%) <3071.953(%) =FALSCH >7(s) =FALSCH <8(counts) <8(counts) =FALSCH =1(MPa) =1(MPa)	10(s)	2 Trip

(
(
High pressure pump is active	=TRUE
(
Engine is in running state	=TRUE
OR	
Crankshaft signal detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
High pressure pump not active	=FALSCH
End of start is reached	=TRUE
)	
(
Start of injection is enabled	=TRUE
{	
Engine start is in pre-injection mode	=TRUE
Injection counter	>(A+B)
(A+B) where in:	=2(counts)
(A) Number of injections for enabling high-pressure controller	
(B) Number of cylinders	=8
OR	
Engine start is not in pre-injection mode	=FALSCH
Injection counter	>2(counts)
)	
)	
(
Engine state of synchronisation for rail pressure control activation	>30
{	
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
)	
for time	=7(s)
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable table

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P228D	Detects if High Pressure fuel system control deviation of rail pressure is lesser than maximum threshold for calibrated period of time	Filtered value of rail pressure control deviation	<-3(MPa)	Conditions for Plausibility check of Fuel supply system (Airbag is activated Rail pressure sensor voltage is not plausible Battery voltage Mean value of effective relative volumetric injected fuel mass Mean value of effective relative volumetric injected fuel mass Initial fueling mode is active) Time counter at end of start Conditions for reset of high-pressure regulation ((((Actual number of cylinders with injection cut-off Desired number of cylinders with injection cut-off) OR End of start is reached) OR Difference between the actual rail pressure and filtered rail pressure setpoint (A+B) where in: (A) rail pressure offset during fuel cutoff for activation demand control (B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cutt off is active) ((High pressure pump is active (Engine is in running state OR Crankshaft signal is detected) Function -	=TRUE =FALSCH =FALSCH <6555.34(V) >7.734(%) <3071.953(%) =FALSCH >7(s) =FALSCH <8(counts) <8(counts) =FALSCH =1(MPa) =1(MPa) =TRUE =TRUE =TRUE	7(s)	1 Trip
-------	--	---	----------	---	--	------	--------

)	
OR	
High pressure pump is not active	=FALSCH
End of start is reached	=TRUE
)	
(
Start of injection enabled	=TRUE
(
(
Engine start is in pre-injection mode	=TRUE
Injection counter	>(A+B)
(A+B) where in:	=2(counts)
(A) Number of injections for enabling high-pressure controller	
(B) Number of cylinders	=8
)	
OR	
(
Engine start is not in pre-injection mode	=FALSCH
Injection counter	>2(counts)
)	
)	
(
Engine state of synchronisation for rail pressure control activation	>30
(
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
)	
for time	=7(s)
High pressure diagnosis disabled due to CSERS diagnosis	=FALSCH
(
Catalyst heating activated	=FALSCH
OR	
Catalyst heating request by cold engine	=FALSCH
OR	
Time counter at end of start	<2(s)
OR	
Plausibility check fuel supply system active	=FALSCH
OR	
,	

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Rail pressure setpoint	>36(MPa)
OR	
Rail pressure setpoint	<6(MPa)
OR	
Absolute of difference between rail pressure set point and its filtered value	>15(MPa)
OR	
Engine speed	<0(rpm)
Coolant temperature at engine output	<-3550(°C)
)	
OR	
High pressure regulation is reset	=TRUE
)	
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable table

P228C	Path 1:	Filtered value of rail pressure control deviation	>3(MPa)	Common conditions	5(s)	1 Trip
	Detects if High Pressure fuel system control deviation of rail pressure is greater than minimum threshold for calibrated period of time					
				Conditions for Plausibility check of Fuel supply system	=TRUE	
				(
				Airbag is activated	=FALSCH	
				Rail pressure sensor voltage is not plausible	=FALSCH	
				Battery voltage	<655.34(V)	
				Mean value of effective relative volumetric injected fuel mass	>7.734(%)	
				Mean value of effective relative volumetric injected fuel mass	<3072(%)	
				Initial fueling mode is active	=FALSCH	
)		
				Time counter at end of start	>7(s)	
				Conditions for reset of high-pressure regulation	=FALSCH	
				(
				(
				(
				(
				Actual number of cylinders with injection cut-off	<8(counts)	
				Desired number of cylinders with injection cut-off	<8(counts)	
)		

OR	
End of start is reached	=FALSCH
)	
OR	
Difference between the actual rail pressure and filtered rail pressure setpoint	
(A+B) where in:	
(A) rail pressure offset during fuel cutoff for activation demand control	=1(MPa)
(B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cutt off is active	=1(MPa)
)	
(
(High pressure pump is active	=TRUE
(Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
High pressure pump is not active	=FALSCH
End of start is reached	=TRUE
)	
(
(Start of injection enabled	=TRUE
(
(Engine start is in pre-injection mode	=TRUE
Injection counter	>(A+B)
(A+B) where in:	=2(counts)
(A) Number of injections for enabling high-pressure controller	
(B) Number of cylinders	=8
)	
OR	
(
Engine start is not in pre-injection mode	=FALSCH
Injection counter	>2(counts)
)	
)	
)	
,	

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Engine state of synchronisation for rail pressure control activation	>30
(
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
)	
for time	=7(s)
High pressure diagnosis disabled due to CSERS diagnosis	=FALSCH
(
Catalyst heating activated	=FALSCH
OR	
Catalyst heating request by cold engine	=FALSCH
OR	
Time counter at end of start	<2(s)
OR	
Plausibility check fuel supply system active	=FALSCH
OR	
/	
Rail pressure setpoint	>36(MPa)
OR	
Rail pressure setpoint	<6(MPa)
OR	
Absolute of difference between rail pressure set point and its filtered value	>15(MPa)
OR	
Engine speed	<0(rpm)
Coolant temperature at engine output	<-3550(°C)
)	
OR	
High pressure regulation is reset	=TRUE
/	
Fuel tank is empty or reserve	=FALSCH
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable table

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Path 2:		Filtered value of rail pressure	>3(MPa)	Common conditions		5(s)	
Detects if High Pressure fuel system control deviation of rail pressure is greater than minimum threshold for calibrated period of time during fuel tank is empty or reserve state		control deviation			Fuel tank is empty or reserve	=TRUE	
P2CA0	Detects if High Pressure fuel system control deviation of rail pressure is lesser than maximum threshold for calibrated period of time	Filtered value of rail pressure control deviation	<-3(MPa)	Conditions for Plausibility check of Fuel supply system (Airbag is activated Rail pressure sensor voltage is not plausible Battery voltage Mean value of effective relative volumetric injected fuel mass Mean value of effective relative volumetric injected fuel mass Initial fueling mode is active) Time counter at end of start Conditions for reset of high-pressure regulation ((((Actual number of cylinders with injection cut-off Desired number of cylinders with injection cut-off) OR End of start is reached) OR Difference between the actual rail pressure and filtered rail pressure setpoint (A+B) where in: (A) rail pressure offset during fuel cutoff for activation demand control (B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cutt off is active)	=TRUE =FALSCH =FALSCH <655.34(V) >7.734(%) <3071.953(%) =FALSCH >7(s) =FALSCH <8(counts) <8(counts) =FALSCH =1(MPa) =1(MPa)	7(s)	1 Trip

```

(
(
  High pressure pump is active      =TRUE
(
  Engine is in running state        =TRUE

  OR
  Crankshaft signal is detected    =TRUE
)
) for time                          =0.04(s)
)
OR
High pressure pump is not active    =FALSCH
End of start is reached            =TRUE
)
(
  Start of injection enabled        =TRUE
(
  (
    Engine start is in pre-injection mode =TRUE
    Injection counter                    >(A+B)
    (A+B) where in:                    =2(counts)
    (A) Number of injections for enabling high-pressure controller
    (B) Number of cylinders              =8
  )
  OR
  (
    Engine start is not in pre-injection mode =FALSCH
    Injection counter                        >2(counts)
  )
)
)
(
  Engine state of synchronisation for rail pressure control activation >30
(
  Engine is in running state          =TRUE

  OR
  Crankshaft signal is detected      =TRUE
)
) for time                          =0.04(s)
)
) for time                          =7(s)
High pressure diagnosis disabled due to CSERS diagnosis =FALSCH

```

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Catalyst heating activated	=FALSCH
OR	
Catalyst heating request by cold engine	=FALSCH
OR	
Time counter at end of start	<2(s)
OR	
Plausibility check fuel supply system active	=FALSCH
OR	
/	
Rail pressure setpoint	>36(MPa)
OR	
Rail pressure setpoint	<6(MPa)
OR	
Absolute of difference between rail pressure set point and its filtered value	>15(MPa)
OR	
Engine speed	<0(rpm)
Coolant temperature at engine output	<-3550(°C)
)	
OR	
High pressure regulation is reset	=TRUE
/	
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable table

P2C9F	Path 1: Detects if High Pressure fuel system control deviation of rail pressure is greater than minimum threshold for calibrated period of time	Filtered value of rail pressure control deviation	>3(MPa)	Common conditions	5(s)	1 Trip
				Conditions for Plausibility check of Fuel supply system	=TRUE	
				{		
				Airbag is activated	=FALSCH	
				Rail pressure sensor voltage is not plausible	=FALSCH	
				Battery voltage	<655.34(V)	
				Mean value of effective relative volumetric injected fuel mass	>7.734(%)	
				Mean value of effective relative volumetric injected fuel mass	<3071.953(%)	
				Initial fueling mode is active	=FALSCH	
)		
				Time counter at end of start	≥7(s)	

Conditions for reset of high-pressure regulation	=FALSCH
(
(
(
(
Actual number of cylinders with injection cut-off	<8(counts)
Desired number of cylinders with injection cut-off	<8(counts)
)	
OR	
End of start is reached	=FALSCH
)	
OR	
Difference between the actual rail pressure and filtered rail pressure setpoint	
(A+B) where in:	
(A) rail pressure offset during fuel cutoff for activation demand control	=1(MPa)
(B) maximum difference between actual rail pressure and set rail pressure for deactivation of MSV if fuel cutt off is active	=1(MPa)
)	
(
(
High pressure pump is active	=TRUE
(
Engine is in running state	=TRUE
)	
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
High pressure pump is not active	=FALSCH
End of start is reached	=TRUE
)	
(
Start of injection enabled	=TRUE
(
(
Engine start is in pre-injection mode	=TRUE
Injection counter	>(A+B)
(A+B) where in:	
(A) Number of injections for	=2(counts)

(B) Number of cylinders	=8
)	
OR	
(
Engine start is not in pre-injection mode	=FALSCH
Injection counter	>2(counts)
)	
)	
)	
(
Engine state of synchronisation for rail pressure control activation	>30
(
Engine is in running state	=TRUE
OR	
Crankshaft signal is detected	=TRUE
)	
for time	=0.04(s)
)	
)	
for time	=7(s)
High pressure diagnosis disabled due to OSERS diagnosis	=FALSCH
(
Catalyst heating activated	=FALSCH
OR	
Catalyst heating request by cold engine	=FALSCH
OR	
Time counter at end of start	<2(s)
OR	
Plausibility check fuel supply system active	=FALSCH
OR	
(
Rail pressure setpoint	>36(MPa)
OR	
Rail pressure setpoint	<6(MPa)
OR	
Absolute of difference between rail pressure set point and its filtered value	>15(MPa)
OR	
Engine speed	<0(rpm)
Coolant temperature at engine output	<-3550(°C)
)	
OR	
High pressure regulation is reset	=TRUE
)	
High pressure regulation is reset	=FALSCH

No pending or confirmed DTCs

=see sheet inhibit table

Basic enable conditions met

=see sheet enable table

Path 2:		Filtered value of rail pressure	>3(MPa)	Common conditions		5(s)	
Detects if High Pressure fuel system control deviation of rail pressure is greater than minimum threshold for calibrated period of time during fuel tank is empty or reserve state		control deviation		Fuel tank is empty or reserve		=TRUE	
P00C6	Fuel Rail Pressure Too Low - Engine Cranking Bank 1	High pressure start	=FALSCH	Engine is in standby state	=TRUE	0.1(s)	2 Trip
		(		Condition calucation of diagnosis high pressure start is stopped	=FALSCH		
		Fuel rail pressure (see Look-Up-Table #28)	<7 to 17(MPa)	Engine temperature for diagnosis start with high fuel pressure	<142.96(°C)		
		for number of synchronous counts (see Look-Up-Table #26)	=16 to 48(counts)	Engine temperature for diagnosis start with high fuel pressure	>-42.54(°C)		
		OR		Release condition for all high pressure starts	=TRUE		
		((
		Fuel rail pressure (see Look-Up-Table #28)	<7 to 17(MPa)	Engine is in ready state	=TRUE		
		OR		OR			
		Filtered rail pressure	<1.5(MPa)				
)					
		Engine is running	=TRUE	Injection is not released	=TRUE		
))			
		for time (Max. waiting time for high fuel pressure) (see Look-Up-Table #29)	=5 to 10(s)				
		OR		Temperature for upper threshold high pressure start	<142.96(°C)		
		(		Temperature for lowe threshold high pressure start	>-60.04(°C)		
		Fuel rail pressure (see Look-Up-Table #28)	>7 to 17(MPa)	Condition disable flow of high pressure pump	=FALSE		

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and	(
Filtered rail pressure	<1.5(MPa)	Voltage rail pressure sensor not plausible	=FALSE
)		Airbag activated	=FALSE
)		and	
		Battery voltage	<655.34(V)
)		
	)	Condition hot start	=FALSE
	(	Engine temperature	<89.96(°C)
	OR	Integrated air mass flow from engine start to maximum value	>550(g)
)		
	(
	(	Condition end of start for activation of md structure	=TRUE
		Condition enable start injection	=TRUE
)		
	OR	Engine is in ready state	=TRUE
)		
	(	High pressure start request	=TRUE
	(	Start type from the start coordinator indicates no start	=TRUE
	OR		
	(	Start type from the start coordinator indicates low pressure start	=FALSE
		Start type from the start coordinator indicates preinjections with low pressure start	=FALSE
)		
)		
	)	Filtered fuel rail pressure real value (absolute pressure)	<1.5(Mpa)
		No pending or confirmed DTCs	=see sheet inhibit tables
		Basic enable conditions met	=see sheet enable tables

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Monitoring of preinjection with low pressure	Preinjection with low pressure is active	=FALSCH	Engine is in standby state	=TRUE
	(		Condition calculation of diagnosis high pressure start is stopped	=FALSCH
	Start temperature for the start co-ordinator	>-10.54(°C)	Engine temperature for diagnosis start with high fuel pressure	<142.96(°C)
	OR		Engine temperature for diagnosis start with high fuel pressure	>-42.54(°C)
	Injection counter	>A * B(counts)	Release condition for all high pressure starts	=TRUE
	where			
	A: Number of working cycle during preinjection (see Look-Up-Table #27)	=0 to 1(cycle)	(
	B: Number of cylinder		(
	OR		Engine is in ready state	=TRUE
	State of EPM operation mode is in Backup camshaft mode	=TRUE	OR	
	OR			
	Repeated cold start	=TRUE		
	)		Injection is not released	=TRUE
			/	
			Temperature for upper threshold high pressure start	<142.96(°C)
			Temperature for lowe threshold high pressure start	>-60.04(°C)
			Condition disable flow of high pressure pump	=FALSE
			(
			Voltage rail pressure sensor not plausible	=FALSE
			Airbag activated	=FALSE
			Battery voltage	<655.34(V)
)	
)	
			Condition hot start	=FALSE
			{	
			Engine temperature	<89.96(°C)
			OR	
			Integrated air mass flow from engine start to maximum value	>550(g)
)	
			(
			(
			Condition end of start for activation of md structure	=TRUE
			Condition enable start injection	=TRUE
)	
			OR	
			Engine is in ready state	=TRUE

24OBDG07 ECM Summary Tables

)			
				(	High pressure start request	=TRUE	
				(	Start type from the start coordinator indicates low pressure start	=TRUE	
				) )	No pending or confirmed DTCs	=see sheet inhibit tables	
					Basic enable conditions met	=see sheet enable tables	
P01CA	Fuel Rail Pressure Too Low - Engine Cranking Bank 2	High pressure start	=FALSCH	Engine is in standby state	=TRUE	0.1(s)	2 Trip
				(	Condition calucation of diagnosis high pressure start is stopped	=FALSCH	
				Fuel rail pressure (see Look-Up-Table #28)	<7 to 17(MPa)	Engine temperature for diagnosis start with high fuel pressure	<142.96(°C)
				for number of synchronous counts (see Look-Up-Table #26)	=16 to 48(counts)	Engine temperature for diagnosis start with high fuel pressure	>-42.54(°C)
				OR	Release condition for all high pressure starts	=TRUE	
				((
				(	Fuel rail pressure (see Look-Up-Table #28)	<7 to 17(MPa)	Engine is in ready state
				OR	OR	=TRUE	
				Filtered rail pressure	<1.5(MPa)		
				)	Engine is running	=TRUE	Injection is not released
				)	for time (Max. waiting time for high fuel pressure) (see Look-Up-Table #29)	=5 to 6(s)	=TRUE
				OR	Temperature for upper threshold high pressure start	<142.96(°C)	
				(Temperature for lowe threshold high nrossuro start	>-60.04(°C)	

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Fuel rail pressure (see Look-Up-Table #28)	>7 to 17(MPa)	Condition disable flow of high pressure pump	=FALSE
and		{	
Filtered rail pressure	<1.5(MPa)	Voltage rail pressure sensor not plausible	=FALSE
)		Airbag activated	=FALSE
)		and	
		Battery voltage	<655.34(V)
)	
)	
		Condition hot start	=FALSE
		{	
		Engine temperature	<89.96(°C)
		OR	
		Integrated air mass flow from engine start to maximum value	>550(g)
)	
		(
		(
		Condition end of start for activation of md structure	=TRUE
		Condition enable start injection	=TRUE
)	
		OR	
		Engine is in ready state	=TRUE
)	
		(	=TRUE
		High pressure start request	
		(
		\	
		Start type from the start coordinator indicates no start	=TRUE
		OR	
		(
		Start type from the start coordinator indicates low pressure start	=FALSE
)	
)	
)	
		Filtered fuel rail pressure real value (absolute pressure)	<1.5(Mpa)
		No pending or confirmed DTCs	=see sheet inhibit tables

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			Basic enable conditions met	see sheet enable tables
Monitoring of preinjection with low pressure	Preinjection with low pressure is active	=FALSCH	Engine is in standby state	=TRUE
	(		Condition calculation of diagnosis high pressure start is stopped	=FALSCH
	Start temperature for the start co-ordinator	>-10.54(°C)	Engine temperature for diagnosis start with high fuel pressure	<142.96(°C)
	OR		Engine temperature for diagnosis start with high fuel pressure	>-42.54(°C)
	Injection counter	>A * B(counts)	Release condition for all high pressure starts	=TRUE
	where			
	A: Number of working cycle during preinjection (see Look-Up-Table #27)	=0 to 1(cycle)	(
	B: Number of cylinder		(
	OR		Engine is in ready state	=TRUE
	State of EPM operation mode is in Backup camshaft mode	=TRUE	OR	
	OR			
	Repeated cold start	=TRUE		
	)		Injection is not released	=TRUE
)	
			Temperature for upper threshold high pressure start	<142.96(°C)
			Temperature for lowe threshold high pressure start	>-60.04(°C)
			Condition disable flow of high pressure pump	=FALSE
			(
			Voltage rail pressure sensor not plausible	=FALSE
			Airbag activated	=FALSE
			Battery voltage	<655.34(V)
)	
)	
			Condition hot start	=FALSE
			(
			Engine temperature	<89.96(°C)
			OR	
			Integrated air mass flow from engine start to maximum value	>550(g)
)	
			(
			(
			Condition end of start for activation of md structure	=TRUE
			Condition enable start injection	=TRUE

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)
OR
Engine is in ready state =TRUE

)
(
High pressure start request =TRUE

{
Start type from the start coordinator
indicates low pressure start =TRUE

)
)
No pending or confirmed DTCs =see sheet inhibit
tables

Basic enable conditions met =see sheet enable
tables

78. FUEL
PRESSURE
REGULATOR
ELECTRICAL
CHECKS

P10E8	Diagnoses the fuel quantity control valve for short circuit fault between the high side and low side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between ECU pin and ground	Battery voltage	>10.9(V)	20(S)	1 Trip
		OR Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery voltage Engine speed	<655.34(V) >80(rpm)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
POOCA	Diagnoses the fuel quantity control valve for short circuit to battery fault at the high side of the driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery voltage	>10.9(V)	20(event)	1 Trip
				Battery voltage Engine speed Basic enable conditions met	<655.34(V) >80(rpm) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		

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P00C9	Diagnoses the fuel quantity control valve for short circuit to ground fault at the high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between ECU pin and ground	Battery voltage	>10.9(V)	20(event)	1 Trip
				Battery voltage Engine speed Basic enable conditions met	<655.34(V) >80(rpm) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P0090	Detects open circuit error of fuel quantity control valve when there is high current flowing through the driver circuit	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	Battery voltage	>10.9(V)	20(S)	1 Trip
				Battery voltage Engine speed Basic enable conditions met	<655.34(V) >80(rpm) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P0092	Diagnoses the fuel quantity control valve for short circuit to battery fault at the low side of the driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery voltage	>10.9(V)	20(event)	1 Trip
				Battery voltage Engine speed Basic enable conditions met	<655.34(V) >80(rpm) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P0091	Diagnoses the fuel quantity control valve for short circuit to ground fault at the low side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between ECU pin and ground	Battery voltage	>10.9(V)	20(event)	1 Trip
				Battery voltage Engine speed Basic enable conditions met	<655.34(V) >80(rpm) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P313A	Diagnoses the fuel quantity control valve for short circuit fault between the high side and low side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between ECU pin and ground	Battery voltage	>10.9(V)	20(S)	1 Trip

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		OR Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery voltage Engine speed	<655.34(V) >80(rpm)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P3139	Diagnoses the fuel quantity control valve for short circuit to battery fault at the high side of the driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery voltage	>10.9(V)	20(event)	1 Trip
				Battery voltage Engine speed Basic enable conditions met	<655.34(V) >80(rpm) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P3138	Diagnoses the fuel quantity control valve for short circuit to ground fault at the high side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: <0.5 Q impedance between ECU pin and ground	Battery voltage	>10.9(V)	20(event)	1 Trip
				Battery voltage Engine speed Basic enable conditions met	<655.34(V) >80(rpm) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P2C02	Detects open circuit error of fuel quantity control valve when there is high current flowing through the driver circuit	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	Battery voltage	>10.9(V)	20(S)	1 Trip
				Battery voltage Engine speed Basic enable conditions met	<655.34(V) >80(rpm) =see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P2C04	Diagnoses the fuel quantity control valve for short circuit to battery fault at the low side of the driver circuit	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between ECU pin and injector supply voltage	Battery voltage	>10.9(V)	20(event)	1 Trip
				Battery voltage Engine speed	<655.34(V) >80(rpm)		

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			Basic enable conditions met	=see sheet enable tables			
			No pending or confirmed DTCs	=see sheet inhibit tables			
	P2C03	Diagnoses the fuel quantity control valve for short circuit to ground fault at the low side of the driver circuit	Voltage low during driver OFF state (indicates short circuit to ground)	Short to ground: <0.5 Q impedance between ECU pin and ground	Battery voltage	>10.9(V)	20(event) 1 Trip
					Battery voltage Engine speed Basic enable conditions met No pending or confirmed DTCs	<655.34(V) >80(rpm) =see sheet enable tables =see sheet inhibit tables	
79. COM - FUEL PUMP - FTZM	P12A6	ECM command state for pump does not match feedback value from FTZM_Information_2_S1 signal FTZMSnsdFuelCtlEnblAtv "Fuel Tank Zone Module Sensed Fuel Control Enable Active"	Status of Pre supply pump is not plausible with the status received from the Communication module	=TRUE	Rationality check for Pre-Supply pump diagnosis is active	=TRUE	2(s) 1 Trip
					No pending or confirmed DTCs Basic enable conditions met	=see sheet inhibit tables =see sheet enable tables	
	P129F	Commanded pump speed in ECM does not match feedback value from FTZM_Information_8_S1 signal FTZMBrshFPmpSnsdSpd "Fuel Tank Zone Module Brushless Fuel Pump Sensed Speed" - feedback speed too high	Difference between actual Pre Supply Pump speed and Pre Supply Pump speed converted from PWM value	>200(rpm)	Rationality check for Pre-Supply pump diagnosis is active	=TRUE	3(s) 2 Trip
					No pending or confirmed DTCs Basic enable conditions met	=see sheet inhibit tables =see sheet enable tables	

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P129F	Commanded pump speed in ECM does not match feedback value from FTZM_Information_8_S1 signal FTZMBrshFPmpSnsdSpd "Fuel Tank Zone Module Brushless Fuel Pump Sensed Speed" - feedback speed too low	Difference between Pre Supply Pump speed converted from PWM value and actual Pre Supply Pump speed	>200(rpm)	Rationality check for Pre-Supply pump diagnosis is active	=TRUE	3(s)	2 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P3188	Filtered fuel pressure deviation in the low pressure fuel system is lesser than calibrated threshold for calibrated period of time	Filtered fuel pressure deviation in the low pressure system	<-50(kPa)	Electrical fuel pump operational mode is in closed loop control	=TRUE	10(s)	2 Trip
				(Fuel flow demand of electrical fuel pump Engine is running state Pre-Supply pump is ON)	>0.1(l/h) =TRUE =TRUE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P3187	Filtered fuel pressure deviation in the low pressure fuel system is greater than calibrated threshold for calibrated period of time	Filtered fuel pressure deviation in the low pressure system	>50(kPa)	Electrical fuel pump operational mode is in closed loop control	=TRUE	10(s)	2 Trip
				(Fuel flow demand of electrical fuel pump Engine is running state Pre-Supply pump is ON)	>0.1(l/h) =TRUE =TRUE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P102B	Monitoring of FTZM fuel pump output for circuits high fault	Fuel Tank Zone Module(FTZM) fuel pump output is shorted to battery	=TRUE	Ignition ON	=TRUE	0.5(s)	1 Trip

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				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enabling conditions are met	=see sheet enable tables		
	P102A	Monitoring of FTZM fuel pump output for circuits low fault	Fuel Tank Zone Module(FTZM) fuel pump output is shorted to ground	=TRUE	Ignition ON	=TRUE	0.5(s) 1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enabling conditions are met	=see sheet enable tables		
	P1029	Monitoring of FTZM fuel pump output for circuits open fault	Fuel Tank Zone Module(FTZM) fuel pump output circuit is opened	=TRUE	Ignition ON	=TRUE	0.5(s) 1 Trip
80. COM - FTZM INTERNAL PERFORMANCE				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enabling conditions are met	=see sheet enable tables		
	P1005	Monitoring of FTZM fuel pump driver control module for too many unexpected resets	Fuel Pump driver control module too many resets is detected	=TRUE	Ignition ON	=TRUE	0.5(s) 1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enabling conditions are met	=see sheet enable tables		
	P1255	Monitoring of FTZM fuel pump output for over temperature fault	Fuel Tank Zone Module(FTZM) over temperature is detected	=TRUE	Ignition ON	=TRUE	0.5(s) 2 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enabling conditions are met	=see sheet enable tables		
	U101A	FTZM communication fault check	FTZM configuration error	=TRUE	Ignition is ON	=TRUE	0.1(s) 2 Trip

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81. COM - CAMSHAFT POSITION ACTUATOR - INTAKE B1 ELECTRICAL DIAGNOSIS			Battery Voltage		>9(V)			
			Basic enable conditions are met		=see sheet enable tables			
	P2089	Diagnoses the "A" Camshaft Position Actuator Bank 1 low side driver circuit for short circuit to battery faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Ignition is ON	=TRUE	1(s)	2 Trip
			ECU is in drive state		=TRUE			
			Engine Speed		>80(rpm)			
			Battery Voltage		>8.9(V)			
			Battery Voltage		<25.5(V)			
			No pending or confirmed DTCs		=see sheet inhibit tables			
			Basic enable conditions met		=see sheet enable tables			
	P2088	Diagnoses the "A" Camshaft Position Actuator Bank 1 low side driver circuit for short circuit to ground faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Ignition is ON	=TRUE	0.2(s)	2 Trip
			ECU is in drive state		=TRUE			
			Engine Speed		>80(rpm)			
			Battery Voltage		>8.9(V)			
			Battery Voltage		<25.5(V)			
			No pending or confirmed DTCs		=see sheet inhibit tables			
			Basic enable conditions met		=see sheet enable tables			
	P0010	Diagnoses the "A" Camshaft Position Actuator Bank 1 low side driver circuit for open circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Ignition is ON	=TRUE	1(s)	2 Trip
			ECU is in drive state		=TRUE			
			Engine Speed		>80(rpm)			
			Battery Voltage		>8.9(V)			
			Battery Voltage		<25.5(V)			
			No pending or confirmed DTCs		=see sheet inhibit tables			
			Basic enable conditions met		=see sheet enable tables			

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82. COM - CAMSHAFT POSITION ACTUATOR - INTAKE B2 ELECTRICAL DIAGNOSIS	P2093	Diagnoses the "A" Camshaft Position Actuator Bank 2 low side driver circuit for short circuit to battery faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Ignition is ON	=TRUE	1(s)	2 Trip
					ECU is in drive state	=TRUE		
					Engine Speed Battery Voltage Battery Voltage No pending or confirmed DTCs Basic enable conditions met	>80(rpm) >8.9(V) <25.5(V) =see sheet inhibit tables =see sheet enable tables		
	P2092	Diagnoses the "A" Camshaft Position Actuator Bank 2 low side driver circuit for short circuit to ground faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Ignition is ON	=TRUE	0.2(s)	2 Trip
					ECU is in drive state	=TRUE		
					Engine Speed Battery Voltage Battery Voltage No pending or confirmed DTCs Basic enable conditions met	>80(rpm) >8.9(V) <25.5(V) =see sheet inhibit tables =see sheet enable tables		
	P0020	Diagnoses the "A" Camshaft Position Actuator Bank 2 low side driver circuit for open circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Ignition is ON	=TRUE	1(s)	2 Trip
					ECU is in drive state	=TRUE		
					Engine Speed Battery Voltage Battery Voltage No pending or confirmed DTCs Basic enable conditions met	>80(rpm) >8.9(V) <25.5(V) =see sheet inhibit tables =see sheet enable tables		
83. CCM - CAMSHAFT POSITION ACTUATOR - EXHAUST B1 ELECTRICAL	P2091	Diagnoses the "B" Camshaft Position Actuator Bank 1 low side driver circuit for short circuit to battery faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Ignition is ON	=TRUE	1(s)	2 Trip

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DIAGNOSIS					ECU is in drive state	=TRUE		
					Engine Speed	>80(rpm)		
					Battery Voltage	>8.9(V)		
					Battery Voltage	<25.5(V)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P2090	Diagnoses the "B" Camshaft Position Actuator Bank 1 low side driver circuit for short circuit to ground faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Ignition is ON	=TRUE	0.2(s)	2 Trip
					ECU is in drive state	=TRUE		
					Engine Speed	>80(rpm)		
					Battery Voltage	>8.9(V)		
					Battery Voltage	<25.5(V)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables			
P0013	Diagnoses the "B" Camshaft Position Actuator Bank 1 low side driver circuit for open circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Ignition is ON	=TRUE	1(s)	2 Trip	
				ECU is in drive state	=TRUE			
				Engine Speed	>80(rpm)			
				Battery Voltage	>8.9(V)			
				Battery Voltage	<25.5(V)			
				No pending or confirmed DTCs	=see sheet inhibit tables			
				Basic enable conditions met	=see sheet enable tables			
84. COM - CAMSHAFT POSITION ACTUATOR - EXHAUST B2 ELECTRICAL DIAGNOSIS	P2095	Diagnoses the "B" Camshaft Position Actuator Bank 2 low side driver circuit for short circuit to battery faults.	Voltage high during driver on state (indicates short-to-power)	Short to power: < 0.5 Q impedance between signal and controller power	Ignition is ON	=TRUE	1(s)	2 Trip
					ECU is in drive state	=TRUE		
					Engine Speed	>80(rpm)		
					Battery Voltage	>8.9(V)		
				Battery Voltage	<25.5(V)			

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				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P2094	Diagnoses the "B" Camshaft Position Actuator Bank 2 low side driver circuit for short circuit to ground faults.	Voltage low during driver off state (indicates short-to-ground)	Short to ground: <0.5 Q impedance between signal and controller ground	Ignition is ON	=TRUE	0.2(s)	2 Trip
				ECU is in drive state	=TRUE		
				Engine Speed	>80(rpm)		
				Battery Voltage	>8.9(V)		
				Battery Voltage	<25.5(V)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0023	Diagnoses the "B" Camshaft Position Actuator Bank 2 low side driver circuit for open circuit faults	Voltage low during driver off state (indicates open circuit)	Open Circuit : > 200 KQ impedance between ECU pin and load	Ignition is ON	=TRUE	1(s)	2 Trip
				ECU is in drive state	=TRUE		
				Engine Speed	>80(rpm)		
				Battery Voltage	>8.9(V)		
				Battery Voltage	<25.5(V)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0524	Oil pressure - Low	Relative engine oil pressure (see Look-Up-Table #86)	<0 to 34.2(kPa)	(Absolute value of transversal acceleration	*5(g)	0(s)	1 Trip
		for time	1.2 to 5(s)	for time	>0(s)		
		(debounce time for low oil pressure warning) (see Look-Up-Table #87)					
				for hold time after condition becomes false)	<0(s)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		

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P06DD	Measured oil pressure compared to setpoint - High	Difference between measured engine oil pressure and oil pressure surface set point (see Look-Up-Table #88)	>10.0 to 80.0(kPa)	Short trip test active	=FALSCH	1(s)	2 Trip
		for time constant filter	>2(s)	(Absolute value of transversal acceleration for time for hold time after condition becomes false) Oil temperature Oil pump high side switch commanded on Backup duty cycle for oil pressure is in use In electric drive mode No pending or confirmed DTCs Basic enable conditions met	≥5(g) >0(s) <0(s) >-50.04(°C) =TRUE =FALSCH =FALSCH =see sheet inhibit tables =see sheet enable tables		
P06DD	Measured oil pressure compared to setpoint - Low	Engine oil pressure minus oil pressure set point (see Look-Up-Table #89)	<-80.0 to -8.0(kPa)	Short trip test active	=FALSCH	1(s)	2 Trip
				(Absolute value of transversal acceleration for time for hold time after condition becomes false) Oil temperature Oil pump high side switch commanded on Backup duty cycle for oil pressure is in use In electric drive mode No pending or confirmed DTCs Basic enable conditions met	≥5(g) >0(s) <0(s) >-50.04(°C) =TRUE =FALSCH =FALSCH =see sheet inhibit tables =see sheet enable tables		
P06DC	Diagnoses oil pump low side driver circuit for circuit high fault	Oil pump actuator driver has posted a high circuit failure	=TRUE	Actuator power stage is enabled	=TRUE	0.05(s)	2 Trip
			Short-to-power: < 0.5 Q impedance between signal and controller power		>10.9(V)		
				for time	>0(s)		

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			No pending or confirmed DTCs	=see sheet inhibit tables			
			Basic enable conditions met	=see sheet enable tables			
	P06DB	Diagnoses oil pump low side driver circuit for circuit low fault	Oil pump actuator driver has posted a low circuit failure	=TRUE	Actuator power stage is enabled	=FALSCH	0.05(s) 1 Trip
			Short-to-ground: <0.5 Q impedance between signal and controller ground	Battery voltage	>10.9(V)		
				for time	>0(s)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
	P06DA	Diagnoses oil pump low side driver circuit for open circuit fault	Oil pump actuator driver has posted an open circuit failure	=TRUE	Actuator power stage is enabled	=TRUE	1(s) 2 Trip
			Open Circuit: > 200 K Q impedance between ECU pin and load	Battery voltage	>10.9(V)		
				for time	>0(s)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
	P06DA	Diagnoses oil pump low side driver circuit for over temperature circuit fault	Oil pump actuator driver has posted an over temperature circuit failure	=TRUE	Actuator power stage is enabled	=TRUE	1(s) 2 Trip
				Battery voltage	>10.9(V)		
				for time	>0(s)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
86. COM - EVAP PURGE VALVE - B1 DIAGNOSTICS	P0459	Diagnoses the EVAP System Purge Control Valve low side driver circuit for circuit high faults.	Output (driver) current	>5.6(A)	Battery voltage	>10(V)	1(s) 2 Trip
					Battery voltage	<17(V)	
					Power stage (driver) is switched on	=TRUE	
					Basic enable conditions met	=see sheet enable tables	

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				No pending or confirmed DTCs	=see sheet inhibit tables		
	P0458	Diagnoses the EVAP System Purge Control Valve low side driver circuit for circuit low faults.	Output (driver) voltage	<2.74(V)	Battery voltage	>10(V)	1(s) 2 Trip
					Battery voltage Power stage (driver) is switched off Basic enable conditions met	<17(V) =TRUE =see sheet enable tables	
					No pending or confirmed DTCs	=see sheet inhibit tables	
	P0443	Diagnoses the EVAP System Purge Control Valve low side driver circuit for open circuit faults.	Output (driver) voltage	>3.26(V)	Battery voltage	>10(V)	1(s) 2 Trip
			Output (driver) voltage	<4.7(V)	Battery voltage Power stage (driver) is switched off Basic enable conditions met	<17(V) =TRUE =see sheet enable tables	
					No pending or confirmed DTCs	=see sheet inhibit tables	
	P04AD	Diagnoses the EVAP System Purge Control Valve low side driver circuit for circuit high faults.	Output (driver) current	>5.6(A)	Battery voltage	>10(V)	1(s) 2 Trip
					Battery voltage Power stage (driver) is switched on Basic enable conditions met	<17(V) =TRUE =see sheet enable tables	
87. COM - EVAP PURGE VALVE - B2 DIAGNOSTICS					No pending or confirmed DTCs	=see sheet inhibit tables	
	P04AC	Diagnoses the EVAP System Purge Control Valve low side driver circuit for circuit low faults.	Output (driver) voltage	<2.74(V)	Battery voltage	>10(V)	1(s) 2 Trip
					Battery voltage Power stage (driver) is switched off Basic enable conditions met	<17(V) =TRUE =see sheet enable tables	
					No pending or confirmed DTCs	=see sheet inhibit tables	
	P04AB	Diagnoses the EVAP System Purge Control Valve low side driver circuit for open circuit faults.	Output (driver) voltage	>3.26(V)	Battery voltage	>10(V)	1(s) 2 Trip

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			Output (driver) voltage	<4.7(V)	Battery voltage	<17(V)		
					Power stage (driver) is switched off	=TRUE		
					Basic enable conditions met	=see sheet enable tables		
					No pending or confirmed DTCs	=see sheet inhibit tables		
88. COM - THROTTLE ACTUATOR - B1 DIAGNOSIS	P2176	Throttle actuator Bank1 first initialization - lower mechanical stop learning fail	(		( Offset learning aborted	=FALSE	0.01(s)	1 Trip
				Initial learning of the closed throttle valve position has started	=TRUE	OR		
				Aborted due to one of the enable conditions no longer being fulfilled (see secondary parameters)	=TRUE	Offset learning successful	=FALSE	
))			
			OR					
			(		Offset check at cold temperature conditions active	=FALSE		
					(
					(
		First learning of closed mechanical stop: Throttle position at lower mechanical stop		Step 1 (Learning of the closed throttle valve position):	(Return spring check aborted	=TRUE		
				Lower mechanical stop offset learning aborted at step 1 (moving throttle valve to the closed position) due to the following reason (closed position has not reached):				
				(		Return spring check successful	=TRUE	
				(		Return spring check fault is set	=FALSE	
				Difference between actual throttle position sensor1 at lower mechanical stop and desired value for adaptation (based on max. allowed for lower mechanical stop voltage)	>1.5(%)	OR		
)					
				for time	>1(s)	Device type	>0	
						(
)					
					Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)		
					(

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)		(
	OR		(Offset learning active =TRUE
	(OR	
First learning of closed mechanical stop: Duty cycle at lower mechanical stop and resulting change in sensor voltage	Step 2 (If no fault in step 1 then ramp to closed position with duty cycle in a defined range and check sensor voltages):		(
	Lower mechanical stop offset learning aborted at step 2 (pressing throttle valve to the		Offset learning active	=FALSE
	(		(	The powerstage of the throttle actuator is
	Calculated duty cycle ratio	<60(%)	commanded on	=TRUE
	)		Battery voltage	>7.5(V)
	for time	>1(s))	
))	
	OR		OR	
			Power save is active	=TRUE
	()	
Range check of learned sensor voltage at low mechanical stop	Step 3 (If no fault in step 2 then check range of learned sensor voltages at lower mechanical stop):		Limp home driving mode requested	=FALSE
	Lower mechanical stop offset learning aborted at step 3 (sensor offset learning at low mechanical stop) due to one of the the following conditions:		Safety fuel cut off requested	=FALSE
	(		Torque limitation requested	=FALSE
	Lower mechanical stop voltage sensor 1	>0.58(V))	
	OR		(Long term and short term adaptation chosen	=FALSE
	Lower mechanical stop voltage sensor 1	<.33(V)	OR	
	OR		(Long term and short term adaptation chosen	=TRUE
	Lower mechanical stop voltage sensor 2	>4.67(V)	Long term and short term is released	=TRUE
	OR)	
	Lower mechanical stop voltage sensor 2	<4.42(V))	
)		OR	
)		(
			(First learning performed =FALSE

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OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
Offset learning active	=TRUE
OR	
/	
Offset learning active	=FALSE
(
The powerstage of the throttle actuator is	=TRUE
commanded on	
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle	<143.26(°C)

Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P2176	Throttle actuator Bank1 - lower mechanical stop learning fail	Lower mechanical stop offset learning aborted at step 2 (pressing throttle valve to the low mechanical stop with certain force) due to the following reason (duty cycle ratio has not reached threshold):	(	Offset learning aborted	=FALSE	1(s)	1 Trip
		(	OR				
		Calculated duty cycle ratio	<60(%)	Offset learning successful	=FALSE		
		for time	>1(s)	/			
		)		Offset check at cold temperature conditions active	=FALSE		
		OR	(
		Lower mechanical stop offset learning aborted at step 3 (sensor offset learning at low mechanical stop) due to one of the the following conditions:	(		=TRUE		
		(	Return spring check aborted				
		Lower mechanical stop voltage sensor 1	OR				
		>.58(V)	Return spring check successful	=TRUE			
		OR	Return spring check fault is set	=FALSE			
		<33(V))				
		OR	OR				
		>4.67(V)	Device type	>0			
		OR)				
		Lower mechanical stop voltage sensor 2	(Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)		
		OR	(
		<4.42(V)	Offset learning active	=TRUE			
)	OR				

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(
Offset learning active	=FALSE	
(
The powerstage of the throttle actuator is	=TRUE	
commanded on		
Battery voltage	>7.5(V)	
)		
)		
)		
OR		
Power save is active	=TRUE	
)		
Limp home driving mode requested	=FALSE	
Safety fuel cut off requested	=FALSE	
Torque limitation requested	=FALSE	
)		
(	=FALSE	
Long term and short term adaptation chosen		
OR		
(	=TRUE	
Long term and short term adaptation chosen		
Long term and short term is released	=TRUE	
)		
)		
OR		
(
(
First learning performed	=FALSE	
OR		
Limp air position is not plausible	=TRUE	
OR		
External trigger to start offset learning	=TRUE	
)		
(	=TRUE	
ECU is in drive state		
OR		
ECU is in post drive state for time	>5(s)	
)		
)		
OR		
ECU is in post drive state for time	>5(s)	
)		

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Offset learning will be enabled when below conditions are satisfied	=TRUE
(
Offset learning active	=TRUE
OR	
Offset learning active	=FALSE
(
The powerstage of the throttle actuator is	=TRUE
commanded on	
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P30E3	Path 1: Throttle position at lower mechanical stop exceeded maximum limit for Throttle Position Sensor Bank	Step 1 (Learning of the closed throttle valve position):	(=FALSE	1(s)	1 Trip
		Actuator throttle position	>(Vmax - V) * Tgrad +	OR		

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Where:			Offset learning successful	=FALSE
Vmax (Maximum voltage value allowed at mechanical stop, position sensor 1))	
V (Actual learned sensor voltage of sensor 1 at the lower mechanical stop)			Offset check at cold temperature conditions active	=FALSE
Tgrad (Gradient of the throttle valve angle versus sensor 1 voltage)			(
Offset (Offset to Desired position value to start ramping into mechanical stop)			(
			Return spring check aborted	=TRUE
			OR	
			Return spring check successful	=TRUE
)	
Path 2: Range check of learned sensor voltage at low mechanical stop for Throttle Position Sensor Bank 1 : Maximum learning limit exceeded	Low mechanical stop first	=TRUE	Return spring check fault is set	=FALSE
	and)	
	Step 3 (If no fault in step 1 then check range of learned sensor voltages at lower mechanical stop):		OR	
	Actual learned sensor voltage of sensor 1 at the mechanical stop	>.58(V)	Device type	>0
	OR)	
			Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)
	Actual learned sensor voltage of sensor 2 at the mechanical stop	>4.67(V)	{	
			(
			(
			Offset learning active	=TRUE
			OR	
			(
			Offset learning active	=FALSE
			(
			The powerstage of the throttle actuator is commanded on	=TRUE
			Battery voltage	>7.5(V)
)	
			,)	

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OR	
Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(

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Offset learning active	=FALSE
(The powerstage of the throttle actuator is commanded on Battery voltage	=TRUE
)	>7.5(V)
)	
)	
OR	
Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P30E4	Range check of learned sensor voltage at lower mechanical stop for Throttle Position Sensor Bank 1: Minimum learning limit exceeded	Low mechanical stop first learning has been performed	=TRUE	(Offset learning aborted	=FALSE	1(s)	1 Trip
		and Step 3 (If no fault in step 2 then check range of learned sensor voltages at lower		OR Offset learning successful	=FALSE		
		Actual learned sensor voltage of sensor 1 at the mechanical stop	<58(V)	Offset check at cold temperature conditions active	=FALSE		

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Actual learned sensor voltage of sensor 2 at the mechanical stop	<4.67(V)	(
((=TRUE
Actual learned sensor voltage of sensor 1 at the mechanical stop	<.33(V)	Return spring check aborted	
OR		OR	
Actual learned sensor voltage of sensor 2 at the mechanical stop	<4.42(V)	Return spring check successful	=TRUE
stop		Return spring check fault is set	=FALSE
))	
		OR	
		Device type	>0
)	
		(	>29(s)
		Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	
		(
		(
		(
		Offset learning active	=TRUE
		OR	
		(
		Offset learning active	=FALSE
		(
		The powerstage of the throttle actuator is commanded on	=TRUE
		Battery voltage	>7.5(V)
)	
)	
		OR	
		Power save is active	=TRUE
)	
		Limp home driving mode requested	=FALSE
		Safety fuel cut off requested	=FALSE
		Torque limitation requested	=FALSE
)	
		(Long term and short term adaptation chosen	=FALSE
		OR	
		(Long term and short term adaptation chosen	=TRUE
		Long term and short term is released	=TRUE
		\	

)		
OR		
(
(	First learning performed	=FALSE
OR		
	Limp air position is not plausible	=TRUE
OR		
	External trigger to start offset learning	=TRUE
)		
(		=TRUE
	ECU is in drive state	
OR		
	ECU is in post drive state for time	>5(s)
)		
)		
OR		
	ECU is in post drive state for time	>5(s)
)		
	Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
	Offset learning active	=TRUE
OR		
/		
	Offset learning active	=FALSE
(
	The powerstage of the throttle actuator is	=TRUE
	commanded on	
	Battery voltage	>7.5(V)
)		
)		
OR		
	Power save is active	=TRUE
)		
	Limp home driving mode requested	=FALSE
	Safety fuel cut off requested	=FALSE
	Torque limitation requested	=FALSE
)		
	Vehicle speed	<0.62(mph)
	Engine speed	<300(rpm)

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Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P2101	Rationality check of throttle actuator control Bank 1 deviation - Actual actuator position is continuously monitored against commanded value	(	( ECU is in DRIVE state	=TRUE	0.5(s)	1 Trip
	Difference between actual actuator position and its commanded value	>A * B + C(%)	OR			
	OR		ECU is in POSTDRIVE state)	=TRUE		
	Difference between commanded value and actual actuator position	>(A * B + C)(%)	(Powerstage switched off by diagnosis	=TRUE		
))			
	Where:		for time	>0.8(s)		
	(A) Rate of change of the commanded value	=calculated value(% / s)	The powerstage of the actuator is switched on, following conditions:	=TRUE		
	(B) Factor for allowed control deviation	=0.02	(
	(C) Allowed control deviation in steady state	=5(%)	State of the throttle valve powerstage bank 1	>0		
) Release of adaptation	=FALSE		

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				Actual position is valid	=TRUE		
				Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
				(
				Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
				(
				Battery voltage for throttle valve operation sufficient bank 1	>7.5(V)		
				OR			
				Engine speed	>2000(rpm)		
)			
				Limp home position not reached bank 1	=FALSE		
)			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0638	Range check of Throttle Actuator Control duty cycle Bank 1	Absolute value of Throttle valve duty cycle ratio bank 1	>Minimum(A, (B*C)) (%) (ECU is in DRIVE state		=TRUE	0.6001(s)	1 Trip
		Where:					
		A - Upper threshold for Throttle Actuator Control duty cycle Bank 1 diagnosis in case of low battery voltage	95(%)	OR			
				ECU is in POSTDRIVE state	=TRUE		
)			
		B - Upper threshold for Throttle Actuator Control duty cycle bank1 diagnosis	80(%)	Absolute value of position controller of the throttle valve bank 1 of motor bench one / gradient of the filtered desired value	<78.1(%/s)		
		C - Factor for battery voltage compensation bank 1	=13.5V / measured battery voltage [V]	The powerstage of the actuator is switched on, following conditions:	=TRUE		
				(
				State of the throttle valve powerstage bank 1	>0		
)			
				Release of adaptation	=FALSE		
				Actual position is valid	=TRUE		
				Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
				(
				Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
				(

```

(
(
Offset learning active                =TRUE

OR

(
Offset learning active                =FALSE

(
The powerstage of the throttle
actuator is
commanded on
Battery voltage                        >7.5(V)
)
)
)
OR
Power save is active                  =TRUE
)
Limp home driving mode requested      =FALSE
Safety fuel cut off requested         =FALSE

Torque limitation requested            =FALSE
)
( Long term and short term
adaptation chosen                      =FALSE
OR
( Long term and short term
adaptation chosen                      =TRUE
Long term and short term is
released                              =TRUE
)
)
OR
(
(
First learning performed              =FALSE

OR
Limp air position is not plausible    =TRUE

OR
External trigger to start offset
learning                              =TRUE
)
(
ECU is in drive state                 =TRUE
OR
ECU is in post drive state for time   >5(s)

)
)
OR

```

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ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator is	=TRUE
commanded on	
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

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P1551	Path 3: Range check of limp air position for Bank 1 - low	Difference between actual learned sensor voltage of sensor 1 at limp air position after mean value calculation and actual learned sensor voltage of sensor 1 at the lower mechanical stop	<87(V)	(Offset learning aborted	=FALSE	0.01(s)	1 Trip
		OR					
		Difference between actual learned sensor voltage of sensor 2 at the lower mechanical stop and actual learned sensor voltage of sensor 2 at limp air position after mean value calculation	<87(V)	OR Offset learning successful	=FALSE		
)			
				Offset check at cold temperature conditions active	=FALSE		
				(
				(
				(	=TRUE	
				Return spring check aborted			
				OR			
				Return spring check successful	=TRUE		
)			
				Return spring check fault is set	=FALSE		
)			
				OR			
				Device type	>0		
)			
				(
				Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)		
				(
				(
				(
				Offset learning active	=TRUE		
				OR			
				(
				Offset learning active	=FALSE		
				(
				The powerstage of the throttle actuator is	=TRUE		
				commanded on			
				Battery voltage	>7.5(V)		
)			
)			
)			
				OR			

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Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(
First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
(
The powerstage of the throttle actuator is commanded on	=TRUE
Return to normal	=FALSE

```

)
)
)
OR
Power save is active                =TRUE
)
Limp home driving mode requested    =FALSE
Safety fuel cut off requested        =FALSE

Torque limitation requested          =FALSE
)
Vehicle speed                       <0.62(mph)

Engine speed                         <300(rpm)

Battery voltage                      <16(V)

Battery voltage                      >10(V)

Intake air temperature before throttle valve <143.26(°C)
Intake air temperature before throttle valve >5.26(°C)
Engine coolant temperature           <100.46(°C)

Engine coolant temperature           >5.26(°C)

No pending or confirmed DTCs        =see sheet inhibit tables
Basic enable conditions met          =see sheet enable tables

```

P1551	Path 4: Limp air position drift (Bank 1 - comparison with lower mechanical stop sensor voltage	(Offset learning aborted	=FALSE	0.01(s)	1 Trip
	Actual offset learning step and	=4	OR		
	(|A - B|) Absolute value of the actual learned value minus last stored value	>0.155(V)	/		
	Where:		Offset check at cold temperature conditions active	=FALSE	
	A	=(A1 + A2)/2(V)	{		
	B	=(B1 + B2)/2(V)	(
	A1	=A11 - A12(V)	(
	A2	=A22 - A21(V)	(
			Return spring check aborted	=TRUE	
			OR		
			Return spring check successful	=TRUE	
			Return spring check fault is set	=FALSE	
	B1	=B11 - B12(V))		
			OR		

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B2	=B22-B21(V)	Device type	>0
(A11) Learned sensor voltage of sensor 1 at limp air position)	
		(
(A12) Learned reference sensor voltage of sensor 1 at the lower mechanical stop		Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)
		(
(A22) Learned reference sensor voltage of sensor 2 at the lower mechanical stop		(
		(
(A21) Learned sensor voltage of sensor 2 at limp air position		Offset learning active	=TRUE
(B11) Actual learned sensor voltage of sensor 1 at limp air position after mean value calculation		OR	
(B12) Learned reference sensor voltage of sensor 1 at the lower mechanical stop		(
(B22) Learned reference sensor voltage of sensor 2 at the lower mechanical stop		Offset learning active	=FALSE
(B21) Actual learned sensor voltage of sensor 2 at limp air position after mean value calculation		(
)			
		The powerstage of the throttle actuator is commanded on and Battery voltage	=TRUE
)	
)	
		OR	
		Power save is active	=TRUE
)	
		Limp home driving mode requested	=FALSE
		Safety fuel cut off requested	=FALSE
		Torque limitation requested	=FALSE
)	
		(	=FALSE
		Long term and short term adaptation chosen	
		OR	
		(=TRUE
		Long term and short term adaptation chosen	

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Long term and short term is released	=TRUE
)	
)	
OR	
(
(
First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	

Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

Code	Path	Description	Condition	Value	Unit	Frequency
P2119	Path 1: Throttle valve opening spring check - opening failure for Bank 1	Here it is checked whether opening spring can be returned by mechanical force only to the defined limp home position in the defined time	(	Offset learning aborted	=FALSE	0.26(s)
		(	Actual offset learning step	=4	OR	
		(	Offset learning successful	=FALSE		
		(	Limp air position is implausible	=TRUE)	
		OR	Offset check at cold temperature conditions active	=FALSE		
		(	First learning performed	=FALSE	(	=TRUE
		)	Return spring check aborted		OR	
		Position of the throttle valve	<A * C1 (%)	Return spring check successful	=TRUE	
			Return spring check fault is set	=FALSE		
		for time	>0.26(s)	OR		
		)	Device type	>0		
		OR	(Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)	
		(

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Limp air position is implausible	=FALSE	(
First learning performed	=TRUE	{	
		Offset learning active	=TRUE
Position of the throttle valve	<Limp home position of throttle valve - 3%(%)	OR	
Limp air position is implausible when:		(
Absolute difference of the deviation of limp air position sensor voltage at ECU start from lower mechanical stop position sensor voltage and the deviation of actual learned limp air position sensor voltage from lower mechanical stop position sensor voltage	>0.155(V)	Offset learning active	=FALSE
for time	>0.26(s)	(
)		The powerstage of the throttle actuator is commanded on	=TRUE
)		Battery voltage	>7.5(V)
Where:			
(A) Gradient of the throttle valve angle	=100% / ((V12 - V11) + (V21 - V22)) * 0.5(%A))	
(C1) Threshold for minimum absolute limp air position allowed	=.87(V)	OR	
(V12) Actual learned sensor voltage of sensor 1 at the upper mechanical stop		Power save is active	=TRUE
(V11) Actual learned sensor voltage of sensor 1 at the lower mechanical stop		Limp home driving mode requested	=FALSE
(V21) Actual learned sensor voltage of sensor 2 at the lower mechanical stop		Safety fuel cut off requested	=FALSE
(V22) Actual learned sensor voltage of sensor 2 at the upper mechanical stop		Torque limitation requested	=FALSE
)	
		(Long term and short term adaptation chosen	=FALSE
		OR	
		(Long term and short term adaptation chosen	=TRUE
		Long term and short term is released	=TRUE
)	
)	
		OR	
		,	

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(
First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator is	=TRUE
commanded on	
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)

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Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P21 19	Path 2: Throttle valve opening spring failure while spreading the opening spring for Bank 1	Position of the throttle valve	>1 + B1 + B2(%)	(Offset learning aborted	=FALSE	0.3(s)	1 Trip
		Where:		OR			
		(B1) Offset for the lower mechanical stop because of dirt	Calculated parameter(%)	Offset learning successful	=FALSE		
		(B2) Range for actual position (offset to desired value) to check whether open spring spread position is reached	=1(%)	Offset check at cold temperature conditions active	=FALSE		
				(
				(
				(
				Return spring check aborted	=TRUE		
				OR			
				Return spring check successful	=TRUE		
				/			
				Return spring check fault is set	=FALSE		
)			
				OR			
				Device type	>0		
)			
				(
				Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)		
				(
				{			
				(
				Offset learning active	=TRUE		
				OR			
				{			
				Offset learning active	=FALSE		

(
The powerstage of the throttle actuator is	=TRUE	
commanded on		
Battery voltage	>7.5(V)	
)		
)		
OR		
Power save is active	=TRUE	
)		
Limp home driving mode requested	=FALSE	
Safety fuel cut off requested	=FALSE	
Torque limitation requested	=FALSE	
)		
(Long term and short term adaptation chosen	=FALSE	
OR		
(Long term and short term adaptation chosen	=TRUE	
Long term and short term is released	=TRUE	
)		
)		
OR		
(
(
First learning performed	=FALSE	
OR		
Limp air position is not plausible	=TRUE	
OR		
External trigger to start offset learning	=TRUE	
)		
(	=TRUE	
ECU is in drive state		
OR		
ECU is in post drive state for time	>5(s)	
)		
)		
OR		
ECU is in post drive state for time	>5(s)	
)		
Offset learning will be enabled when below conditions are satisfied	=TRUE	
(
(
(
Offset learning active	=TRUE	

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OR		
(
Offset learning active		=FALSE
(
The powerstage of the throttle actuator is		=TRUE
commanded on		
Battery voltage		>7.5(V)
)		
)		
OR		
Power save is active		=TRUE
)		
Limp home driving mode requested		=FALSE
Safety fuel cut off requested		=FALSE
Torque limitation requested		=FALSE
/		
Vehicle speed		<0.62(mph)
Engine speed		<300(rpm)
Battery voltage		<16(V)
Battery voltage		>10(V)
Intake air temperature before throttle valve		<143.26(°C)
Intake air temperature before throttle valve		>5.26(°C)
Engine coolant temperature		<100.46(°C)
Engine coolant temperature		>5.26(°C)
No pending or confirmed DTCs		=see sheet inhibit tables
Basic enable conditions met		=see sheet enable tables

P2119	Path 3: Throttle valve return spring failure check for Bank 1	(	(	Offset learning aborted	=FALSE	0.36(s)	1 Trip
		(
			Limp air position is implausible	=TRUE	OR		
			OR		Offset learning successful	=FALSE	
			First learning performed	=FALSE	/		
					Offset check at cold temperature conditions active	=FALSE	
)		(
				(

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Position of the throttle valve	>A*C1(V)	(Return spring check aborted	=TRUE
for time	>0.36(s)	OR		
)			Return spring check successful	=TRUE
OR		)	Return spring check fault is set	=FALSE
)		
(		OR		
Limp air position is implausible	=FALSE	Device type	>0	
)		
First learning performed	=TRUE	(
Position of the throttle valve	>Limp home position of throttle valve + 3%(%)	Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)	
		(
Limp air position is implausible when:		(
Absolute difference of the deviation of limp air position sensor voltage at ECU start from lower mechanical stop position sensor voltage and the deviation of actual learned limp air position sensor voltage from lower mechanical stop position sensor voltage	>0.155(V)	Offset learning active	=TRUE	
for time	>0.36(s)	OR		
)		(
Where:		Offset learning active	=FALSE	
(A) Gradient of the throttle valve angle	=100% / ((V12 - V11) + (V21 - V22)) * 0.5(%A/)	(
(C1) Threshold for maximum absolute limp air position allowed	=1.31(V)	The powerstage of the throttle actuator is commanded on	=TRUE	
(V12) Actual learned sensor voltage of sensor 1 at the upper mechanical stop		Battery voltage	>7.5(V)	
(V11) Actual learned sensor voltage of sensor 1 at the lower mechanical stop)		
(V21) Actual learned sensor voltage of sensor 2 at the lower mechanical stop)		
(V22) Actual learned sensor voltage of sensor 2 at the upper mechanical stop		OR		
		Power save is active	=TRUE	
)		

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Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(ECU is in drive state	=TRUE
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
(
The powerstage of the throttle actuator is	=TRUE
commanded on	
Battery voltage	>7.5(V)
)	
)	
)	
~	

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Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P2119	Path 4: Throttle valve return spring failure while spreading the return spring for Bank 1	Position of the throttle valve	<(D1 + D2)-D3(%)	(Offset learning aborted	=FALSE	0.2(s)	1 Trip
		Where:		OR			
		(D1) Limp home position of the throttle valve	Calculated parameter(%)	Offset learning successful	=FALSE		
		(D2) Value by which return spring is spread starting from power off position	=15(%))			
		(D3) Range for actual position (offset to desired value) to check whether return spring spread position is reached	=2(%)	Offset check at cold temperature conditions active	=FALSE		
				(
				(
				(Return spring check aborted	=TRUE		
				OR			
				Return spring check successful	=TRUE		
				/			
				Return spring check fault is set	=FALSE		
)			
				OR			
				Device type	>0		
)			
				(

Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
(
The powerstage of the throttle actuator is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
)	
(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(
First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(=TRUE
ECU is in drive state	
OR	

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ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
(
The powerstage of the throttle actuator is	=TRUE
commanded on	
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active	=TRUE
)	
Limp home driving mode requested	=FALSE
Safety fuel cut off requested	=FALSE
Torque limitation requested	=FALSE
/	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable

P2100	Path 1 : Diagnosis of the Throttle Actuator Control Bank 1 H bridge circuit for open circuit	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	(ECU is in DRIVE state =TRUE 0.0(s) 1 Trip		
			OR ECU is in POSTDRIVE state)	=TRUE		
			The powerstage of the actuator is switched on, following conditions: (State of the throttle valve powerstage bank 1)	=TRUE >0		
			Release of adaptation Actual position is valid	=FALSE =TRUE		
			Request safety fuel cut off SKA bank 1, following condition: (Request reversible safety fuel cut off SKA bank 1, which has following condition: (Battery voltage for throttle valve operation sufficient bank 1 OR Engine speed)	=FALSE =FALSE >7.5(V) >2000(rpm)		
			Limp home position not reached bank 1)	=FALSE		
			No pending or confirmed DTCs	=see sheet inhibit tables		
			Basic enable conditions met	=see sheet enable tables		
P2100	Path 2: Check throttle valve power stage IC for over temperature	Over temperature error from the power stage is detected	=TRUE	(ECU is in DRIVE state =TRUE 0.01(s) 1 Trip		
			OR ECU is in POSTDRIVE state)	=TRUE		
			The powerstage of the actuator is switched on, following conditions: (State of the throttle valve powerstage bank 1)	=TRUE >0		
			Release of adaptation	=CAI qc		

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Actual position is valid	=TRUE
Request safety fuel cut off SKA bank 1, following condition:	=FALSE
{	
Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE
{	
Battery voltage for throttle valve operation sufficient bank 1	>7.5(V)
OR	
Engine speed	>2000(rpm)
}	
Limp home position not reached bank 1	=FALSE
}	
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P2100	Path 3 : Diagnoses the Turbine bypass valve H bridge high side driver circuit at out 1 for circuit low fault	Voltage low during driver ON state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between signal and controller ground	(ECU is in DRIVE state	=TRUE	0.01(s)	1 Trip
		OR					
	Diagnoses the Turbine bypass valve H bridge low side driver circuit at out 2 for circuit high fault	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between signal and controller power	OR ECU is in POSTDRIVE state	=TRUE		
				The powerstage of the actuator is switched on, following conditions:	=TRUE		
				{			
				State of the throttle valve powerstage bank 1	>0		
				}			
				Release of adaptation	=FALSE		
				Actual position is valid	=TRUE		
				Request safety fuel cut off SKA bank 1, following condition:	=FALSE		
				{			
				Request reversible safety fuel cut off SKA bank 1, which has following condition:	=FALSE		
				{			
				Battery voltage for throttle valve operation sufficient bank 1	>7.5(V)		
				OR			

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					Engine speed	>2000(rpm)		
)			
					Limp home position not reached bank 1	=FALSE		
)			
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
89. COM - THROTTLE ACTUATOR - B2 DIAGNOSIS	P218A	Throttle actuator Bank2 first initialization - lower mechanical stop learning fail			(Offset learning aborted	=FALSE	0.01(s)	1 Trip
			Initial learning of the closed throttle valve position has started	TRUE	OR			
			Aborted due to one of the enable conditions no longer being fulfilled (see secondary parameters)	TRUE	Offset learning successful	=FALSE		
))			
			OR		Offset check at cold temperature conditions active	=FALSE		
		First learning of closed mechanical stop: Throttle position at lower mechanical stop	Lower mechanical stop offset learning aborted at step 1 (moving throttle valve to the closed position) due to the following reason (closed position has not reached):		(
			(		( Return spring check aborted	=TRUE		
			(		OR			
			Difference between actual throttle position sensor2 at	>1.5(%)	Return spring check successful	=TRUE		
))			
					Return spring check fault for bank 2 is set	=FALSE		
)			
			for time	>1(s)	OR			
			)		Device type	>0		
			OR)			
			Lower mechanical stop offset learning aborted at step 2 (pressing throttle valve to the low mechanical stop with certain force) due to the following reason (duty cycle ratio has not reached threshold):		(		>29(s)	
					Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time			
					(

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First learning of closed mechanical stop: Duty cycle at lower mechanical stop and resulting change in sensor voltage	((
	Calculated duty cycle ratio	<60(%)	Offset learning active	=TRUE
	)		OR	
	for time	>1(s)	(
Range check of learned sensor voltage at low mechanical stop	OR		Offset learning active	=FALSE
	Lower mechanical stop offset learning aborted at step 3 (sensor offset learning at low mechanical stop) due to one of the the following conditions:		(
	(		The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
	Lower mechanical stop voltage sensor 1	>0.58(V)	Battery voltage	>7.5(V)
	OR)	
)	
	Lower mechanical stop voltage sensor 1	<0.33(V)	OR	
	OR		Power save is active for bank 2	=TRUE
	Lower mechanical stop voltage sensor 2	>4.67(V))	
	OR		Limp home driving mode requested for bank 2	=FALSE
	Lower mechanical stop voltage sensor 2	<4.42(V)	Safety fuel cut off requested for bank 2	=FALSE
			Torque limitation requested for bank 2	=FALSE
))	
			(Long term and short term adaptation chosen	=FALSE
			OR	
			(Long term and short term adaptation chosen	=TRUE
			Long term and short term is released	=TRUE
)	
)	
			OR	
			(
			(First learning performed	=FALSE
			OR	

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Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)

Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

PID	Parameter Name	Unit	Value	Condition	Result
P218A	Throttle actuator Bank2 - lower mechanical stop learning fail			(Offset learning aborted	=FALSE
	Lower mechanical stop offset learning aborted at step 2 (pressing throttle valve to the low mechanical stop with certain force) due to the following reason (duty cycle ratio has not reached threshold):)	
	(Calculated duty cycle ratio	<60(%)		Offset learning successful	=FALSE
	for time	>1(s)		) Offset check at cold temperature conditions active	=FALSE
)			(
	OR			(Return spring check aborted	=TRUE
	Lower mechanical stop offset learning aborted at step 3 (sensor offset learning at low mechanical stop) due to one of the the following conditions:			OR	
	(			Return spring check successful	=TRUE
	Lower mechanical stop voltage sensor 1	>0.58(V)		Return spring check fault for bank 2 is set	=FALSE
	OR			) OR	
	Lower mechanical stop voltage sensor 1	<0.33(V)		Device type	>0
	OR)	
	Lower mechanical stop voltage sensor 2	>4.67(V)		(Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)
	OR			(
				(
				(

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Lower mechanical stop voltage sensor 2	<4.42(V)	Offset learning active	=TRUE
)		OR	
		(Offset learning active	=FALSE
		(The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
		Battery voltage	>7.5(V)
)	
)	
		OR	
		Power save is active for bank 2	=TRUE
)	
		Limp home driving mode requested for bank 2	=FALSE
		Safety fuel cut off requested for bank 2	=FALSE
		Torque limitation requested for bank 2	=FALSE
)	
		(Long term and short term adaptation chosen	=FALSE
		OR	
		(Long term and short term adaptation chosen	=TRUE
		Long term and short term is released	=TRUE
)	
)	
		OR	
		(
		(First learning performed	=FALSE
		OR	
		Limp air position is not plausible	=TRUE
		OR	
		External trigger to start offset learning	=TRUE
)	
		(=TRUE
		ECU is in drive state	
		OR	
		ECU is in post drive state for time	>5(s)
)	
)	
		OR	

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ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

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P30E5	Path 1: Throttle position at lower mechanical stop exceeded maximum limit for Throttle Position Sensor Bank 2	Step 1 (Learning of the closed throttle valve position):	(Offset learning aborted	=FALSE	1(s)	1 Trip
		Actuator throttle position	$>(V_{max} - V) * T_{grad} + \text{Offset}(\%)$	OR		
		Where:		Offset learning successful	=FALSE	
		Vmax (Maximum voltage value allowed at mechanical stop, position sensor bank 2)	=0.58(V)	Offset check at cold temperature conditions active	=FALSE	
		V (Actual learned sensor voltage of sensor bank 2 at the lower mechanical stop)	=sensed voltage(V)	(
		Tgrad (Gradient of the throttle valve angle versus sensor bank 2 voltage)	=calculated value(% / V)	(
		Offset (Offset to Desired position value to start ramping into mechanical stop)	=1.5(%)	OR		
				Return spring check aborted	=TRUE	
				Return spring check successful	=TRUE	
)		
	Path 2: Range check of learned sensor voltage at lower mechanical stop for Throttle Position Sensor Bank 2 : Maximum learning limit exceeded	Low mechanical stop first learning has been performed	=TRUE	Return spring check fault for bank 2 is set	=FALSE	
		and		OR		
		Step 3 (If no fault in step 2 then check range of learned sensor voltages at lower mechanical stop):		Device type	>0	
		Actual learned sensor voltage of sensor 1 at the mechanical stop	>0.58(V)	(
		OR		Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)	
		Actual learned sensor voltage of sensor 2 at the mechanical stop	>4.67(V)	(
				(
				(
				Offset learning active	=TRUE	
				OR		
				{		
				Offset learning active	=FALSE	
				(

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The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(
First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	

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Offset learning will be enabled when below conditions are satisfied	=TRUE
(
Offset learning active	=TRUE
OR	
Offset learning active	=FALSE
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

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P30E6	Range check of learned sensor voltage at lower mechanical stop for Throttle Position Sensor Bank 2: Minimum learnina limit exceeded	Low mechanical stop first learning has been performed	=TRUE	(Offset learning aborted	=FALSE	1(s)	1 Trip
		and		OR			
		Step 3 (If no fault in step 2 then check range of learned sensor voltages at lower mechanical stop):		Offset learning successful	=FALSE		
		Actual learned sensor voltage of sensor 1 at the mechanical stop	<0.58(V))			
		Actual learned sensor voltage of sensor 2 at the mechanical stop	<4.67(V)	(
		((
		Actual learned sensor voltage of sensor 1 at the mechanical stop	<0.33(V)	Return spring check aborted	=TRUE		
		OR		OR			
		Actual learned sensor voltage of sensor 2 at the mechanical stop	<4.42(V)	Return spring check successful	=TRUE		
		)		Return spring check fault for bank 2 is set	=FALSE		
)			
				OR			
				Device type	>0		
)			
				(
				Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)		
				(
				{			
				(
				Offset learning active	=TRUE		
				OR			
				{			
				Offset learning active	=FALSE		
				(
				The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE		
				Battery voltage	>7.5(V)		
)			
)			
)			
				OR			
				Power save is active for bank 2	=TRUE		
				\			

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Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(
First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Return to normal	=FALSE

Code	Description	Condition	Value	Unit	Trips
P210B	Rationality check of throttle actuator control Bank 2 deviation - Actual actuator position is continuously monitored against commanded value	(Difference between actual actuator position and its commanded value > A * B + C(%) OR ECU is in POSTDRIVE state)	=TRUE	0.5(s)	1 Trip

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Difference between commanded value and actual actuator position	$>(A * B + C)(\%)$	(Powerstage switched off by diagnosis	TRUE
))	
Where:		for time	$>0.8(s)$
(A) Rate of change of the commanded value	=calculated value(% / s)	The powerstage of the actuator is switched on, following conditions:	=TRUE
(B) Factor for allowed control deviation	=0.02	(
(C) Allowed control deviation in steady state	=5(%)	State of the throttle valve powerstage bank 2	>0
)	
		Release of adaptation	=FALSE
		Actual position is valid	=TRUE
		Request safety fuel cut off SKA bank 2, following condition:	=FALSE
		(
		Request reversible safety fuel cut off SKA bank 2, which has following condition:	=FALSE
		/	
		Battery voltage for throttle valve operation sufficient bank 2	$>7.5(V)$
		OR	
		Engine speed	$>2000(rpm)$
)	
		Limp home position not reached bank 2	=FALSE
)	
		No pending or confirmed DTCs	=see sheet inhibit tables
		Basic enable conditions met	=see sheet enable tables

P0639	Range check of Throttle Actuator Control duty cycle Bank 2	Absolute value of Throttle valve duty cycle ratio bank 2	$>\text{Minimum}(A, (B * C))(\%)$ (ECU is in DRIVE state	TRUE	0.6001(s)	1 Trip
-------	--	---	---	------	-----------	--------

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		A - Upper threshold for Throttle Actuator Control duty cycle Bank 2 diagnosis in case of low battery voltage	95(%)	ECU is in POSTDRIVE state)	=TRUE		
		B - Upper threshold for Throttle Actuator Control duty cycle bank 2 diagnosis	80(%)	Absolute value of position controller of the throttle valve bank 2 of motor bench one / gradient of the filtered desired value	<78.1(%/s)		
		C - Factor for battery voltage compensation bank 2	=13.5V / measured battery voltage [V]	The powerstage of the actuator is switched on, following conditions:	=TRUE		
				(State of the throttle valve powerstage bank 2)	>0		
				Release of adaptation Actual position is valid	=FALSE =TRUE		
				Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
				(Request reversible safety fuel cut off SKA bank 2, which has following condition:	=FALSE		
				(Battery voltage for throttle valve operation sufficient bank 2	=TRUE		
				OR Engine speed	>2000(rpm)		
				) Limp home position not reached bank 2	=FALSE		
				) Battery voltage for throttle valve operation sufficient for bank 2	=TRUE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P30E7	Path 2: Range check of limp air position for Bank 2 - high	Difference between actual learned sensor voltage of sensor 1 at limp air position after mean value calculation and actual learned sensor voltage of sensor 1 at the lower mechanical stop	>1.31(V)	(Offset learning aborted	=FALSE	0.01(s)	1 Trip
		OR		OR			

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Difference between actual learned sensor voltage of sensor 2 at the lower mechanical stop and actual learned sensor voltage of sensor 2 at limp air position after mean value calculation	>1.31(V)	Offset learning successful	=FALSE
)	
		Offset check at cold temperature conditions active	=FALSE
		(
		(
		(Return spring check aborted	=TRUE
		OR	
		Return spring check successful	=TRUE
)	
		Return spring check fault for bank 2 is set	=FALSE
)	
		OR	
		Device type	>0
)	
		(
		Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)
		(
		(
		(
		Offset learning active	=TRUE
		OR	
		(
		Offset learning active	=FALSE
		(
		The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
		Battery voltage	>7.5(V)
)	
)	
		OR	
		Power save is active for bank 2	=TRUE
)	
		Limp home driving mode requested for bank 2	=FALSE
		Safety fuel cut off requested for bank 2	=FALSE
		Torque limitation requested for bank 2	=FALSE
		,	

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(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(
First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	

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Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P30E7	Path 3: Range check of limp air position for Bank 2 - low	Difference between actual learned sensor voltage of sensor 1 at limp air position after mean value calculation and actual learned sensor voltage of sensor 1 at the lower mechanical stop	<0.87(V)	(Offset learning aborted	=FALSE	0.01(s)	1 Trip
		OR Difference between actual learned sensor voltage of sensor 2 at the lower mechanical stop and actual learned sensor voltage of sensor 2 at limp air position after mean value calculation	<0.87(V)	OR Offset learning successful)	=FALSE		
				Offset check at cold temperature conditions active (((Return spring check aborted	=FALSE =TRUE		
				OR Return spring check successful)	=TRUE		

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Return spring check fault for bank 2 is set	=FALSE
)	
OR	
Device type	>0
)	
(
Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(
First learning performed	=FALSE
OR	

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Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(	=TRUE
ECU is in drive state	
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)

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				Intake air temperature before throttle valve	<143.26(°C)		
				Intake air temperature before throttle valve	>5.26(°C)		
				Engine coolant temperature	<100.46(°C)		
				Engine coolant temperature	>5.26(°C)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P30E7	Path 4: Limp air position drift (Bank 2 - comparison with lower mechanical stop sensor voltage	(	Offset learning aborted	=FALSE	0.01(s)	1 Trip	
	Actual offset learning step and	=4	OR				
	(|A - B|) Absolute value of the actual learned value minus last stored value	>0.155(V)	Offset learning successful	=FALSE			
	Where:		)	Offset check at cold temperature conditions active	=FALSE		
	A	=(A1 + A2) / 2(V)	(	Return spring check aborted	=TRUE		
	B	=(B1 + B2)/2(V)	OR				
	A1	=A11 - A12(V)	Return spring check successful	=TRUE			
	A2	=A22- A21(V)	Return spring check fault for bank 2 is set	=FALSE			
	B1	=B11 - B12(V)	)	OR			
	B2	=B22-B21(V)	Device type	>0			
	(A11) Learned sensor voltage of sensor 1 at limp air position, bank 2)				
	(A12) Learned reference sensor voltage of sensor 1 at the lower mechanical stop, bank 2		(	Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)		
	(A22) Learned reference sensor voltage of sensor 2 at the lower mechanical stop		(
	(A21) Learned sensor voltage of sensor 2 at limp air position, bank 2		(Offset learning active	=TRUE		

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(B11) Actual learned sensor voltage of sensor 1 at limp air position after mean value calculation	OR	
(B12) Learned reference sensor voltage of sensor 1 at the lower mechanical stop, bank 2	(
(B22) Learned reference sensor voltage of sensor 2 at the lower mechanical stop, bank 2	Offset learning active	=FALSE
(B21) Actual learned sensor voltage of sensor 2 at limp air position after mean value calculation	(
)	The powerstage of the throttle actuator for bank 2 is commanded on Battery voltage	=TRUE >7.5(V)
)	
)	
	OR	
	Power save is active for bank 2	=TRUE
)	
	Limp home driving mode requested for bank 2	=FALSE
	Safety fuel cut off requested for bank 2	=FALSE
	Torque limitation requested for bank 2	=FALSE
)	
	(Long term and short term adaptation chosen	=FALSE
	OR	
	(Long term and short term adaptation chosen	=TRUE
	Long term and short term is released	=TRUE
)	
)	
	OR	
	(
	(
	First learning performed	=FALSE
	OR	
	Limp air position is not plausible	=TRUE
	OR	
	External trigger to start offset learning	=TRUE

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(ECU is in drive state	=TRUE
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)

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No pending or confirmed DTCs

=see sheet inhibit
tables

Basic enable conditions met

=see sheet enable
tables

P211D	Path 1: Throttle valve opening spring check - opening failure for Bank 2	Here it is checked whether opening spring can be returned by mechanical force only to the defined limp home position in the defined time	(	Offset learning aborted	=FALSE	0.26(s)	1 Trip
		Actual offset learning step	=4	OR			
		(		Offset learning successful	=FALSE		
		()			
		Limp air position is implausible	=TRUE	Offset check at cold temperature conditions active	=FALSE		
		OR		(
		First learning performed	=FALSE	(
				(	Return spring check aborted	=TRUE	
		)		OR			
		Position of the throttle valve	<A * C1 (%)	Return spring check successful	=TRUE		
		for time	>0.26(s)	/			
				Return spring check fault for bank 2 is set	=FALSE		
))			
		OR		OR			
				Device type	>0		
		()			
		Limp air position is implausible	=FALSE	(
				Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)		
		First learning performed	=TRUE	{			
		Position of the throttle valve	<Limp home position of throttle valve - 3%(%)	(
				Offset learning active	=TRUE		
		Limp air position is implausible when:		OR			
		Absolute difference of the deviation of limp air position sensor voltage at ECU start from lower mechanical stop position sensor voltage and the deviation of actual learned limp air position sensor voltage from lower mechanical stop position sensor voltage	>0.155(V)	(
		for time	>0.26(s)	Offset learning active	=FALSE		

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)		(
)			
Where:		The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
(A) Gradient of the throttle valve angle	=100% / ((V12 - V11) + (V21 - V22)) * 0.5(%A/)	Battery voltage	>7.5(V)
(C1) Threshold for minimum absolute limp air position allowed	=0.87(V))	
(V12) Actual learned sensor voltage of sensor 1 at the upper mechanical stop)	
(V11) Actual learned sensor voltage of sensor 1 at the lower mechanical stop)	
(V21) Actual learned sensor voltage of sensor 2 at the lower mechanical stop		OR	
(V22) Actual learned sensor voltage of sensor 2 at the upper mechanical stop			
		Power save is active for bank 2	=TRUE
)	
		Limp home driving mode requested for bank 2	=FALSE
		Safety fuel cut off requested for bank 2	=FALSE
		Torque limitation requested for bank 2	=FALSE
)	
		(Long term and short term adaptation chosen	=FALSE
		OR	
		(Long term and short term adaptation chosen	=TRUE
		Long term and short term is released	=TRUE
)	
)	
		OR	
		(
		(
		First learning performed	=FALSE
		OR	
		Limp air position is not plausible	=TRUE
		OR	
		External trigger to start offset learning	=TRUE
)	
		(ECU is in drive state	=TRUE
		OR	
		ECU is in post drive state for time	>5(s)
)	
)	
)	

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ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

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P211D	Path 2: Throttle valve opening spring failure while spreading the opening spring for Bank 2	Position of the throttle valve	>1 + B1 + B2(%)	(Offset learning aborted	=FALSE	0.3(s)	1 Trip
		Where:		OR			
		(B1) Offset for the lower mechanical stop because of dirt	Calculated Parameter(%)	Offset learning successful	=FALSE		
		(B2) Range for actual position (offset to desired value) to check whether open spring spread position is reached	=1(%)	Offset check at cold temperature conditions active	=FALSE		
				(
				(
				(Return spring check aborted	=TRUE		
				OR			
				Return spring check successful	=TRUE		
				Return spring check fault for bank 2 is set	=FALSE		
)			
				OR			
				Device type	>0		
)			
				(
				Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)		
				(
				{			
				(
				Offset learning active	=TRUE		
				OR			
				{			
				Offset learning active	=FALSE		
				(
				The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE		
				Battery voltage	>7.5(V)		
)			
)			
				OR			
				Power save is active for bank 2	=TRUE		
)			
				Limp home driving mode requested for bank 2	=FALSE		
				Safety fuel cut off requested for bank 2	=FALSE		

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Torque limitation requested for bank 2	=FALSE
)	
(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(ECU is in drive state	=TRUE
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
Offset learning active	=TRUE
OR	
/	
Offset learning active	=FALSE
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
)	
OR	

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Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P211D	Path 3: Throttle valve return spring failure check for Bank 2	(	(	Offset learning aborted	=FALSE	0.36(s)	1 Trip
)					
	Limp air position is implausible	=TRUE	OR				
	OR			Offset learning successful	=FALSE		
	First learning performed	=FALSE	)	Offset check at cold temperature conditions active	=FALSE		
)		(
	Position of the throttle valve	>A * C 1 (V)	(	Return spring check aborted	=TRUE		
	for time	>0.36(s)	OR				
	)			Return spring check successful	=TRUE		
	OR			Return spring check fault for bank 2 is set	=FALSE		
	()				
	Limp air position is implausible	=FALSE	OR	Device type	>0		
)				

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First learning performed	=TRUE	(
Position of the throttle valve	>Limp home position of throttle valve + 3%(%)	Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)
		(
Limp air position is implausible when:		(
Absolute difference of the deviation of limp air position sensor voltage at ECU start from lower mechanical stop position sensor voltage and the deviation of actual learned limp air position sensor voltage from lower mechanical stop position sensor voltage	>0.155(V)	Offset learning active	=TRUE
for time	>0.36(s)	OR	
)		(
Where:		Offset learning active	=FALSE
(A) Gradient of the throttle valve angle	=100% / ((V12 - V11) + (V21 - V22)) * 0.5(%A/)	(
(C1) Threshold for minimum absolute limp air position allowed	=1.31(V)	The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
(V12) Actual learned sensor voltage of sensor 1 at the upper mechanical stop		Battery voltage	>7.5(V)
(V11) Actual learned sensor voltage of sensor 1 at the lower mechanical stop)	
(V21) Actual learned sensor voltage of sensor 2 at the lower mechanical stop)	
(V22) Actual learned sensor voltage of sensor 2 at the upper mechanical stop		OR	
		Power save is active for bank 2	=TRUE
)	
		Limp home driving mode requested for bank 2	=FALSE
		Safety fuel cut off requested for bank 2	=FALSE
		Torque limitation requested for bank 2	=FALSE
)	
		(Long term and short term adaptation chosen	=FALSE
		OR	
		(Long term and short term adaptation chosen	=TRUE

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Long term and short term is released	=TRUE
)	
)	
OR	
(
(
First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(ECU is in drive state	=TRUE
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)
)	
Offset learning will be enabled when below conditions are satisfied	=TRUE
(
(
(
Offset learning active	=TRUE
OR	
(
Offset learning active	=FALSE
)	
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
,	

Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

P211D	Path 4: Throttle valve return spring failure while spreading the return spring for Bank 2	Position of the throttle valve	$<(D1 + D2) - D3(\%)$	(Offset learning aborted	=FALSE	0.2(s)	1 Trip
		Where:		OR			
		(D1) Limp home position of the throttle valve	Calculated parameter(%)	) Offset learning successful	=FALSE		
		(D2) Value by which return spring is spread starting from power off position	=15(%)	) Offset check at cold temperature conditions active	=FALSE		
		(D3) Range for actual position (offset to desired value) to check whether return spring spread position is reached	=2(%)	(
				(
				(Return spring check aborted	=TRUE		
				OR			
				) Return spring check successful	=TRUE		
				) Return spring check fault for bank 2 is set	=FALSE		
)			
				OR			
				Device type	>0		
)			
				(
				Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)		
				(
				(
				(

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Offset learning active	=TRUE
OR	
(Offset learning active	=FALSE
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
(Long term and short term adaptation chosen	=FALSE
OR	
(Long term and short term adaptation chosen	=TRUE
Long term and short term is released	=TRUE
)	
)	
OR	
(
(First learning performed	=FALSE
OR	
Limp air position is not plausible	=TRUE
OR	
External trigger to start offset learning	=TRUE
)	
(ECU is in drive state	=TRUE
OR	
ECU is in post drive state for time	>5(s)
)	
)	
OR	
ECU is in post drive state for time	>5(s)

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Offset learning will be enabled when below conditions are satisfied	=TRUE
(
Offset learning active	=TRUE
OR	
Offset learning active	=FALSE
(
The powerstage of the throttle actuator for bank 2 is commanded on	=TRUE
Battery voltage	>7.5(V)
)	
)	
OR	
Power save is active for bank 2	=TRUE
)	
Limp home driving mode requested for bank 2	=FALSE
Safety fuel cut off requested for bank 2	=FALSE
Torque limitation requested for bank 2	=FALSE
)	
Vehicle speed	<0.62(mph)
Engine speed	<300(rpm)
Battery voltage	<16(V)
Battery voltage	>10(V)
Intake air temperature before throttle valve	<143.26(°C)
Intake air temperature before throttle valve	>5.26(°C)
Engine coolant temperature	<100.46(°C)
Engine coolant temperature	>5.26(°C)
No pending or confirmed DTCs	=see sheet inhibit tables
Basic enable conditions met	=see sheet enable tables

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P210A	Path 1 : Diagnosis of the Throttle Actuator Control Bank 2 H bridge circuit for open circuit	Voltage low during driver OFF state (indicates open circuit)	Open Circuit: > 200 K Q impedance between ECU pin and load	(ECU is in DRIVE state	=TRUE	0.8(s)	1 Trip
				OR ECU is in POSTDRIVE state	=TRUE		
)			
				The powerstage of the actuator is switched on, following conditions:	=TRUE		
				{			
				State of the thottle valve powerstage bank 2	>0		
				}			
				Release of adaptation	=FALSE		
				Actual position is valid	=TRUE		
				Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
{							
Request reversible safety fuel cut off SKA bank 2, which has following condition:	=FALSE						
{							
Battery voltage for throttle valve operation sufficient bank 2	>7.5(V)						
OR							
Engine speed	>2000(rpm)						
}							
Limp home position not reached bank 2	=FALSE						
}							
No pending or confirmed DTCs	=see sheet inhibit tables						
Basic enable conditions met	=see sheet enable tables						
P210A	Path 2: Check throttle valve power stage IC for over temperature	Over temperature error from the power stage is detected	=TRUE	(ECU is in DRIVE state	=TRUE	0.01(s)	1 Trip
				OR ECU is in POSTDRIVE state	=TRUE		
)			
				The powerstage of the actuator is switched on, following conditions:	=TRUE		
				{			
				State of the thottle valve powerstage bank 2	>0		
				}			
				Release of adaptation	=FALSE		

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				Actual position is valid	=TRUE		
				Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
				{			
				Request reversible safety fuel cut off SKA bank 2, which has following condition:	=FALSE		
				/			
				Battery voltage for throttle valve operation sufficient bank 2	>7.5(V)		
				OR			
				Engine speed	>2000(rpm)		
				}			
				Limp home position not reached bank 2	=FALSE		
				}			
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P210A	Path 3 : Diagnoses the Turbine bypass valve H bridge high side driver circuit at out 1 for circuit low fault	Voltage low during driver ON state (indicates short circuit to ground)	Short to ground: < 0.5 Q impedance between signal and controller ground	(ECU is in DRIVE state	=TRUE	0.01(s)	1 Trip
		OR					
	Diagnoses the Turbine bypass valve H bridge low side driver circuit at out 2 for circuit high fault	Voltage high during driver ON state (indicates short circuit to battery)	Short to power: < 0.5 Q impedance between signal and controller power	OR ECU is in POSTDRIVE state)	=TRUE		
				The powerstage of the actuator is switched on, following conditions:	=TRUE		
				{			
				State of the throttle valve powerstage bank 2	>0		
				}			
				Release of adaptation	=FALSE		
				Actual position is valid	=TRUE		
				Request safety fuel cut off SKA bank 2, following condition:	=FALSE		
				{			
				Request reversible safety fuel cut off SKA bank 2, which has following condition:	=FALSE		
				{			
				Battery voltage for throttle valve operation sufficient bank 2	>7.5(V)		
				OR			

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					Engine speed	>2000(rpm)		
) Limp home position not reached bank 2	=FALSE		
) No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
90. COOLING FANS PERFORMANCE MONITORS	P30EF	Fan1 speed out of range high	Fan speed	>4999(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P30EE	Fan1 speed out of range low	Fan speed	<-109(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
	P0495	Fan1 Speed performance	Actual fan speed - Max estimated fan speed (see Look-Up-Table #34)	>1300 to 4050(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
					Percent cooling fan commanded	<101(%)		
					Basic enable conditions met	=see sheet enable tables		
	P0494	Fan1 Speed performance	Actual fan speed (see Look-Up-Table #35)	<0 to 3550(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
					(Time since fan commanded on	>5(s)		
					OR (Fan speed	<1000(rpm)		
					Time since fan commanded on))	>6(s)		
					Commanded fan speed			
					(Percent cooling fan commanded with hysteresis)	>7.65(%) <7.64(%)		

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				Basic enable conditions met	=see sheet enable tables		
U1314	Fan1 communication via CAN	Fan1 communication error reported	=TRUE	Ignition is on	=TRUE	10(events)	2 Trip
				Battery Voltage Basic enable conditions met	>9.5(V) =see sheet enable tables		
P30F1	Fan2 speed out of range high	Fan speed	>4999(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P30F0	Fan2 speed out of range low	Fan speed	<-109(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P2CBA	Fan2 Speed performance	Actual fan speed - Max estimated fan speed (see Look-Up-Table #36)	>1400 to 4050(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				Percent cooling fan commanded	<101(%)		
				Basic enable conditions met	=see sheet enable tables		
P2CB9	Fan2 Speed performance	Actual fan speed (see Look-Up-Table #37)	<0 to 3550(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				(Time since fan commanded on	>5(s)		
				OR (Fan speed	<1000(rpm)		
				Time since fan commanded on))	>6(s)		
				Commanded fan speed			
				(Percent cooling fan commanded with hysteresis)	>7.65(%) <7.64(%)		

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				Basic enable conditions met	=see sheet enable tables		
U1315	Fan2 communication via CAN	Fan2 communication error reported	=TRUE	Ignition is on	=TRUE	10(events)	2 Trip
				Battery Voltage Basic enable conditions met	>9.5(V) =see sheet enable tables		
P14E0	Fan3 speed out of range high	Fan speed	>4999(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P14DF	Fan3 speed out of range low	Fan speed	<-109(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P14D8	Fan3 Speed performance	Actual fan speed - Max estimated fan speed (see Look-Up-Table #38)	>1300 to 4800(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				Percent cooling fan commanded	<101(%)		
				Basic enable conditions met	=see sheet enable tables		
P14D7	Fan3 Speed performance	Actual fan speed (see Look-Up-Table #39)	<0 to 4300(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				(Time since fan commanded on	>5(s)		
				OR (Fan speed	<1000(rpm)		
				Time since fan commanded on))	>6(s)		
				Commanded fan speed			
				(Percent cooling fan commanded with hysteresis)	>7.65(%) <7.64(%)		

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				Basic enable conditions met	=see sheet enable tables		
U1384	Fan3 communication via CAN	Fan3 communication error reported	=TRUE	Ignition is on	=TRUE	10(events)	2 Trip
				Battery Voltage Basic enable conditions met	>9.5(V) =see sheet enable tables		
P14DE	Fan4 speed out of range high	Fan speed	>4999(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P14DD	Fan4 speed out of range low	Fan speed	<-109(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
P14DC	Fan4 Speed performance	Actual fan speed - Max estimated fan speed (see Look-Up-Table #40)	>1300 to 4800(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				Percent cooling fan commanded	<101(%)		
				Basic enable conditions met	=see sheet enable tables		
P14DB	Fan4 Speed performance	Actual fan speed (see Look-Up-Table #41)	<0 to 4300(rpm)	Battery Voltage	>9.5(V)	20(s)	2 Trip
				(Time since fan commanded on	>5(s)		
				OR (Fan speed	<1000(rpm)		
				Time since fan commanded on))	>6(s)		
				Commanded fan speed			
				(Percent cooling fan commanded with hysteresis)	>7.65(%) <7.64(%)		

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					Basic enable conditions met	=see sheet enable tables		
	U1385	Fan4 communication via CAN	Fan4 communication error reported	=TRUE	Ignition is on	=TRUE	10(events)	2 Trip
					Battery Voltage Basic enable conditions met	>9.5(V) =see sheet enable tables		
91. COM - ECM 5 VOLT SENSOR REFERENCE - 1 TO 4 DIAGNOSIS	P0641	Sensor supply voltage circuit over temperature	Circuit temperature	>170(°C)	Ignition is ON	=TRUE	0.5(s)	1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P0641	Sensor supply voltage circuit overvoltage	Voltage ratio between supply voltage output and reference voltage (+5V)	>1.06	Ignition is ON	=TRUE	0.5(s)	1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P0641	Sensor supply voltage circuit short circuit to ground	Supply voltage	<1(V)	Ignition is ON	=TRUE	0.5(s)	1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P0641	Sensor supply voltage circuit undervoltage	Voltage ratio between supply voltage output and reference voltage (+5V)	<0.94	Ignition is ON	=TRUE	0.5(s)	1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	P0651	Sensor supply voltage circuit over temperature	Circuit Temperature	>170(°C)	Ignition is ON	=TRUE	0.5(s)	1 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		

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P0651	Sensor supply voltage circuit overvoltage	Voltage ratio between supply voltage output and reference voltage (+5V)	>1.06	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0651	Sensor supply voltage short circuit to Ground	Supply voltage	<1(V)	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0651	Sensor supply voltage circuit undervoltage	Voltage ratio between supply voltage output and reference voltage (+5V)	<0.94	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0697	Sensor supply voltage circuit over temperature	Circuit Temperature	>170(°C)	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0697	Sensor supply voltage circuit overvoltage	Voltage ratio between supply voltage output and reference voltage (+5V)	>1.06	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0697	Sensor supply voltage short circuit to Ground	Supply voltage	<1(V)	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		

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P0697	Sensor supply voltage circuit undervoltage	Voltage ratio between supply voltage output and reference voltage (+5V)	<0.94	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P06A3	Sensor supply voltage circuit over temperature	Circuit Temperature	>170(°C)	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P06A3	Sensor supply voltage circuit overvoltage	Voltage ratio between supply voltage output and reference voltage (+5V)	>1.06	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P06A3	Sensor supply voltage short circuit to Ground	Supply voltage	<1(V)	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P06A3	Sensor supply voltage circuit undervoltage	Voltage ratio between supply voltage output and reference voltage (+5V)	<0.94	Ignition is ON	=TRUE	0.5(s)	1 Trip
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P1176	The FTZM raw sensor reference voltage is measured and provided via CAN to the ECM. The ECM monitors value provided from the FTZM and is rationalized for Sensor Supply 1.	Following conditions for time	>0(s)	Ignition ON	=FALSCH	40(counts)	2 Trip
		FTZM reference 1 voltage (converted in ECM to percent of reference to rationalize) OR	<92.3(%)	ECM and CAN bus awake for transmission (meaning CAN awaken by BCM or ECM) Battery Voltage	=TRUE =>0(V)		

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			FTZM reference 1 voltage (converted in ECM to percent OR	<87.75(%)	No pending or confirmed DTCs	=see sheet inhibit tables	
			I (a) -(b) | where: (a) is the filtered FTZM supply voltage 1 (b) is FTZM raw supply voltage 1	>1.1(%) calculated parameter =measured parameter	Basic enabling conditions are met	=see sheet enable tables	
	P1177	The FTZM raw sensor reference voltage is measured and provided via CAN to the ECM. The ECM monitors value provided from the FTZM and is rationalized for Sensor Supply 2.	Following conditions for time	>0(s)	Ignition ON	=FALSCH	40(counts) 2 Trip
			FTZM reference 2 voltage (converted in ECM to percent of reference to rationalize) OR	<92.3(%)	ECM and CAN bus awake for transmission (meaning CAN awaken by BCM or ECM)	=TRUE	
			FTZM reference 2 voltage (converted in ECM to percent OR	<87.75(%)	Battery Voltage No pending or confirmed DTCs	>0(V) =see sheet inhibit tables	
					Basic enabling conditions are met	=see sheet enable tables	
			I (a) -(b) | where: (a) is the filtered FTZM supply voltage 2 (b) is FTZM raw supply voltage 2	>1.1(%) calculated parameter =measured parameter			
92. COM - ECM MAIN RELAY	P0690	Detection of sticky main realy for non permanently supplied system	ECU is switched on after the Main Relay was not opened	=TRUE	Current control state of the Main Relay is set to open	=TRUE	2 Trip
			ECU was still powered during shutdown for time	>0.5(s)	Basic enable conditions met No pending or confirmed DTCs	=see sheet enable tables =see sheet inhibit tables	
	P0689	Monitoring of ECM/PCM Power Relay Circuit Low fault	ECU is switched off before "End of Shutdown" was reached	=TRUE	Engine is in running state	=TRUE	1 Trip
			for number of counts	>3(counts)	End of shutdown was not reached Basic enable conditions met	=TRUE =see sheet enable tables	

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93. CCM - GENERATOR F-TERMINAL	P0626	Key-On Test for F-Terminal	Filtered duty cycle of the Terminal-F input	>65(%)	Ignition is on	=True	5(s)	1 Trip
					Engine is in starting mode	=True		
					Engine Speed	=0(RPM)		
					Engine crank fault	=False		
					Cam sensors fault	=False		
					Vehicle Speed	<0.62(mph)		
					Basic enable conditions met	=see sheet enable tables		
	P0625	Run Test for F-Terminal	Filtered duty cycle of the Terminal-F input	<5(%)	Ignition is on	=True	5(s)	1 Trip
					Engine is running	=True		
					Engine Speed	<1000(rpm)		
94. CCM - IDLE SPEED CONTROL DIAGNOSIS	P0507	Detects a negative deviation between commanded and current idle speed - engine operation mode: warm operation			ECU Sub-State in DRIVE	=TRUE	5(s)	2 Trip
			Deviation of idle speed precontrol (set point - current) and Engine speed	<-200(rpm)	Engine start has finished	=TRUE		
			Integral part of the idle speed control at its lower limit, which is the following conditions:		(No external torque demand (engine is running in idle)	=TRUE		
			A - (B+C)	<3276.7(Nm)	) for time	>10(s)		
			Where: A: Maximum torque of idle speed control B: Precontrol of the drag torque C: Current idle speed governor torque) OR		Catalyst heating is active	=FALSCH		
					Limp-home operation is not active	=TRUE		
					Safety fuel cut off is not active	=TRUE		
					Valid crankshaft signal is present	=TRUE		
					Altitude correction factor	>0.688		

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		Number of fuel cut-out phases	>255(counts)	Vehicle speed	=0(mph)		
				Intake air temperature	>-20.3(°C)		
				Engine coolant temperature	<126(°C)		
				Engine coolant temperature	>58.5(°C)		
				Time after end of start	>30(s)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enabling conditions are met	=see sheet enable tables		
P0506	Detects a positive deviation between commanded and current idle speed - engine operation mode: warm operation	Deviation of idle speed precontrol (set point - current) and Engine speed	>100(rpm)	ECU Sub-State in DRIVE	=TRUE	5(s)	2 Trip
		Integral part of the idle speed control at its upper limit, which is the following conditions:		Engine start has finished	=TRUE		
		(A+B)-C	<3276.7(Nm)	(No external torque demand (engine is running in idle)) for time	=TRUE		
		Where: A: Maximum torque of idle speed control B: Precontrol of the drag torque C: Current idle speed governor torque		Catalyst heating is active	>10(s) =FALSCH		
				Limp-home operation is not active	=TRUE		
				Safety fuel cut off is not active	=TRUE		
				Valid crankshaft signal is present	=TRUE		
				Altitude correction factor	>0.688		
				Vehicle speed	=0(mph)		
				Intake air temperature	>-20.3(°C)		
				Engine coolant temperature	<126(°C)		
				Engine coolant temperature	>58.5(°C)		
				Time after end of start	>30(s)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enabling conditions are met	=see sheet enable tables		
P0660	Monitoring open load in the Intake Manifold Tuning Valve 1 module	Fault State will be activated if the next condiction are met.	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
		means (Battery Voltage	>9(V)		
		not		Basic enable conditions met	=see sheet enable tables		

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		(Current actuator sensor data	>32.767(A)	(Open Load Diagnosis Mode is configured as 1.	=1		
		and Torque limitation value based on actuator position (absolute value)	>400(%)	or (
		)		Open Load Diagnosis Mode is configured as 2.	=2		
		and (		and status of current based Open Load diagnosis	=1.1		
		Current actuator sensor data	<-32.768(A))			
		and Torque limitation value based on actuator position (absolute value)	>400(%))			
		and		Device Library - state of powerstage enabling conditions is enable	!=0		
		Governor Deviation data (absolute value)	>400(%)				
)					
)					
P0662	Intake Manifold Tuning Valve 1 H-Bridge Open Circuit	A "Short circuit to battery for Out1 error" is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P31AD	Intake Manifold Tuning Valve 1 H-Bridge Open Circuit	A "Short circuit to battery for Out2 error" is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		

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				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P0661	Monitoring Short circuit to ground for Out 1 error Intake Manifold Tuning Valve Bank 1.	A "Short circuit to ground for Out1 error " is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	0.1(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P31AC	Monitoring Short circuit to ground for Out 2 error Intake Manifold Tuning Valve 1.	A "Short circuit to ground for Out2 error " is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	0.1(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P3140	Monitoring of the short circuit over load in the powerstage in the Intake Manifold Tuning Valve Bank 1.	A "Short Circuit over load " error is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P31B0	Monitoring of the undervoltage in the powerstage in the Intake Manifold Tuning Valve Bank 1.	A "Under Voltage error" is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip

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Battery Voltage	>9(V)
Basic enable conditions met	=see sheet enable tables
Device Library - state of powerstage enabling conditions is enable	!=0
Status of the open-load diagnosis for H-bridge	=True

P2070	Monitoring of jammed valve at (closed position Intake Manifold Tuning (IMT) Valve 1 - Stuck Closed.			Battery Voltage	<17.5(V)	0.05(s)	2 Trip
	Positive governor deviation	=TRUE		Battery Voltage	>9(V)		
	or			Basic enable conditions met	=see sheet enable tables		
	Negative governor deviation)	=TRUE		Status of IMTV1_swtConf2_C after initialization is reporting a Disturbance pressure compensation	=TRUE		
	Jammed preliminary error is reported.	=TRUE		The next conditions needs to meet (
	Governor Deviation Monitoring is reporting Closed jammed valve fault.	=TRUE		status of system monitoring 2 is not reporting a invalid disturbance pressure.	=TRUE		
					>3276.7(kPa)		
)			
				No system errors	=TRUE		
				No Frozen Actuator is detected	=TRUE		
				Actuator is available for Monitoring is indicating that Soft shutoff is active	=True		
				or			
				Actuator is available for Monitoring is indicating that Actuator is active	=True		
)			

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			Actuator test not active	=TRUE		
			First learning of end stops is not active	=TRUE		
			Sufficient Pressure is available for Actuation	=True		
			means (	=True		
			Environment pressure is above a threshold	=True		
			Brake not pressed	=True		
			time since state COENG_RUNNING was reached	>0(s)		
			)	=True		
P2071	Monitoring of jammed valve at (closed position Intake Manifold Tuning (IMT) Valve Stuck Opened Bank 1		Battery Voltage	<17.5(V)	0.05(s)	2 Trip
		Positive governor deviation	=TRUE	Battery Voltage	>9(V)	
		or		Basic enable conditions met	=see sheet enable tables	
		Negative governor deviation)	=TRUE	Status of IMTV1_swtConf2_C after initialization is reporting a Disturbance pressure compensation	=TRUE	
		Jammed preliminary error is reported.	=TRUE	The next conditions needs to meet (
		Governor Deviation Monitoring is reporting Opened jammed valve	=TRUE	status of system monitoring 2 is not reporting a invalid disturbance pressure.	=TRUE	
				Maximum limit of the disturbance pressure to deactivate the controller deviation	>3276.7(kPa)	
)		
				No system errors	=True	
				No Frozen Actuator is detected	=True	
				\		
				Actuator is available for Monitoring is indicating that Soft shutoff is active	=True	

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				Actuator is available for Monitoring is indicating that Actuator is active	=True		
				) Actuator test not active	=True		
				First learning of end stops is not active	=True		
				Sufficient Pressure is available for Actuation	=True		
				means (	=True		
				Environment pressure is above a threshold	=True		
				Brake not pressed	=True		
				Engine run time	>0(s)		
				)	=True		
P2078	Monitoring maximun range error of Intake Manifold Tuning Valve 1	Raw voltage value of position sensor	<4.8(V)	Battery Voltage	<17.5(V)	0.05(s)	2 Trip
		and		Battery Voltage	>9(V)		
		Raw voltage value of position sensor	>6.55(V)	Basic enable conditions met	=see sheet enable tables		
				/			
				Position feedback via ADC activated	=True		
				PWM Position feedback activated	=True		
				Position feedback via SENT interface activated	=True		
				)	=True		
P2077	Monitoring minimun range error of Intake Manifold Tuning Valve 1	Raw voltage value of position sensor	<0.7(V)	Battery Voltage	<17.5(V)	0.05(s)	2 Trip

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		and		Battery Voltage	>9(V)		
		Raw voltage value of position sensor	>0(V)	Basic enable conditions met	=see sheet enable tables		
				\ Position feedback via ADC activated	=True		
				PWM Position feedback activated	=True		
				Position feedback via SENT interface activated	=True		
				)	=True		
U101D	Monitoring Communication of Intake Manifold Tuning Valve 1	Comunincation error is reported.	=TRUE	Battery Voltage	<17.5(V)	0.05(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
U1387	Monitoring data error in the Intake Manifold Tuning Valve 1 module	Data error is reported.	=TRUE	Battery Voltage	<17.5(V)	0.05(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
P2076	Monitoring sensor error in the Intake Manifold Tuning Valve 1 module	Raw data value received via SENT interface	>4000	Battery Voltage	<17.5(V)	1(s)	2 Trip
		or		Battery Voltage	>9(V)		
		Raw data value received via SENT interface		Basic enable conditions met	=see sheet enable tables		

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	P2D31	Monitoring the learning limit of IMTV1 in closed position	calculated average voltage value of IMTV1 feedback position in the closed stop	>4.5(V)	Engine coolant temperature	<3000(°C)	1(s)	2 Trip
			or		Engine coolant temperature	>-3000(°C)		
			calculated average voltage value of IMTV1 feedback position in the closed stop	<4.25(V)	Battery Voltage	<17.5(V)		
					Battery Voltage	>9(V)		
					Status of the following faults:	P2078=False		
						P2077=False		
						P2076=False		
						P0660=False		
					Basic enable conditions met	=see sheet enable tables		
	P2D32	Monitoring IMTV1 Over Current	IMTV1 over current is reported by power stage	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
					Battery Voltage	>9(V)		
					Basic enable conditions met	=see sheet enable tables		
	P2D32	Monitoring IMTV1 Over Temperature	IMTV1 over temperature is reported by power stage	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
					Battery Voltage	>9(V)		
					Basic enable conditions met	=see sheet enable tables		
	P3141	Monitoring open load in the Intake Manifold Tuning Valve 2 module	Fault State will be activated if the next condiction are met.	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip

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		means (Battery Voltage	>9(V)		
		not		Basic enable conditions met	=see sheet enable tables		
		({			
		Current actuator sensor data	>32.767(A)	Open Load Diagnosis Mode is configured as 1.	=1		
		and		or			
		Torque limitation value based on actuator position (absolute value)	>399.9878(%)	(
		)		Open Load Diagnosis Mode is configured as 2.	=2		
		and		and			
		(		status of current based Open Load diagnosis	=1.0		
		Current actuator sensor data	<-32.768(A))			
		and)			
		Torque limitation value based on actuator position (absolute value)	>400(%)				
		and		Device Library - state of powerstage enabling conditions is enable	!0		
		Governor Deviation data (absolute value)	>400(%)				
)					
)					
P3143	Intake Manifold Tuning Valve2 H-Bridge Open Circuit	A "Short circuit to battery for Out1 error " is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P31AF	Intake Manifold Tuning Valve 2 H-Bridge Open Circuit	A "Short circuit to battery for Out2 error " is reported by the actuator power stage	TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
				Battery Voltage	>9(V)		

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				Basic enable conditions met	=see sheet enable tables		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P3142	Monitoring Short circuit to ground for Out 1 error in Intake Manifold Tuning Valve Bank 2	A "Short circuit to ground for Out1 error " is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	0.1(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P31AE	Monitoring Short circuit to ground for Out 2 error Intake Manifold Tuning Valve Bank 2.	A "Short circuit to ground for Out2 error " is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	0.1(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P3144	Monitoring of the short circuit over load in the powerstage in the Intake Manifold Tuning Valve 2.	A "Short Circuit over load " error is reported by the actuator power stage	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P31B1	Monitoring of the undervoltage in the noworstaoA in in the	A "Under Voltage error" is reported by the actuator nowor	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip

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2.

Battery Voltage	>9(V)
Basic enable conditions met	=see sheet enable tables
Device Library - state of powerstage enabling conditions is enable	!=0
Status of the open-load diagnosis for H-bridge	=True

P3145	Monitoring of jammed valve at (closed position of Intake Manifold Tuning (IMT)2- Stuck Closed.		Battery Voltage	<17.5(V)	0.05(s)	2 Trip
	Positive governor deviation	=TRUE	Battery Voltage	>9(V)		
	or		Basic enable conditions met	=see sheet enable tables		
	Negative governor deviation)	=TRUE	Status of IMTV2_swtConf2_C after initialization is reporting a Disturbance pressure compensation	=TRUE		
	Jammed preliminary error is reported.	=TRUE	The next conditions needs to meet (
	Governor Deviation Monitoring is reporting Closed jammed valve fault.	=TRUE	status of system monitoring 2 is not reporting a invalid disturbance pressure.	=TRUE		
			Maximum limit of the disturbance pressure to deactivate the controller deviation	>3276.7(kPa)		
)			
			No system errors	=TRUE		
			No Frozen Actuator is detected	=TRUE		
			(
			Actuator is available for Monitoring is indicating that Soft shutoff is active	=True		
			or			
			Actuator is available for Monitoring is indicating that Actuator is active	=True		
)			
			Actuator test not active	=TRUE		
			First learning of end stops is not active	=TRUE		

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				Sufficient Pressure is available for Actuation	=True		
				means (=True		
				Environment pressure is above a threshold	=True		
				Brake not pressed	=True		
				Engine run time	>0(s)		
				)	=True		
P3146	Monitoring of jammed valve at (closed position of Intake Manifold Tuning (IMT) Valve 2 - Stuck Opened.			Battery Voltage	<17.5(V)	0.05(s)	2 Trip
		Positive governor deviation or	=TRUE	Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
		Negative governor deviation	=TRUE	Status of IMTV2_swtConf2_C after initialization is reporting a Disturbance pressure compensation	=TRUE		
				The next condicions needs to meet (
		Jammmed preliminary error is reported.	=TRUE	status of system monitoring 2 is not reporting a invalid disturbance pressure.	=TRUE		
		Governor Deviation Motinoring is reporting Opened jammed valve	=TRUE		>3276.7(kPa)		
)			
				No system errors	=TRUE		
				No Frozen Actuator is detected	=TRUE		
				\			
				Actuator is available for Monitoring is indicating that Soft shutoff is active	=True		
				or			
				Actuator is available for Monitoring is indicating that Actuator is active	=True		
)			
				Actuator test not active	=TRUE		
				First learning of end stops is not active	=TRUE		

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				Sufficient Pressure is available for Actuation	=True		
				means (=True		
				Environment pressure is above a threshold	=True		
				Brake not pressed	=True		
				time since state COENG_RUNNING was reached	>0(s)		
				)	=True		
P313D	Monitoring maximum range error of Intake Manifold Tuning Valve 2	Raw voltage value of position sensor	<4.8(V)	Battery Voltage	<17.5(V)	0.05(s)	2 Trip
		and		Battery Voltage	>9(V)		
		Raw voltage value of position sensor	>6.55(V)	Basic enable conditions met	=see sheet enable tables		
				/			
				Position feedback via ADC activated	=True		
				PWM Position feedback activated	=True		
				Position feedback via SENT interface activated	=True		
				)	=True		
P313C	Monitoring minimum range error of Intake Manifold Tuning Valve 2	Raw voltage value of position sensor	<0.7(V)	Battery Voltage	<17.5(V)	0.05(s)	2 Trip
		and		Battery Voltage	>9(V)		
		Raw voltage value of position sensor	>0(V)	Basic enable conditions met	=see sheet enable tables		
				/			
				Position feedback via ADC activated	=True		
				PWM Position feedback activated	=True		
				Position feedback via SENT interface activated	=True		
				)	=True		
111019	Monitoring Communication of Intake Manifold Tuning Valve 2 reported.	Communication error is	=TRUE	Battery Voltage	<17.5(V)	0.05(s)	2 Trip

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				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
U1386	Monitoring data error in the Intake Manifold Tuning Valve 2.	Data error is reported.	=TRUE	Battery Voltage	<17.5(V)	0.05(s)	2 Trip
				Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables		
P313E	Monitoring sensor error in the Intake Manifold Tuning Valve 2 module	Raw data value received via SENT interface	>4000	Battery Voltage	<17.5(V)	1(s)	2 Trip
				or	Battery Voltage	>9(V)	
				Raw data value received via SENT interface	<500	Basic enable conditions met	=see sheet enable tables
P31B2	Monitoring the learning limit of IMTV2 in closed position	calculated average voltage value of IMTV2 feedback position in the closed stop	>4.5(V)	Engine coolant temperature	<3000(°C)	1(s)	2 Trip
				or	Engine coolant temperature	>3000(°C)	
				calculated average voltage value of IMTV2 feedback position in the closed stop	<4.25(V)	Battery Voltage	<17.5(V)
				Battery Voltage	>9(V)		
				Status of the following faults:	P313D=False		
					P313C=False		
					P313E=False		
					P3141=False		
				Basic enable conditions met	=see sheet enable tables		
P31B3	Monitoring IMTV2 Over Current	IMTV2 over current is reported by power stage	=TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip

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					Battery Voltage	>9(V)		
					Basic enable conditions met	=see sheet enable tables		
	P31B3	Monitoring IMTV2 Over Temperature	IMTV2 over temperature is reported by power stage	TRUE	Battery Voltage	<17.5(V)	1(s)	2 Trip
					Battery Voltage	>9(V)		
				Basic enable conditions met	=see sheet enable tables			
96. VARIABLE EXHAUST VALVE PERFORMANCE DIAGNOSIS	P3179	Path 1: Diagnostic Valve actuator when an internal fault is present.	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>3.33(ms)	Battery Voltage	>9(V)	4(s)	2 Trip
					Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<3.33(ms)	Basic enable conditions met	=see sheet enable tables
	Path 2: Diagnostic Valve actuator when the valve is open stuck in the end stop learning mode	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>7.47(ms)	The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(s)			
					Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<7.93(ms)	VEV valve 1 actuator Performace Diagnostic is Enable	=True
					Valve learn state import VALUE is opened status learn	!=TRUE		
	Path 3: Diagnostic Valve actuator when the valve is closed stuck in the end stop learning mode	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>8.83(ms)	Fault trip disable value	=False			

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		Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<9.37(ms)	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>.0049(s)		
		Valve learn state import VALUE is closed status learn	!=TRUE	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<0.01(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value has a diferent value of INRNGERR	!=TRUE		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<0.003(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>.003(s)		
P3171	Monitors for out-of-range high period values on the exhaust valve diagnostic PWM feedback signal.	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>10.3(ms)	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
				The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(8)		
				VEV valve 1 actuator Performace Diagnostic is Enable	=True		
P3170	Monitors for out-of-range low period values on the exhaust valve diagnostic PWM feedback signal.	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<4.86(ms)	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met	see sheet enable tables		

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				The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(8)		
				VEV valve 1 actuator Performance Diagnostic is Enable	=True		
P3174	Monitors diagnostic feedback from exhaust valve to determine if the valve end stops have not been learned	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>6.93(ms)	Battery Voltage	>9(V)	4(s)	2 Trip
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<7.36(ms)		
				Basic enable conditions met	=see sheet enable tables		
				The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(s)		
				VEV valve 1 actuator Performance Diagnostic is Enable	=True		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>0.005(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<0.01(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value has a different value of INRNGERR	!=TRUE		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<0.003(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>0.003(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<0.003(s)		

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				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>0.003(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<0.009(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>.0094(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<0.0075(s)		
				Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>.008(s)		
P316F	Monitors for out-of-range high duty cycle values on the exhaust valve diagnostic PWM feedback signal.	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Duty Cycle Raw Value	>98(%)	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	=see sheet enable tables <5(s)		
				VEV valve 1 actuator Performace Diagnostic is Enable	=True		
P316E	Monitors for out-of-range low duty cycle values on the exhaust valve diagnostic PWM feedback signal.	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Duty Cycle Raw Value	<2(%)	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	=see sheet enable tables <5(s)		
				VEV valve 1 actuator Performace Diagnostic is Enable	True		

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P3173	Monitors the sensed exhaust valve position for values that are out-of-range High.	Value Position sensor	>96.5(%)	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
				The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(s)		
				VEV valve 1 actuator Performace Diagnostic is Enable	=True		
				VEV Valve 1 Position Sensor Circuit Low Diagnostic Failure is present	=False		
				VEV Valve 1 Position Sensor Circuit High Diagnostic Failure is present	=False		
P3172	Monitors the sensed exhaust valve position for values that are out-of-range low.	Value Position sensor	<3.5(%)	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
				The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(s)		
				VEV valve 1 actuator Performace Diagnostic is Enable	=True		
				VEV Valve 1 Position Sensor Circuit Low Diagnostic Failure is present	=False		
				VEV Valve 1 Position Sensor Circuit High Diagnostic Failure is present	=False		
P3177		Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>9.71(ms)	Battery Voltage	>9(V)	4(s)	2 Trip

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Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<10.31(ms)	Basic enable conditions met	=see sheet enable tables
--	------------	-----------------------------	--------------------------

The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(s)
---	-------

VEV valve 1 actuator Performace Diagnostic is Enable	=True
--	-------

Fault trip disable value	=FALSE
--------------------------	--------

Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>.0049(s)
--	-----------

Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<0.01(s)
--	----------

Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value has a diferent value of INRNGERR	!=True
---	--------

Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	<0.003(s)
--	-----------

Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value	>.003(s)
--	----------

P317A	Path 1: Diagnostic Valve actuator when an internal fault is present.	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>3.33(ms)	Battery Voltage	>9(V)	4(s)	2 Trip
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Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<3.33(ms)	Basic enable conditions met	=see sheet enable tables
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Path 2: Diagnostic Valve actuator when the valve is open stuck in the end stop learning mode	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>7.47(ms)	The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(8)
--	--	-----------	---	-------

Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<7.92(ms)	VEV valve 2 actuator Performace Diagnostic is Enable	=True
--	-----------	--	-------

Valve learn state import VALUE is opened status learn	!=TRUE
---	--------

Path 3: Diagnostic Valve actuator when the valve is closed stuck in the end stop learning mode	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>8.83(ms)	Fault trip disable value	=False
--	--	-----------	--------------------------	--------

Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<9.37(ms)	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>.0049(s)
--	-----------	--	-----------

Valve learn state import VALUE is closed status learn	!=TRUE	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<0.01(s)
---	--------	--	----------

Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	!=TRUE
--	--------

Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<0.003(s)
--	-----------

Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>.003(s)
--	----------

P317E	Monitors for out-of-range high period values on the exhaust valve diagnostic PWM feedback signal.	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>10.31(ms)	Battery Voltage	>9(V)	4(s)	2 Trip
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Basic enable conditions met	see sheet enable tables
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				The valve Init time value flag indicates that sufficient time has been allowed for this initialization. VEV valve 2 actuator Performace Diagnostic is Enable	<5(8) =True		
P317D	Monitors for out-of-range low period values on the exhaust valve diagnostic PWM feedback signal.	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<8.56(ms)	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met The valve Init time value flag indicates that sufficient time has been allowed for this initialization. VEV valve 2 actuator Performace Diagnostic is Enable	=see sheet enable tables <5(8) =True		
P3181	Monitors diagnostic feedback from exhuast valve to determine if the valve end stops have not been learned	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>6.94(ms)	Battery Voltage	>9(V)	4(s)	2 Trip
		Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<7.36(ms)	Basic enable conditions met	=see sheet enable tables		
				The valve Init time value flag indicates that sufficient time has been allowed for this initialization. VEV valve 2 actuator Performace Diagnostic is Enable	<5(s) =True		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>.0049(s)		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<0.01(s)		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	!=TRUE		

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				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<0.003(s)		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>0.003(s)		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<0.003(s)		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>0.003(s)		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<0.0088(s)		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>0.0094(s)		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<0.0075(s)		
				Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>0.0079(s)		
P317C	Monitors for out-of-range high duty cycle values on the exhaust valve diagnostic PWM feedback signal.	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Duty Cycle Raw Value	>98(%)	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
				The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(s)		
				VEV valve 2 actuator Performace Diagnostic is Enable	:True		

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P317B	Monitors for out-of-range low duty cycle values on the exhaust valve diagnostic PWM feedback signal.	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Duty Cycle Raw Value	<2(%)	Battery Voltage	>9(V)	4(s)	2 Trip
P3180	Monitors the sensed exhaust valve position for values that are out-of-range High.	Value Position sensor	<96.5(%)	Battery Voltage	>9(V)	4(s)	2 Trip
P317F	Monitors the sensed exhaust valve position for values that are out-of-range low.	Value Position sensor	<3.5(%)	Battery Voltage	>9(V)	4(s)	2 Trip

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The valve Init time value flag indicates that sufficient time has been allowed for this initialization. <5(s)

VEV valve 2 actuator Performace Diagnostic is Enable =True

VEV Valve 2 Position Sensor Circuit Low Diagnostic Failure is present =False

VEV Valve 2 Position Sensor Circuit High Diagnostic Failure is present =False

P3184	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>9.7(ms)	Battery Voltage	>9(V)	4(s)	2 Trip
	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<10.31(ms)	Basic enable conditions met	=see sheet enable tables		
			The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(s)		
			VEV valve 2 actuator Performace Diagnostic is Enable	=True		
			Fault trip disable value			
			Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>0.0048(s)		
			Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<0.01(s)		
			Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	!=True		
			Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<0.003(s)		

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					Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	>0.003(s)		
97. VARIABLE EXHAUST VALVE RATIONALITY DIAGNOSIS	P3176	Monitors for in-range errors that result when the sensed period of the diagnostic PWM feedback signal for exhaust valve is neither out of range low nor out of range high and does not fall within any of the calibrated ranges defined for diagnostic feedback data.	Fuel Tank Zone Module Pulse 1 Input Sensed Raw Value : Sensed Period Raw Value is not between the calibrated ranges defined for diagnostic data.	=TRUE	Battery Voltage	>9(V)	4(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
					The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(8)		
					VEV valve 1 actuator Performace Diagnostic is Enable	=True		
	P3175	Path 1: Diagnostic in steady state condition the VEV valve 1 is deemed to be within the positive steady state tolerance	VEV Perform Valve 1 Tracking Rationality Diagnostics Class Instance / VEV Valve System Error	>10(%)	Battery Voltage	>9(V)	8(s)	2 Trip
			VEV Valve Feedback PWM Percentage Difference	>3(%)	Basic enable conditions met	=see sheet enable tables		
		Path 2: Diagnostic in steady state condition the VEV valve 1 is deemed to be within the negative steady state tolerance	VEV Perform Valve 1 Tracking Rationality Diagnostics Class Instance / VEV Valve System Error	<10(%)	and (
			VEV Valve Feedback PWM PercentageDifference	<3(%)	Count diagnostics delay for valve 1	>200(counts)		
					That means the next condictionns are met:(

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				VEV Valve Rate of Change of Command PWM Percentage	>3(%)		
	Path 3: Diagnostic in steady state condition the VEV valve 1 is deemed to be within the absolute steady state tolerance	VEV Perform Valve 1 Tracking Rationality Diagnostics Class Instance / VEV Valve System Error -absolute Value	<10(%)	and (
				Present system error	>10(%)		
				and (
				Previous system error	<10(%)		
				or			
				Previous system error	>10(%)		
)			
)			
)			
				or			
				Absolute value of Previous system error	<10(%)		
				VEV Valve Feedback PWM PercentageDifference	>3(%)		
)			
P3183	Monitors for in-range errors that result when the sensed period of the diagnostic PWM feedback signal for exhaust valve is neither out of range low nor out of range high and does not fall within any of the calibrated ranges defined for diagnostic feedback data.	Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value is not between the calibrated ranges defined for diagnostic data.	=TRUE	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
				The valve Init time value flag indicates that sufficient time has been allowed for this initialization.	<5(s)		
				VEV valve 2 actuator Performace Diagnostic is Enable	=True		

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P3182	Path 1: Diagnostic in steady state condition the VEV valve 2 is deemed to be within the positive steady state tolerance	VEV Perform Valve 2 Tracking Rationality Diagnostics Class Instance / VEV Valve System Error	>10(%)	Battery Voltage	>9(V)	8(s)	2 Trip
		VEV Valve Feedback PWM Percentage Difference	>3(%)	Basic enable conditions met	=see sheet enable tables		
	Path 2: Diagnostic in steady state condition the VEV valve 2 is deemed to be within the negative steady state tolerance	VEV Perform Valve 2 Tracking Rationality Diagnostics Class Instance / VEV Valve System Error	<10(%)	and (
		VEV Valve Feedback PWM PercentageDifference	<3(%)	Count diagnostics delay for valve 2	>200(counts)		
				That means the next condictionns are met:(
	Path 3: Diagnostic in steady state condition the VEV valve 2 is deemed to be within the absolute steady state tolerance	VEV Perform Valve 2 Tracking Rationality Diagnostics Class Instance / VEV Valve System Error - absolute value	<10(%)	VEV Valve Rate of Change of Command PWM Percentage	>3(%)		
				and (
				Present system error	>10(%)		
				and (
				Previous system error	<10(%)		
				or			
				Previous system error	>10(%)		
)			
)			
)			
				or			
				Absolute value of Previous system error	<10(%)		

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				VEV Valve Feedback PWM PercentageDifference	>3(%)		
				}			
P2BF9	Monitors for ground short circuit faults in the exhaust valve PWM control circuit.	The exhaust valve circuit diagnostics is reporting a Ground Short Circuit Status.	TRUE	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
				VEV valve cuircuit Diagnostic short to power is enable	=True		
				The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(8)		
P2BF8	Monitors for open circuit faults in the exhaust valve PWM control circuit.	The exhaust valve circuit diagnostics is reporting an Open Circuit Status.	TRUE	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
				VEV valve cuircuit Diagnostic short to power is enable	=True		
				The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
P2BFA	Monitors for gower short circuit faults in the exhaust valve PWM control circuit.	The exhaust valve circuit diagnostics is reporting an Power Short Circuit Status.	TRUE	Battery Voltage	>9(V)	4(s)	2 Trip
				Basic enable conditions met	=see sheet enable tables		
				VEV valve cuircuit Diagnostic short to power is enable	=True		
				The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
P10B3		Resistance value of engine compartment temperature sensor lies below the	<53(Ohm)	Ignition is ON	=TRUE	0.5(s)	2 Trip

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NT TEMPERATURE SENSOR DIAGNOSIS				Battery Voltage	>9(V)		
	P10B4	Resistance value of engine compartment temperature sensor lies above the	>650000(0hm)	Basic enable conditions met	=see sheet enable tables		2 Trip
				Coolant temperature at the output of cooler	>-30.04(°C)		
	P134D	Absolute difference between the raw sensor value and the low-pass filtered raw sensor value	>14.96(°C)	Ignition is ON	=TRUE	0.1(s)	2 Trip
		for time	>A+B(s)	Battery Voltage	>9(V)		
		where:		Basic enable conditions met	=TRUE		
		A: debounce time error detection Loose Connection Check engine compartment temperature sensor	=2(s)	Sensor's power stage faults status:			
		B: debounce time error Loose Connection Check engine compartment temperature sensor	=5(s)		P10B3=False		
					P10B4=False		
	P10B5	(Filtered sensor value engine compartment temperature) - (Temperature mean value, calculated out of freeze values from provided temperature sensors)	>14.96(°C)	Ignition is ON	=TRUE	0.1(s)	2 Trip
				Battery Voltage	>9(V)		

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	P10B5		(Temperature mean value, calculated out of freeze values from provided temperature sensors) - (Filtered sensor value engine compartment temperature)	>14.96(°C)	Basic enable conditions met	=TRUE	0.1(s)	2 Trip
					Engine coolant temperature at start	<39.96(°C)		
99. TRANSMISSION RANGE DIAGNOSTIC	P1789		Time of transmission current range unknown	>0.5(s)	Ignition is ON	=TRUE	0.01(s)	2 Trip
					Basic enable conditions met	=see sheet enable tables		
100. ELECTRONIC TRANSMISSION PRNDL CORRELATION DIAGNOSIS	P17E3	Monitoring Fault information for Shifter A from SIB index 0	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	Battery Voltage	>9(V)	0.01(s)	2 Trip
			Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=0	Basic enable conditions met	=see sheet enable tables		
					and (
	P17E4	Monitoring Fault information for Shifter A from SIB index 1	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	Status value for shifter C DTC from SIB	=3		2 Trip
			Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=1	or			
					Status value for shifter C DTC from SIB	=4		
)			
	P17E5	Monitoring Fault information for Shifter A from SIB index 2	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4				2 Trip

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		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=2	
P17E6	Monitoring Fault information for Shifter A from SIB index 3	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=3	
P17E7	Monitoring Fault information for Shifter A from SIB index 4	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=4	
P17E8	Monitoring Fault information for Shifter A from SIB index 5	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=5	
P17E9	Monitoring Fault information for Shifter A from SIB index 6	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip

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		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=6	
P17EA	Monitoring Fault information for Shifter A from SIB index 7	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=7	
P17EB	Monitoring Fault information for Shifter A from SIB index 8	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=8	
P17EC	Monitoring Fault information for Shifter A from SIB index 9	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=9	
P17ED	Monitoring Fault information for Shifter A from SIB index 10	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip

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		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=10	
P17EE	Monitoring Fault information for Shifter A from SIB index 11	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=11	
P17EF	Monitoring Fault information for Shifter A from SIB index 12	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=12	
P17F0	Monitoring Fault information for Shifter A from SIB index 13	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=13	
P17F8	Monitoring Fault information for Shifter A from SIB index 14	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip

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		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=14	
P17F9	Monitoring Fault information for Shifter A from SIB index 15	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=15	
P17FD	Monitoring Fault information for Shifter A from SIB index 16	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=16	
P17FE	Monitoring Fault information for Shifter A from SIB index 17	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=17	
P1803	Monitoring Fault information for Shifter A from SIB index 18	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip

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		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=18	
P1805	Monitoring Fault information for Shifter A from SIB index 19	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=19	
P1806	Monitoring Fault information for Shifter A from SIB index 20	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=20	
P1807	Monitoring Fault information for Shifter A from SIB index 21	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=21	
P180C	Monitoring Fault information for Shifter A from SIB index 22	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip

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		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	■22	
P180D	Monitoring Fault information for Shifter A from SIB index 23	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=23	
P180E	Monitoring Fault information for Shifter A from SIB index 24	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=24	
P180F	Monitoring Fault information for Shifter A from SIB index 25	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=25	
P1812	Monitoring Fault information for Shifter A from SIB index 26	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4	2 Trip

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		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=26				
P186B	Monitoring Fault information for Shifter A from SIB index 30	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4				2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=30				
P186C	Monitoring Fault information for Shifter A from SIB index 25	Status value for shifter A DTC from SIB / Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Status	=4				2 Trip
		Diagnostic Status Shifter Interface Board : A Diagnostic Trouble Code Index / Com signal for index values shifter A DTC from SIB	=31				
P186D	Monitoring Fault information for Shifter B from SIB index 0	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	Battery Voltage	>9(V)	0.01(s)	2 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=0	Basic enable conditions met and (	=see sheet enable tables		
P07B4	Monitoring Fault information for Shifter B from SIB index 4	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	Status value for shifter B DTC from SIB	=3		2 Trip

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		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=4	or	
				Status value for shifter B DTC from SIB)	=4
P07B3	Monitoring Fault information for Shifter B from SIB index 5	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4		2 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=5		
P07B5	Monitoring Fault information for Shifter B from SIB index 6	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4		2 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=6		
P07BA	Monitoring Fault information for Shifter B from SIB index 7	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4		2 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=7		
P07B9	Monitoring Fault information for Shifter B from SIB index 8	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4		2 Trip

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		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=8	
P07BB	Monitoring Fault information for Shifter B from SIB index 9	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=9	
P17D9	Monitoring Fault information for Shifter B from SIB index 11	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	1 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=11	
P17DA	Monitoring Fault information for Shifter B from SIB index 12	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	1 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=12	
P17DB	Monitoring Fault information for Shifter B from SIB index 13	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	1 Trip

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		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=13	
P17E0	Monitoring Fault information for Shifter B from SIB index 18	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=18	
P17E1	Monitoring Fault information for Shifter B from SIB index 19	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=19	
U18C6	Monitoring Fault information for Shifter B from SIB index 24	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=24	
U1970	Monitoring Fault information for Shifter B from SIB index 28	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4	1 Trip

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		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=28				
U1971	Monitoring Fault information for Shifter B from SIB index 29	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4				1 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=29				
U1972	Monitoring Fault information for Shifter B from SIB index 30	Status value for shifter B DTC from SIB / Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Status	=4				2 Trip
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=30				
U2421	Monitoring Fault information for Shifter C from SIB index 0	Status value for shifter C DTC from SIB / Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Status	=4	Battery Voltage	>9(V)	0.01(s)	2 Trip
		Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Index / Com signal for index values shifter C DTC from SIB	=0	Basic enable conditions met and (	=see sheet enable tables		
U100B	Monitoring Fault information for Shifter C from SIB index 1	Status value for shifter C DTC from SIB / Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Status	=4	Status value for shifter B DTC from SIB	=3		2 Trip

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Diagnostic Status Shifter
Interface Board : C Diagnostic
Trouble Code Index / Com
signal for index values shifter
C DTC from SIB

=1

or

Status value for shifter B DTC from
SIB

=4

)

U137B Monitoring Fault information for Status value for shifter C DTC
Shifter C from SIB index 3 from SIB / Diagnostic Status
Shifter Interface Board : C
Diagnostic Trouble Code
Status

=4

2 Trip

Diagnostic Status Shifter
Interface Board : C Diagnostic
Trouble Code Index / Com
signal for index values shifter
C DTC from SIB

=3

U2215 Monitoring Fault information for Status value for shifter C DTC
Shifter C from SIB index 4 from SIB / Diagnostic Status
Shifter Interface Board : C
Diagnostic Trouble Code
Status

=4

2 Trip

Diagnostic Status Shifter
Interface Board : C Diagnostic
Trouble Code Index / Com
signal for index values shifter
C DTC from SIB

=4

U137C Monitoring Fault information for Status value for shifter C DTC
Shifter C from SIB index 5 from SIB / Diagnostic Status
Shifter Interface Board : C
Diagnostic Trouble Code
Status

=4

2 Trip

Diagnostic Status Shifter
Interface Board : C Diagnostic
Trouble Code Index / Com
signal for index values shifter
C DTC from SIB

=5

U137D Monitoring Fault information for Status value for shifter C DTC
Shifter C from SIB index 6 from SIB / Diagnostic Status
Shifter Interface Board : C
Diagnostic Trouble Code
Status

=4

2 Trip

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		Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Index / Com signal for index values shifter C DTC from SIB	=6	
U2405	Monitoring Fault information for Shifter C from SIB index 7	Status value for shifter C DTC from SIB / Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Status	=4	2 Trip
		Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Index / Com signal for index values shifter C DTC from SIB	=7	
P18F3	Monitoring Fault information for Shifter C from SIB index 13	Status value for shifter C DTC from SIB / Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Status	=4	1 Trip
		Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Index / Com signal for index values shifter C DTC from SIB	=13	
P139E	Monitoring Fault information for Shifter C from SIB index 14	Status value for shifter C DTC from SIB / Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Status	=4	1 Trip
		Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Index / Com signal for index values shifter C DTC from SIB	=14	
P13FE	Monitoring Fault information for Shifter C from SIB index 15	Status value for shifter C DTC from SIB / Diagnostic Status Shifter Interface Board : C Diagnostic Trouble Code Status	=4	1 Trip

24OBDG07 ECM Summary Tables

Diagnostic Status Shifter
Interface Board : C Diagnostic
Trouble Code Index / Com
signal for index values shifter
C DTC from SIB

=15

P07E5	Diagnostic if it is able to engage drive	Receive message from ETRS TRCR Diagnostics detecting - Unable to Engage Drive	=TRUE	Ignition is ON	=TRUE	0(s)	2 Trip
				Battery Voltage	>9(V)		
P073D	Diagnostic if it is able to engage neutral	Receive message from ETRS TRCR Diagnostics detecting - Unable to Engage Neutral	=TRUE	Basic enable conditions are met	=see sheet enable tables	0(s)	2 Trip
P07E4	Diagnostic if it is able to engage parking	Receive message from ETRS TRCR Diagnostics detecting - Unable to Engage Parking	=TRUE			0(s)	2 Trip
P073E	Diagnostic if it is able to engage reverse	Receive message from ETRS TRCR Diagnostics detecting - Unable to Engage Reverse	=TRUE			0(s)	2 Trip
P1787	Diagnostic if an unexpected range change is detected	Receive message from ETRS TRCR Diagnostics detecting - Unexpected Range Change Detected	=TRUE			0(s)	2 Trip

END OF SECTION

24OBDG07 ECM Initial Supporting Tables

Table no.

1	Absolute difference between accelerator pedal position sensor 1 voltage (a) and sensor 2 voltage (b)			
	V	0.5	2.1	2.1002
	V	0.12	0.18	0.18

2	difference of the brake sensor voltage corresponds to a corrected value									
	V	0	0.0346	0.035	0.04	0.045	0.051	0.0512	4.999	5
	-	0	0	0	0	0	0	1	1	1

3	Upper threshold for the relative air charge in order to determine the operating range LOW depending on the engine speed nmot for automatic transmission						
	kPa / rpm	1000	1400	1720	1920	2120	2600
	0.000	50.3	50.3	50.3	54.8	54.8	54.8
	0.1016	50.3	50.3	50.3	54.8	54.8	54.8
	0.1992	50.3	50.3	50.3	54.8	54.8	54.8
	0.3008	50.3	50.3	50.3	54.8	54.8	54.8

4	Lower threshold for the relative air charge in order to determine the operating range LOW depending on the low resolution engine speed for automatic transmission						
	rpm	1000	1400	1720	1920	2120	2600
	%	20.3	20.3	20.3	20.3	24.8	24.8

5	Propulsion torque after driving assistance coordination														
	rpm	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000
	Nm	900	900	900	900	1000	1150	1300	1300	1300	1300	1300	1300	1300	1300

6	(d1) temperatue model correction dependent on vehicle speed and ambient temperature								
	mph / °C	-40.04	-15.04	-10.04	-0.04	19.96	39.96	59.96	79.96
	0.00	-0.0000488	-0.0000488	-0.0000488	-0.0000488	-0.0000488	-0.0000488	-0.0000488	-0.0000488
	18.65	-0.0370605	-0.0360596	-0.0350586	-0.0330566	-0.0310547	-0.0300537	-0.0290527	-0.0280518
	31.08	-0.0520508	-0.0510498	-0.0500488	-0.0480469	-0.0515625	-0.0540527	-0.0528564	-0.0516602
	49.72	-0.0570557	-0.0560547	-0.0550537	-0.0530518	-0.0571777	-0.0600586	-0.0588623	-0.0576660
	74.58	-0.0630371	-0.0620605	-0.0610596	-0.0590576	-0.0684570	-0.0560547	-0.0550537	-0.0540527
	93.23	-0.0690430	-0.0680420	-0.0670410	-0.0650391	-0.0684082	-0.0620605	-0.0610596	-0.0600586
	111.87	-0.0750488	-0.0740479	-0.0730469	-0.0710449	-0.0690430	-0.0680420	-0.0670410	-0.0660400
	124.30	-0.0810547	-0.0800537	-0.0790527	-0.0770508	-0.0750488	-0.0740479	-0.0730469	-0.0720459

7	(c) correction factor for temperature difference over the radiator															
	°C	-20	-10	0	5	10	15	20	25	30	35	40	50	60	75	90
	°C/s	0	0	0	0	0	0	0.0399902	0.0449951	0.05	0.05	0.0521484	0.0527588	0.0544189	0.075	0.1

24OBDG07 ECM Initial Supporting Tables

Table no.

8	(a) temperature increment depending on inner torque and ambient temperature											
°C/ W	0	508.9	2507	4995.1	7502.1	10009.1	35003.6	70007.3	99996.9	150004.8	199993.8	250001.7
-5.04	0	0.0050049	0.05	0.0748291	0.1002686	0.1412109	0.2415527	0.2241455	0.2160156	0.2160156	0.2399902	0.2639893
29.96	0	0.0050049	0.051 001	0.0763184	0.097168	0.1107422	0.2006836	0.2315918	0.2187012	0.2203125	0.2447998	0.2692627

9	(b) Correction factor dependent on vehicle speed and ambient temperature											
°C/ mph	0.0	2.5	4.4	6.2	12.4	24.9	37.3	49.7	55.9	62.2	74.6	99.4
-40.04	1	1	1	1	1.040039	1.060059	1.089966	1.109985	1.130005	1.140015	1.150024	1.160034
-10.04	1	1	1	1	1.030029	1.050049	1.074951	1.094971	1.11499	1.125	1.13501	1.14502
9.96	1	1	1	1	1.02002	1.040039	1.060059	1.079956	1.099976	1.109985	1.119995	1.130005
29.96	1	1	1	1	1.001953	1.021973	1.041 992	1.062012	1.082031	1.092041	1.102051	1.112061
39.96	1	1	1	1	1.000977	1.020996	1.041 016	1.061035	1.081055	1.090942	1.100952	1.110962
69.96	1	1	1	1	1	1.02002	1.040039	1.060059	1.079956	1.089966	1.099976	1.109985

10	monitoring delay time since engine start							
°C	-40	-10	0	10	30	50	70	90
s	60	45	25	15	10	10	10	10

11	(b) Upstream 02 sensor heat threshold for release of heating (kJ)									
°C/°C	-30.04	-20.04	-10.04	-0.04	9.96	19.96	29.96	49.96	74.96	99.96
-30.04	500	500	500	500	500	500	500	500	500	500
-20.04	500	400	400	400	400	400	400	400	400	400
-10.04	500	400	310	310	310	310	310	310	310	310
-0.04	500	400	310	280	280	280	280	280	280	280
9.96	500	400	310	280	240	240	240	240	240	240
19.96	500	400	310	280	240	200	200	200	200	200
29.96	500	400	310	280	240	200	100	100	100	100
49.96	500	400	310	280	240	200	100	60	60	60
74.96	500	400	310	280	240	200	100	60	10	10
99.96	500	400	310	280	240	200	100	60	10	10

12	(c) Instance of dew point end class of sensor 1 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature			
°C	-20.04	-0.04	19.96	54.96
-	0.4	0.5	0.25	0

Table no.

13 (b) Upstream 02 sensor heat threshold for release of heating (kJ)

°C/°C	-30.04	-20.04	-10.04	-0.04	9.96	19.96	29.96	49.96	74.96	99.96
-30.04	500	500	500	500	500	500	500	500	500	500
-20.04	500	400	400	400	400	400	400	400	400	400
-10.04	500	400	310	310	310	310	310	310	310	310
-0.04	500	400	310	280	280	280	280	280	280	280
9.96	500	400	310	280	240	240	240	240	240	240
19.96	500	400	310	280	240	200	200	200	200	200
29.96	500	400	310	280	240	200	100	100	100	100
49.96	500	400	310	280	240	200	100	60	60	60
74.96	500	400	310	280	240	200	100	60	10	10
99.96	500	400	310	280	240	200	100	60	10	10

14 (c) Instance of dew point end class of sensor 1 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature

°C	-20.04	-0.04	19.96	54.96
-	0.4	0.5	0.25	0

15 (b) Downstream 02 sensor heat threshold for release of heating (kJ)

°C/°C	-30.04	-20.04	-10.04	-0.04	9.96	19.96	29.96	49.96	74.96	99.96
-30.04	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
-20.04	2200	1800	1800	1800	1800	1800	1800	1800	1800	1800
-10.04	2200	1800	1600	1600	1600	1600	1600	1600	1600	1600
-0.04	2200	1800	1600	1300	1300	1300	1300	1300	1300	1300
9.96	2200	1800	1600	1300	1000	1000	1000	1000	1000	1000
19.96	2200	1800	1600	1300	1000	800	800	800	800	800
29.96	2200	1800	1600	1300	1000	800	600	600	600	600
49.96	2200	1800	1600	1300	1000	800	600	300	300	300
74.96	2200	1800	1600	1300	1000	800	600	300	200	200
99.96	2200	1800	1600	1300	1000	800	600	300	200	200

16 (c) Instance of dew point end class of sensor 2 at bank 1 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature

°C	-20.04	-0.04	19.96	54.96
-	0.4	0.5	0.25	0

Table no.

17

(b) Downstream O2 sensor heat threshold for release of heating (kJ)

°C/°C	-30.04	-20.04	-10.04	-0.04	9.96	19.96	29.96	49.96	74.96	99.96
-30.04	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
-20.04	2200	1800	1800	1800	1800	1800	1800	1800	1800	1800
-10.04	2200	1800	1600	1600	1600	1600	1600	1600	1600	1600
-0.04	2200	1800	1600	1300	1300	1300	1300	1300	1300	1300
9.96	2200	1800	1600	1300	1000	1000	1000	1000	1000	1000
19.96	2200	1800	1600	1300	1000	800	800	800	800	800
29.96	2200	1800	1600	1300	1000	800	600	600	600	600
49.96	2200	1800	1600	1300	1000	800	600	300	300	300
74.96	2200	1800	1600	1300	1000	800	600	300	200	200
99.96	2200	1800	1600	1300	1000	800	600	300	200	200

18	(c) Instance of dew point end class of sensor 2 at bank 2 / Factor to adjust the heat energy threshold depending on the could start counter and the start temperature				
	°C	-20.04	-0.04	19.96	54.96
	-	0.4	0.5	0.25	0

19	integrated exhaust gas mass flow bank 1 since engine start							
	°C	-20.04	-10.04	-0.04	19.96	39.96	59.96	79.96
	g	10000	3000	3000	3000	2250	2250	2250

20	engine load						
	rpm	800	1000	1240	1520	2400	3000
	%	1535.977	13.5	13	13.5	13.5	13.5

21	Relative air mass				
	rpm	800	1000	3000	4000
	%	1535.977	16.992	15	15

22

(b) Exhaust mass flow dependent correction for delay response time of secondary O2 sensor Lean to Rich

g/s	2.78	5.56	11.11	22.22	33.33
s	0.04	0.02	0	0	0

23

(b) Exhaust mass flow dependent correction for delay response time of secondary O2 sensor Rich to Lean

g/s	2.78	5.56	11.11	22.22	33.33
s	0.08	0.06	0.04	0.04	0.04

Table no.

24	(b) Exhaust mass flow dependent correction for transition response time of secondary 02 S2B1 Lean to Rich						
	g/s	2.78	8.33	11.11	16.67	22.22	33.33
	s	0.08	0.06	0.05	0.04	0.03	0.03

25	(b) Exhaust mass flow dependent correction for transition response time of secondary 02 S2B1 Rich to Lean						
	g/s	2.78	8.33	11.11	16.67	22.22	33.33
	s	0.1	0.08	0.07	0.06	0.05	0.04

26

for number of synchronous counts

°C	-30.04	-20.04	-0.04	19.96	59.96	89.96
-	48	40	24	24	16	16

27

A: Number of working cycle during preinjection

°C	-30.04	-15.04	-5.04
-	1	1	0

28	Fuel rail pressure								
	°C	-20.04	-15.04	-10.04	-0.04	19.96	59.96	89.96	109.96
	MPa	17	15	12	7	7	7	7	7

29

for time
(Max. waiting time for high fuel pressure)

°C	-20	-10	-0.04	19.96	59.96	89.96
s	10	10	5	5	5	5

30

Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 1

°C/°C	-40.04	-10.04	-0.04	9.96	19.96	59.96	99.96
-40.04	1	1	1	1	1	0	0
-10.04	1	1	1	1	1	0	0
-0.04	1	1	1	1	1	0	0
9.96	1	1	1	1	1	0	0
19.96	1	1	1	1	1	0	0
59.96	0	0	0	0	0	0	0
99.96	0	0	0	0	0	0	0

Table no.

31	Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 2						
°C/°C	-40.04	-10.04	-0.04	9.96	19.96	59.96	99.96
-40.04	1	1	1	1	1	0	0
-10.04	1	1	1	1	1	0	0
-0.04	1	1	1	1	1	0	0
9.96	1	1	1	1	1	0	0
19.96	1	1	1	1	1	0	0
59.96	0	0	0	0	0	0	0
99.96	0	0	0	0	0	0	0

32	Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 1						
°C/°C	-40.04	-10.04	-0.04	9.96	19.96	59.96	99.96
-40.04	0.40625	0.203125	0.203125	0	0	0	0
-10.04	0.203125	0.203125	0.101563	0	0	0	0
-0.04	0.203125	0.101563	0.101563	0	0	0	0
9.96	0	0	0	0	0	0	0
19.96	0	0	0	0	0	0	0
59.96	0	0	0	0	0	0	0
99.96	0	0	0	0	0	0	0

33	Ratio of heat quantity for dew-point end detection sensor 1 and heat quantity threshold for dew-point end detection sensor 1 bank 2						
°C/°C	-40.04	-10.04	-0.04	9.96	19.96	59.96	99.96
-40.04	0.40625	0.203125	0.203125	0	0	0	0
-10.04	0.203125	0.203125	0.101563	0	0	0	0
-0.04	0.203125	0.101563	0.101563	0	0	0	0
9.96	0	0	0	0	0	0	0
19.96	0	0	0	0	0	0	0
59.96	0	0	0	0	0	0	0
99.96	0	0	0	0	0	0	0

34	Actual fan speed - Max estimated fan speed																
rpm	0	1000	1001	2100	3500	3750	3751	3752	3753	3754	3755	3756	3757	3758	3759	3760	3761
rpm	1300	1300	1300	2400	3800	4050	4050	4050	4050	4050	4050	4050	4050	4050	4050	4050	4050

35	Actual fan speed																
rpm	0	1000	1001	2100	3500	3750	3751	3752	3753	3754	3755	3756	3757	3758	3759	3760	3761
rpm	0	800	800	1900	3300	3550	3550	3550	3550	3550	3550	3550	3550	3550	3550	3550	3550

24OBDG07 ECM Initial Supporting Tables

Table no.

36	Actual fan speed - Max estimated fan speed																
rpm	0	1100	1101	3750	3751	3752	3753	3754	3755	3756	3757	3758	3759	3760	3761	3762	3763
rpm	1400	1400	1400	4050	4050	4050	4050	4050	4050	4050	4050	4050	4050	4050	4050	4050	4050

37	Actual fan speed																
rpm	0	1100	1101	3750	3751	3752	3753	3754	3755	3756	3757	3758	3759	3760	3761	3762	3763
rpm	0	900	900	3550	3550	3550	3550	3550	3550	3550	3550	3550	3550	3550	3550	3550	3550

38	Actual fan speed - Max estimated fan speed																
rpm	0	1000	1001	4500	4501	4502	4503	4504	4505	4506	4507	4508	4509	4510	4511	4512	4513
rpm	1300	1300	1300	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800

39	Actual fan speed																
rpm	0	1000	1001	4500	4501	4502	4503	4504	4505	4506	4507	4508	4509	4510	4511	4512	4513
rpm	0	800	800	4250	4250	4250	4250	4250	4250	4250	4250	4250	4250	4250	4250	4250	4300

40	Actual fan speed - Max estimated fan speed																
rpm	0	1000	1001	4500	4501	4502	4503	4504	4505	4506	4507	4508	4509	4510	4511	4512	4513
rpm	1300	1300	1300	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800

41	Actual fan speed																
rpm	0	1000	1001	4500	4501	4502	4503	4504	4505	4506	4507	4508	4509	4510	4511	4512	4513
rpm	0	800	800	4250	4250	4250	4250	4250	4250	4250	4250	4250	4250	4250	4250	4250	4300

42	The low-pass filtered absolute value of the difference of the two rail pressure data values					
-	0	1000	2000	3000	4000	
-	241	241	250	260	290	

43	Engine Speed					
°C	-10.00	-0.04	14.96	24.96	49.96	89.96
rpm	16383.50	520.00	520.00	520.00	520.00	520.00

24OBDG07 ECM Initial Supporting Tables

Table no.

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Engine Speed

°C	-10.00	-0.04	14.96	24.96	49.96	89.96
rpm	16383.50	520.00	520.00	520.00	520.00	520.00

45	Internal resistance of Secondary HO2S sensor bank 1					
	-/°C	350.006	500.006	599.991	699.998	849.998
	0.6	10000	3500	3150	3000	3000
	0.65	1000	850	750	650	500
	0.7	1000	850	750	650	500
	0.85	1000	850	750	650	500
	1	1000	850	750	650	500

46	Internal resistance of Secondary HO2S sensor bank 2					
	-/°C	350.006	500.006	599.991	699.998	849.998
	0.6	10000	3500	3150	3000	3000
	0.65	1000	850	750	650	500
	0.7	1000	850	750	650	500
	0.85	1000	850	750	650	500
	1	1000	850	750	650	500

47

Normalized reference level of knock control

rpm	800	1520	2000	2600	3200	3800	4400	5000	5500	6000	6500	7000	7500	8000	8300	8600
V*ms	0.00156	0.00234	0.00273	0.00352	0.0043	0.00508	0.00586	0.00586	0.00586	0.00586	0.00586	0.00586	0.00586	0.00586	0.00586	0.00586

48

Normalized reference level of knock control

rpm	800	1520	2000	2600	3200	3800	4400	5000	5500	6000	6500	7000	7500	8000	8300	8600
V*ms	0.67109	0.67109	0.67109	0.67109	0.67109	0.70391	0.79961	0.92109	1.05039	1.21563	1.38477	1.5543	1.73203	2.0207	2.33047	3

49

Intake manifold pressure

% / rpm	800	1520	2000	2600	3200	3800	4400	5000	5500	6000	6500	7000	7500	8000	8300	8600
24.75	40	11	11	11	11	21	22	23	23	23	24	24	24	24	25	25
39.75	40	11	11	11	11	22	23	23	23	23	24	24	24	24	25	25
54.75	40	12	12	12	12	23	24	24	25	25	26	26	26	26	27	27
69.75	40	12	12	12	12	24	25	25	26	26	27	27	27	27	28	28

24OBDG07 ECM Initial Supporting Tables

Table no.

50	Engine speed gradient averaged during one working cycle															
rpm	800	1520	2000	2600	3200	3800	4400	5000	5500	6000	6500	7000	7500	8000	8300	8600
rpm/s	4500	4500	4500	4500	4600	4700	4700	4700	4700	4700	4700	4800	4900	5200	5500	12700

51	maintained active for time (Knock control: time for load-dynamic action on knock detection)							
rpm	1000	1400	2000	3000	4000	5000	6000	7520
s	0.44	0.3	0.3	0.3	0.36	0.34	0.31	0.29

52	maintained active for time (Knock control: time for dynamic adaptation)							
rpm	1000	1400	2000	3000	4000	5000	6000	7520
s	0.5	0.42	0.4	0.37	0.36	0.34	0.31	0.29

53	Relative charge of air in the cylinder															
rpm	800	1520	2000	2600	3200	3800	4400	5000	5500	6000	6500	7000	7500	8000	8300	8600
%	34.992	34.992	37.406	40.008	40.008	40.008	40.008	40.008	40.008	40.008	40.008	40.008	40.008	40.008	40.008	40.008

54	Integrated Air mass flow		
°C	-30.04	-20.04	-0.04
g	20020	8010	460

55	Integrated Air mass flow		
°C	-30.04	-20.04	-0.04
g	20020	8010	460

56	Difference between the maximum and the minimum intake air temperature values																			
°C	-48.04	-39.74	-30.04	-20.24	-9.74	-0.04	9.76	24.76	39.76	50.26	59.96	69.76	80.26	89.96	99.76	110.26	119.96	129.76	140.26	143.26
°C	1.56	1.56	1.56	1.36	1.16	0.66	0.36	0.36	0.36	0.46	0.56	0.76	0.96	1.06	1.16	1.16	1.16	1.16	1.16	1.16

57	Difference between the maximum and the minimum intake air temperature values																			
°C	-48.04	-39.74	-30.04	-20.24	-9.74	-0.04	9.76	24.76	39.76	50.26	59.96	69.76	80.26	89.96	99.76	110.26	119.96	129.76	140.26	143.26
°C	1.56	1.56	1.56	1.36	1.16	0.66	0.36	0.36	0.36	0.46	0.56	0.76	0.96	1.06	1.16	1.16	1.16	1.16	1.16	1.16

58	Difference between max. tank differential pressure & min. tank differential pressure (A-B)
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24OBDG07 ECM Initial Supporting Tables

Table no.

I/°C	-7.5	-2.3	3.8	9	14.3	20.3	25.5	30.8	36.8
8	0.55005	0.55005	0.60999	0.66003	0.73999	0.79004	0.84998	0.90002	0.95996
15	0.52502	0.52502	0.57996	0.64002	0.71997	0.76001	0.81995	0.88001	0.93994
22	0.50000	0.50000	0.56006	0.59998	0.68005	0.71997	0.78003	0.85999	0.92004
29	0.47498	0.47498	0.53003	0.58997	0.66003	0.69995	0.76001	0.81995	0.88001
36	0.44995	0.44995	0.50000	0.56006	0.64002	0.68005	0.71997	0.78003	0.83997
43	0.42505	0.42505	0.47998	0.54004	0.62000	0.66003	0.69995	0.76001	0.81995
50	0.40002	0.40002	0.45996	0.52002	0.59998	0.64002	0.68005	0.73999	0.80005
57	0.34998	0.34998	0.40002	0.45996	0.54004	0.59998	0.64002	0.69995	0.76001
64	0.30005	0.30005	0.34998	0.35999	0.43994	0.47998	0.33997	0.40002	0.45996

59 Torque commanded to charge control

rpm	760	1240	7000	8000
%	75	75	75	0

60 Torque commanded to charge control

rpm	760	1240	7000	8000
%	99.998	13.000	13.000	13.499

61 Canister purge mass flow

-	0	0.25	0.5	1
g/s	0.833	0.278	0.139	0.000

62 Torque commanded to charge control

rpm	440	520	920	1000
%	17.999	17.999	17.999	0.000

63 Torque commanded to charge control

rpm	440	520	880	7000
%	99.998	2.499	2.499	2.499

64 Temperature inside first brick of front catalyst during start

-	0.200012	0.5	0.700012	1
°C	439.96	429.96	419.96	399.96

65 where A - delay time for lambda fuel adaption (rich condition)

Table no.

s	3	4	5
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66

where B - delay time for lambda fuel adaption (lean condition)

s	1	5	15
s	3	4	5

67

Method 1: Angular acceleration of crankshaft in idle state, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire

%	7.800	9.000	10.001	13.000	17.999	39.999
deg/s ^{^2}	170	180	190	230	250	800

68

Method 1: Angular acceleration of crankshaft in catalyst heating, compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire

%	3.000	6.000	9.000	12.000	17.000	39.999
deg/s ^{^2}	240	265	320	340	345	800

69

[A] Base continuous misfire threshold in catalyst heating state

%	3.000	6.000	9.000	12.000	17.000	39.999
deg/s ^{^2}	240	262	300	300	335	335

70

Base continuous misfire threshold in the transmission idle state

%	7.800	9.000	10.001	13.000	17.999	39.999
deg/s ^{^2}	160	160	170	180	180	180

Table no.

71

Method 1: Angular acceleration of crankshaft in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire

rpm / %	9.00	12.00	15.00	23.00	32.00	45.00	60.00	75.00
1000	195	195	285	420	560	840	1040	1040
2000	235	235	330	460	720	840	1250	1250
3100	280	280	340	470	720	850	1250	1400
4100	330	330	340	470	730	890	1300	1400
5100	350	350	400	470	730	850	1300	1400
6100	370	370	410	470	735	950	1250	1300
7100	400	400	420	540	755	1000	1100	1300
8200	450	450	450	550	775	1000	1200	1400

72

[A] Base continuous misfire threshold in the transmission grip state

rpm / %	9.00	12.00	15.00	23.00	32.00	45.00	60.00	75.00
1000	240	250	300	420	650	900	1000	1000
2000	270	270	330	500	700	1100	1250	1250
3100	330	330	350	500	720	1000	1300	1400
4100	345	345	330	490	740	950	1300	1420
5100	360	360	465	550	760	1000	1350	1400
6100	380	380	470	600	785	1000	1400	1400
7100	420	420	490	620	810	1100	1150	1400
8200	450	450	520	620	825	1100	1200	1400

73

Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission grip state (clutch is engaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system

rpm / %	9.00	12.00	15.00	23.00	32.00	45.00	60.00	75.00
1000	370	370	450	600	780	1100	1200	1200
2000	350	350	400	560	690	900	1030	1030
3100	260	260	380	530	650	900	2000	1000
4100	350	350	320	510	700	900	1100	1300
5100	450	450	600	520	620	800	1000	1700
6100	600	600	615	640	750	900	1200	2047.9
7100	700	700	900	850	950	1000	1300.0	2047.9
8200	900	900	1100	1050	1100	1100	1400.0	2047.9

74

Method 1: Angular acceleration of crankshaft in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire

rpm / %	9.00	12.00	15.00	23.00	32.00	45.00	60.00	75.00
1000	195	195	285	420	560	840	1040	1040
2000	235	235	330	460	720	840	1250	1250
3100	280	280	340	470	720	850	1250	1400
4100	330	330	340	470	730	890	1300	1400
5100	350	350	400	470	730	850	1300	1400
6100	370	370	410	470	735	950	1250	1300
7100	400	400	420	540	755	1000	1100	1300
8200	450	450	450	550	775	1000	1200	1400

Table no.

75	[A] Base continuous misfire threshold in the transmission open state							
rpm / %	9.00	12.00	15.00	23.00	32.00	45.00	60.00	75.00
1000	240	250	300	420	650	900	1000	1000
2000	270	270	330	500	700	1100	1250	1250
3100	330	330	350	500	720	1000	1300	1400
4100	345	345	330	490	740	950	1300	1420
5100	360	360	465	550	760	1000	1350	1400
6100	380	380	470	600	785	1000	1400	1400
7100	420	420	490	620	810	1100	1150	1400
8200	450	450	520	620	825	1100	1200	1400

76	Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission open state (clutch is disengaged), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system							
rpm / %	9.00	12.00	15.00	23.00	32.00	45.00	60.00	75.00
1000	370	370	450	600	780	1100	1200	1200
2000	350	350	400	560	690	900	1030	1030
3100	260	260	380	530	650	900	2000	1000
4100	350	350	320	510	700	900	1100	1300
5100	450	450	600	520	620	800	1000	1700
6100	600	600	615	640	750	900	1200	2048
7100	700	700	900	850	950	1000	1300	2048
8200	900	900	1100	1050	1100	1100	1400	2048

77	Method 1: Angular acceleration of crankshaft in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single random misfire as well as single cylinder continuous misfire							
rpm / %	9.00	12.00	15.00	23.00	32.00	45.00	60.00	75.00
1000	195	195	285	420	560	840	1040	1040
2000	235	235	330	460	720	840	1250	1250
3100	280	280	340	470	720	850	1250	1400
4100	330	330	340	470	730	890	1300	1400
5100	350	350	400	470	730	850	1300	1400
6100	370	370	410	470	735	950	1250	1300
7100	400	400	420	540	755	1000	1100	1300
8200	450	450	450	550	775	1000	1200	1400

Table no.

78 [A] Base continuous misfire threshold in the transmission slip state

rpm / %	9.00	12.00	15.00	23.00	32.00	45.00	60.00	75.00
1000	240	250	300	420	650	900	1000	1000
2000	270	270	330	500	700	1100	1250	1250
3100	330	330	350	500	720	1000	1300	1400
4100	345	345	330	490	740	950	1300	1420
5100	360	360	465	550	760	1000	1350	1400
6100	380	380	470	600	785	1000	1400	1400
7100	420	420	490	620	810	1100	1150	1400
8200	450	450	520	620	825	1100	1200	1400

79 Method 2: Angular acceleration of crankshaft corrected for cylinders sharing same sensor wheel segments in transmission slip state (clutch is slipping), compared to threshold primarily used to detect single cylinder continuous and select paired cylinder continuous misfires in a non-adapted system

rpm / %	9.00	12.00	15.00	23.00	32.00	45.00	60.00	75.00
1000	370	370	450	600	780	1100	1200	1200
2000	350	350	400	560	690	900	1030	1030
3100	260	260	380	530	650	900	2000	1000
4100	350	350	320	510	700	900	1100	1300
5100	450	450	600	520	620	800	1000	1700
6100	600	600	615	640	750	900	1200	2048
7100	700	700	900	850	950	1000	1300	2048
8200	900	900	1100	1050	1100	1100	1400	2048

80 [A] Threshold zero torque, driving state

rpm	800	1500	2300	3000	5000	6200	7400	8500
%	5.32	7.00	6.30	9.50	14.10	19.40	23.50	27.00

81 [D] Threshold zero torque, idle state]

rpm	800	1500	2300	3000	5000	6200	7400	8500
%	4.26	4.86	5.04	5.68	6.01	6.52	6.52	6.52

82 [B] Map for zero torque correction, engine speed and altitude dependant

- / rpm	650	1500	2500	3000	4000
0.641	-1.581	-1.270	-0.900	-0.999	-1.660
0.906	0	0	0	0	0

Table no.

00	Abs (Physical value of driver demand torque extracted from Level1 CAN buffer in function monitoring) - (Driver demand torque output value from ring buffer in function monitoring)								
Nm	-3000.0	-2000.0	-1000.0	0.0	500.0	1000.0	2000.0	3000.0	5.0
Nm	300.00	200.00	100.00	10.00	50.00	100.00	200.00	300.00	1049.80

84	engine speed for normal, non-repeated, key starts			
kPa/ °C	-30.04	-0.04	39.96	79.96
50	700	600	600	600
70	700	600	600	600
90	700	600	600	600
100	700	600	600	600

85	Engine Oil Pressure									
V	0.24	0.50	1.00	1.50	2.00	3.00	3.50	4.00	4.50	5.00
kPa	0.00	57.00	167.30	277.60	387.90	608.50	718.80	829.20	939.50	1049.80

86	Relative engine oil pressure							
°C/ rpm	0	399.5	400	5000	6000	6500	7000	8600
-0.04	0	0	13.5	13.5	21.3	23.6	25.9	34.2
19.96	0	0	13.5	13.5	21.3	23.6	25.9	34.2
39.96	0	0	13.5	13.5	21.3	23.6	25.9	34.2
59.96	0	0	13.5	13.5	21.3	23.6	25.9	34.2
79.96	0	0	13.5	13.5	21.3	23.6	25.9	34.2
99.96	0	0	13.5	13.5	21.3	23.6	25.9	34.2
119.96	0	0	13.5	13.5	21.3	23.6	25.9	34.2
139.96	0	0	13.5	13.5	21.3	23.6	25.9	34.2

87	for time (debounce time for low oil pressure warning)			
°C	-40.04	-10.04	19.96	89.96
s	5	3.5	1.2	1.2

Table no.

88	Difference between measured engine oil pressure and oil pressure surface set point										
	°C/ rpm	0	400	550	800	2400	2800	4000	4800	5400	9000
	-40.04	80	80	30	30	30	30	30	30	30	30
	-10.04	80	80	30	30	30	30	30	30	30	30
	-0.04	80	80	10	10	10	10	10	10	10	10
	19.96	80	80	10	10	10	10	10	10	10	10
	39.96	80	80	10	10	10	10	10	10	10	10
	59.96	80	80	10	10	10	10	10	10	10	10
	79.96	80	80	10	10	10	10	10	10	10	10
	99.96	80	80	10	10	10	10	10	10	10	10
	119.96	80	80	10	10	10	10	10	10	10	10
	149.96	80	80	10	10	10	10	10	10	10	10

89	Engine oil pressure minus oil pressure set point										
	°C/ rpm	0	400	550	800	2400	2800	4000	4800	5400	9000
	-40.04	-80	-80	-50	-50	-50	-50	-50	-50	-50	-50
	-10.04	-80	-80	-50	-50	-50	-50	-50	-50	-50	-50
	-0.04	-80	-80	-50	-50	-50	-50	-50	-50	-50	-50
	19.96	-80	-80	-8	-8	-8	-8	-8	-8	-8	-8
	39.96	-80	-80	-8	-8	-8	-8	-8	-8	-8	-8
	59.96	-80	-80	-8	-8	-8	-8	-8	-8	-8	-8
	79.96	-80	-80	-8	-8	-8	-8	-8	-8	-8	-8
	99.96	-80	-80	-8	-8	-8	-8	-8	-8	-8	-8
	119.96	-80	-80	-8	-8	-8	-8	-8	-8	-8	-8
	149.96	-80	-80	-8	-8	-8	-8	-8	-8	-8	-8

90	Pre Supply Pump output voltage					
	V	4.00	5.00	6.00	7.00	9.00
	V	1.95	2.50	2.95	3.35	4.50

91	Relative fuel mass transient componet threshold for acceleration enrichment (Bank 1)									
	°C	-30.00	-20.30	-9.80	0.00	9.80	20.30	39.80	65.30	69.80
	%/seg	49.99	46.50	42.75	39.26	35.74	31.99	25.01	4.99	

92	Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2)									
	°C	-30.00	-20.30	-9.80	0.00	9.80	20.30	39.80	65.30	69.80
	%/seg	49.99	46.50	42.75	39.26	35.74	31.99	25.01	4.99	

Table no.

93

Absolute difference between relative actual angle calculated based on voltages from sensor 1 and sensor 2

%	0	5	10	15	100
%	5	5	6.25	6.25	6.25

94	Absolute difference between relative actual angle calculated based on voltages from sensor 1 and sensor 2					
	%	0	5	10	15	100
	%	5	5	6.25	6.25	6.25

95

for time
(blocking time for activation LC after acceleration enrichment)

°C	-39.8	-20.3	-9.8	0	20.3	39.8	60	90
s	1	1	1	1	0.5	0.4	0.3	0.3

96	for time								
	°C	-39.8	-20.3	-9.8	0	20.3	39.8	60	90
	s	1	1	1	1	0.5	0.5	0.5	0.5

97

Exhaust gas mass flow sensor 2

OSC Factor	0.30	0.70
g	219.73	320.00

98

Current integrator value of P-part balanced primary control enable

-	0.300	0.700
g	200	300

99	Relative air mass								
	rpm	1000	1120	1520	1800	2120	2520	3600	7000
	%	39.8	18.8	18.8	18.8	18.8	18.8	17.3	15.8

Table no.

100	Power stage feedback voltage					
V	4.00	5.00	6.00	7.00	8.00	9.00
V	1.95	2.50	2.95	3.35	4.00	4.50

101	Borderline OSC							
°C/g/s	450	500	600	650	700	750	800	850
4.2	0.125	0.125	0.200	0.225	0.260	0.300	0.300	0.300
6.9	0.125	0.125	0.200	0.225	0.260	0.300	0.300	0.300
9.7	0.125	0.125	0.200	0.225	0.260	0.300	0.300	0.300
13.9	0.125	0.125	0.200	0.225	0.260	0.300	0.300	0.300
27.8	0.125	0.125	0.200	0.225	0.260	0.300	0.300	0.300
38.9	0.125	0.125	0.200	0.225	0.260	0.300	0.300	0.300
50.0	0.125	0.125	0.200	0.225	0.260	0.300	0.300	0.300
69.4	0.125	0.125	0.200	0.225	0.260	0.300	0.300	0.300

END OF SECTION

240BDG07 EPS Summary Tables

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Steering Wheel Positon Sensor	C0051	Monitoring for steering angle sensor initialization. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	The Steering Angle Sensor is not initialized	TRUE	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	INSTANT	Safety Emissions Neutral Diagnostic - Type C
Steering Wheel Positon Sensor	C0051	Monitoring for steering angle sensor calibration status. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	The Steering Angle Sensor is not calibrated	TRUE	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	INSTANT	Safety Emissions Neutral Diagnostic - Type C
Steering Wheel Positon Sensor	C0051	This monitoring checks if the steering angle signal is constant when it should change. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Variation of steering angle signal during left and right curve since last vehicle standstill	< 5 [deg]	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	40 ms	Safety Emissions Neutral Diagnostic - Type C
Steering Wheel Positon Sensor	C0051	This monitoring checks if the steering angle velocity is plausible or not. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Variation of steering angle signal during left and right curve since last vehicle standstill	< 5 [deg]	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	40 ms	Safety Emissions Neutral Diagnostic - Type C
Steering Wheel Positon Sensor	C0051	This monitoring checks if the steering angle velocity is plausible or not. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Steering angle signal gradient OR Steering angle signal gradient after 2 messages OR Steering angle signal gradient after 3 messages	> 30 [deg]/0.020 [s] > 60 [deg]/0.020 [s] > 90 [deg]/0.020 [s]	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	60 ms	Safety Emissions Neutral Diagnostic - Type C
Steering Wheel Positon Sensor	C0051	This monitoring checks if the Steering angle offset has an acceptable value.. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Steering angle offset	> 15 [deg]	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	INSTANT	Safety Emissions Neutral Diagnostic - Type C
Steering Wheel Positon Sensor	C0051	This monitoring checks the Steering Angle Sensor's range by checking the raw sensor signal. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Absolute value of received raw sensor signal	> 810 [deg]	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	300 ms	Safety Emissions Neutral Diagnostic - Type C
Steering Wheel Positon Sensor	C0051	This monitoring checks if the steering angle signal is physically plausible. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Difference between measured steering angle and model calculated value based on yaw rate signal	> 10-100 [deg/s] velocity dependent (the bigger the velocity, the lower the threshold)	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	0.4 [s] - 4.8 [s] depending on the extent of the deviation - the larger the deviation is, the smaller the detection time	Safety Emissions Neutral Diagnostic - Type C
Steering Wheel Positon Sensor	C0051	This monitoring checks if the sign of the steering angle signal is incorrect.. Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Calculated integral value during forward driving OR Calculated integral value independently from driving direction	> -30 [deg] '> -90 [deg]	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	INSTANT	Safety Emissions Neutral Diagnostic - Type C
Steering Wheel Positon Sensor	C1211	This monitoring checks for an error in the Steering Wheel Angle Sensor Signal Message Counter . Emissions neutral default action: disable steering angle based auto-stop inhibit and perform auto-stops.	Communication of the Alive Rolling from the Steering Wheel Angle Sensor over CANbus is incorrect for out of total samples Communication of the Protection Value from the Steering Wheel Angle Sensor over CANbus is incorrect for out of total samples	>= 15.00 counts >= 18.00 counts >= 2.00 counts >= 18.00 counts	Diagnostic Voltage Vehicle Power Mode	= Enabled = 6V < voltage < 16V = RUN	= Isavailable	Safety Emissions Neutral Diagnostic - Type C

24OBDG07 TCM Summary Tables

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL/Illum.
Transmission Control Module (TCM)	P0601	TCM Read Only Memory	program/calibrations checksum failure at powerup	= True	Enable Conditions: OTA Program State Flag	= INACTIVE	>= 1 fail count	A
Transmission Control Module (TCM)	P0602	TCM Hardware configuration	HW configuration differs from SW configuration at powerup OR TCM end of line data checksum failure at powerup	= True = True	Enable Conditions: OTA Program State Flag	= INACTIVE	>= 1 fail count	A
Transmission Control Module (TCM)	P0604	TCM Random Access Memory	Incorrectable RAM fault causing running reset OR Incorrectable fault in shared memory	= True = True			>= 1 fail count	A
Transmission Control Module (TCM)	P0605	TCM Flash Program Memory	Flash Memory uncorrectable read error	= True	Enable Conditions: OTA Program State Flag	= INACTIVE	>= 1 fail count	A
Transmission Control Module (TCM)	P0606	TCM CPU internal fault monitor	CPU related fault detected at start up initialization OR Runtime CPU fault detected	= True = True			>= 1 fail count	A
Transmission Control Module (TCM)	P0607	TCM internal fault monitor	One Time Test reports a fault at start up initialization OR Internal Communication related fault caused running reset	= True = True			>= 1 fail count	A
Transmission Control Module	P0607	TCM internal fault monitor	Runtime Internal communications fault detected	= True			>= 400ms	A
Transmission Control Module	P0607	TCM internal fault monitor	Consistency check fault on redundant input detected	= True			>= 2 fail count	A
Transmission Control Module	P0607	TCM internal fault monitor	Runtime Internal communications integrity fault related to Received CAN data detected	= True			>= 4 fail count	A
Transmission Control Module	P0607	TCM internal fault monitor	Runtime Internal communications aging fault related to Safety Relevant Received CAN data detected	= True			>= 400 ms	A

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Transmission Control Module	P0607	TCM internal fault monitor	Runtime Internal communications aging fault related to Non Safety Relevant Received CAN data detected	=	True			>=	10 sec	A
Transmission Control Module (TCM)	P060A	TCM Clock and Timing monitor	Watchdog fault detected at start up initialization OR Clock or PLL related fault detected at start up initialization OR Task / program flow monitoring fault detected	=	True			>=	1 fail count	A
Transmission Control Module (TCM)	P060B	ADC performance monitor	ADC related fault detected at start up initialization	=	True		Enable Conditions: OTA Program State Flag	=	INACTIVE	A
Transmission Control Module (TCM)	P060B	ADC performance monitor	ADC converter related fault detected OR ADC multiplexer related fault detected	=	True			>=	1 fail count	A
							Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Power Mode = RUN OTA Program State Flag = INACTIVE			
Transmission Control Module (TCM)	P060C	Supply voltage monitor	Supply related fault detected at start up initialization	=	True		Enable Conditions: OTA Program State Flag	=	INACTIVE	A
Transmission Control Module (TCM)	P0613	Operating system fault monitor	OS related fault detected at start up initialization	=	True			>=	1 fail count	A
Transmission Control Module (TCM)	P062F	Non Volatile parameter monitor	Fault detected related to Non Volatile Memory blocks storing part numbers, tester serial numbers, VIN and programming date	=	True			>=	1 fail count	A
Transmission Control Module (TCM)	P064F	Non Volatile parameter monitor	Fault detected related to application software parameters including MCV M data	=	True		Enable Conditions: OTA Program State Flag	=	INACTIVE	A
Transmission Control Module (TCM)	P1188	Calibration ID verification	Mismatch between Calibration ID and Application ID detected	=	True			>=	1 fail count	A

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					Enable Conditions:	OTA Program State Flag	=	INACTIVE		
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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions		Time Required	MILillum.
Transmission Control Module (TCM)	U0073	Controller Area Network bus Communication Error	CAN Hardware Circuitry Detects a bus-off condition	= True			>=	5 occurrences	A
					Enable Conditions: Stabilization delay Ignition Voltage Ignition Voltage Partial network OTA Program State Flag	>= 5 sec >= 8.75 Volt < 18 Volt = ACTIVE for at least 2sec = INACTIVE	in	5 sec	
Transmission Control Module (TCM)	U1960	Key Provisioning	Empty Key Slot found at power up initialization	= True			>=	1 fail count	A
					Enable Conditions: Stabilization delay Ignition Voltage Ignition Voltage Partial network OTA Program State Flag	>= 5 sec >= 8.75 Volt < 18 Volt = ACTIVE for at least 5sec = INACTIVE			
Transmission Control Module (TCM)	U1960	Key Provisioning	Authoritative counter overflow	= True			>=	1 fail count	A
					Enable Conditions: Stabilization delay Ignition Voltage Ignition Voltage Partial network OTA Program State Flag	>= 5 sec >= 8.75 Volt < 18 Volt = ACTIVE for at least 5sec = INACTIVE			
Transmission Control Module (TCM)	U196192	Security Peripheral Monitor	Security peripheral related fault during MAC generation or Security peripheral related fault during MAC verification	= True			>=	1 fail count	A
					Enable Conditions: Stabilization delay Ignition Voltage Ignition Voltage Partial network OTA Program State Flag	>= 5 sec >= 8.75 Volt < 18 Volt = ACTIVE for at least 5sec = INACTIVE			
Transmission Control Module (TCM)	U1962	Message authentication Monitor	Message Authentication failed	= True			>=	250 fail counts per key slot	A
					Enable Conditions: Stabilization delay Ignition Voltage Ignition Voltage Partial network OTA Program State Flag Disable Conditions: MIL Illuminated for	>= 5 sec >= 8.75 Volt < 18 Volt = ACTIVE for at least 2sec = INACTIVE DTC U1960			
Transmission Control Module (TCM)	U1611	Lost Communications with ECM CAN	CAN messages from ECM are not received by the TCM	= True			>=	1 sec	A

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					Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073			
Transmission Control Module (TCM)	U1619	Lost Communications with ECM LIN	LIN messages from ECM are not received by the TCM	= True			>= 1 sec	B
					Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Power Mode = RUN or PROPULSION Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073			
Transmission Control Module (TCM)	U0131	Lost Communications with EPS	CAN messages from EPS are not received by the TCM	= True			>= 1 sec	C
					Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073			
Transmission Control Module (TCM)	U0151	Lost Communications with SDM	CAN messages from SDM are not received by the TCM	= True			>= 1 sec	B
					Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073			
Transmission Control Module (TCM)	U0140	Lost Communications with BCM	CAN messages from BCM are not received by the TCM	= True			>= 1 sec	B
					Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073			
Transmission Control Module (TCM)	U0146	Lost Communications with CGM	CAN messages from CGM are not received by the TCM	= True			>= 1 sec	A
					Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt			

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						Ignition Voltage < 18 Volt Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073		
Transmission Control Module (TCM)	U1610	Lost Communications with EBCM	CAN messages from EBCM are not received by the TCM	= True			>= 1 sec	A
						Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073		
Transmission Control Module (TCM)	U0401	Invalid data received from ECM	CAN message from ECM signal integrity fault detected	= True			>= 40 out of 80	A
						Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073		
Transmission Control Module (TCM)	U0420	Invalid data received from EPS	CAN message from EPS signal integrity fault detected	= True			>= 40 out of 80	C
						Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073		
Transmission Control Module (TCM)	U0452	Invalid data received from SDM	CAN message from SDM signal integrity fault detected	= True			>= 40 out of 80	B
						Enable Conditions: Stabilization delay >= 5 sec Ignition Voltage >= 8.75 Volt Ignition Voltage < 18 Volt Partial network = ACTIVE for at least 5sec OTA Program State Flag = INACTIVE Disable Conditions: MIL Illuminated for DTC U0073		
Transmission Control Module (TCM)	U0422	Invalid data received from BCM	CAN message from BCM signal integrity fault detected	= True			>= 40 out of 80	B

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					<div><div>Enable Conditions:</div><div>Stabilization delay Ignition Voltage Ignition Voltage Partial network OTA Program State Flag</div><div>>= 5 sec >= 8.75 Volt < 18 Volt = ACTIVEfor at least 5sec = INACTIVE</div></div> <div><div>Disable Conditions:</div><div>MIL Illuminated for</div><div>DTC U0073</div></div>			
Transmission Control Module (TCM)	U0447	Invalid data received from CGM	CAN message from CGM signal integrity fault detected	= True			>= 40 out of 80	A
				<div><div>Enable Conditions:</div><div>Stabilization delay Ignition Voltage Ignition Voltage Partial network OTA Program State Flag</div><div>>= 5 sec >= 8.75 Volt < 18 Volt = ACTIVEfor at least 5sec = INACTIVE</div></div> <div><div>Disable Conditions:</div><div>MIL Illuminated for</div><div>DTC U0073</div></div>				
Transmission Control Module (TCM)	U0418	Invalid data received from EBCM	CAN message from EBCM signal integrity fault detected	= True			>= 40 out of 80	A
				<div><div>Enable Conditions:</div><div>Stabilization delay Ignition Voltage Ignition Voltage Partial network OTA Program State Flag</div><div>>= 5 sec >= 8.75 Volt < 18 Volt = ACTIVEfor at least 5sec = INACTIVE</div></div> <div><div>Disable Conditions:</div><div>MIL Illuminated for</div><div>DTC U0073</div></div>				
Transmission Control Module (TCM)	P06AF	Invalid data received from ECM/LIN	ECM diagnostic pattern check failed	= True			>= 5 out of 50 or no fault free sample window during 5s	A
				<div><div>Enable Conditions:</div><div>Power Mode</div><div>= not OFF at least 5 sec</div></div> <div><div>Disable Conditions:</div><div>MIL Illuminated for</div><div>DTC U0073</div></div>				

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Transmission Clutch 1 Pressure Sensor	P0843	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTCis set.	Clutch 1 Pressure Sensor Voltage Hysteresis	> 4530 = 30 mV mV	Enable Conditions: Sensor supply voltage (VREF1) Sensor supply voltage (VREF1) Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 5500 mV < 4500 mV > 8750 mV < 18000 mV != Cranking != Stop 150 ms P0882, P0883, P0642, P0643	Runs Continuously	A
Transmission Clutch 1 Pressure Sensor	P0842	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTCis set.	Clutch 1 Pressure Sensor Voltage Hysteresis	< 220 = 30 mV mV	Enable Conditions: Sensor supply voltage (VREF1) Sensor supply voltage (VREF1) Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 5500 mV < 4500 mV > 8750 mV < 18000 mV != Cranking != Stop 150 ms P0882, P0883, P0642, P0643	Runs Continuously	A
Transmission Clutch 2 Pressure Sensor	P0848	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTCis set.	Clutch 2 Pressure Sensor Voltage Hysteresis	> 4530 = 30 mV mV	Enable Conditions: Sensor supply voltage (VREF2) Sensor supply voltage (VREF2) Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 5500 mV < 4500 mV > 8750 mV < 18000 mV != Cranking != Stop 150 ms P0882, P0883, P0652, P0653	Runs Continuously	A
Transmission Clutch 2 Pressure Sensor	P0847	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTCis set.	Clutch 2 Pressure Sensor Voltage Hysteresis	< 220 = 30 mV mV	Enable Conditions: Sensor supply voltage (VREF2) Sensor supply voltage (VREF2) Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 5500 mV < 4500 mV > 8750 mV < 18000 mV != Cranking != Stop 150 ms P0882, P0883, P0652, P0653	Runs Continuously	A

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Transmission system Pressure Sensor	P0873	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	System pressure Sensor Voltage	>	4530		Enable Conditions: Sensor supply voltage (VREF2)	>	5500	mV	Runs Continuously	A
			Hysteresis	=	30	mV mV	Sensor supply voltage (VREF2) Battery voltage Battery voltage Engine Status Key Status	< > < != !=	4500 8750 18000 Cranking Stop	mV mV mV		
							Debounce: Fail confirmation time	>=	150	ms		
							Disable Conditions:		P0882, P0883, P0652, P0653			
Transmission system Pressure Sensor	P0872	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	System pressure Sensor Voltage	<	220		Enable Conditions: Sensor supply voltage (VREF2)	>	5500	mV	Runs Continuously	A
			Hysteresis	=	30	mV mV	Sensor supply voltage (VREF2) Battery voltage Battery voltage Engine Status Key Status	< > < != !=	4500 8750 18000 Cranking Stop	mV mV mV		
							Debounce: Fail confirmation time	>=	150	ms		
							Disable Conditions:		P0882, P0883, P0652, P0653			
Transmission LSD Pressure Sensor	P0878	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	LSD pressure Sensor Voltage	>	4530		Enable Conditions: Sensor supply voltage (VREF1)	>	5500	mV	Runs Continuously	B
			Hysteresis	=	30	mV mV	Sensor supply voltage (VREF1) Battery voltage Battery voltage Engine Status Key Status	< > < != !=	4500 8750 18000 Cranking Stop	mV mV mV		
							Debounce: Fail confirmation time	>=	150	ms		
							Disable Conditions:		P0882, P0883, P0642, P0643			
Transmission LSD Pressure Sensor	P0877	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	LSD pressure Sensor Voltage	<	220		Enable Conditions: Sensor supply voltage (VREF1)	>	5500	mV	Runs Continuously	B
			Hysteresis	=	30	mV mV	Sensor supply voltage (VREF1) Battery voltage Battery voltage Engine Status Key Status	< > < != !=	4500 8750 18000 Cranking Stop	mV mV mV		
							Debounce: Fail confirmation time	>=	150	ms		
							Disable Conditions:		P0882, P0883, P0642, P0643			

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Cooler temperature Sensor	P2743	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Cooler temperature Sensor resistance	>	4745	mV	Enable Conditions: Battery voltage	>	8750	mV	Runs Continuously	B
			Hysteresis	=	5	mV	Battery voltage Engine Status Key Status	< != !=	18000 Cranking Stop	mV		
							Debounce: Fail confirmation time	>=	500	ms		
							Disable Conditions:		P0882, P0883			
Cooler temperature Sensor	P2742	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Cooler temperature Sensor resistance	<	200	mV	Enable Conditions: Battery voltage	>	8750	mV	Runs Continuously	B
			Hysteresis	=	30	mV	Battery voltage Engine Status Key Status	< != !=	18000 Cranking Stop	mV		
							Debounce: Fail confirmation time	>=	500	ms		
							Disable Conditions:		P0882, P0883			
Sump temperature Sensor	P0713	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sump temperature Sensor resistance	>	4745	mV	Enable Conditions: Battery voltage	>	8750	mV	Runs Continuously	B
			Hysteresis	=	5	mV	Battery voltage Engine Status Key Status	< != !=	18000 Cranking Stop	mV		
							Debounce: Fail confirmation time	>=	500	ms		
							Disable Conditions:		P0882, P0883			
Sump temperature Sensor	P0712	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sump temperature Sensor resistance	<	200	mV	Enable Conditions: Battery voltage	>	8750	mV	Runs Continuously	B
			Hysteresis	=	30	mV	Battery voltage Engine Status Key Status	< != !=	18000 Cranking Stop	mV		
							Debounce: Fail confirmation time	>=	500	ms		
							Disable Conditions:		P0882, P0883			
Speed sensor supply 1	P06A5	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Speed sensor supply voltage VSS1	>	10500	mV	Enable Conditions: Battery voltage	>	8750	mV	Runs Continuously	A
			Hysteresis	=	500	mV	Battery voltage Engine Status Key Status	< != !=	18000 Cranking Stop	mV		
							Debounce: Fail confirmation time	>=	75	ms		
							Disable Conditions:		P0882, P0883			

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Speed sensor supply 1	P06A4	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Speed sensor supply voltage VSS1 hysteresis	< 8000 = 250 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV 18000 mV Cranking Stop != != 75 ms P0882, P0883	Runs Continuously	A
Speed sensor supply 2	P06D4	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Speed sensor supply voltage VSS2 hysteresis	> 10500 = 500 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV 18000 mV Cranking Stop != != 75 ms P0882, P0883	Runs Continuously	A
Speed sensor supply 2	P06D3	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Speed sensor supply voltage VSS2 Hysteresis	< 8000 = 250 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV 18000 mV Cranking Stop != != 75 ms P0882, P0883	Runs Continuously	A
Sensor supply 1	P0643	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor supply voltage VREF1 Hysteresis	> 5500 = 50 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV 18000 mV Cranking Stop != != 40 ms P0882, P0883	Runs Continuously	A
Sensor supply 1	P0642	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor supply voltage VREF1 Hysteresis	< 4500 = 50 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV 18000 mV Cranking Stop != != 40 ms P0882, P0883	Runs Continuously	A

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Sensor supply 2	P0653	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor supply voltage VREF2 Hysteresis	> 5500 = 50 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV < 18000 mV != Cranking != Stop >= 40 ms P0882, P0883	Runs Continuously	A
Sensor supply 2	P0652	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor supply voltage VREF2 Hysteresis	< 4500 = 50 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV < 18000 mV != Cranking != Stop >= 40 ms P0882, P0883	Runs Continuously	A
Paddle plus input	P2777	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	TAPUP paddle input Hysteresis	> 4774 = 30 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs Continuously	C
Paddle plus input	P2776	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	TAPUP paddle input Hysteresis	< 2519 = 30 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs Continuously	C
Paddle min input	P2781	This diagnostic verifies that the input voltage is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	TAPDN paddle input Hysteresis	> 4774 = 30 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs Continuously	C

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Paddle min input	P2780	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	TAPDN paddle input Hysteresis	< 2519 = 30 mV mV	Enable Conditions: Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	> 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs Continuously	C
TCM input voltage	P0883	This diagnostic verifies that the supply voltage on KL30 is below the maximum working voltage (with hysteresis). If the voltage is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Battery voltage Hysteresis	> 18300 = 300 mV mV	Enable Conditions: Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	!= Cranking != Stop >= 500 ms	Runs Continuously	A
TCM input voltage	P0882	This diagnostic verifies that the input voltage is above the minimum working voltage (with hysteresis). If the voltage is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Battery voltage Hysteresis	< 8500 = 250 mV mV	Enable Conditions: Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	!= Cranking != Stop >= 500 ms	Runs Continuously	A

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Rod 1 Position Sensor	P2834	This diagnostic verifies that there are pulses detected on the input.If there are no pulses detected and the input level is high a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	= True	Enable Conditions: Sensor supply voltage (VREF1)	5500 mV	Runs Continuously	A
			Pin voltage	> 3500 mV	Sensor supply voltage (VREF1) Battery voltage	> 4500 mV > 8750 mV		
		This diagnostic verifies that the input duty cycle is below the maximum working duty cycle. If the duty cycle is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	> 92 %	Battery voltage	18000 mV		
					Engine Status Key Status	< Cranking != Stop		
					Debounce: Fail confirmation time	>= 150 ms		
					Disable Conditions:	P0882, P0883, P0642, P0643		
Rod 1 Position Sensor	P2833	This diagnostic verifies that there are pulses detected on the input.If there are no pulses detected and the input level is low a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	= True	Enable Conditions: Sensor supply voltage (VREF1)	5500 mV	Runs Continuously	A
			Pin voltage	< 2000 mV	Sensor supply voltage (VREF1) Battery voltage	> 4500 mV > 8750 mV		
		This diagnostic verifies that the input duty cycle is above the minimum working duty cycle. If the duty cycle is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	< 8 %	Battery voltage	18000 mV		
					Engine Status Key Status	< Cranking != Stop		
					Debounce: Fail confirmation time	>= 150 ms		
					Disable Conditions:	P0882, P0883, P0642, P0643		
Rod 1 Position Sensor	P2835	This diagnosit checks the frequency of the digital input signal. If the frequency is outside the valid working range of the sensor a fault timer is increased. If the fault timeout is reached, the DTC is set.	Minimum sensor frequency	< 1500 Hz	Enable Conditions: Sensor supply voltage (VREF1)	5500 mV	Runs Continuously	A
			Maximum sensor frequency	> 2500 Hz	Sensor supply voltage (VREF1) Battery voltage Battery voltage Engine Status Key Status	> 4500 mV > 8750 mV < 18000 mV != Cranking != Stop		
					Debounce: Fail confirmation time	150 ms		
					Disable Conditions:	P0882, P0883, P0642, P0643		
Rod 2 Position Sensor	P2839	This diagnostic verifies that there are pulses detected on the input.If there are no pulses detected and the input level is high a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	= True	Enable Conditions: Sensor supply voltage (VREF1)	5500 mV	Runs Continuously	A
			Pin voltage	> 3500 mV	Sensor supply voltage (VREF1) Battery voltage	> 4500 mV > 8750 mV		

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		This diagnostic verifies that the input duty cycle is below the maximum working duty cycle. If the duty cycle is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	>	92	%	Battery voltage	18000	mV			
							Engine Status Key Status	< != !=	Cranking Stop			
							Debounce: Fail confirmation time	>=	150	ms		
							Disable Conditions:		P0882, P0883, P0642, P0643			
Rod 2 Position Sensor	P2838	This diagnostic verifies that there are pulses detected on the input. If there are no pulses detected and the input level is low a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	=	True		Enable Conditions: Sensor supply voltage (VREF1)	5500	mV	Runs Continuously	A	
			Pin voltage	<	2000	mV	Sensor supply voltage (VREF1) Battery voltage	> < >	4500 8750	mV mV		
		This diagnostic verifies that the input duty cycle is above the minimum working duty cycle. If the duty cycle is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	<	8	%	Battery voltage	18000	mV			
							Engine Status Key Status	< != !=	Cranking Stop			
							Debounce: Fail confirmation time	>=	150	ms		
							Disable Conditions:		P0882, P0883, P0642, P0643			
Rod 2 Position Sensor	P283A	This diagnosis checks the period of the digital input signal. If the period is outside the valid working range of the sensor a fault timer is increased. If the fault timeout is reached, the DTC is set.	Minimum sensor frequency	<	1500	Hz	Enable Conditions: Sensor supply voltage (VREF1)	5500	mV	Runs Continuously	A	
			Maximum sensor frequency	>	2500	Hz	Sensor supply voltage (VREF1) Battery voltage Battery voltage Engine Status Key Status	> < > < != !=	4500 8750 18000 Cranking Stop	mV mV mV		
							Debounce: Fail confirmation time	>=	150	ms		
							Disable Conditions:		P0882, P0883, P0642, P0643			
Rod 3 Position Sensor	P283E	This diagnostic verifies that there are pulses detected on the input. If there are no pulses detected and the input level is high a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	=	True		Enable Conditions: Sensor supply voltage (VREF2)	5500	mV	Runs Continuously	A	
			Pin voltage	>	3500	mV	Sensor supply voltage (VREF2) Battery voltage	> < >	4500 8750	mV mV		
		This diagnostic verifies that the input duty cycle is below the maximum working duty cycle. If the duty cycle is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	>	92	%	Battery voltage	18000	mV			
							Engine Status Key Status	< != !=	Cranking Stop			
							Debounce: Fail confirmation time	>=	150	ms		

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						Disable Conditions:	P0882, P0883, P0652, P0653							
Rod 3 Position Sensor	P283D	This diagnostic verifies that there are pulses detected on the input.If there are no pulses detected and the input level is low a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	=	True	Enable Conditions: Sensor supply voltage (VREF2) Sensor supply voltage (VREF2) Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	5500	mV	Runs Continuously	A				
			Pin voltage	<	2000		mV	> < >			4500 8750	mV mV		
		This diagnostic verifies that the input duty cycle is above the minimum working duty cycle. If the duty cycle is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	<	8		%	< != !=			18000 Cranking Stop	mV		
								>=			150	ms		
							P0882, P0883, P0652, P0653							
Rod 3 Position Sensor	P283F	This diagnosis checks the period of the digital input signal. If the period is outside the valid working range of the sensor a fault timer is increased. If the fault timeout is reached, the DTC is set.	Minimum sensor frequency	<	1500	Hz	Enable Conditions: Sensor supply voltage (VREF2) Sensor supply voltage (VREF2) Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	5500	mV	Runs Continuously	A			
			Maximum sensor frequency	>	2500	Hz		> < > < != !=	4500 8750 18000 Cranking Stop			mV mV mV		
								150	ms					
								P0882, P0883, P0652, P0653						
Rod 4 Position Sensor	P2843	This diagnostic verifies that there are pulses detected on the input.If there are no pulses detected and the input level is high a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	=	True	Enable Conditions: Sensor supply voltage (VREF2) Sensor supply voltage (VREF2) Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	5500	mV	Runs Continuously	A				
			Pin voltage	>	3500		mV	> < >			4500 8750	mV mV		
		This diagnostic verifies that the input duty cycle is below the maximum working duty cycle. If the duty cycle is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	>	92		%	< != !=			18000 Cranking Stop	mV		
								150			ms			
							P0882, P0883, P0652, P0653							
Rod 4 Position Sensor	P2842	This diagnostic verifies that there are pulses detected on the input.If there are no pulses detected and the input level is low a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	=	True	Enable Conditions: Sensor supply voltage (VREF2) Sensor supply voltage (VREF2) Battery voltage	5500	mV	Runs Continuously	A				
			Pin voltage	<	2000		mV	> < >			4500 8750	mV mV		

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		This diagnostic verifies that the input duty cycle is above the minimum working duty cycle. If the duty cycle is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	<	8	%	Battery voltage	18000	mV		
							Engine Status Key Status	< != !=	Cranking Stop		
							Debounce: Fail confirmation time		150	ms	
							Disable Conditions:		P0882, P0883, P0652, P0653		
Rod 4 Position Sensor	P2844	This diagnosis checks the period of the digital input signal. If the period is outside the valid working range of the sensor a fault timer is increased. If the fault timeout is reached, the DTC is set.	Minimum sensor frequency	<	1500	Hz	Enable Conditions: Sensor supply voltage (VREF2)	5500	mV	Runs Continuously	A
			Maximum sensor frequency	>	2500	Hz	Sensor supply voltage (VREF2) Battery voltage Battery voltage Engine Status Key Status	> < > < != !=	4500 8750 18000 Cranking Stop	mV mV mV	
							Debounce: Fail confirmation time	>=	150	ms	
							Disable Conditions:		P0882, P0883, P0652, P0653		
Rod 5 Position Sensor	P2866	This diagnostic verifies that there are pulses detected on the input.If there are no pulses detected and the input level is high a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	=	True		Enable Conditions: Sensor supply voltage (VREF2)	5500	mV	Runs Continuously	A
			Pin voltage	>	3500	mV	Sensor supply voltage (VREF2) Battery voltage	> < >	4500 8750	mV mV	
		This diagnostic verifies that the input duty cycle is below the maximum working duty cycle. If the duty cycle is too high a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	>	92	%	Battery voltage Engine Status Key Status	< != !=	18000 Cranking Stop	mV	
							Debounce: Fail confirmation time	>=	150	ms	
							Disable Conditions:		P0882, P0883, P0652, P0653		
Rod 5 Position Sensor	P2865	This diagnostic verifies that there are pulses detected on the input.If there are no pulses detected and the input level is low a timer is increased. If the fault timeout limit is reached, the DTC is set.	No pulses detected	=	True		Enable Conditions: Sensor supply voltage (VREF2)	5500	mV	Runs Continuously	A
			Pin voltage	<	2000	mV	Sensor supply voltage (VREF2) Battery voltage	> < >	4500 8750	mV mV	
		This diagnostic verifies that the input duty cycle is above the minimum working duty cycle. If the duty cycle is too low a timer is increased, if the fault timeout limit is reached, the DTC is set.	Sensor Duty Cycle	<	8	%	Battery voltage Engine Status Key Status	< != !=	18000 Cranking Stop	mV	
							Debounce: Fail confirmation time	>=	150	ms	

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						Disable Conditions:	P0882, P0883, P0652, P0653						
Rod 5 Position Sensor	P2867	This diagnosis checks the period of the digital input signal. If the period is outside the valid working range of the sensor a fault timer is increased. If the fault timeout is reached, the DTC is set.	Minimum sensor frequency	<	1500	Hz	Enable Conditions:	Sensor supply voltage (VREF2)	5500	mV	Runs Continuously	A	
			Maximum sensor frequency	>	2500	Hz		Sensor supply voltage (VREF2)	>				
								Battery voltage	<	4500			mV
								Battery voltage	>	8750			mV
								Battery voltage	<	18000			mV
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	150			ms
							Disable Conditions:						
									P0882, P0883, P0652, P0653				

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Parklock position sensor	P17F7	If the parklock position sensor value is above the funtional range, too high fault is set after confirmation time.	Parklock position sensor value	> 90 %	Enable Conditions: Sensor supply voltage (VREF2)	> 5500 mV	Runs Continuously	B
		If the parklock sensor SENTinput didn't receive any new value and the input pin is high. A too high fault is set after a confirmation time.	Receive timestamp	= previous receive timestamp	Sensor supply voltage (VREF2)	< 4500 mV		
			Parklock position input pin voltage	> 3500 mV	Battery voltage Battery voltage Engine Status Key Status	> 8750 mV < 18000 mV != Cranking != Stop		
					Debounce: Fail confirmation time	150 ms		
					Disable Conditions:	P0882, P0883, P0652, P0653		
Parklock position sensor	P17F6	If the parklock position sensor value is below the funtional range, too high fault is set after confirmation time.	Parklock position sensor value	< 10 %	Enable Conditions: Sensor supply voltage (VREF2)	> 5500 mV	Runs Continuously	B
		If the parklock sensor SENTinput didn't receive any new value and the input pin is Low. A too low fault is set after a confirmation time.	Receive timestamp	= previous receive timestamp	Sensor supply voltage (VREF2)	< 4500 mV		
			Parklock position input pin voltage	< 2000 mV	Battery voltage Battery voltage Engine Status Key Status	> 8750 mV < 18000 mV != Cranking != Stop		
					Debounce: Fail confirmation time	>= 150 ms		
					Disable Conditions:	P0882, P0883, P0652, P0653		
Parklock position sensor	P191C	This diagnostic checks if a new values is received from the parklock postion SENTsensor. If no new value is received and the input pin is toggling a DTCis set after a confirmation timeout.	Receive timestamp	= previous receive timestamp	Enable Conditions: Sensor supply voltage (VREF2)	> 5500 mV	Runs Continuously	B
		This diagnostic checks if the SENTsignal reveiced from the parklock position sensor is within the sensor value range. If not a DTCis set after a confirmation time.	Parklock position sensor value	> 99.78 %	Sensor supply voltage (VREF2)	< 4500 mV		
			Parklock position sensor value	< 0.05 %	Battery voltage	> 8750 mV		
		This diagnosis checks if the received SENTsignal is OK. If the CRCis wrong or the no End of frame was received successfully a DTCis se after a confirmation time.	Parklock position sencorCRC	= wrong	Battery voltage	< 18000 mV		
			Parklock position sencorSENT end of frame	= wrong	Engine Status Key Status	!= Cranking != Stop		
					Debounce: Fail confirmation time	>= 150 ms		
					Disable Conditions:	P0882, P0883, P0652, P0653		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters		Enable Conditions		Time Required	MIL ilium.			
Output Speed Sensor	P077D	This diagnostic verifies that the average voltage on the speed input pin is below the maximum working range limit. If it's too high, a timer is increased. If the fault timeout limit is reached, the DTC is set.	Speed Level Voltage	>	4230	mV	Enable Conditions:	Sensor supply voltage (VSS1)	>	8250	mV	Runs Continuously	A	
			Hysteresis	=	30	mV		Sensor supply voltage (VSS1)	<	10000	mV			
		This diagnostic verifies that the speed input pulse time is within the valid ranges. If the pulse time is outside all valid ranges, a fault timer increases. If the fault timeout limit is reached, the DTC is set.	Speed Sensor Pulse Width	<	29	ps	Battery voltage	>	8750	mV				
			OR											
			Speed Sensor Pulse Width	>	63	ps		Battery voltage	<	18000	mV			
			Speed Sensor Pulse Width	<	67	ps			Engine Status	!=	Cranking			
			OR							Key Status	!=			Stop
			Speed Sensor Pulse Width	>	115	ps								
			Speed Sensor Pulse Width	<	144	ps								
			OR											
		Speed Sensor Pulse Width	>	218	ps									
		This diagnostic verifies that there are no non-direction pulses when the speed is high enough to guarantee stable pulses.	Speed Sensor Frequency	>=	40	Hz								
			Speed Sensor Pulse Width	<	144	ps								
			Speed Sensor Pulse Width	>	218	ps								
		This diagnostic verifies that there are no jumps in pulse width when the speed is high enough to guarantee stable pulses.	Speed Sensor Frequency	>=	40	Hz								
Speed sensor Pulse Width difference inside valid range	>		15	ps										
This diagnostic verifies that the average voltage on the speed input pin is below the maximum possible voltage when there are no pulses. If it's too high a timer is increased. If the fault timeout limit is reached, the DTC is set.	Speed Sensor Frequency	=	0	Hz	Debounce:	Fail confirmation time	>=	300	ms					
	Speed Level Voltage	>	2640	mv		Disable Conditions:	P0882, P0883							
Output Speed Sensor	P077C	This diagnostic verifies that the average voltage on the speed input pin is above the minimum working range limit. If it's too low a timer is increased. If the fault timeout limit is reached, the DTC is set.	Speed Level Voltage	<	980	mV	Enable Conditions:	Sensor supply voltage (VSS1)	>	8250		Runs Continuously	A	
			Hysteresis	=	20	mV		Sensor supply voltage (VSS1)	<	10000	mV			
								Battery voltage	>	8750	mV			
								Battery voltage	<	18000	mV			
				Engine Status	!=	Cranking								
				Key Status	!=	Stop								
					Debounce:	Fail confirmation time	>=	300	ms					
					Disable Conditions:	P0882, P0883								
Odd Clutch Speed Sensor	P07C6	This diagnostic verifies that the average voltage on the speed input pin is below the maximum working range limit. If it's too high, a timer is increased. If the fault timeout limit is reached, the DTC is set.	Speed Level Voltage	>	4230	mV	Enable Conditions:	Sensor supply voltage (VSS1)	>	8250	mV	Runs Continuously	A	
			Hysteresis	=	30	mV		Sensor supply voltage (VSS1)	<	10000	mV			
							Battery voltage	>	8750	mV				

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			Speed Sensor Pulse Width	>	115	ps						
			Speed Sensor Pulse Width	<	144	ps						
			OR									
			Speed Sensor Pulse Width	>	218	ps						
		This diagnostic verifies that there are no non-direction pulses when the speed is high enough to guarantee stable pulses.	Speed Sensor Frequency	>=	40	Hz						
			Speed Sensor Pulse Width	<	144	ps						
			Speed Sensor Pulse Width	>	218	ps						
		This diagnostic verifies that there are no jumps in pulse width when the speed is high enough to guarantee stable pulses.	Speed Sensor Frequency	>=	40	Hz						
			Speed sensor Pulse Width difference inside valid range	>	15	ps						
		This diagnostic verifies that the average voltage on the speed input pin is below the maximum possible voltage when there are no pulses. If it's too high a timer is increased. If the fault timeout limit is reached, the DTC is set.	Speed Sensor Frequency	=	0	Hz						
			Speed Level Voltage	>	2640	mv						
							Debounce:	Fail confirmation time	>=	300 ms		
							Disable Conditions:		P0882, P0883			
Even Clutch Speed Sensor	P07C7	This diagnostic verifies that the average voltage on the speed input pin is above the minimum working range limit. If it's too low a timer is increased. If the fault timeout limit is reached, the DTC is set.	Speed Level Voltage	<	980	mV	Enable Conditions:	Sensor supply voltage (VSS2)	>	8250	Runs Continuously	A
			Hysteresis	=	20	mV		Sensor supply voltage (VSS2)	<	10000 mV		
							Battery voltage	>	8750 mV			
							Battery voltage	<	18000 mV			
							Engine Status	!=	Cranking			
							Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	300 ms		
							Disable Conditions:		P0882, P0883			

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
HSO1	P0658	This diagnosis checks that the HSO is not shorted to ground. If the Measured voltage at the HSO is lower than a percentage of the supply voltage or if the average measured current is too high a fault timer is increased. If the timer reaches the fault timeout limit a DTC is set.	HSO1 voltage level OR HSO1 current feedback	< 40 %off Vbatt > 10000 mA	Enable Conditions: Shutdownpath test OK Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 60 ms P0882, P0883	Runs Continuously	A
HSO2	P2670	This diagnosis checks that the HSO is not shorted to ground. If the Measured voltage at the HSO is lower than a percentage of the supply voltage or if the average measured current is too high a fault timer is increased. If the timer reaches the fault timeout limit a DTC is set.	HSO2 voltage level OR HSO2 current feedback	< 40 %off Vbatt > 10000 mA	Enable Conditions: Shutdownpath test OK Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 60 ms P0882, P0883	Runs Continuously	A
HSO7	P2685	This diagnosis checks that the HSO is not shorted to ground. If the Measured voltage at the HSO is lower than a percentage of the supply voltage or if the average measured current is too high a fault timer is increased. If the timer reaches the fault timeout limit a DTC is set.	HSO7 voltage level OR HSO7 current feedback	< 40 %off Vbatt > 5000 mA	Enable Conditions: Shutdownpath test OK Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 60 ms P0882, P0883	Runs Continuously	A
HSO8	P26E8	This diagnosis checks that the HSO is not shorted to ground. If the Measured voltage at the HSO is lower than a percentage of the supply voltage or if the average measured current is too high a fault timer is increased. If the timer reaches the fault timeout limit a DTC is set.	HSO8 voltage level OR HSO8 current feedback	< 40 %off Vbatt > 5000 mA	Enable Conditions: Shutdownpath test OK Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 60 ms P0882, P0883	Runs Continuously	A

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Odd Clutch Proportional Pressure Valve	P0960	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status = Open load LSO turned off = True Tested timer > 19.2 ps Vpos < 3000 (+/-500) mV Vpos > 1700 (+/-500) mV LSO turn off time > 5 ms		Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs continuously	A
Odd Clutch Proportional Pressure Valve	P0963	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage,shorted load is detected.	TLE8242 component/driver diagnostic status = Short to Vbatt Tested timer > 19.2 ps Vpos (battery voltage < 11500 mV) > 700 (+/-100) mV Vpos (12000 mV < battery voltage < 15000 mV) > 900 (+/-100) mV Vpos (battery voltage > 15500 mV) > 1100 (+/-100) mV LSO turned on = True		Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs continuously	A
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	Error on current estimation versus target current > 70 % Time with big error > 60 ms OR Error on current estimation versus target current > 200 mA Time with small error > 300 ms		Debounce: Fail confirmation time Disable Conditions:	>= 150 ms P0882, P0883		
Odd Clutch Proportional Pressure Valve	P0962	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status = Short to ground LSO turned on = True Tested timer > 19.2 ps Vpos < 1700 (+/-500) mV LSO turn off time = 5 ms Tested timer > 19.2 ps		Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs continuously	A
Even Clutch Proportional Pressure Valve	P0964	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status = Open load LSO turned off = True Tested timer > 19.2 ps		Enable Conditions: System not in safe state Battery voltage Battery voltage	= True > 8750 mV < 18000 mV	Runs continuously	A

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			Vpos Vpos LSO turn off time	< > >	3000 (+/-500) 1700 (+/-500) 5	mV mV ms	Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	!= != >=	Cranking Stop 150 ms P0882, P0883		
Even Clutch Proportional Pressure Valve	P0967	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage, shorted load is detected.	TLE8242 component/driver diagnostic status Tested timer Vpos (battery voltage < 11500 mV) Vpos (12000 mV < battery voltage < 15000 mV) Vpos (battery voltage > 15500 mV) LSO turned on	= > > > > =	Short to Vbatt 19.2 700 (+/-100) 900 (+/-100) 1100 (+/-100) True	 ps mV mV mV	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status	= > < != !=	True 8750 mV 18000 mV Cranking Stop	Runs continuously	A
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	Error on current estimation versus target current Time with big error OR Error on current estimation versus target current Time with small error	> > > >	70 60 200 300	% ms mA ms	Debounce: Fail confirmation time Disable Conditions:	>= P0882, P0883	150 ms		
Even Clutch Proportional Pressure Valve	P0966	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status LSO turned on Tested timer Vpos LSO turn off time Tested timer	= = > < = >	Short to ground True 19.2 1700 (+/-500) 5 19.2	 ps mV ms ps	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= > < != != >=	True 8750 mV 18000 mV Cranking Stop 150 ms P0882, P0883	Runs continuously	A
Odd Clutch Redundant Shutdown Valve	P0968	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status LSO turned off Tested timer Vpos Vpos LSO turn off time	= = > < > >	Open load True 19.2 3000 (+/-500) 1700 (+/-500) 5	 ps mV mV ms	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= > < != != >=	True 8750 mV 18000 mV Cranking Stop 100 ms P0882, P0883	Runs continuously	A

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Odd Clutch Redundant Shutdown Valve	P0971	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage,shorted load is detected.	<p>TLE8242 component/driver diagnostic status = Short to Vbatt</p> <p>Tested timer > 19.2 1S</p> <p>Vpos (battery voltage < 11500 mV) > 700 (+/-100) mV</p> <p>Vpos (12000 mV < battery voltage < 15000 mV) > 900 (+/-100) mV</p> <p>Vpos (battery voltage > 15500 mV) > 1100 (+/-100) mV</p> <p>LSO turned on = True</p>	<p>Enable Conditions:</p> <p>System not in safe state = True</p> <p>Battery voltage > 8750 mV</p> <p>Battery voltage < 18000 mV</p> <p>Engine Status != Cranking</p> <p>Key Status != Stop</p>	Runs continuously	A
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	<p>Error on current estimation versus target current > 70 %</p> <p>Time with big error > 60 ms</p> <p>OR</p> <p>Error on current estimation versus target current > 200 mA</p> <p>Time with small error > 300 ms</p>	<p>Debounce: Fail confirmation time >= 100 ms</p> <p>Disable Conditions: P0882, P0883</p>		
Odd Clutch Redundant Shutdown Valve	P0970	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	<p>TLE8242 component/driver diagnostic status = Short to ground</p> <p>LSO turned on = True</p> <p>Tested timer > 19.2 |1S</p> <p>Vpos < 1700 (+/-500) mV</p> <p>LSO turn off time = 5 ms</p> <p>Tested timer > 19.2 |1S</p>	<p>Enable Conditions:</p> <p>System not in safe state = True</p> <p>Battery voltage > 8750 mV</p> <p>Battery voltage < 18000 mV</p> <p>Engine Status != Cranking</p> <p>Key Status != Stop</p> <p>Debounce: Fail confirmation time >= 100 ms</p> <p>Disable Conditions: P0882, P0883</p>	Runs continuously	A
Even Clutch Redundant Shutdown Valve	P2718	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	<p>TLE8242 component/driver diagnostic status = Open load</p> <p>LSO turned off = True</p> <p>Tested timer > 19.2 |1S</p> <p>Vpos < 3000 (+/-500) mV</p> <p>Vpos > 1700 (+/-500) mV</p> <p>LSO turn off time > 5 ms</p>	<p>Enable Conditions:</p> <p>System not in safe state = True</p> <p>Battery voltage > 8750 mV</p> <p>Battery voltage < 18000 mV</p> <p>Engine Status != Cranking</p> <p>Key Status != Stop</p> <p>Debounce: Fail confirmation time >= 100 ms</p> <p>Disable Conditions: P0882, P0883</p>	Runs continuously	A
Even Clutch Redundant Shutdown Valve	P2721	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage,shorted load is detected.	<p>TLE8242 component/driver diagnostic status = Short to Vbatt</p> <p>Tested timer > 19.2 1S</p> <p>Vpos (battery voltage < 11500 mV) > 700 (+/-100) mV</p> <p>Vpos (12000 mV < battery voltage < 15000 mV) > 900 (+/-100) mV</p> <p>Vpos (battery voltage > 15500 mV) > 1100 (+/-100) mV</p>	<p>Enable Conditions:</p> <p>System not in safe state = True</p> <p>Battery voltage > 8750 mV</p> <p>Battery voltage < 18000 mV</p> <p>Engine Status != Cranking</p> <p>Key Status != Stop</p>	Runs continuously	A

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		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	LSO turned on	=	True					
			Error on current estimation versus target current	>	70	%				
			Time with big error	>	60	ms				
			OR							
			Error on current estimation versus target current	>	200	mA		Debounce:	Fail confirmation time	>= 100 ms
			Time with small error	>	300	ms		Disable Conditions:		P0882, P0883
Even Clutch Redundant Shutdown Valve	P2720	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status	=	Short to ground			Enable Conditions:		
			LSO turned on	=	True					
			Tested timer	>	19.2	ps			System not in safe state	= True
			Vpos	<	1700 (+/-500)	mV		Battery voltage	> 8750 mV	
			LSO turn off time	=	5	ms		Battery voltage	< 18000 mV	
			Tested timer	>	19.2	ps		Engine Status	!= Cranking	
								Key Status	!= Stop	
								Debounce:	Fail confirmation time	>= 100 ms
								Disable Conditions:		P0882, P0883
System Pressure Pilot Valve	P2727	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status	=	Open load			Enable Conditions:		
			LSO turned off	=	True					
			Tested timer	>	19.2	ps			System not in safe state	= True
			Vpos	<	3000 (+/-500)	mV		Battery voltage	> 8750 mV	
			Vpos	>	1700 (+/-500)	mV		Battery voltage	< 18000 mV	
			LSO turn off time	>	5	ms		Engine Status	!= Cranking	
								Key Status	!= Stop	
								Debounce:	Fail confirmation time	>= 150 ms
								Disable Conditions:		P0882, P0883
System Pressure Pilot Valve	P2730	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage, shorted load is detected.	TLE8242 component/driver diagnostic status	=	Short to Vbatt			Enable Conditions:		
			Tested timer	>	19.2	ps				
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV			System not in safe state	= True
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Battery voltage	> 8750 mV	
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Battery voltage	< 18000 mV	
			LSO turned on	=	True			Engine Status	!= Cranking	
								Key Status	!= Stop	
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	Error on current estimation versus target current	>	70	%				
			Time with big error	>	60	ms				
			OR							
			Error on current estimation versus target current	>	400	mA		Debounce:	Fail confirmation time	>= 150 ms
			Time with small error	>	300	ms		Disable Conditions:		P0882, P0883

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System Pressure Pilot Valve	P2729	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status = Short to ground LSO turned on = True Tested timer > 19.2 μ s Vpos < 1700 (+/-500) mV LSO turn off time = 5 ms Tested timer > 19.2 μ s	System not in safe state Battery voltage > 8750 mV Battery voltage < 18000 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 150 ms Disable Conditions: P0882, P0883	Runs continuously	A
Synchronizer Actuation Valve 1	P08C8	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status = Open load LSO turned off = True Tested timer > 19.2 μ s Vpos < 3000 (+/-500) mV Vpos > 1700 (+/-500) mV LSO turn off time > 5 ms	System not in safe state Battery voltage > 8750 mV Battery voltage < 18000 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 150 ms Disable Conditions: P0882, P0883	Runs continuously	A
Synchronizer Actuation Valve 1	P08CB	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage, shorted load is detected. This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	TLE8242 component/driver diagnostic status = Short to Vbatt Tested timer > 19.2 μ s Vpos (battery voltage < 11500 mV) > 700 (+/-100) mV Vpos (12000 mV < battery voltage < 15000 mV) > 900 (+/-100) mV Vpos (battery voltage > 15500 mV) > 1100 (+/-100) mV LSO turned on = True Error on current estimation versus target current > 70 % Time with big error > 60 ms OR Error on current estimation versus target current > 400 mA Time with small error > 300 ms	System not in safe state Battery voltage > 8750 mV Battery voltage < 18000 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 150 ms Disable Conditions: P0882, P0883	Runs continuously	A
Synchronizer Actuation Valve 1	P08CA	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status = Short to ground LSO turned on = True Tested timer > 19.2 μ s Vpos < 1700 (+/-500) mV LSO turn off time = 5 ms Tested timer > 19.2 μ s	System not in safe state Battery voltage > 8750 mV Battery voltage < 18000 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 150 ms	Runs continuously	A

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						Disable Conditions:	P0882, P0883		
Synchronizer Actuation Valve 2	P27BD	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status	=	Open load	Enable Conditions:		Runs continuously	A
			LSO turned off	=	True	System not in safe state	=	True	
			Tested timer	>	19.2 ps	Battery voltage	>	8750 mV	
			Vpos	<	3000 (+/-500) mV	Battery voltage	<	18000 mV	
			Vpos	>	1700 (+/-500) mV	Engine Status	!	Cranking	
			LSO turn off time	>	5 ms	Key Status	!	Stop	
						Debounce:	Fail confirmation time	>=	150 ms
						Disable Conditions:	P0882, P0883		
Synchronizer Actuation Valve 2	P27C0	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage,shorted load is detected.	TLE8242 component/driver diagnostic status	=	Short to Vbatt	Enable Conditions:		Runs continuously	A
			Tested timer	>	19.2 ps	System not in safe state	=	True	
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100) mV	Battery voltage	>	8750 mV	
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100) mV	Battery voltage	<	18000 mV	
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100) mV	Engine Status	!	Cranking	
			LSO turned on	=	True	Key Status	!	Stop	
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	Error on current estimation versus target current	>	70 %				
			Time with big error	>	60 ms				
			OR			Debounce:	Fail confirmation time	>=	150 ms
			Error on current estimation versus target current	>	400 mA				
			Time with small error	>	300 ms	Disable Conditions:	P0882, P0883		
Synchronizer Actuation Valve 2	P27BF	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status	=	Short to ground	Enable Conditions:		Runs continuously	A
			LSO turned on	=	True	System not in safe state	=	True	
			Tested timer	>	19.2 ps	Battery voltage	>	8750 mV	
			Vpos	<	1700 (+/-500) mV	Battery voltage	<	18000 mV	
			LSO turn off time	=	5 ms	Engine Status	!	Cranking	
			Tested timer	>	19.2 ps	Key Status	!	Stop	
						Debounce:	Fail confirmation time	>=	150 ms
						Disable Conditions:	P0882, P0883		
Synchronizer Actuation Valve 3	P27C5	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status	=	Open load	Enable Conditions:		Runs continuously	A
			LSO turned off	=	True	System not in safe state	=	True	
			Tested timer	>	19.2 ps	Battery voltage	>	8750 mV	
						Battery voltage	<	18000 mV	

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			Vpos Vpos LSO turn off time	< > >	3000 (+/-500) 1700 (+/-500) 5	mV mV ms	Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	!= != >=	Cranking Stop 150 ms P0882, P0883		
Synchronizer Actuation Valve 3	P27C8	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage, shorted load is detected.	TLE8242 component/driver diagnostic status	=	Short to Vbatt		Enable Conditions:			Runs continuously	A
			Tested timer	>	19.2	1s	System not in safe state	=	True		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV	Battery voltage	>	8750 mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV	Battery voltage	<	18000 mV		
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV	Engine Status	!=	Cranking		
			LSO turned on	=	True		Key Status	!=	Stop		
			Error on current estimation versus target current	>	70	%					
			Time with big error	>	60	ms	Debounce: Fail confirmation time	>=	150 ms		
			OR								
			Error on current estimation versus target current	>	400	mA					
			Time with small error	>	300	ms	Disable Conditions:		P0882, P0883		
Synchronizer Actuation Valve 3	P27C7	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status	=	Short to ground		Enable Conditions:			Runs continuously	A
			LSO turned on	=	True		System not in safe state	=	True		
			Tested timer	>	19.2	1s	Battery voltage	>	8750 mV		
			Vpos	<	1700 (+/-500)	mV	Battery voltage	<	18000 mV		
			LSO turn off time	=	5	ms	Engine Status	!=	Cranking		
			Tested timer	>	19.2	1s	Key Status	!=	Stop		
							Debounce: Fail confirmation time	>=	150 ms		
							Disable Conditions:		P0882, P0883		
Synchronizer Actuation Valve 4	P27CD	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status	=	Open load		Enable Conditions:			Runs continuously	A
			LSO turned off	=	True		System not in safe state	=	True		
			Tested timer	>	19.2	1s	Battery voltage	>	8750 mV		
			Vpos	<	3000 (+/-500)	mV	Battery voltage	<	18000 mV		
			Vpos	>	1700 (+/-500)	mV	Engine Status	!=	Cranking		
			LSO turn off time	>	5	ms	Key Status	!=	Stop		
							Debounce: Fail confirmation time	>=	150 ms		
							Disable Conditions:		P0882, P0883		

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		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	LSO turned on	=	True					
			Error on current estimation versus target current	>	70	%				
			Time with big error	>	60	ms				
			OR							
			Error on current estimation versus target current	>	400	mA		Debounce:	Fail confirmation time	>= 150 ms
			Time with small error	>	300	ms		Disable Conditions:		P0882, P0883
Synchronizer Actuation Valve 5	P27D7	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status	=	Short to ground			Enable Conditions:		
			LSO turned on	=	True					
			Tested timer	>	19.2	ps			System not in safe state	= True
			Vpos	<	1700 (+/-500)	mV			Battery voltage	> 8750 mV
			LSO turn off time	=	5	ms			Battery voltage	< 18000 mV
			Tested timer	>	19.2	ps			Engine Status	!= Cranking
									Key Status	!= Stop
								Debounce:	Fail confirmation time	>= 150 ms
								Disable Conditions:		P0882, P0883
Selector pilot valve	P282D	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status	=	Open load			Enable Conditions:		
			LSO turned off	=	True					
			Tested timer	>	19.2	ps			System not in safe state	= True
			Vpos	<	3000 (+/-500)	mV			Battery voltage	> 8750 mV
			Vpos	>	1700 (+/-500)	mV			Battery voltage	< 18000 mV
			LSO turn off time	>	5	ms			Engine Status	!= Cranking
									Key Status	!= Stop
								Debounce:	Fail confirmation time	>= 100 ms
								Disable Conditions:		P0882, P0883
Selector pilot valve	P2830	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage, shorted load is detected.	TLE8242 component/driver diagnostic status	=	Short to Vbatt			Enable Conditions:		
			Tested timer	>	19.2	ps				
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV			System not in safe state	= True
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV			Battery voltage	> 8750 mV
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV			Battery voltage	< 18000 mV
			LSO turned on	=	True				Engine Status	!= Cranking
									Key Status	!= Stop
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	Error on current estimation versus target current	>	70	%				
			Time with big error	>	60	ms				
			OR							
			Error on current estimation versus target current	>	400	mA		Debounce:	Fail confirmation time	>= 100 ms
			Time with small error	>	300	ms		Disable Conditions:		P0882, P0883

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Selector pilot valve	P282F	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	<p>TLE8242 component/driver diagnostic status = Short to ground</p> <p>LSO turned on = True</p> <p>Tested timer > 19.2 ps</p> <p>Vpos < 1700 (+/-500) mV</p> <p>LSO turn off time = 5 ms</p> <p>Tested timer > 19.2 ps</p>	<p>Enable Conditions:</p> <p>System not in safe state = True</p> <p>Battery voltage > 8750 mV</p> <p>Battery voltage < 18000 mV</p> <p>Engine Status != Cranking</p> <p>Key Status != Stop</p> <p>Debounce: Fail confirmation time >= 100 ms</p> <p>Disable Conditions: P0882, P0883</p>	Runs continuously	A
Clutch Cooling Valve	P2736	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	<p>TLE8242 component/driver diagnostic status = Open load</p> <p>LSO turned off = True</p> <p>Tested timer > 19.2 ps</p> <p>Vpos < 3000 (+/-500) mV</p> <p>Vpos > 1700 (+/-500) mV</p> <p>LSO turn off time > 5 ms</p>	<p>Enable Conditions:</p> <p>System not in safe state = True</p> <p>Battery voltage > 8750 mV</p> <p>Battery voltage < 18000 mV</p> <p>Engine Status != Cranking</p> <p>Key Status != Stop</p> <p>Debounce: Fail confirmation time >= 150 ms</p> <p>Disable Conditions: P0882, P0883</p>	Runs continuously	A
Clutch Cooling Valve	P2739	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage, shorted load is detected.	<p>TLE8242 component/driver diagnostic status = Short to Vbatt</p> <p>Tested timer > 19.2 ps</p> <p>Vpos (battery voltage < 11500 mV) > 700 (+/-100) mV</p> <p>Vpos (12000 mV < battery voltage < 15000 mV) > 900 (+/-100) mV</p> <p>Vpos (battery voltage > 15500 mV) > 1100 (+/-100) mV</p> <p>LSO turned on = True</p>	<p>Enable Conditions:</p> <p>System not in safe state = True</p> <p>Battery voltage > 8750 mV</p> <p>Battery voltage < 18000 mV</p> <p>Engine Status != Cranking</p> <p>Key Status != Stop</p>	Runs continuously	A
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	<p>Error on current estimation versus target current > 70 %</p> <p>Time with big error > 60 ms</p> <p>OR</p> <p>Error on current estimation versus target current > 400 mA</p> <p>Time with small error > 300 ms</p>	<p>Debounce: Fail confirmation time >= 150 ms</p> <p>Disable Conditions: P0882, P0883</p>		
Clutch Cooling Valve	P2738	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	<p>TLE8242 component/driver diagnostic status = Short to ground</p> <p>LSO turned on = True</p> <p>Tested timer > 19.2 ps</p> <p>Vpos < 1700 (+/-500) mV</p> <p>LSO turn off time = 5 ms</p> <p>Tested timer > 19.2 ps</p>	<p>Enable Conditions:</p> <p>System not in safe state = True</p> <p>Battery voltage > 8750 mV</p> <p>Battery voltage < 18000 mV</p> <p>Engine Status != Cranking</p> <p>Key Status != Stop</p> <p>Debounce: Fail confirmation time >= 150 ms</p>	Runs continuously	A

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					Disable Conditions:	P0882, P0883		
Limited Slip Differential Proportional Pressure Valve	P2812	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status = Open load LSO turned off = True Tested timer > 19.2 ps Vpos < 3000 (+/-500) mV Vpos < 1700 (+/-500) mV LSO turn off time > 5 ms		Enable Conditions: System not in safe state = True Battery voltage > 8750 mV Battery voltage < 18000 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 150 ms Disable Conditions: P0882, P0883		Runs continuously	B
Limited Slip Differential Proportional Pressure Valve	P2815	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage, shorted load is detected.	TLE8242 component/driver diagnostic status = Short to Vbatt Tested timer > 19.2 ps Vpos (battery voltage < 11500 mV) > 700 (+/-100) mV Vpos (12000 mV < battery voltage < 15000 mV) > 900 (+/-100) mV Vpos (battery voltage > 15500 mV) > 1100 (+/-100) mV LSO turned on = True		Enable Conditions: System not in safe state = True Battery voltage > 8750 mV Battery voltage < 18000 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 150 ms Disable Conditions: P0882, P0883		Runs continuously	B
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	Error on current estimation versus target current > 70 % Time with big error > 60 ms OR Error on current estimation versus target current > 200 mA Time with small error > 300 ms					
Limited Slip Differential Proportional Pressure Valve	P2814	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status = Short to ground LSO turned on = True Tested timer > 19.2 ps Vpos < 1700 (+/-500) mV LSO turn off time = 5 ms Tested timer > 19.2 ps		Enable Conditions: System not in safe state = True Battery voltage > 8750 mV Battery voltage < 18000 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 150 ms Disable Conditions: P0882, P0883		Runs continuously	B
Limited Slip Differential Redundant Shutdown Valve	P281B	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status = Open load LSO turned off = True Tested timer > 19.2 ps		Enable Conditions: System not in safe state = True Battery voltage > 8750 mV Battery voltage < 18000 mV		Runs continuously	B

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			Vpos Vpos LSO turn off time	< > >	3000 (+/-500) 1700 (+/-500) 5	mV mV ms	Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	!= != >= P0882, P0883			
Limited Slip Differential Redundant Shutdown Valve	P281E	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage,shorted load is detected.	TLE8242 component/driver diagnostic status Tested timer Vpos (battery voltage < 11500 mV) Vpos (12000 mV < battery voltage < 15000 mV) Vpos (battery voltage > 15500 mV) LSO turned on	= > > > > =	Short to Vbatt 19.2 700 (+/-100) 900 (+/-100) 1100 (+/-100) True	 µs mV mV mV	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status	= > < != !=	True 8750 mV 18000 mV Cranking Stop	Runs continuously	B
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	Error on current estimation versus target current Time with big error OR Error on current estimation versus target current Time with small error	> > > >	70 60 200 300	% ms mA ms	Debounce: Fail confirmation time Disable Conditions:	>= P0882, P0883			
Limited Slip Differential Redundant Shutdown Valve	P281D	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status LSO turned on Tested timer Vpos LSO turn off time Tested timer	= = > < = >	Short to ground True 19.2 1700 (+/-500) 5 19.2	 µs mV ms µs	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= > < != != >= P0882, P0883	True 8750 mV 18000 mV Cranking Stop 150 ms	Runs continuously	B
Parking Lock Engaging Valve	P2824	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status LSO turned off Tested timer Vpos Vpos LSO turn off time	= = > < > >	Open load True 19.2 3000 (+/-500) 1700 (+/-500) 5	 µs mV mV ms	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= > < != != >= P0882, P0883	True 8750 mV 18000 mV Cranking Stop 150 ms	Runs continuously	B

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Parking Lock Engaging Valve	P2827	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage,shorted load is detected.	TLE8242 component/driver diagnostic status = Short to Vbatt	Enable Conditions:					
			Tested timer > 19.2 |1S Vpos (battery voltage < 11500 mV) > 700 (+/-100) mV Vpos (12000 mV < battery voltage < 15000 mV) > 900 (+/-100) mV Vpos (battery voltage > 15500 mV) > 1100 (+/-100) mV LSO turned on = True	System not in safe state Battery voltage Battery voltage Engine Status Key Status	= True > 8750 mV < 18000 mV != Cranking != Stop			Runs continuously	B
		This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.	Error on current estimation versus target current > 70 % Time with big error > 60 ms OR Error on current estimation versus target current > 200 mA Time with small error > 300 ms	Debounce: Fail confirmation time Disable Conditions:	>= 150 ms P0882, P0883				
Parking Lock Engaging Valve	P2826	Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.	TLE8242 component/driver diagnostic status = Short to ground	Enable Conditions:					
			LSO turned on = True Tested timer > 19.2 |1S Vpos < 1700 (+/-500) mV LSO turn off time = 5 ms Tested timer > 19.2 |1S	System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883			Runs continuously	B
Parking Lock Hold Solenoid	P18A3	Open load is checked when the solenoid is switched off. The voltage at the Vpos pin between sense resistor and load should be pulled to the battery supply by the load. The current driver tries to regulate the output pin to a defined low voltage with a very low current. If this succeeds Open load is detected.	TLE8242 component/driver diagnostic status = Open load	Enable Conditions:					
			LSO turned off = True Tested timer > 19.2 |1S Vpos < 3000 (+/-500) mV Vpos > 1700 (+/-500) mV LSO turn off time > 5 ms	System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883			Runs continuously	B
Parking Lock Hold Solenoid	P18A4	Short to battery is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is higher than a limit depending on the supply voltage,shorted load is detected.	TLE8242 component/driver diagnostic status = Short to Vbatt	Enable Conditions:					
			Tested timer > 19.2 1S Vpos (battery voltage < 11500 mV) > 700 (+/-100) mV Vpos (12000 mV < battery voltage < 15000 mV) > 900 (+/-100) mV Vpos (battery voltage > 15500 mV) > 1100 (+/-100) mV	System not in safe state Battery voltage Battery voltage Engine Status Key Status	= True > 8750 mV < 18000 mV != Cranking != Stop			Runs continuously	B

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		<p>This diagnostic checks the error between the target current and the estimated current based upon the current driver duty cycle and the battery voltage. If the error is too big a DTC is set.</p>	<p>LSO turned on</p> <p>Error on current estimation versus target current</p> <p>Time with big error</p> <p>OR</p> <p>Error on current estimation versus target current</p> <p>Time with small error</p>	<p>= True</p> <p>> 70 %</p> <p>> 60 ms</p> <p>> 200 mA</p> <p>> 300 ms</p>	<p>Debounce: Fail confirmation time</p> <p>Disable Conditions:</p>	<p>>= 150 ms</p> <p>P0882, P0883</p>		
Parking Lock Hold Solenoid	P18A2	<p>Short to ground is checked when the solenoid is switched on. The voltage at the Vpos pin between sense resistor and load should be pulled towards ground. If this voltage is lower than a limit, short to ground is detected.</p>	<p>TLE8242 component/driver diagnostic status</p> <p>LSO turned on</p> <p>Tested timer</p> <p>Vpos</p> <p>LSO turn off time</p> <p>Tested timer</p>	<p>= Short to ground</p> <p>= True</p> <p>> 19.2 ps</p> <p>< 1700 (+/-500) mV</p> <p>= 5 ms</p> <p>> 19.2 ps</p>	<p>Enable Conditions:</p> <p>System not in safe state</p> <p>Battery voltage</p> <p>Battery voltage</p> <p>Engine Status</p> <p>Key Status</p> <p>Debounce: Fail confirmation time</p> <p>Disable Conditions:</p>	<p>= True</p> <p>> 8750 mV</p> <p>< 18000 mV</p> <p>!= Cranking</p> <p>!= Stop</p> <p>>= 150 ms</p> <p>P0882, P0883</p>	Runs continuously	B

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters		Enable Conditions		Time Required	MIL ilium.		
Speed sensor supply VSS1enable	P06B1	If the speed sensor supply switch for VSS1 reports overtemperature or over current a fault timer is increased. If the fault timer reaches the limit a DTCis set.	VSS1 supply current	>	220	mA	Enable Conditions:	Battery voltage	>	8750	mV	Runs Continuously	A
			VSS1switch temperature too high	OR	=	True		mV	Battery voltage	<				18000	mV
							Engine Status		!=	Cranking			
			Key Status	!=	Stop								
							Debounce:	Fail confirmation time	>=	60	ms		
							Disable Conditions:	P0882, P0883					
Speed sensor supply VSS2enable	P06B4	If the speed sensor supply switch for VSS2 reports overtemperature or over current a fault timer is increased. If the fault timer reaches the limit a DTCis set.	VSS2supply current	>	220	mA	Enable Conditions:	Battery voltage	>	8750	mV	Runs Continuously	A
			VSS2switch temperature too high	OR	=	True		mV	Battery voltage	<				18000	mV
							Engine Status		!=	Cranking			
			Key Status	!=	Stop								
							Debounce:	Fail confirmation time	>=	60	ms		
							Disable Conditions:	P0882, P0883					

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
HSO1	P0657	This diagnosis checks that the HSO is not open load. This is done at powerdown. When the HSO is disabled, the voltage at the HSO is defined by a resistor network. When the HSO is disabled and a corresponding LSO is enabled, the voltage at the HSO should be pulled down by the LSO through the load. If the voltage stays too high, open load is saved in NVM. Next startup the fault is read from NVM and the DTC is set.	HSO1 voltage level	> 40 % off Vbatt	Enable Conditions: Shutdown path test busy Battery voltage > 8750 mV Battery voltage < 18000 mV Battery voltage change during the test < 1500 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 60 ms Disable Conditions: P0882, P0883	shutdown	Runs at shutdown	A
HSO1	P0659	This diagnosis checks that the HSO is not shorted switch. This is done at powerdown. When the HSO is disabled a defined voltage is expected at the HSO. If the voltage stays too high, shorted switch is saved in NVM. Next startup the fault is read from NVM and the DTC is set.	HSO1 voltage level	> 70 % off Vbatt	Enable Conditions: Shutdown path test busy Battery voltage > 8750 mV Battery voltage < 18000 mV Battery voltage change during the test < 1500 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 60 ms Disable Conditions: P0882, P0883	shutdown	Runs at shutdown	B
HSO2	P2669	This diagnosis checks that the HSO is not open load. This is done at powerdown. When the HSO is disabled, the voltage at the HSO is defined by a resistor network. When the HSO is disabled and a corresponding LSO is enabled, the voltage at the HSO should be pulled down by the LSO through the load. If the voltage stays too high, open load is saved in NVM. Next startup the fault is read from NVM and the DTC is set.	HSO2 voltage level	> 40 % off Vbatt	Enable Conditions: Shutdown path test busy Battery voltage > 8750 mV Battery voltage < 18000 mV Battery voltage change during the test < 1500 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 60 ms Disable Conditions: P0882, P0883	shutdown	Runs at shutdown	A

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HS02	P2671	This diagnosis checks that the HSO is not shorted switch. This is done at powerdown. When the HSO is disabled a defined voltage is expected at the HSO. If the voltage stays too high, shorted switch is saved in NVM. Next startup the fault is read from NVM and the DTC is set.	HSO2 voltage level	>	70	% off Vbatt	Enable Conditions: Shutdown path test busy Battery voltage > 8750 mV Battery voltage < 18000 mV Battery voltage change during the test < 1500 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 60 ms Disable Conditions: P0882, P0883	shutdown	Runs at shutdown	B
HS07	P2684	This diagnosis checks that the HSO is not open load. This is done at powerdown. When the HSO is disabled, the voltage at the HSO is defined by a resistor network. When the HSO is disabled and a corresponding LSO is enabled, the voltage at the HSO should be pulled down by the LSO through the load. If the voltage stays too high, open load is saved in NVM. Next startup the fault is read from NVM and the DTC is set.	HSO7 voltage level	>	40	% off Vbatt	Enable Conditions: Shutdown path test busy Battery voltage > 8750 mV Battery voltage < 18000 mV Battery voltage change during the test < 1500 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 60 ms Disable Conditions: P0882, P0883	shutdown	Runs at shutdown	A
HS07	P2686	This diagnosis checks that the HSO is not shorted switch. This is done at powerdown. When the HSO is disabled a defined voltage is expected at the HSO. If the voltage stays too high, shorted switch is saved in NVM. Next startup the fault is read from NVM and the DTC is set.	HSO7 voltage level	>	70	% off Vbatt	Enable Conditions: Shutdown path test busy Battery voltage > 8750 mV Battery voltage < 18000 mV Battery voltage change during the test < 1500 mV Engine Status != Cranking Key Status != Stop Debounce: Fail confirmation time >= 60 ms Disable Conditions: P0882, P0883	shutdown	Runs at shutdown	B

HS08	P26E7	<p>This diagnosis checks that the HSO is not open load. This is done at powerdown. When the HSO is disabled, the voltage at the HSO is defined by a resistor network. When the HSO is disabled and a corresponding LSO is enabled, the voltage at the HSO should be pulled down by the LSO through the load. If the voltage stays too high, open load is saved in NVM. Next startup the fault is read from NVM and the DTC is set.</p>	HSO8 voltage level	>	40	% off Vbatt	<p>Enable Conditions: Shutdown path test busy</p> <p>Battery voltage > 8750 mV Battery voltage < 18000 mV Battery voltage change during the test < 1500 mV Engine Status != Cranking Key Status != Stop</p> <p>Debounce: Fail confirmation time >= 60 ms</p> <p>Disable Conditions: P0882, P0883</p>	shutdown	Runs at shutdown	A
HS08	P26E9	<p>This diagnosis checks that the HSO is not shorted switch. This is done at powerdown. When the HSO is disabled a defined voltage is expected at the HSO. If the voltage stays too high, shorted switch is saved in NVM. Next startup the fault is read from NVM and the DTC is set.</p>	HSO8 voltage level	>	70	% off Vbatt	<p>Enable Conditions: Shutdown path test busy</p> <p>Battery voltage > 8750 mV Battery voltage < 18000 mV Battery voltage change during the test < 1500 mV Engine Status != Cranking Key Status != Stop</p> <p>Debounce: Fail confirmation time >= 60 ms</p> <p>Disable Conditions: P0882, P0883</p>	shutdown	Runs at shutdown	B

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Odd Clutch Proportional Pressure Valve	P0963	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvmm at shutdown. At startup the nvmm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs at shutdown	A
Even Clutch Proportional Pressure Valve	P0967	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvmm at shutdown. At startup the nvmm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs at shutdown	A
Odd Clutch Redundant Shutdown Valve	P0971	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvmm at shutdown. At startup the nvmm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 100 ms P0882, P0883	Runs at shutdown	A
Even Clutch Redundant Shutdown Valve	P2721	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvmm at shutdown. At startup the nvmm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND	= Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status	= True > 8750 mV < 18000 mV != Cranking	Runs at shutdown	A

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			TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True	Key Status Debounce: Fail confirmation time Disable Conditions:	!= Stop >= 100 ms P0882, P0883		
System Pressure Pilot Valve	P2730	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs at shutdown	A
Synchronizer Actuation Valve 1	P08CB	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs at shutdown	A
Synchronizer Actuation Valve 2	P27C0	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs at shutdown	A

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Synchronizer Actuation Valve 3	P27C8	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	<p>TLE8242 component/driver diagnostic status for this LSO</p> <p>LSO turned off Other LSO on</p> <p>AND</p> <p>TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on</p>	<p>= Short to ground</p> <p>= True</p> <p>= True</p> <p>= Short to ground</p> <p>= True</p> <p>= True</p>	<p>Enable Conditions: System not in safe state</p> <p>Battery voltage Battery voltage Engine Status</p> <p>Key Status</p> <p>Debounce: Fail confirmation time</p> <p>Disable Conditions:</p>	<p>= True</p> <p>> 8750 mV</p> <p>< 18000 mV</p> <p>!= Cranking</p> <p>!= Stop</p> <p>>= 150 ms</p> <p>P0882, P0883</p>	Runs at shutdown	A
Synchronizer Actuation Valve 4	P27D0	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	<p>TLE8242 component/driver diagnostic status for this LSO</p> <p>LSO turned off Other LSO on</p> <p>AND</p> <p>TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on</p>	<p>= Short to ground</p> <p>= True</p> <p>= True</p> <p>= Short to ground</p> <p>= True</p> <p>= True</p>	<p>Enable Conditions: System not in safe state</p> <p>Battery voltage Battery voltage Engine Status</p> <p>Key Status</p> <p>Debounce: Fail confirmation time</p> <p>Disable Conditions:</p>	<p>= True</p> <p>> 8750 mV</p> <p>< 18000 mV</p> <p>!= Cranking</p> <p>!= Stop</p> <p>>= 150 ms</p> <p>P0882, P0883</p>	Runs at shutdown	A
Synchronizer Actuation Valve 5	P27D8	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	<p>TLE8242 component/driver diagnostic status for this LSO</p> <p>LSO turned off Other LSO on</p> <p>AND</p> <p>TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on</p>	<p>= Short to ground</p> <p>= True</p> <p>= True</p> <p>= Short to ground</p> <p>= True</p> <p>= True</p>	<p>Enable Conditions: System not in safe state</p> <p>Battery voltage Battery voltage Engine Status</p> <p>Key Status</p> <p>Debounce: Fail confirmation time</p> <p>Disable Conditions:</p>	<p>= True</p> <p>> 8750 mV</p> <p>< 18000 mV</p> <p>!= Cranking</p> <p>!= Stop</p> <p>>= 150 ms</p> <p>P0882, P0883</p>	Runs at shutdown	A
Selector pilot valve	P2830	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	<p>TLE8242 component/driver diagnostic status for this LSO</p> <p>LSO turned off Other LSO on</p> <p>AND</p> <p>TLE8242 component/driver diagnostic status for another LSO</p>	<p>= Short to ground</p> <p>= True</p> <p>= True</p> <p>= Short to ground</p>	<p>Enable Conditions: System not in safe state</p> <p>Battery voltage Battery voltage Engine Status</p> <p>Key Status</p>	<p>= True</p> <p>> 8750 mV</p> <p>< 18000 mV</p> <p>!= Cranking</p> <p>!= Stop</p>	Runs at shutdown	A

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			The other LSO turned OFF This LSO is turned on	= True = True	Debounce: Fail confirmation time	>= 100 ms		
					Disable Conditions:	P0882, P0883		
Clutch Cooling Valve	P2739	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms	Runs at shutdown	A
					Disable Conditions:	P0882, P0883		
Limited Slip Differential Proportional Pressure Valve	P2815	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms	Runs at shutdown	B
					Disable Conditions:	P0882, P0883		
Limited Slip Differential Redundant Shutdown Valve	P281E	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSO on AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms	Runs at shutdown	B
					Disable Conditions:	P0882, P0883		
Parking Lock Engaging Valve	P2827	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off	= Short to ground = True	Enable Conditions: System not in safe state Battery voltage	= True > 8750 mV	Runs at shutdown	B

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			Other LSOon AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= True = Short to ground = True = True	Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	< 18000 mV != Cranking != Stop >= 150 ms P0882, P0883		
Parking Lock Hold Solenoid	P18A4	Short to neighbour is checked at shutdown. The test enables all LSO's one by one. If this LSO reports short to ground while it is disabled and 1 other LSO is enabled and vice versa, both LSO's are shorted together. This will be saved to nvram at shutdown. At startup the nvram info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO LSO turned off Other LSOon AND TLE8242 component/driver diagnostic status for another LSO The other LSO turned OFF This LSO is turned on	= Short to ground = True = True = Short to ground = True = True	Enable Conditions: System not in safe state Battery voltage Battery voltage Engine Status Key Status Debounce: Fail confirmation time Disable Conditions:	= True > 8750 mV < 18000 mV != Cranking != Stop >= 150 ms P0882, P0883	Runs at shutdown	B

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Longitudinal acceleration sensor out-of-range high	C0554	This diagnostic detects an out of range high fault with the longitudinal acceleration sensor. The data from the acceleration sensor is received over CAN. If the acceleration sensor value received from CAN is higher than threshold for too long during a sampling window, the sensor is diagnosed out of range high.	Longitudinal acceleration value from CAN	>= 3.8501743386815117 g	Enable conditions Longitudinal acceleration data available on CAN Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state Fault confirmation Stability timer before increasing the fault timer Fault confirmation timer Diagnostic sampling time window	= True = False = True = True >= 30000 ms >= 75000 ms = 120000 ms	Runs Continuously	C
Longitudinal acceleration sensor out-of-range low	C0553	This diagnostic detects an out of range low fault with the longitudinal acceleration sensor. The data from the acceleration sensor is received over CAN. If the acceleration sensor value received from CAN is low than threshold for too long during a sampling window, the sensor is diagnosed out of range low	Longitudinal acceleration value from CAN	<= -3.8501743386815117 g	Enable conditions Longitudinal acceleration data available on CAN Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state Fault confirmation Stability timer before increasing the fault timer Fault confirmation timer Diagnostic sampling time window	= True = False = True = True >= 30000 ms >= 75000 ms = 120000 ms	Runs Continuously	C
Lateral acceleration sensor out-of-range high	C0698	This diagnostic detects an out of range high fault with the lateral acceleration sensor. The data from the acceleration sensor is received over CAN. If the acceleration sensor value received from CAN is higher than threshold for too long during a sampling window, the sensor is diagnosed out of range high.	Lateral acceleration value from CAN	>= 3.8501743386815117 g	Enable conditions Lateral acceleration data available on CAN Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state Fault confirmation Stability timer before increasing the fault timer Fault confirmation timer Diagnostic sampling time window	= True = False = True = True >= 30000 ms >= 75000 ms = 120000 ms	Runs Continuously	C
Lateral acceleration sensor out-of-range low	C0697	This diagnostic detects an out of range low fault with the lateral acceleration sensor. The data from the acceleration sensor is received over CAN. If the acceleration sensor value received from CAN is low than threshold for too long during a sampling window, the sensor is diagnosed out of range low	Lateral acceleration value from CAN	<= -3.8501743386815117 g	Enable conditions Lateral acceleration data available on CAN Diagnostic reset event Application state is unequal to error state	= True = False = True	Runs Continuously	C

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						Application state is unequal to bypass state	=	True		
						Fault confirmation				
						Stability timer before increasing the fault timer	>=	30000	ms	
						Fault confirmation timer	>=	75000	ms	
						Diagnostic sampling time window	=	120000	ms	

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Longitudinal acceleration sensor stuck at high value	C0552	<p>This diagnostic detects a stuck at high value fault with the longitudinal acceleration sensor.</p> <p>The data from the acceleration sensor is received over CAN and compared to the calculated longitudinal acceleration based on wheel/output speed data under certain driving conditions.</p> <p>If the difference between the longitudinal acceleration from the sensor versus the longitudinal acceleration calculated is too high for too long during the sample window of the diagnostic, the longitudinal acceleration sensor is diagnosed stuck at high value.</p>	Absolute difference between Longitudinal acceleration value from CAN and longitudinal acceleration based on wheel/ouput speed data.	>= 0.5300149496868873 g	<p>Enable conditions</p> <p>Longitudinal acceleration data available on CAN</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Longitudinal acceleration out-of-range high electrical fault active</p> <p>Longitudinal acceleration out-of-range low electrical fault active</p> <p>Absolute Vehicle speed</p> <p>Fault confirmation</p> <p>Stability timer before increasing the fault timer</p> <p>Stability timer decrease rate when vehicle conditons are not met</p> <p>Fault confirmation timer</p> <p>Diagnostic sampling time window</p>	<p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p>=</p> <p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>False</p> <p>>= 15 kph</p> <p>>= 10000 ms</p> <p>= 20 ms</p> <p>>= 75000 ms</p> <p>= 120000 ms</p>	Runs Continuously	C
Lateral acceleration sensor stuck at high value	C0699	<p>This diagnostic detects a stuck at high value fault with the lateral acceleration sensor.</p> <p>The data from the acceleration sensor is received over CAN and compared to a threshold under certain driving conditions.</p> <p>If the lateral acceleration sensor is reading a too high value for too long during the sample window of the diagnostic, the lateral acceleration sensor is diagnostic stuck at high value.</p>	Absolute lateral acceleration value from CAN	>= 0.5300149496868873 g	<p>Enable conditions</p> <p>Lateral acceleration data available on CAN</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Lateral acceleration out-of-range high electrical fault active</p> <p>Lateral acceleration out-of-range low electrical fault active</p> <p>Transmission driving gear attained</p> <p>Absolute clutch slip for driving gear</p> <p>Brake pedal</p> <p>Actual engine torque</p> <p>Absolute Vehicle speed</p> <p>Absolute Vehicle speed</p> <p>Longitudinal acceleration based on wheel/output speed</p>	<p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p>=</p> <p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p><= 100 rpm</p> <p><= 1 %o</p> <p>>= 80 Nm</p> <p>>= 15 kph</p> <p><= 200 kph</p> <p>-</p> <p>>= 0.100049779195 g</p> <p>21446</p>	Runs Continuously	C

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						Longitudinal acceleration based on wheel/output speed	<=	0.530014949686			
								8873	g		
						Fault confirmation					
						Stability timer before increasing the fault timer	>=	30000	ms		
						Stability timer decrease rate when vehicle conditons are not met	=	20	ms		
						Fault confirmation timer	>=	75000	ms		
						Diagnostic sampling time window	=	120000	ms		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Paddle Plus Stuck Switches	P0815	The diagnostic detects if the upshift paddle is pulled too long indicating a stuck switch. If times how long voltage is measured within the paddle pulled voltage window.	Paddle plus analogue input voltage Paddle plus analogue input voltage	>=	Not Found mV	Enable Conditions: Electrical fault for paddle plus detected Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state Paddle min analogue input voltage is outside paddle min pressed voltage (3), see Summary table attachments C_SID_ASV_CMP_PADDLE	= False = False = True = True = True	Runs Continuously	C
						Fault confirmation time:	Not Found ms		
Paddle Plus plausibility	P2775	The diagnostic detects if the upshift paddle not within valid voltage windows for a certain time. The acceptable voltage windows correspond to the paddle being pulled or being released.	Paddle plus analogue input voltage is outside paddle plus pressed voltage (1), see Summary table attachments C_SID_ASV_CMP_PADDLE Paddle plus analogue input voltage is outside paddle plus released voltage (2), see Summary table attachments C_SID_ASV_CMP_PADDLE	=	True True	Enable Conditions: Electrical fault for paddle plus detected Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state	= False = False = True = True	Runs Continuously	C
						Fault confirmation time:	Not Found ms		
Paddle Min Stuck Switches	P0816	The diagnostic detects if the downshift paddle is pulled too long indicating a stuck switch. If times how long voltage is measured within the paddle pulled voltage window.	Paddle min analogue input voltage Paddle min analogue input voltage	>=	Not Found mV	Enable Conditions: Electrical fault for paddle min detected Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state Paddle plus analogue input voltage is outside paddle plus pressed voltage (1), see Summary table attachments C_SID_ASV_CMP_PADDLE	= False = False = True = True	Runs Continuously	C
						Fault confirmation time:	Not Found ms		
Paddle Min plausibility	P2779	The diagnostic detects if the downshift paddle not within valid voltage windows for a certain time. The acceptable voltage windows correspond to the paddle being pulled or being released.	Paddle min analogue input voltage is outside paddle min pressed voltage (3), see Summary table attachments C_SID_ASV_CMP_PADDLE	=	True	Enable Conditions: Electrical fault for paddle min detected	= False	Runs Continuously	C

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			Paddle min analogue input voltage is outside paddle min released voltage (4), see Summary table attachments C_SID_ASV_CMP_PADDLE	=	True		Diagnostic reset event	=	False		
							Application state is unequal to error state	=	True		
							Application state is unequal to bypass state	=	True		
						Fault confirmation time:			Not Found	ms	

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Selector pilot valve hydraulically stuck on	P282A	This diagnostic detects a hydraulically stuck on selector pilot valve. This is by use of the synchronizer recovery routine which is triggered by the setting of a gear system or compoment diagnostic failure. The recovery routine uses the synchronizer integrity routine which performs small rod movement actuations and evaluates the actual rod movements cause by this.	Selector mechanism confirmed hydraulically stuck on by synchronizer integrity routine	= True	Enable Conditions: Synchronizer integrity intrusive routine triggered by the synchronizer recovery routine (1), see Summary table attachments C_SID_ASV_CMP_SEL SY Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL SY Cooler out temperature Fault confirmation Selector mechsims hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL SY Synchronizer integrity selector stuck off fault test suite confirmation runs Selector pilot valve current profile check fail confirmation counter	True	Runs continuously	A
		When a rod movement is detected for a rod corresponding to the inverse position of the selector target positon corresponding to the test case, the selector mechanism is determined to be stuck.	Current profile consistently indicates fail for selector pilot valve current profile check	= True		True		
		If the selector target postion was hydraulic off during the test case and the actual rod movement show movement corresponding to the selector mechanism in the hydraulic on position, the selector mechanism is considered hydraulically faulted stuck on.				=		
		To further pinpoint the actual failed component within the selector mechanism either the selector pilot valve or the selector spool for the corresponding clutch shaft, the current profile check feature of the current driver is used.	Fault condition for synchronizer integrity test case selector mechanism stuck on detection:			>= 40 °C		
		If the current profile check for the selector pilot valve consistently indicates a fail, the selector pilot valve is diagnosed hydraulically stuck on.						
			Selector target position for the test case Rod movement in intended move direction during a synchronizer integrity test case (6), see Summary table attachments C_SID_ASV_CMP_SEL SY Complement rod movement for actuated shift solenoid during a test case (6), see Summary table attachments C_SID_ASV_CMP_SEL SY	= Hydraulic off <= 100 pm > 100 pm		>= 1 count = 1 count >= 3 count		
Selector pilot valve hydraulically stuck off	P2829	This diagnostic detects a hydraulically stuck off selector pilot valve. This is by use of the synchronizer recovery routine which is triggered by the setting of a gear system or compoment diagnostic failure. The recovery routine uses the synchronizer integrity routine which performs small rod movement actuations and evaluates the actual rod movements cause by this.	Selector mechanism confirmed stuck off by synchronizer integrity routine	= True	Enable Conditions: Synchronizer integrity intrusive routine triggered by the synchronizer recovery routine (1), see Summary table attachments C_SID_ASV_CMP_SEL SY Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL SY	True	Runs continuously	A
		When a rod movement is detected for a rod corresponding to the inverse position of the selector target positon corresponding to the test case, the selector mechanism is determined to be stuck.	Current profile consistently indicates fail for selector pilot valve current profile check	= True		True		

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		<p>If the selector target position was hydraulic on during the test case and the actual rod movement show movement corresponding to the selector mechanism in the hydraulic off position, the selector mechanism is considered hydraulically faulted stuck off.</p> <p>To further pinpoint the actual failed component within the selector mechanism either the selector pilot valve or the selector spool for the corresponding clutch shaft, the current profile check feature of the current driver is used.</p> <p>If the current profile check for the selector pilot valve consistently indicates a fail, the selector pilot valve is diagnosed hydraulically stuck off.</p>	<p>Fault condition for synchronizer integrity test case selector mechanism stuck off detection:</p> <p>Selector target position for the test case</p> <p>Rod movement in intended move direction during a synchronizer integrity test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY</p> <p>Complement rod movement for actuated shift solenoid during a test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY</p>	<p>= Hydraulic on</p> <p><= 100 μm</p> <p>> 100 μm</p>	<p>Fault confirmation</p> <p>Cooler out temperature</p> <p>Selector mechanism hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL_SY</p> <p>Synchronizer integrity selector stuck off fault test suite confirmation runs</p> <p>Selector pilot valve current profile check fail confirmation counter</p>	<p>>= 40 °C</p> <p>>= 1 count</p> <p>= 1 count</p> <p>>= 3 count</p>		
Selector valve 1 hydraulically stuck on	P1956	<p>This diagnostic detects a hydraulically stuck on selector pilot valve. This is by use of the synchronizer recovery routine which is triggered by the setting of a gear system or component diagnostic failure. The recovery routine uses the synchronizer integrity routine which performs small rod movement actuations and evaluates the actual rod movements caused by this.</p> <p>When a rod movement is detected for a rod corresponding to the inverse position of the selector target position corresponding to the test case, the selector mechanism is determined to be stuck.</p> <p>If the selector target position was hydraulic off during the test case and the actual rod movement show movement corresponding to the selector mechanism in the hydraulic on position, the selector mechanism is considered hydraulically faulted stuck on.</p> <p>To further pinpoint the actual failed component within the selector mechanism either the selector pilot valve or the selector spool for the corresponding clutch shaft, the current profile check feature of the current driver is used.</p> <p>If the current profile check for the selector pilot valve consistently indicates a pass the selector spool corresponding with the tested clutch shaft is diagnosed hydraulically stuck on.</p>	<p>Selector mechanism confirmed hydraulically stuck on by synchronizer integrity routine</p> <p>Current profile consistently indicates pass for selector pilot valve current profile check</p> <p>Fault condition for synchronizer integrity test case selector mechanism stuck on detection:</p> <p>Selector target position for the test case</p>	<p>= True</p> <p>= True</p> <p>= Hydraulic off</p>	<p>Enable Conditions:</p> <p>Synchronizer integrity intrusive routine triggered by the odd clutch shaft synchronizer recovery routine (1), see Summary table attachments C_SID_ASV_CMP_SEL_SY</p> <p>Odd clutch shaft synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL_SY</p> <p>Cooler out temperature</p> <p>Selector mechanism hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL_SY</p>	<p>True</p> <p>True</p> <p>>= 40 °C</p> <p>>= 1 count</p>	Runs continuously	A

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			Rod movement in intended move direction during a synchronizer integrity test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY	<=	100	μm	Synchronizer integrity selector stuck off fault test suite confirmation runs	=	1	count		
			Complement rod movement for actuated shift solenoid during a test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY	>	100	μm	Selector pilot valve current profile check fail confirmation counter	>=	3	count		
Selector valve 1 hydraulically stuck off	P1957	This diagnostic detects a hydraulically stuck on selector pilot valve. This is by use of the synchronizer recovery routine which is triggered by the setting of a gear system or component diagnostic failure. The recovery routine uses the synchronizer integrity routine which performs small rod movement actuations and evaluates the actual rod movements cause by this.	Selector mechanism confirmed hydraulically stuck off by synchronizer integrity routine	=	True		Enable Conditions: Synchronizer integrity intrusive routine triggered by the odd clutch shaft synchronizer recovery routine (1), see Summary table attachments C_SID_ASV_CMP_SEL_SY		True		Runs continuously	A
		When a rod movement is detected for a rod corresponding to the inverse position of the selector target position corresponding to the test case, the selector mechanism is determined to be stuck.	Current profile consistently indicates pass for selector pilot valve current profile check	=	True		Odd clutch shaft synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL_SY	=	True			
		If the selector target position was hydraulic off during the test case and the actual rod movement show movement corresponding to the selector mechanism in the hydraulic on position, the selector mechanism is considered hydraulically faulted stuck on.						>=	40	°C		
		To further pinpoint the actual failed component within the selector mechanism either the selector pilot valve or the selector spool for the corresponding clutch shaft, the current profile check feature of the current driver is used.	Fault condition for synchronizer integrity test case selector mechanism stuck off detection:				Cooler out temperature					
		If the current profile check for the selector pilot valve consistently indicates a pass the selector spool corresponding with the tested clutch shaft is diagnosed hydraulically stuck off.					Fault confirmation Selector mechanism hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL_SY	>=	1	count		
			Selector target position for the test case	=	Hydraulic on							
			Rod movement in intended move direction during a synchronizer integrity test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY	<=	100	μm	Synchronizer integrity selector stuck off fault test suite confirmation runs	=	1	count		
			Complement rod movement for actuated shift solenoid during a test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY	>	100	μm	Selector pilot valve current profile check fail confirmation counter	>=	3	count		
Selector valve 2 hydraulically stuck on	P1958	This diagnostic detects a hydraulically stuck on selector pilot valve. This is by use of the synchronizer recovery routine which is triggered by the setting of a gear system or component diagnostic failure. The recovery routine uses the synchronizer integrity routine which performs small rod movement actuations and evaluates the actual rod movements cause by this.	Selector mechanism confirmed hydraulically stuck on by synchronizer integrity routine	=	True		Enable Conditions: Synchronizer integrity intrusive routine triggered by the even clutch shaft synchronizer recovery routine (1), see Summary table attachments C_SID_ASV_CMP_SEL_SY		True		Runs continuously	A

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		<p>When a rod movement is detected for a rod corresponding to the inverse position of the selector target position corresponding to the test case, the selector mechanism is determined to be stuck.</p> <p>If the selector target position was hydraulic off during the test case and the actual rod movement show movement corresponding to the selector mechanism in the hydraulic on position, the selector mechanism is considered hydraulically faulted stuck on.</p> <p>To further pinpoint the actual failed component within the selector mechanism either the selector pilot valve or the selector spool for the corresponding clutch shaft, the current profile check feature of the current driver is used.</p> <p>If the current profile check for the selector pilot valve consistently indicates a pass the selector spool corresponding with the tested clutch shaft is diagnosed hydraulically stuck on.</p>	<p>Current profile consistently indicates pass for selector pilot valve current profile check</p> <p>Fault condition for synchronizer integrity test case selector mechanism stuck on detection:</p> <p>Selector target position for the test case Rod movement in intended move direction during a synchronizer integrity test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY</p> <p>Complement rod movement for actuated shift solenoid during a test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY</p>	<p>= True</p> <p>= Hydraulic off</p> <p><= 100 pm</p> <p>> 100 pm</p>	<p>Fault confirmation</p> <p>Even clutch shaft synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL_SY</p> <p>Cooler out temperature</p> <p>Selector mechanism hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL_SY</p> <p>Synchronizer integrity selector stuck off fault test suite confirmation runs</p> <p>Selector pilot valve current profile check fail confirmation counter</p>	<p>= True</p> <p>>= 40 °C</p> <p>>= 1 count</p> <p>= 1 count</p> <p>>= 3 count</p>		
Selector valve 2 hydraulically stuck off	P1959	<p>This diagnostic detects a hydraulically stuck on selector pilot valve. This is by use of the synchronizer recovery routine which is triggered by the setting of a gear system or component diagnostic failure. The recovery routine uses the synchronizer integrity routine which performs small rod movement actuations and evaluates the actual rod movements cause by this.</p> <p>When a rod movement is detected for a rod corresponding to the inverse position of the selector target position corresponding to the test case, the selector mechanism is determined to be stuck.</p> <p>If the selector target position was hydraulic off during the test case and the actual rod movement show movement corresponding to the selector mechanism in the hydraulic on position, the selector mechanism is considered hydraulically faulted stuck on.</p> <p>To further pinpoint the actual failed component within the selector mechanism either the selector pilot valve or the selector spool for the corresponding clutch shaft, the current profile check feature of the current driver is used.</p>	<p>Selector mechanism confirmed hydraulically stuck off by synchronizer integrity routine</p> <p>Current profile consistently indicates pass for selector pilot valve current profile check</p> <p>Fault condition for synchronizer integrity test case selector mechanism stuck off detection:</p>	<p>= True</p> <p>= True</p>	<p>Enable Conditions:</p> <p>Synchronizer integrity intrusive routine triggered by the even clutch shaft synchronizer recovery routine (1), see Summary table attachments C_SID_ASV_CMP_SEL_SY</p> <p>Even clutch shaft synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL_SY</p> <p>Cooler out temperature</p>	<p>= True</p> <p>= True</p> <p>>= 40 °C</p>	Runs continuously	A

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		<div>If the current profile check for the selector pilot valve consistently indicates a pass the selector spool corresponding with the tested clutch shaft is diagnosed hydraulically stuck off.</div>	<div>Selector target position for the test case Rod movement in intended move direction during a synchronizer integrity test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY</div>	<div>= Hydraulic on</div>		<div>Fault confirmation</div>	<div>Selector mechansim hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL_SY</div>	<div>>=</div>	<div>1</div>	<div>count</div>		
			<div>Complement rod movement for actuated shift solenoid during a test case (6), see Summary table attachments C_SID_ASV_CMP_SEL_SY</div>	<div><= 100 μm</div>			<div>Synchronizer integrity selector stuck off fault test suite confirmation runs</div>	<div>=</div>	<div>1</div>	<div>count</div>		
				<div>> 100 μm</div>			<div>Selector pilot valve current profile check fail confirmation counter</div>	<div>>=</div>	<div>3</div>	<div>count</div>		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Park lock position sensor consistency	P18E7	<p>This diagnostic detects a parking lock position sensor consistency fault during parking lock open error strategy.</p> <p>The parking lock open error strategy is used when electrical faults are present of when parking lock unintentionally engaged before, it keeps the parking lock disengaged by forcing high system pressure and setting the parking latching valve, engagement valve and hold solenoid to their respective parking lock disengaged states.</p> <p>If the parking lock is disengaged based on output/vehicle speed and the parking lock position sensor is reading something different from open or hold, the parking lock position sensor is diagnosed faulted.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK</p> <p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK</p> <p>Absolute vehicle speed</p> <p>OR</p> <p>Output speed</p>	<p>!= Open</p> <p>!= Hold</p> <p>> 10 kph</p> <p>> 100 rpm</p>	<p>Enable Conditions: Parking lock actuation strategy</p> <p>Parking lock engagement valve position target</p> <p>Parking lock latching valve position target</p> <p>Parking lock engagement valve logical position</p> <p>Parking lock latching valve logical position</p> <p>Electrical fault detected for the parking lock position sensor</p> <p>Measured system pressure</p> <p>System pressure sensor electrical fault detected</p> <p>System pressure sensor electrical fault detected</p> <p>System pressure low confirmation timer</p> <p>Fault confirmation time Parking lock position sensor fault confirmation timer</p>	<p>= Parking lock open error strategy</p> <p>= Hydraulic On</p> <p>= Hydraulic On</p> <p>= Hydraulic On</p> <p>= Hydraulic On</p> <p>= False</p> <p>> 15 bar</p> <p>= False</p> <p>= False</p> <p>>= 100 ms</p> <p>>= 200 ms</p>	Runs continuously	B
		<p>This diagnostic detects a parking lock position sensor consistency fault during parking lock locked error strategy.</p> <p>The parking lock locked error strategy is used when electrical faults are present of when parking lock unintentionally disengaged before, it keeps the parking lock engaged by forcing low system pressure and setting the parking latching valve, engagement valve and hold solenoid to their respective parking lock engaged states.</p> <p>If the parking lock position sensor is reading something different from locked or hold, the parking lock position sensor is diagnosed faulted.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK</p> <p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK</p>	<p>!= Locked</p> <p>!= Hold</p>	<p>Parking lock actuation strategy</p> <p>Parking lock engagement valve position target</p> <p>Parking lock latching valve position target</p> <p>Parking lock engagement valve logical position</p> <p>Parking lock latching valve logical position</p> <p>Electrical fault detected for the parking lock position sensor</p> <p>Measured system pressure</p> <p>System pressure sensor electrical fault detected</p> <p>System pressure sensor electrical fault detected</p>	<p>= Parking lock locked error strategy</p> <p>= Hydraulic Off</p> <p>= Hydraulic Off</p> <p>= Hydraulic Off</p> <p>= False</p> <p>< 8 bar</p> <p>= False</p> <p>= False</p>	Runs continuously	

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					System pressure low confirmation timer	>=	100	ms		
				Fault confirmation time	Parking lock position sensor fault confirmation timer	>=	100	ms		
This diagnostic detects a parking lock position sensor consistency fault during parking lock engage error strategy.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	!=	Locked		Parking lock actuation strategy	=	Parking lock engage error strategy		Runs continuously	
The parking lock locked error strategy is used when electrical faults are present of when parking lock unintentionally disengaged before, it keeps the parking lock engaged by forcing low system pressure and setting the parking latching valve, engagement valve and hold solenoid to their respective parking lock engaged states.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	!=	Hold		Absolute vehicle speed	<	0.8125	kph		
If the parking lock position sensor is reading something different from locked or hold, the parking lock position sensor is diagnosed faulted.					Parking lock latching valve position target	=	Hydraulic Off			
					Parking lock engagement valve logical position	=	Hydraulic Off			
					Parking lock latching valve logical position	=	Hydraulic Off			
					Electrical fault detected for the parking lock position sensor	=	False			
					Measured system pressure	<	8	bar		
					System pressure sensor electrical fault detected	=	False			
					System pressure sensor electrical fault detected	=	False			
					System pressure low confirmation timer	>=	100	ms		
				Fault confirmation time	Parking lock position sensor fault confirmation timer	>=	1000	ms		
This diagnostic detects a parking lock position sensor consistency fault during parking lock standstill engagement strategy.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	=	Open	Enable Conditions:	Diagnostic reset event	=	False		Runs continuously	
During the parking lock standstill engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is set to the electrical off position immediately.					Application state is unequal to error state	=	True			
When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.					Application state is unequal to bypass state	=	True			
If both the parking lock latching valve and the parking lock engagement valve are set hydraulic off and the parking lock position sensor does not read locked, the system pressure is forced low to attempt parking lock engagement.					Electrical fault detected for the parking lock hold solenoid	=	False			

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	<p>If at the end of the low system pressure phase, the parking lock position sensor still reads open the parking lock engagement valve is diagnosed faulted.</p>			<p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve</p> <p>Electrical fault detected for the parking lock stepper motor</p> <p>Electrical fault detected for the parking lock position sensor</p> <p>Parking lock actuation strategy</p> <p>Parking lock engagement valve logical position</p> <p>Parking lock latching valve logical position</p> <p>Measured system pressure</p> <p>System pressure sensor electrical fault detected</p> <p>System pressure sensor electrical fault detected</p> <p>System pressure low confirmation timer</p>	<p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= Parking lock standstill engage strategy</p> <p>= Hydraulic Off</p> <p>= Hydraulic Off</p> <p>< 8 bar</p> <p>= False</p> <p>= False</p> <p>>= 100 ms</p>		
	<p>This diagnostic detects a parking lock position sensor consistency fault during parking lock low speed engagement strategy.</p> <p>During the parking lock low speed engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is kept in the electrical on position until the vehicle speed falls below the parking lock engagement speed. When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.</p> <p>If both the parking lock latching valve and the parking lock engagement valve are set hydraulic off and the parking lock position sensor does not read locked, the system pressure is forced low to attempt parking lock engagement.</p> <p>If at the end of the low system pressure phase, the parking lock position sensor still reads open the parking lock engagement valve is diagnosed faulted.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK</p>	<p>= Open</p>	<p>Fault confirmation time</p> <p>Parking lock forced low system pressure timer</p> <p>Enable Conditions:</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault detected for the parking lock hold solenoid</p> <p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve</p> <p>Electrical fault detected for the parking lock stepper motor</p>	<p>>= 600 ms</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p>	<p>Runs continuously</p>	

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						Electrical fault detected for the parking lock position sensor	=	False		
						Parking lock actuation strategy	=	Parking lock low speed engage strategy		
						Parking lock engagement valve logical position	=	Hydraulic Off		
						Parking lock latching valve logical position	=	Hydraulic Off		
						Measured system pressure	<	8	bar	
						System pressure sensor electrical fault detected	=	False		
						System pressure sensor electrical fault detected	=	False		
						System pressure low confirmation timer	>=	100	ms	
					Fault confirmation time	Parking lock forced low system pressure timer	>=	600	ms	
					</					

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				Fault confirmation time	Parking lock initial disengagement time	>=	1250	ms	
	<p>This diagnostic detects a parking lock position sensor consistency fault during parking lock diagnostic disengage strategy at the disengagement when vehicle speed is detected. During the parking lock diagnostic disengagement routine, the parking lock components are tested by first disengaging the parking lock completely. This is done by setting both the parking lock latching valve and parking lock engagement valve to the hydraulic on position.</p> <p>Once the parking position sensor shows parking lock disengagement, the parking hold solenoid is actuated to keep the parking lock disengaged even if hydraulic pressure to the parking lock piston is lost.</p> <p>After the parking lock has been disengaged and the parking lock hold solenoid is actuated, the parking lock engagement valve is tested by draining the parking lock piston with the parking lock engagement valve only.</p> <p>After the parking lock engagement valve hydraulic off test, the parking lock is disengaged again and a similar test is performed for the latching valve by setting the latching valve to the hydraulic off position.</p> <p>The latching valve is kept at the hydraulic off position until vehicle speed is detected at which point the latching valve is set to the hydraulic on position.</p> <p>if the parking lock position sensor is reading locked at the end of the initial disengagement the parking lock position sensor is suspicious. When the parking lock is disengaged confirmed by the presence of vehicle speed and the parking lock position sensor was considered suspicious, the parking lock position sensor is diagnosed faulted.</p>	Parking lock logical position (1) at the end of initial disengagement, see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	=	Locked					
					Diagnostic reset event	=	False		
					Application state is unequal to error state	=	True		
					Application state is unequal to bypass state	=	True		
					Electrical fault detected for the parking lock hold solenoid	=	False		
					Electrical fault detected for the parking lock engagement valve	=	False		
					Electrical fault detected for the parking lock latching valve	=	False		
					Electrical fault detected for the parking lock stepper motor	=	False		
					Electrical fault detected for the parking lock position sensor	=	False		
					Parking lock actuation strategy	=	Parking lock low diagnostic disengage strategy		
					Absolute vehicle speed	>	3	kph	
					Parking lock actuation strategy	=	Parking lock low diagnostic disengage strategy		
					Measured system pressure	>	15	bar	
					System pressure sensor electrical fault detected	=	False		
					System pressure sensor electrical fault detected	=	False		
					System pressure high confirmation timer	>=	100	ms	
					Parking lock engagement valve logical position	=	Hydraulic On		

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						Parking lock latching valve logical position	=	Hydraulic On		
					Fault confirmation time	Parking lock initial disengagement time	>=	1250 ms		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Position sensor for rod 1 consistency	P2832	During gear engagements, the dynamic gear diagnosis monitors the position sensor readings and the clutch/output speed sensor readings.	Gear to be engaged located on rod 1 at the A side	= True	Enable Conditions: Hydraulic power available	= True	Runs continuously	A
		If the speeds sensor indicate the gear is properly engaged while enough force is applied to engage the gear and the position sensor does not indicate gear engagement, a rod position sensor fault is set after a confirmation time.	Difference between rod 1 position sensor measured and learned engaged A position	> 1100 pm	Application state is equal to error state	= False		
			OR		Application state is equal to bypass state Rod 1 force target in gear engagement direction	= False > 600 N		
			Gear to be engaged located on rod 1 at the B side	= True	Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD Rod 1 position sensor electrical fault detected	= True = False		
			Difference between learned engaged B position and rod 1 position sensor measured	> 1100 pm	Rod 1 gear engagement active	= True		
					Time since last odd clutch speed sensor electrical fault detected	>= 100 ms		
					Time since last output speed sensor electrical fault detected	>= 100 ms		
					Fault confirmation time:	= 50		
		During gear disengagements, the dynamic gear diagnosis monitors the position sensor readings and the clutch/output speed sensor readings.	Gear to be disengaged located on rod 1 at the A side	= True	Hydraulic power available	= True	Runs continuously	
		If the speeds sensor indicate the gear is properly disengaged position sensor still indicates gear engagement, a rod position sensor fault is set after a confirmation time.	Difference between rod 1 position sensor measured and rod 1 position at start of the shift	< 1000 pm	Application state is equal to error state	= False		
			Difference between rod 1 learned blocking ring A position and rod 1 position sensor measured	> 1500 pm	Application state is equal to bypass state Rod 1 force target in gear engagement direction	= False > 600 N		
			OR		Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD Rod 1 position sensor electrical fault detected	= False = False		
			Gear to be disengaged located on rod 1 at the B side	= True	Rod 1 gear disengagement active	= True		
			Difference between rod 1 position sensor at start of the shift and rod 1 position sensor measured	< 1000 pm	Time since last odd clutch speed sensor electrical fault detected	>= 100 ms		
			Difference between rod 1 position sensor measured and rod 1 learned blocking ring B position	> 1500 pm	Time since last output speed sensor electrical fault detected	>= 100 ms		

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				Fault confirmation time:		Gear disengagement timeout (2)		
<p>When no outside forces are applied on the rod, the static rod diagnostic monitors the position sensor reading within tolerance bands of the learned engaged or neutral position for the corresponding logical current gear for the rod. If the rod position sensor is measuring a value outside these tolerance bands for a confirmation time the rod position sensor is considered suspicious.</p> <p>The sensor is confirmed to be faulted when at the time of the detected fault, the clutch speed and output speed can be independently verified by comparing clutch speed with engine speed during clutch closed situations and comparing output speed with output speed calculated from the driven wheel speeds.</p>	Rod 1 position measurement	Rod drift fault high limit (6), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	µm	Enable Conditions:	No rod 1 force present condition (8) confirmation time, see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	100		
	OR	>			Electrical fault for rod 1 position sensor	False		
		<	Rod drift fault low limit (7), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD				False	
	Rod 1 position measurement			µm		Consistency fault rod 1 position sensor Synchronizer shift busy on corresponding clutch shaft No electrical odd clutch speed sensor OR output speed sensor fault time	100	ms
					Logically engaged gear matches rod 1 speed gear (9), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	True		
					Output speed available from sensor OR substituted by CAN info	True		
					Odd clutch speed available from sensor	True		
					End-of-line rod 1 position learn routine busy	=	False	
					End-of-line rod 2 position learn routine busy	=	False	
					End-of-line rod 3 position learn routine busy	=	False	
					End-of-line rod 4 position learn routine busy	=	False	
					End-of-line rod 5 position learn routine busy	=	False	
					Application state is unequal to error state	=	True	
					Application state is unequal to bypass state	=	True	
				Fault confirmation:	Fault confirmation time for rod position sensor measured out of limits Fault confirmation conditions to consider the rod position sensor faulted	500	ms	
					Driving gear is an odd gear	=	True	
					Difference between odd clutch speed sensor and engine speed sensor	<	350 rpm	

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			OR C_ROD_2 movement during C_ROD_2 move A to B test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_OFF)	> 100 μm		OR C ROD2 move A to B test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically SOOSPOSOFF)	= True		
					Fault confirmation	Synchronizer integrity rod position sensor fault test suite confirmation runs	= 1		
Position sensor for rod 2 consistency	P2837	During gear engagements, the dynamic gear diagnosis monitors the position sensor readings and the clutch/output speed sensor readings.	Gear to be enaged located on rod 2 at the A side	= True	Enable Conditions:	Hydraulic power available	= True	Runs continuously	A
		If the speeds sensor indicate the gear is properly engaged while enough force is applied to engage the gear and the position sensor does not indicate gear engagement, a rod positon sensor fault is set after a confirmation time.	Difference between rod 2 position sensor measured and learned engaged A position	> 1100 μm		Application state is equal to error state	= False		
			OR			Application state is equal to bypass state	= False		
						Rod 2 force target in gear engament direction	> 600 N		
			Gear to be engaged located on rod 2 at the B side	= True		Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD Rod 2 position sensor electrical fault detected	= False		
			Difference between learned engaged B position and rod 2 position sensor measured	> 1100 μm		Rod 2 gear engagement active	= True		
					Fault confirmation time:	Time since last odd clutch speed sensor electrical fault detected Time since last output speed sensor electrical fault detected	>= 100 ms >= 100 ms		
							= 50		
		During gear disengagements, the dynamic gear diagnosis monitors the position sensor readings and the clutch/output speed sensor readings.	Gear to be disengaged located on rod 2 at the A side	= True		Hydraulic power available	= True	Runs continuously	
		If the speeds sensor indicate the gear is properly disengaged position sensor still indicates gear engagement, a rod position sensor fault is set after a confirmation time.	Difference between rod 2 position sensor measured and rod 2 position at start of the shift	< 1000 μm		Application state is equal to error state	= False		
			Difference between rod 2 learned blocking ring A position and rod 2 position sensor measured	> 1500 μm		Application state is equal to bypass state Rod 2 force target in gear engament direction	= False > 600 N		

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			OR			Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD Rod 2 position sensor electrical fault detected	=	False				
			Gear to be disengaged located on rod 2 at the B side	=	True	Rod 2 gear disengagement active	=	True				
			Difference between rod 2 position sensor at start of the shift and rod 2 position sensor measured	<	1000	pm	Time since last odd clutch speed sensor electrical fault detected	>=	100	ms		
			Difference between rod 2 position sensor measured and rod 2 learned blocking ring B position	>	1500	pm	Time since last output speed sensor electrical fault detected	>=	100	ms		
						Fault confirmation time:	=	Gear disengagement timeout (2)				
			When no outside forces are applied on the rod, the static rod diagnostic monitors the position sensor reading within tolerance bands of the learned engaged or neutral position for the corresponding logical current gear for the rod. If the rod position sensor is measuring a value outside these tolerance bands for a confirmation time the rod position sensor is considered suspicious.									
			Rod 2 position measurement		Rod drift fault high limit (6), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	pm	Enable Conditions:	No rod 2 force present condition (8) confirmation time, see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	>=	100	ms	Runs continuously
			OR	>				Electrical fault for rod 2 position sensor		False		
				<	Rod drift fault low limit (7), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD					False		
			Rod 2 position measurement			pm		Consistency fault rod 2 position sensor Synchronizer shift busy on corresponding clutch shaft No electrical odd clutch speed sensor OR output speed sensor fault time	>=	100	ms	
								Logically engaged gear matches rod 2 speed gear (9), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD		True		
								Output speed available from sensor OR substituted by CAN info Odd clutch speed available from sensor		True		
								End-of-line rod 1 position learn routine busy	=	False		
								End-of-line rod 2 position learn routine busy	=	False		
								End-of-line rod 3 position learn routine busy	=	False		
								End-of-line rod 4 position learn routine busy	=	False		
								End-of-line rod 5 position learn routine busy	=	False		

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			<p>C_ROD_1 movement during C_ROD_2 move A to B test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDFF)</p>	<p><=</p> <p>100</p> <p>μm</p>	<p>C ROD2 move B to A test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_2 actuation with selector position target hydraulically SOOSPOSOFF)</p>	<p>=</p> <p>True</p>		
			<p>C ROD1 movement during C_ROD_1 move B to A test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDN)</p> <p>OR</p>	<p>></p> <p>100</p> <p>μm</p>	<p>C ROD1 move B to A test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDN)</p> <p>OR</p>	<p>=</p> <p>True</p>		
			<p>C_ROD_1 movement during C_ROD_1 move A to B test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDN)</p>	<p>></p> <p>100</p> <p>μm</p>	<p>C ROD1 move A to B test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_2 actuation with selector position target hydraulically SOOSPOSON)</p>	<p>=</p> <p>True</p>		
					<p>Fault confirmation</p> <p>Synchronizer integrity rod position sensor fault test suite confirmation runs</p>	<p>=</p> <p>1</p>		
Position sensor for rod 3 consistency	P283C	<p>During gear engagements, the dynamic gear diagnosis monitors the position sensor readings and the clutch/output speed sensor readings.</p> <p>If the speeds sensor indicate the gear is properly engaged while enough force is applied to engage the gear and the position sensor does not indicate gear engagement, a rod position sensor fault is set after a confirmation time.</p>	<p>Gear to be engaged located on rod 3 at the A side</p>	<p>=</p> <p>True</p>	<p>Enable Conditions:</p> <p>Hydraulic power available</p>	<p>=</p> <p>True</p>	Runs continuously	A
			<p>Difference between rod 3 position sensor measured and learned engaged A position</p>	<p>></p> <p>1100</p> <p>pm</p>	<p>Application state is equal to error state</p>	<p>=</p> <p>False</p>		
			OR		<p>Application state is equal to bypass state</p>	<p>=</p> <p>False</p>		
					<p>Rod 3 force target in gear engagement direction</p>	<p>></p> <p>600</p> <p>N</p>		
					<p>Speed sensors indicate gear is engaged (1)</p>	<p>=</p> <p>True</p>		
			<p>Gear to be engaged located on rod 3 at the B side</p>	<p>=</p> <p>True</p>	<p>Rod 3 position sensor electrical fault detected</p>	<p>=</p> <p>False</p>		
						<p>=</p> <p>True</p>		
			<p>Difference between learned engaged B position and rod 3 position sensor measured</p>	<p>></p> <p>1100</p> <p>μm</p>	<p>Rod 3 gear engagement active</p>			
					<p>Time since last even clutch speed sensor electrical fault detected</p>	<p>>=</p> <p>100</p> <p>ms</p>		
					<p>Time since last output speed sensor electrical fault detected</p>	<p>>=</p> <p>100</p> <p>ms</p>		
					<p>Fault confirmation time:</p>	<p>=</p> <p>50</p>		

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<p>During gear disengagements, the dynamic gear diagnosis monitors the position sensor readings and the clutch/output speed sensor readings.</p> <p>If the speeds sensor indicate the gear is properly disengaged position sensor still indicates gear engagement, a rod position sensor fault is set after a confirmation time.</p>	<p>Gear to be disengaged located on rod 3 at the A side</p>	=	True		Hydraulic power available	=	True	Runs continuously
	<p>Difference between rod 3 position sensor measured and rod 3 position at start of the shift</p>	<	1000	µm	Application state is equal to error state	=	False	
	<p>Difference between rod 3 learned blocking ring A position and rod 3 position sensor measured</p>	>	1500	µm	Application state is equal to bypass state	=	False	
	OR				Rod 3 force target in gear engagement direction	>	600 N	
					Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=	False	
					Rod 3 position sensor electrical fault detected	=	False	
	<p>Gear to be disengaged located on rod 3 at the B side</p>	=	True		Rod 3 gear disengagement active	=	True	
	<p>Difference between rod 3 position sensor at start of the shift and rod 3 position sensor measured</p>	<	1000	µm	Time since last even clutch speed sensor electrical fault detected	>=	100 ms	
	<p>Difference between rod 3 position sensor measured and rod 3 learned blocking ring B position</p>	>	1500	µm	Time since last output speed sensor electrical fault detected	>=	100 ms	
					Fault confirmation time:	=	Gear disengagement timeout (2)	
<p>When no outside forces are applied on the rod, the static rod diagnostic monitors the position sensor reading within tolerance bands of the learned engaged or neutral position for the corresponding logical current gear for the rod. If the rod position sensor is measuring a value outside these tolerance bands for a confirmation time the rod position sensor is considered suspicious.</p> <p>The sensor is confirmed to be faulted when at the time of the detected fault, the clutch speed and output speed can be independently verified by comparing clutch speed with engine speed during clutch closed situations and comparing output speed with output speed calculated from the driven wheel speeds.</p>	<p>Rod 3 position measurement</p>		<p>Rod drift fault high limit (6), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD</p>	µm	<p>Enable Conditions:</p> <p>No rod 3 force present condition (8) confirmation time, see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD</p> <p>Electrical fault for rod 3 position sensor</p>	>=	100 ms	Runs continuously
	OR						False	
							False	
	<p>Rod 3 position measurement</p>	<	<p>Rod drift fault low limit (7), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD</p>	µm	<p>Consistency fault rod 3 position sensor Synchronizer shift busy on corresponding clutch shaft No electrical even clutch speed sensor OR output speed sensor fault time</p>	>=	100 ms	
							True	
					<p>Logically engaged gear matches rod 3 speed gear (9), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD</p>			

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					<div>Output speed available from sensor OR substituted by CAN info</div> <div>Even clutch speed available from sensor</div> <div>End-of-line rod 1 position learn routine busy</div> <div>End-of-line rod 2 position learn routine busy</div> <div>End-of-line rod 3 position learn routine busy</div> <div>End-of-line rod 4 position learn routine busy</div> <div>End-of-line rod 5 position learn routine busy</div> <div>Application state is unequal to error state</div> <div>Application state is unequal to bypass state</div> <div>Fault confirmation:</div> <div>Fault confirmation time for rod position sensor measured out of limits</div> <div>Fault confirmation conditions to consider the rod position sensor faulted</div> <div>Driving gear is an even gear</div> <div>Difference between even clutch speed sensor and engine speed sensor</div> <div>Difference between output speed sensor and output speed based on driven wheel speeds</div> <div>Transmission output speed</div> <div>Driving gear is located on rod 3 OR Driving gear is located on rod 4 or rod 5</div> <div>Difference between rod 3 learned blocking ring A position and rod 3 position sensor measurement OR Driving gear is located on rod 4 or rod 5</div> <div>Difference between rod 3 position sensor measurement and rod 3 learned blocking ring B position</div>	<div>True</div> <div>True</div> <div>= False</div> <div>= False</div> <div>= False</div> <div>= False</div> <div>= False</div> <div>= True</div> <div>= True</div> <div>500 ms</div> <div>= True</div> <div>< 350 rpm</div> <div>< 70 rpm</div> <div>> 50 rpm</div> <div>= True</div> <div>= True</div> <div>> 1000 pm</div> <div>= True</div> <div>> 1000 pm</div>		
This diagnostic detects a stuck shift rod position sensor. This is by use of the synchronizer integrity routine which can be triggered by the setting by a gear system or component diagnostic failure. The synchronizer integrity routine performs small rod movement actuations and evaluates the actual rod movements caused by this.	C ROD3 movement during C_ROD_3 move B to A test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN)	<= 100 pm	Enable Conditions:	Synchronizer integrity intrusive routine triggered (15), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	True	Runs continuously		

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		When no rod movement is detected when trying to move the rod in both directions and at least one of the valves needed for these moves is confirmed operational by showing rod movement during a test case for the complement rod move, the rod position sensor is diagnosed faulted.	C_ROD_4 movement during C_ROD_3 move B to A test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN)	<=	100	pm	Synchronizer integrity routine running conditions (16), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=	True		
		This strategy is possible as two rods share two synchronizer pressure control valves. As such results from different test cases can be combined to determine which component is faulted.	C_ROD_3 movement during C_ROD_3 move A to B test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)	<=	100	pm	C_ROD3 move A to B test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)	=	True		
			C_ROD_4 movement during C_ROD_3 move A to B test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)	<=	100	pm	C_ROD3 move B to A test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN)	=	True		
			C_ROD_4 movement during C_ROD_4 move B to A test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDFF) OR	>	100	pm	C_ROD_4 move B to A test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDFF) OR	=	True		
			C_ROD_4 movement during C_ROD_4 move A to B test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDFF)	>	100	pm	C_ROD_4 move A to B test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDFF)	=	True		
							Fault confirmation Synchronizer integrity rod position sensor fault test suite confirmation runs	=	1		
Position sensor for rod 4 consistency	P2841	During gear engagements, the dynamic gear diagnosis monitors the position sensor readings and the clutch/output speed sensor readings. If the speeds sensor indicate the gear is properly engaged while enough force is applied to engage the gear and the position sensor does not indicate gear engagement, a rod position sensor fault is set after a confirmation time.	Gear to be engaged located on rod 4 at the A side	=	True		Enable Conditions: Hydraulic power available	=	True	Runs continuously	A
			Difference between rod 4 position sensor measured and learned engaged A position	>	1100	µm	Application state is equal to error state	=	False		
			OR				Application state is equal to bypass state Rod 4 force target in gear engagement direction	= >	False 600 N		

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The sensor is confirmed to be faulted when at the time of the detected fault, the clutch speed and output speed can be independently verified by comparing clutch speed with engine speed during clutch closed situations and comparing output speed with output speed calculated from the driven wheel speeds.

Rod 4 position measurement

<

Rod drift fault low limit (7), see
Summary table attachments
C_SID_ASV_CMP_SNS_POS_ROD

pm

False

Consistency fault rod 4 position
sensor
Synchronizer shift busy on
corresponding clutch shaft
No electrical even clutch speed
sensor OR output speed sensor fault
time

>=

100

ms

True

Logically engaged gear matches rod
4 speed gear (9), see Summary
table attachments
C_SID_ASV_CMP_SNS_POS_ROD

True

Output speed available from sensor
OR substituted by CAN info

True

Even clutch speed available from
sensor

=

False

End-of-line rod 1 position learn
routine busy

=

False

End-of-line rod 2 position learn
routine busy

=

False

End-of-line rod 3 position learn
routine busy

=

False

End-of-line rod 4 position learn
routine busy

=

False

End-of-line rod 5 position learn
routine busy

=

True

Application state is unequal to error
state

=

True

Application state is unequal to
bypass state

Fault confirmation:

Fault confirmation time for rod
position sensor measured out of
limits

500

ms

Fault confirmation conditions to
consider the rod position sensor
faulted

=

True

Driving gear is an even gear
Difference between even clutch
speed sensor and engine speed
sensor

<

350

rpm

Difference between output
speed sensor and output speed
based on driven wheel speeds

<

70

rpm

Transmission output speed

>

50

rpm

Driving gear is located on rod 4
OR
Driving gear is located on rod 3 or
rod 5

=

True

=

True

Difference between rod 4 learned
blocking ring A position and rod 3
position sensor measurement
OR

>

1000

pm

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					Driving gear is located on rod 3 or rod 5	=	True		
					Difference between rod 4 position sensor measurement and rod 4 learned blocking ring B position	>	1000 pm		
<p>This diagnostic detects a stuck shift rod position sensor. This is by use of the synchronizer integrity routine which can be triggered by the setting by a gear system or component diagnostic failure. The synchronizer integrity routine performs small rod movement actuations and evaluates the actual rod movements caused by this.</p> <p>When no rod movement is detected when trying to move the rod in both directions and at least one of the valves needed for these moves is confirmed operational by showing rod movement during a test case for the complement rod move, the rod position sensor is diagnosed faulted.</p> <p>This strategy is possible as two rods share two synchronizer pressure control valves. As such results from different test cases can be combined to determine which component is faulted.</p>	<p>C_ROD_4 movement during C_ROD_4 move B to A test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDFF)</p>	<=	100	pm	<p>Enable Conditions:</p> <p>Synchronizer integrity intrusive routine triggered (15), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD</p>	=	True	Runs continuously	
	<p>CROD3 movement during C_ROD_4 move B to A test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDFF)</p>	<=	100	pm	<p>Synchronizer integrity routine running conditions (16), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD</p>	=	True		
	<p>C_ROD_4 movement during C_ROD_4 move A to B test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDFF)</p>	<=	100	pm	<p>C_ROD_4 move A to B test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDFF)</p>	=	True		
	<p>C_ROD_3 movement during C_ROD_4 move A to B test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDFF)</p>	<=	100	pm	<p>C_ROD_4 move B to A test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDFF)</p>	=	True		
	<p>CROD3 movement during C_ROD_3 move B to A test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN) OR</p>	>	100	pm	<p>CROD3 move B to A test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN) OR</p>	=	True		
	<p>C_ROD_3 movement during C_ROD_3 move A to B test case (20), see Summary table attachments C_SID_ASV_CM P_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)</p>	>	100	pm	<p>CROD3 move A to B test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchroizer pressure control valve C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)</p>	=	True		

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						Fault confirmation	Synchronizer integrity rod position sensor fault test suite confirmation runs	=	1				
Position sensor for rod 5 consistency	P2864	During gear engagements, the dynamic gear diagnosis monitors the position sensor readings and the clutch/output speed sensor readings.	Gear to be engaged located on rod 5 at the B side	=	True	Enable Conditions:	Hydraulic power available	=	True	Runs continuously	A		
		If the speeds sensor indicate the gear is properly engaged while enough force is applied to engage the gear and the position sensor does not indicate gear engagement, a rod position sensor fault is set after a confirmation time.	Difference between learned engaged B position and rod 5 position sensor measured	>	1100		µm	Application state is equal to error state	=			False	
								Application state is equal to bypass state	=			False	
								Rod 5 force target in gear engagement direction	>			600	N
								Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=			True	
								Rod 5 position sensor electrical fault detected	=			False	
								Rod 5 gear engagement active	=			True	
								Time since last even clutch speed sensor electrical fault detected	>=			100	ms
								Time since last output speed sensor electrical fault detected	>=			100	ms
								Fault confirmation time:	=			50	
	During gear disengagements, the dynamic gear diagnosis monitors the position sensor readings and the clutch/output speed sensor readings.	Gear to be disengaged located on rod 5 at the B side	=	True		Hydraulic power available	=	True	Runs continuously				
If the speeds sensor indicate the gear is properly disengaged position sensor still indicates gear engagement, a rod position sensor fault is set after a confirmation time.	Difference between rod 5 position sensor at start of the shift and rod 5 position sensor measured	<	1000	µm	Application state is equal to error state	=	False						
					Application state is equal to bypass state	=	False						
	Difference between rod 5 position sensor measured and rod 5 learned blocking ring B position	>	1500	µm	Rod 5 force target in gear engagement direction	>	600	N					
					Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=	False						
					Rod 5 position sensor electrical fault detected	=	False						
					Rod 5 gear disengagement active	=	True						
					Time since last even clutch speed sensor electrical fault detected	>=	100	ms					
					Time since last output speed sensor electrical fault detected	>=	100	ms					

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				Fault confirmation time:	Gear disengagement timeout (2)	
When no outside forces are applied on the rod, the static rod diagnostic monitors the position sensor reading within tolerance bands of the learned engaged or neutral position for the corresponding logical current gear for the rod. If the rod position sensor is measuring a value outside these tolerance bands for a confirmation time the rod position sensor is considered suspicious.	Rod 5 position measurement	Rod drift fault high limit (6), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	μm	Enable Conditions:	No rod 5 force present condition (8) confirmation time, see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	100
	OR				Electrical fault for rod 5 position sensor	False
The sensor is confirmed to be faulted when at the time of the detected fault, the clutch speed and output speed can be independently verified by comparing clutch speed with engine speed during clutch closed situations and comparing output speed with output speed calculated from the driven wheel speeds.		Rod drift fault low limit (7), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	μm		Consistency fault rod 5 position sensor	False
	Rod 5 position measurement				Synchronizer shift busy on corresponding clutch shaft	False
					No electrical even clutch speed sensor OR output speed sensor fault time	100 ms
					Logically engaged gear matches rod 5 speed gear (9), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	True
					Output speed available from sensor OR substituted by CAN info	True
					Even clutch speed available from sensor	True
					End-of-line rod 1 position learn routine busy	False
					End-of-line rod 2 position learn routine busy	False
					End-of-line rod 3 position learn routine busy	False
					End-of-line rod 4 position learn routine busy	False
					End-of-line rod 5 position learn routine busy	False
					Application state is unequal to error state	True
					Application state is unequal to bypass state	True
				Fault confirmation:	Fault confirmation time for rod position sensor measured out of limits	500 ms
					Fault confirmation conditions to consider the rod position sensor faulted	
					Driving gear is an even gear	True
					Difference between even clutch speed sensor and engine speed sensor	350 rpm

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					Difference between output speed sensor and output speed based on driven wheel speeds	<	70	rpm		
					Transmission output speed	>	50	rpm		
					Driving gear is located on rod 5 OR Driving gear is located on rod 3 or rod 4	=	True			
					Difference between rod 5 position sensor measurement and rod 5 learned blocking ring B position	>	1000	pm		
	This diagnostic detects a stuck shift rod position sensor. This is by use of the synchronizer integrity routine which can be triggered by the setting by a gear system or component diagnostic failure. The synchronizer integrity routine performs small rod movement actuations and evaluates the actual rod movements caused by this.	C_ROD_5 movement towards A side during CROD5 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchro nizer pressure control valve C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDF)	<=	100	pm	Enable Conditions:	Synchronizer integrity intrusive routine triggered (15), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	True		Runs continuously
	When no rod movement is detected when trying to move the rod in both directions the rod position sensor may be stuck at value or the synchronizer pressure control valve may be stuck hydraulically off.	CROD5 movement during C_ROD_5 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchro nizer pressure control valve C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDF)	<=	100	pm		Synchronizer integrity routine running conditions (16), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	True	=	
	As there are no shared synchronizer pressure control valves for this rod, the pinpointing between rod position sensor failure and synchronizer pressure control valve failure is done by use of the current profile check for the synchronizer pressure control valve.	C_ROD_5 movement during C_ROD_5 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchro nizer pressure control valve C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDN)	<=	100	pm		C_ROD_5 move A to B test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchro nizer pressure control valve C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDN)	True	=	
	If the current profile check for the synchronizer pressure control valve consistently indicates pass, the rod position sensor is diagnosed faulted.	C_ROD_5 movement during C_ROD_5 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchro nizer pressure control valve C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDN)	<=	100	pm		C_ROD_5 move B to A test case executed (17), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchro nizer pressure control valve C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDF)	True	=	
		Synchronizer pressure control valve 5 current profile check consistently indicates FAIL	=	True		Fault confirmation	Synchronizer pressure control valve 5 current profile check fail confirmation count		=	3 count
					Transmission oil temperature	>=	40	°C		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Clutch 1 pressure sensor consistency	P0841	This diagnostic detects a sensor consistency fault for a clutch pressure sensor. This is done by using the clutch recovery routine which is triggered by the setting of of a clutch system or component diagnostic failure. The clutch recovery routine first verified indepently from the clutch pressure sensor that the clutch pressure control valve and the clutch pressure redundant shutdown valve are operational.	Absolute difference between odd clutch pressure measured and clutch pressure small step target	> 1 bar	Enable Conditions: Diagnostic reset event Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_CMP_SNS_PRS_CLU J2ONSIST Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine Odd clutch redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine Odd clutch redundant shutdown valve stuck off fault detected during this instance of the odd clutch recovery routine Odd clutch proportional pressure valve stuck on fault detected during this instance of the odd clutch recovery routine Odd clutch proportional pressure valve stuck off fault detected during this instance of the odd clutch recovery routine Small step pressure target Big step pressure target	= False	Runs Continuously	A
		OR	Absolute difference between odd clutch pressure measured and clutch pressure big step target	> 1 bar		= True		
		If the clutch pressure control valve and the clutch pressure redundant shutdown valve are confirmed operational, the clutch pressure sensor is diagnosed by attempting to attain a small and a big pressure target. If one of the pressure steps cannot be attained, the clutch pressure sensor is diagnosed faulted.				= False = False = False = False = False = False		
					Fault confirmation time	> 100 ms		
Clutch 2 pressure sensor consistency	P0846	This diagnostic detects a sensor consistency fault for a clutch pressure sensor. This is done by using the clutch recovery routine which is triggered by the setting of of a clutch system or component diagnostic failure. The clutch recovery routine first verified indepently from the clutch pressure sensor that the clutch pressure control valve and the clutch pressure redundant shutdown valve are operational.	Absolute difference between even clutch pressure measured and clutch pressure small step target	> 1 bar	Enable Conditions: Diagnostic reset event Even clutch pressure recovery routine is requested (1), see Summary table attachments Even clutch pressure recovery routine run conditions met (2), see Summary table attachments	= False	Runs Continuously	A
		OR	Absolute difference between even clutch pressure measured and clutch pressure big step target	> 1 bar		= True		
		If the clutch pressure control valve and the clutch pressure redundant shutdown valve are confirmed operational, the clutch pressure sensor is diagnosed by attempting to attain a small and a big pressure target.				= True		

		If one of the pressure steps cannot be attained, the clutch pressure sensor is diagnosed faulted.			Even clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False		
					Even clutch redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine	=	False		
					Even clutch redundant shutdown valve stuck off fault detected during this instance of the odd clutch recovery routine	=	False		
					Even clutch proportional pressure valve stuck on fault detected during this instance of the odd clutch recovery routine	=	False		
					Even clutch proportional pressure valve stuck off fault detected during this instance of the odd clutch recovery routine	=	False		
					Small step pressure target	=	4	bar	
					Big step pressure target	=	6	bar	
				Fault confirmation time		>	100	ms	

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Clutch 1 pressure sensor drift out of window	P0844	This diagnostic detects the offset for the clutch pressure sensor is too high by analyzing the raw clutch pressure sensor measured while the clutch pressure should be reading zero. If the absolute value for the raw clutch pressure sensor reading during the zero pressure condition is too high, the clutch pressure sensor is diagnosed faulted.	Absolute raw measured clutch 1 pressure Valid raw measured clutch 1 pressure samples found (1), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_D RIFT	Pressure sensor drift out of window threshold (2), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_DR IFT > False =	Enable Conditions: Clutch zero pressure condition (4), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_DR IFT Controller awake time Application state is unequal to error state Application state is unequal to bypass state Code clear event Electrical clutch pressure sensor diagnostic indicates ok	True = 20 ms => True => True => False => True	Runs Continuously	A
Clutch 2 pressure sensor drift out of window	P0849	This diagnostic detects the offset for the clutch pressure sensor is too high by analyzing the raw clutch pressure sensor measured while the clutch pressure should be reading zero. If the absolute value for the raw clutch pressure sensor reading during the zero pressure condition is too high, the clutch pressure sensor is diagnosed faulted.	Absolute raw measured clutch 2 pressure Valid raw measured clutch 2 pressure samples found (1), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_D RIFT	Pressure sensor drift out of window threshold (2), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_DR IFT > False =	Enable Conditions: Clutch zero pressure condition (4), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_DR IFT Controller awake time Application state is unequal to bypass state Electrical clutch pressure sensor diagnostic indicates ok Code clear event Electrical clutch pressure sensor diagnostic indicates ok	True = 20 ms => True => True => False => True	Runs Continuously	A

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
LSDpressure sensor consistency	P0876	This diagnostic detects a sensor consistency fault for a limited slip differential pressure sensor. This is done by using the limited slip differential recovery routine which is triggered by the setting of of a clutch system or component diagnostic failure.	Absolute difference between limited slip differential pressure measured and limited slip differential pressure small step target	> 1 bar	Enable Conditions: Diagnostic reset event Limited slip differential recovery routine is requested (1), see Summary table attachments Limited slip differential recovery routine run conditions met (2), see Summary table attachments Limited slip differential pressure sensor out-of-window drift fault detected duringthis instance of the odd clutch recovery routine Limited slip differential redundant shutdown valve stuck on fault detected duringthis instance of the odd clutch recovery routine Limited slip differential redundant shutdown valve stuck off fault detected duringthis instance of the odd clutch recovery routine Limited slip differential proportional pressure valve stuck on fault detected duringthis instance of the odd clutch recovery routine Limited slip differential proportional pressure valve stuck off fault detected duringthis instance of the odd clutch recovery routine Small step pressure target Big step pressure target Fault confirmation time	= False	Runs Continuously	B
		The limited slip differential recovery routine first verified indepently from the limited slip differential pressure sensor that the limited slip differential pressure control valve and the limited slip differential pressure redundant shutdown valve are operational.	OR			= True		
		If the limited slip differential pressure control valve and the limited slip differential pressure redundant shutdown valve are confirmed operational, the limited slip differential pressure sensor is diagnosed by attempting to attain a small and a big pressure target.	Absolute difference between limited slip differential pressure measured and limited slip differential pressure big step target	> 1 bar		= True		
		If one of the pressure steps cannot be attained, the limited slip differential pressure sensor is diagnosed faulted.				= False		
						= False		
						= False		
						= False		
						= 4 bar		
						= 6 bar		
						= 100 ms		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Limited slip differential pressure sensor drift out of window	P0879	This diagnostic detects the offset for the limited slip differential pressure sensor is too high by analyzing the raw limited slip differential pressure sensor measured while the limited slip differential pressure should be reading zero. If the absolute value for the raw limited slip differential pressure sensor reading during the zero pressure condition is too high, the limited slip differential pressure sensor is diagnosed faulted.	Absolute raw measured limited slip differential pressure Valid raw measured raw limited slip differential pressure samples found (1)	Pressure sensor drift out of window threshold (2), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_LSD_DR1 FT False =	Enable Conditions: Limited slip differential zero pressure condition (4), see Summary table attachments C_SID_ASV_CMP_SNSPRSLSDDR 1 FT Controller awake time Electrical limited slip differential pressure sensor diagnostic indicates ok Application state is unequal to error state Application state is unequal to bypass state Code clear event Electrical limited slip differential pressure sensor fault	True = 20 => ms = True = True = True = False = False	Runs Continuously	B

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
System pressure sensor consistency	P0871	This diagnostic detects a sensor consistency fault for a system pressure sensor. This is done by using the system recovery routine which is triggered by the setting of system pressure control system or component diagnostic failure.	Pressure difference between the system pressure and the clutch pressure of the selected clutch for the sensor consistency check for open loop system pressure target 1	>= 2.5 bar	Enable Conditions: Diagnostic reset event System pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CM P_SNS_PRS_SYS_CO NSIST System pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CM P_SNS_PRS_SYS_CO NSIST System pressure was unable to attain one of the system pressure steps during this instance of the system pressure recovery routine (3), see Summary table attachments C_SID_ASV_CM P_SNS_PRS_SYS_CO NSIST System pressure sensor check against clutch pressure sensor conditions met (4), see Summary table attachments C_SID_ASV_CM P_SNS_PRS_SYS_CO NSIST Fault confirmation time	= False	Runs Continuously	A
		The system pressure recovery routine first attempts to attain different pressure targets. If this fails, the faulted component is determined: system pressure sensor, system pressure pilot valve or the system pressure relief valve.	OR			= True		
		If the system pressure target check has failed for one of the system pressure target, the system pressure sensor measurement is checked against a clutch pressure sensor by disengaging the gear on a clutch shaft when possible and ramping up the clutch pressure control valve current untilll the clutch is completely closed.	Pressure difference between the system pressure and the clutch pressure of the selected clutch for the sensor consistency check for open loop system pressure target 2	>= 2.5 bar		= True		
		When the clutch is completely closed, the system pressure and clutch pressure should be reading a similar value. If this is the not the case, the system pressure sensor is diagnosed faulted.				= True		
						= 2000 ms		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
System pressure sensor drift out of window	P0874	<p>This diagnostic detects the offset for the system pressure sensor is too high by analyzing the raw system pressure sensor measured while the clutch pressure should be reading zero.</p> <p>If the absolute value for the raw system pressure sensor reading during the zero pressure condition is too high, the system pressure sensor is diagnosed faulted.</p>	<p>Absolute raw measured system pressure</p> <p>Valid raw measured system pressure samples found (1)</p>	<p>Pressure sensor drift out of window threshold (2), see Summary table attachments</p> <p>C_SID_ASV_VA_CM P_SNS_PRS_SYS _DRIFT</p> <p>></p> <p>False</p> <p>=</p>	<p>Enable Conditions:</p> <p>System pressure zero condition (4), see Summary table attachments</p> <p>C_SID_ASV_VA_CMP_SNS_PRS_SYS _DRIFT</p> <p>Controller awake time</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Code clear event</p> <p>Electrical system pressure sensor diagnostic indicates ok</p>	<p>True</p> <p>=</p> <p>20</p> <p>></p> <p>ms</p> <p>=</p> <p>True</p> <p>=</p> <p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p>	<p>Runs Continuously</p>	<p>A</p>

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Clutch 1 speed sensor consistency	P0792	<p>This diagnostic detects consistency fault for the clutch speed sensor by comparing the reading for the clutch speed sensor with the engine speed during clutch closed conditons.</p> <p>When the clutch is fully closed and there are no pressure control related issues which could induce clutch slippage, the clutch speed measurement should match the engine speed. If the difference between the two is too high for too long, the clutch speed sensor is diagnosed faulted.</p>	Absolute difference between measured clutch 1 speed and engine speed	>= 150 rpm	<p>Enable Conditions: Engine speed available (3), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Electrical clutch 1 speed sensor fault Clutch 1 state is closed Microslip active Odd clutch pressure pressure control ok condition (17), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU Odd clutch pressure request - Odd clutch pressure target Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state</p> <p>Fault confirmation time</p>	<p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>= True</p> <p>= False</p> <p>True</p> <p>=</p> <p><= 0.150390625 bar</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>=</p> <p>= 1100 ms</p>	Runs Continuously	A
		<p>This diagnostic detects consistency faults for the clutch speed sensor by comparing the reading for the clutch speed sensor with the clutch speed calculated from the output speed based on engaged gear ratios.</p> <p>If the logically engaged gear is confirmed by the rod position sensors, the output speed sensor matches output speed based on driven wheel speeds and the clutch speed differs from the clutch speed based on the output speed, the clutch speed sensor is diagnosed faulted.</p>	Synchronizer differential speed for clutch 1 engaged gear	>= (1), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU rpm	<p>Enable Conditions: Output speed consistency with wheel speeds from CAN (5), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Electrical clutch 1 speed sensor fault Synchronizer shift busy on clutch 1 shaft Absolute output speed Current logical gear on matches rod position sensor readings for clutch 1 shaft (6) Clutch 1 shaft has gear engaged Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state</p> <p>Fault confirmation time</p>	<p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>= False</p> <p>>= 150 rpm</p> <p>True</p> <p>= True</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>=</p> <p>= 200 ms</p>	Runs Continuously	

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		<p>This diagnostic detects consistency fault for the clutch speed sensor by monitoring gear engagements.</p> <p>If during gear engagements, the corresponding rod position sensor indicates rod movement towards the intended gear engagement and the rod position sensor indicates the gear has successfully engaged while the calculated differential speed for the synchronizer remains high, the clutch speed sensor is diagnosed faulted.</p>	<p>Engaged gear for clutch 1 based on speed sensor information matches gear to be engaged (11), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Engaged gear based on rod position sensor for shifting rod matches gear to be engaged (12), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Rod position sensor movement during shift detected (13), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Synchronizer differential speed for gear to engaged on clutch 1 shaft</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>> 200 rpm</p>	<p>Enable Conditions:</p> <p>Synchronizer shift busy on clutch 1 shaft</p> <p>Output speed sensor is suspicious (9), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Clutch 1 speed sensor is suspicious (10), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation time</p>	<p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p>=</p> <p>True</p> <p>=</p> <p>50 ms</p>	Runs Continuously	
Clutch 2 speed sensor consistency	P2746	<p>This diagnostic detects consistency fault for the clutch speed sensor by comparing the reading for the clutch speed sensor with the engine speed during clutch closed conditions.</p> <p>When the clutch is fully closed and there are no pressure control related issues which could induce clutch slippage, the clutch speed measurement should match the engine speed. If the difference between the two is too high for too long, the clutch speed sensor is diagnosed faulted.</p>	<p>Absolute difference between measured clutch 2 speed and engine speed</p>	<p>>= 150 rpm</p>	<p>Enable Conditions:</p> <p>Engine speed available (3), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Electrical clutch 2 speed sensor fault</p> <p>Clutch 2 state is closed</p> <p>Microslip active</p> <p>Even clutch pressure pressure control ok condition (17), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Even clutch pressure request - Even clutch pressure target</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation time</p>	<p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p>=</p> <p>0.150390625 bar</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p>=</p> <p>True</p> <p>=</p> <p>1100 ms</p>	Runs Continuously	A
		<p>This diagnostic detects consistency faults for the clutch speed sensor by comparing the reading for the clutch speed sensor with the clutch speed calculated from the output speed based on engaged gear ratios.</p>	<p>Synchronizer differential speed for clutch 2 engaged gear</p>	<p>>= Synchronizer differential speed limit (1) rpm</p>	<p>Enable Conditions:</p> <p>Output speed consistency with wheel speeds from CAN (5), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p>	<p>True</p> <p>=</p>	Runs Continuously	

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		<p>If the logically engaged gear is confirmed by the rod position sensors, the output speed sensor matches output speed based on driven wheel speeds and the clutch speed differs from the clutch speed based on the output speed, the clutch speed sensor is diagnosed faulted.</p>			<p>Electrical clutch 2 speed sensor fault = False</p> <p>Synchronizer shift busy on clutch 2 shaft = False</p> <p>Absolute output speed >= 150 rpm</p> <p>Current logical gear on matches rod position sensor readings for clutch 2 shaft (6) = True</p> <p>Clutch 1 shaft has gear engaged = True</p> <p>Diagnostic reset event = False</p> <p>Application state is unequal to error state = True</p> <p>Application state is unequal to bypass state = True</p> <p>Fault confirmation time = 200 ms</p>		
	<p>This diagnostic detects consistency fault for the clutch speed sensor by monitoring gear engagements.</p> <p>If during gear engagements, the corresponding rod position sensor indicates rod movement towards the intended gear engagement and the rod position sensor indicates the gear has sucesfully engaged while the calculated differential speed for the synchronizer remains high, the clutch speed sensor is diagnosed faulted.</p>	<p>Engaged gear for clutch 2 based on speed sensor information matches gear to be engaged (11), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Engaged gear based on rod position sensor for shifting rod matches gear to be engaged (12), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Rod position sensor movement during shift detected (13), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Synchronizer differential speed for gear to engaged on clutch 2 shaft</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>> 200 rpm</p>	<p>Enable Conditions:</p> <p>Synchronizer shift busy on clutch 2 shaft</p> <p>Output speed sensor is suspicious (9), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Clutch speed sensor is suspicious (10), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation time</p>	<p>= True</p> <p>= False</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>= 50 ms</p>	Runs Continuously	

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.	
Engine speed sensor consistency	P0336	This diagnostic detects consistency faults engine speed sensor input towards the transmission controller.	Absolute difference between measured engine speed and engine speed from ECM	>	350 rpm	Enable Conditions:	False	Runs Continuously	A
		Electrical engine speed sensor fault				=			
		The engine speed sensor input for the transmission controller is compared against the engine speed received over CAN from the ECM. If the difference is too high for too long, the engine speed sensor input towards the transmission controller is diagnosed faulted.				Engine speed from ECM valid (1), see Summary table attachments	True		
						C_SID_ASV_CMP_SNS_SPD_ENG	=		
						Engine speed from ECM	>=	400 rpm	
						Diagnostic clear event	=	False	
						Application state is unequal to error state	=	True	
						Application state is unequal to bypass state	=	True	
						High engine speed gradient expected condition (2), see Summary table attachments	=	False	
						C_SID_ASV_CMP_SNS_SPD_ENG			
					Fault confirmation time	=	800 ms		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Output speed sensor consistency	P0721	<p>This diagnostic detects consistency faults for the transmission output speed sensor.</p> <p>The transmission output speed sensor reading is compared against the output speed calculated based on the driven wheel speeds.</p> <p>If there is a mismatch between the output speed from the sensor and the output speed calculated based on the driven wheel speeds, the transmission output speed sensor is considered suspicious.</p> <p>If one of the transmission clutch speed sensor confirms the mismatch for the output speed sensor while the other clutch speed sensor does not show a match, the output speed sensor is diagnosed faulted.</p> <p>To verify the output speed sensor reading with the clutch speed, a gear has to be engaged on the corresponding clutch shaft and the output speed is calculated based on the clutch speed sensor reading and the engaged gear ratio.</p>	Absolute difference between Measured output speed and Output speed from Wheel Speed on CAN	>= 150 rpm	<p>Enable Conditions:</p> <p>Electrical output peed sensor fault</p> <p>Wheel speed information from CAN valid (2), see Summary table attachments</p> <p>C_SID_ASV_CM P_SNS_SPD_OUT</p> <p>Output speed from clutch 1 available (3), see Summary table attachments</p> <p>C_SID_ASV_CM P_SNS_SPD_OUT</p> <p>Output speed from clutch 2 available (3), see Summary table attachments</p> <p>C_SID_ASV_CM P_SNS_SPD_OUT</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Diagnostic clear event</p> <p>Fault confirmation time</p>	= False	Runs Continuously	A
			Hysteresis low difference threshold	= 50 rpm		= True		
			AND			= True		
			Absolute difference between Measured output speed and Output speed from clutch 1 too high (1), see Summary table attachments	= True		= True		
			C_SID_ASV_CMP_SNS_SPD_OUT			= True		
			OR			= True		
			Absolute difference between Measured output speed and Output speed from clutch 2 too high (1), see Summary table attachments	= True		= True		
			C_SID_ASV_CMP_SNS_SPD_OUT			= False		
						= 300 ms		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters		Enable Conditions	Time Required	MIL ilium.
Sump temperature consistency	P0711	<p>This diagnostic detects a consistency fault for the sump temperature sensor by monitoring high temperature gradient.</p> <p>The sump temperature sensor reading physically cannot change with high gradients. If a high filtered gradient for the sump temperature sensor reading is detected, the sump temperature sensor is diagnosed faulted.</p>	Absolute filtered gradient of sump temperature	>	700	°C/s	<p>Enable Conditions:</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault on sump temperature sensor active</p> <p>Sump temperature gradient valid (enough samples taken)</p> <p>Fault confirmation</p> <p>Number of sump temperature measurement samples used for raw sump temperature gradient calculation</p> <p>Number of raw sump temperature gradients used for filtered sump temperature gradient calculation</p> <p>Sump temperature gradient fault confirmation timer</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= True</p> <p>= 5 count</p> <p>= 5 count</p> <p>= 60 ms</p>	Runs Continuously	B
		<p>This diagnostic detects a consistency fault for the sump temperature sensor by comparing transmission temperature sensor readings with engine water temperature when the engine has not been running for a long time.</p> <p>When the engine was turned off for a long time and the transmission controller is powered up, the two transmission internal temperature sensors are compared.</p> <p>If the transmission temperature sensor values read values that differ greatly from each other, the average difference between the transmission temperature sensors and the engine water temperature are calcuted.</p> <p>If the difference between the sump and cooler out temperature sensor readings is high, the difference between the sump and engine water temperature is high and the difference between the cooler out temperature and the engine engine water temperature is low, the sump temperature sensor is diagnosed faulted.</p>	<p>Absolute average difference between sump temperature and engine water temperature during cold start check</p> <p>Absolute difference between cooler out temperature and sump temperature measurement</p> <p>Average absolute difference between cooler out and engine water temperature received from CAN</p>	>	15	°C	<p>Enable Conditions:</p> <p>Diagnostic reset event</p> <p>Electrical fault on sump temperature sensor active</p> <p>Electrical fault on cooler out temperature sensor active</p> <p>Propulsion system off time valid received from CAN</p> <p>Propulsion system off time received from CAN</p> <p>Engine is running</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Engine coolant water temperature valid received from CAN</p>	<p>= False</p> <p>= False</p> <p>= False</p> <p>= True</p> <p>>= 28800 s</p> <p>= False</p> <p>= True</p> <p>= True</p>	Runs Continuously	

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							Time since controller initialization	>=	2000	ms			
							Time since controller initialization	<=	20000	ms			
							Fault confirmation		Difference between measured cooler out temperature and measured sump temperature confirmation timer	>	1000	ms	
									Difference between transmission temperature sensors and valid engine water temperature from CAN sample counter	>	200	count	
Cooler out temperature consistency	P2741	This diagnostic detects a consistency fault for the cooler out temperature sensor by monitoring high temperature gradient. The cooler out temperature sensor reading physically cannot change with high gradients. If a high filtered gradient for the cooler out temperature sensor reading is detected, the cooler out temperature sensor is diagnosed faulted.	Absolute filtered gradient of cooler out temperature	>	700	°C/s	Enable Conditions:		Diagnostic reset event	=	False	Runs Continuously	B
									Application state is unequal to error state	=	True		
									Application state is unequal to bypass state	=	True		
									Electrical fault on cooler out temperature sensor active	=	False		
									Cooler out temperature gradient valid (enough samples taken)	=	True		
							Fault confirmation		Number of cooler out temperature measurement samples used for raw cooler out temperature gradient calculation	=	5	count	
									Number of raw cooler out temperature gradients used for filtered cooler out temperature gradient calculation	=	5	count	
									Cooler out temperature gradient fault confirmation timer	=	60	ms	
		This diagnostic detects a consistency fault for the cooler out temperature sensor by comparing transmission temperature sensor readings with engine water temperature when the engine has not been running for a long time. When the engine was turned off for a long time and the transmission controller is powered up, the two transmission internal temperature sensors are compared.	Absolute average difference between cooler temperature and engine water temperature during cold start check	>	15	°C	Enable Conditions:		Diagnostic reset event	=	False	Runs Continuously	
		If the transmission temperature sensor values read values that differ greatly from each other, the average difference between the transmission temperature sensors and the engine water temperature are calculated.	Absolute difference between cooler out temperature and sump temperature measurement	>	10	°C			Electrical fault on sump temperature sensor active	=	False		
			Average absolute difference between sump temperature and engine water temperature received from CAN	<	7	°C			Electrical fault on cooler out temperature sensor active	=	False		

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[illegible]

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Park lock hold solenoid stuck off	P18A9	<p>This diagnostic detects a mechanical stuck off hold solenoid during the parking lock engagement valve off test state of the parking lock diagnostic disengage routine. During the parking lock diagnostic disengagement routine, the parking lock components are tested by first disengaging the parking lock completely. This is done by setting both the parking lock latching valve and parking lock engagement valve to the hydraulic on position. Once the parking position sensor shows parking lock disengagement, the parking hold solenoid is actuated to keep the parking lock disengaged even if hydraulic pressure to the parking lock piston is lost.</p> <p>After the parking lock has been disengaged and the parking lock hold solenoid is actuated, the parking lock engagement valve is tested by draining the parking lock piston with the parking lock engagement valve only.</p> <p>If the parking lock position sensor reads a value below the hold position, this means the hold solenoid was unable to keep the parking lock out of park and the parking lock hold solenoid is diagnosed mechanically stuck off.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF</p> <p>OR</p> <p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF</p>	<p>= Between Locked and Hold</p> <p>= Locked</p>	<p>Enable Conditions:</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault detected for the parking lock hold solenoid</p> <p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve Electrical fault detected for the parking lock stepper motor Electrical fault detected for the parking lock position sensor</p> <p>Parking lock actuation strategy</p> <p>Parking lock engagement valve position target Parking lock latching valve position target Parking lock hold solenoid position target</p> <p>Fault confirmation time Parking lock hold solenoid stuck off fault confirmation timer</p>	<p>= False </p>		

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	<p>Once the parking position sensor shows parking lock disengagement, the parking hold solenoid is actuated to keep the parking lock disengaged even if hydraulic pressure to the parking lock piston is lost.</p> <p>After the parking lock has been disengaged and the parking lock hold solenoid is actuated, the parking lock engagement valve is tested by draining the parking lock piston with the parking lock engagement valve only.</p> <p>After the parking lock engagement hydraulic stuck on test, the parking lock engagement valve is set to the hydraulic on position.</p> <p>When the parking lock position sensor reads open after the parking engagement valve test, the parking lock latching valve is tested by draining the parking lock piston with the parking lock latching valve only.</p> <p>If the parking lock position sensor reads a value below the hold position, this means the hold solenoid was unable to keep the parking lock out of park and the parking lock hold solenoid is diagnosed mechanically stuck off.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF</p>	=	Locked		<p>Battery voltage</p> <p>Parking lock latching valve logical position</p> <p>Parking lock actuation strategy</p> <p>Parking lock engagement valve position target</p> <p>Parking lock latching valve position target</p> <p>Parking lock hold solenoid position target</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault detected for the parking lock hold solenoid</p> <p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve</p> <p>Electrical fault detected for the parking lock stepper motor</p> <p>Electrical fault detected for the parking lock position sensor</p>	<p>>= 10000 mV</p> <p>= Hydraulic Off</p> <p>= Parking lock diagnostic disengage strategy</p> <p>= Hydraulic On</p> <p>= Hydraulic Off</p> <p>= Electrical On</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p>		
					Fault confirmation time	Parking lock hold solenoid stuck off fault confirmation timer	>= 25 ms		
	<p>This diagnostic detects a mechanical stuck off hold solenoid during the wait for vehicle speed state of the parking lock diagnostic disengage routine.</p> <p>During the parking lock diagnostic disengagement routine, the parking lock components are tested by first disengaging the parking lock completely. This is done by setting both the parking lock latching valve and parking lock engagement valve to the hydraulic on position.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF</p>	=	Between Locked and Hold		<p>Absolute vehicle speed</p> <p>Transmission oil temperature</p>	<p><= 3 kph</p> <p><= 120 °C</p>	Runs Continuously	
		OR							

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	<p>Once the parking position sensor shows parking lock disengagement, the parking hold solenoid is actuated to keep the parking lock disengaged even if hydraulic pressure to the parking lock piston is lost.</p> <p>After the parking lock has been disengaged and the parking lock hold solenoid is actuated, the parking lock engagement valve is tested by draining the parking lock piston with the parking lock engagement valve only.</p> <p>After the parking lock engagement hydraulic stuck on test, the parking lock engagement valve is set to the hydraulic on position.</p> <p>When the parking lock position sensor reads open after the parking engagement valve test, the parking lock latching valve is tested by draining the parking lock piston with the parking lock latching valve only.</p> <p>After the parking lock engagement and parking lock latching valve tests of the parking lock diagnostic disengage sequence, the parking lock is kept disengage using the hold solenoid with the latching valve in the hydraulic off position until vehicle speed is detected.</p> <p>If the parking lock position sensor reads a value below the hold position, this means the hold solenoid was unable to keep the parking lock out of park and the parking lock hold solenoid is diagnosed mechanically stuck off.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF</p>	=	Locked		<p>Battery voltage</p> <p>Parking lock latching valve logical position</p> <p>Parking lock actuation strategy</p> <p>Parking lock engagement valve position target</p> <p>Parking lock latching valve position target</p> <p>Parking lock hold solenoid position target</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault detected for the parking lock hold solenoid</p> <p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve</p> <p>Electrical fault detected for the parking lock stepper motor</p> <p>Electrical fault detected for the parking lock position sensor</p>	<p>>= 10000 mV</p> <p>= Hydraulic Off</p> <p>= Parking lock diagnostic disengage strategy</p> <p>= Hydraulic On</p> <p>= Hydraulic Off</p> <p>= Electrical On</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p>		
	<p>This diagnostic detects a mechanical stuck off hold solenoid during parking lock latching valve off state of the parking lock diagnostic disengage routine.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF</p>	=	Between Locked and Hold	<p>Fault confirmation time</p> <p>Enable Conditions:</p>	<p>Parking lock hold solenoid stuck off fault confirmation timer</p> <p>Diagnostic reset event</p>	<p>>= 25 ms</p> <p>= False</p>		Runs Continuously

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During the parking lock low speed engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is kept in the electrical on position until the vehicle speed falls below the parking lock engagement speed. OR
When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.

If the parking lock position sensor reads a value below the hold position, this means the hold solenoid was unable to keep the parking lock out of park and the parking lock hold solenoid is diagnosed mechanically stuck off.

OR

Parking lock logical position (1) , see Summary table attachments
C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF

= Locked

Application state is unequal to error state

= True

Application state is unequal to bypass state

= True

Electrical fault detected for the parking lock hold solenoid

= False

Electrical fault detected for the parking lock engagement valve
Electrical fault detected for the parking lock latching valve

= False

= False

Electrical fault detected for the parking lock stepper motor

= False

Electrical fault detected for the parking lock position sensor

= False

Parking lock actuation strategy

= Parking lock low speed engage strategy

Parking lock engagement valve position target

= Hydraulic On

Parking lock latching valve position target

= Hydraulic Off

Parking lock hold solenoid position target

= Electrical On

Absolute vehicle speed

>= 0.8125 kph

Fault confirmation time

Parking lock hold solenoid stuck off fault confirmation timer

>= 25 ms

This diagnostic detects a mechanical stuck off hold solenoid during parking lock engagement valve off state of the parking lock diagnostic disengage routine.

Parking lock logical position (1) , see Summary table attachments
C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF

= Between Locked and Hold

Enable Conditions:

Diagnostic reset event

= False

During the parking lock low speed engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is kept in the electrical on position until the vehicle speed falls below the parking lock engagement speed. OR
When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.

OR

Parking lock logical position (1) , see Summary table attachments
C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF

= Locked

Application state is unequal to error state

= True

Application state is unequal to bypass state

= True

		If the parking lock position sensor reads a value below the hold position, this means the hold solenoid was unable to keep the parking lock out of park and the parking lock hold solenoid is diagnosed mechanically stuck off.				Electrical fault detected for the parking lock hold solenoid	=	False		
						Electrical fault detected for the parking lock engagement valve	=	False		
						Electrical fault detected for the parking lock latching valve	=	False		
						Electrical fault detected for the parking lock stepper motor	=	False		
						Electrical fault detected for the parking lock position sensor	=	False		
						Parking lock actuation strategy	=	Parking lock low speed engage strategy		
						Parking lock engagement valve position target	=	Hydraulic Off		
						Parking lock latching valve position target	=	Hydraulic Off		
						Parking lock hold solenoid position target	=	Electrical On		
						Absolute vehicle speed	>=	0.8125 kph		
					Fault confirmation time	Parking lock hold solenoid stuck off fault confirmation timer	>=	25 ms		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Park lock hold solenoid stuck on	P18A8	<p>This diagnostic detects a mechanical stuck on parking lock hold solenoid by use of the parking standstill engagement routine. This routine is used when parking lock engagement is requested at standstill based on PRND and there are no electrical faults present for the parking lock components.</p>	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_ON	= Hold	Enable Conditions:	= False	Runs Continuously	B
		Diagnostic reset event						
		<p>During the parking lock standstill engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is set to the electrical off position immediately.</p> <p>When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.</p>				Application state is unequal to error state	= True	
						Application state is unequal to bypass state	= True	
		<p>If both the parking lock latching valve and the parking lock engagement valve are set hydraulic off and the parking lock position sensor does not read locked, the system pressure is forced low to attempt parking lock engagement.</p> <p>If at the end of the low system pressure phase, the parking lock position sensor reads hold the parking lock hold solenoid is diagnosed mechanically stuck on.</p>				Electrical fault detected for the parking lock hold solenoid	= False	
						Electrical fault detected for the parking lock engagement valve	= False	
						Electrical fault detected for the parking lock latching valve	= False	
						Electrical fault detected for the parking lock stepper motor	= False	
						Electrical fault detected for the parking lock position sensor	= False	
						Parking lock actuation strategy	= Parking lock standstill engage strategy	
						Parking lock engagment valve logical position	= Hydraulic Off	
						Parking lock latching valve logical position	= Hydraulic Off	
						Parking lock hold solenoid logical position	= Mechanical Off	
						Measured system pressure	< 8 bar	
						System pressure sensor electrical fault detected	= False	
						System pressure sensor electrical fault detected	= False	
						System pressure low confirmation timer	>= 100 ms	
					Fault confirmation time	Parking lock forced low system pressure timer	>= 600 ms	

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		<p>This diagnostic detects a mechanical stuck on parking lock hold solenoid by use of the parking low speed engagement routine. This routine is used when parking lock engagement is requested at low speed based on PRND and there are no electrical faults present for the parking lock components.</p> <p>During the parking lock low speed engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is kept in the electrical on position until the vehicle speed falls below the parking lock engagement speed. When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.</p> <p>If both the parking lock latching valve and the parking lock engagement valve are set hydraulic off and the parking lock position sensor does not read locked, the system pressure is forced low to attempt parking lock engagement.</p> <p>If during the low system pressure phase, the parking lock position sensor reads hold the parking lock hold solenoid is diagnosed mechanical stuck on.</p>	<p>Parking lock logical position (1), see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_ON</p>	=	Hold	<p>Enable Conditions:</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault detected for the parking lock hold solenoid</p> <p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve</p> <p>Electrical fault detected for the parking lock stepper motor</p> <p>Electrical fault detected for the parking lock position sensor</p> <p>Parking lock actuation strategy</p> <p>Parking lock engagement valve logical position</p> <p>Parking lock latching valve logical position</p> <p>Parking lock hold solenoid logical position</p> <p>Measured system pressure</p> <p>System pressure sensor electrical fault detected</p> <p>System pressure sensor electrical fault detected</p> <p>System pressure low confirmation timer</p> <p>Fault confirmation time</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= Parking lock low speed engage strategy</p> <p>= Hydraulic Off</p> <p>= Hydraulic Off</p> <p>= Mechanical Off</p> <p>< 8 bar</p> <p>= False</p> <p>= False</p> <p>>= 100 ms</p> <p>>= 600 ms</p>	Runs Continuously	
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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
System pressure relief valve stuck	P1955	This diagnostic detects a system pressure relief valve performance fault. This is done by using the system recovery routine which is triggered by the setting of system pressure control system or component diagnostic failure.	Current profile check consistently indicated pass for the system pressure pilot valve	= True	Enable Conditions: Diagnostic reset event	= False	Runs Continuously	A
		The system pressure recovery routine first attempts to attain different pressure targets. If this fails, the faulted component is determined: system pressure sensor, system pressure pilot valve or the system pressure relief valve.	System pressure target checks fail (3), see Summary table attachments C_SID_ASV_CMP_SPL_PRS_SYS	= True	System pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_SPL_PRS_SYS	= True		
		If the system pressure target check has failed for one of the system pressure target, the system pressure sensor measurement is checked against a clutch pressure sensor by disengaging the gear on a clutch shaft when possible and ramping up the clutch pressure control valve current untilll the clutch is completely closed.			System pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CM P_SPL_PRS_SYS	= True		
		If the system pressure sensor is diagnosed operational during the system pressure versus clutch pressure check, current profile checks are triggered for the system pressure pilot valve.			System pressure was unable to attain one of the system pressure steps during this instance of the system pressure recovery routine (3), see Summary table attachments C_SID_ASV_CMP_SPL_PRS_SYS	= True		
		If the current profile check for the system pressure pilot valve consistently indicates pass, the system pressure relief valve is diagnostic stuck by process of elimination			System pressure sensor check against clutch pressure sensor check passed during this instance of the system pressure recovery routine (4), see Summary table attachments C_SID_ASV_CM P_SPL_PRS_SYS	= True		
					Transmission oil temperature Engine speed during forced zero current on the system pressure pilot valve	>= 60 °C <= 2000 rpm		
					Time zero current is commanded for the system pressure pilot valve before triggering the current profile check	>= 300 ms		
					Fault confirmation System pressure pilot valve current profile check consist fail confirmation count	= 3		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Park lock engaging valve stuck off	P2820	<p>This diagnostic detects a hydraulic stuck off parking lock engagement valve.</p> <p>If driver attempts to drive away and the parking lock position sensor indicate the parking remains engaged, no output speed or vehicle speed is detected, the parking lock is considered stuck in park.</p> <p>This stuck in park behaviour is considered caused by either the parking lock engagement valve or the parking lock latching valve not pressurizing the parking lock piston which corresponds to parking lock engagement valve hydraulically stuck off or latching valve hydraulically stuck. To differentiate between the parking lock engagement valve and the parking lock latching valve hydraulically stuck off, the current profile check is used for the parking lock engagement valve.</p> <p>If the current profile check for the parking lock engagement valve consistently fails, the parking lock engagement valve is diagnosed hydraulically stuck off.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CM P_VA_EN_PLK_STUCK_OFF</p> <p>Currently profile check for the parking lock engagement valve consistently indicate fails</p>	<p>= Locked</p> <p>True</p> <p>=</p>	<p>Enable Conditions:</p> <p>Absolute vehicle speed</p> <p>Output speed</p> <p>Clutch torque</p> <p>Brake bressed</p> <p>Parking lock position sensor electrical fault detected</p> <p>Parking lock latching valve electrical fault detected</p> <p>Parking lock latching valve logical position</p> <p>Transmission oil temperature</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation</p> <p>Drive away fail confirmation time</p> <p>Current profile check fail confirmation count</p>	<p><= 10 kph</p> <p><= 100 rpm</p> <p>> 75</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= Hydraulic On</p> <p>>= 40 °C</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>>= 3000 ms</p> <p>>= 3 count</p>	Runs Continuously	B

24OBDG07 TCM Summary Tables

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illum.
Park lock engaging valve stuck on	P2821	<p>This diagnostic detects a hydraulic stuck on parking lock engagement valve by use of the parking lock diagnostic disengagement routine. This routine is used when parking lock disengagement is requested based on PRND and there are no electrical faults present for the parking lock components.</p> <p>During the parking lock diagnostic disengagement routine, the parking lock components are tested by first disengaging the parking lock completely. This is done by setting both the parking lock latching valve and parking lock engagement valve to the hydraulic on position.</p> <p>Once the parking position sensor shows parking lock disengagement, the parking hold solenoid is actuated to keep the parking lock disengaged even if hydraulic pressure to the parking lock piston is lost.</p> <p>After the parking lock has been disengaged and the parking lock hold solenoid is actuated, the parking lock engagement valve is tested by draining the parking lock piston with the parking lock engagement valve only.</p> <p>If the parking lock position sensor keeps reading open instead of hold when the parking lock engagement valve is set to the hydraulic off after a time, the parking lock engagement valve is diagnosed hydraulic stuck on.</p>	<p>Parking lock logical position (1) at the end of parking lock engagement valve hydraulic off test state, see Summary table attachments C_SID_ASV_CM_P_VA_EN_PLK_STUCK_ON</p>	= Open	<p>Enable Conditions:</p> <p>Absolute vehicle speed</p> <p>Transmission oil temperature</p> <p>Battery voltage</p> <p>Parking lock engagement valve logical position</p> <p>Parking lock actuation strategy</p> <p>Parking lock engagement valve position target</p> <p>Parking lock latching valve position target</p> <p>Parking lock hold solenoid position target</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault detected for the parking lock hold solenoid</p> <p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve</p> <p>Electrical fault detected for the parking lock stepper motor</p> <p>Electrical fault detected for the parking lock position sensor</p> <p>Fault confirmation time</p>	<p><= 3</p> <p><= 120 °C</p> <p>>= 10000 mV</p> <p>= Hydraulic Off</p> <p>= Parking lock diagnostic disengage strategy</p> <p>= Hydraulic Off</p> <p>= Hydraulic On</p> <p>= Electrical On</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>> 200 ms</p>	Runs Continuously	B

24OBDG07 TCM Summary Tables

This diagnostic detects a hydraulic stuck on parking lock engagement valve by use of the parking standstill engagement routine. This routine is used when parking lock engagement is requested at standstill based on PRND and there are no electrical faults present for the parking lock components.

During the parking lock standstill engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is set to the electrical off position immediately. When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.

If both the parking lock latching valve and the parking lock engagement valve are set hydraulic off and the parking lock position sensor does not read locked, the system pressure is forced low to attempt parking lock engagement.

If during the low system pressure phase, the parking lock position sensor reads locked, the parking lock engagement valve is diagnosed hydraulic stuck on.

If after a timeout during the low system pressure phase the parking lock piston reads between hold and locked, the parking lock engagement is diagnosed hydraulic stuck on.

Parking lock logical position (1) at the end of parking lock engagement valve and latching valve hydraulic off state, see Summary tabel attachments
C_SID_ASV_CM P_VA_EN_PLK_STUCK_ON

Parking lock logical position (1) during forced low system pressure state, see Summary tabel attachments
C_SID_ASV_CM P_VA_EN_PLK_STUCK_ON

OR

Parking lock logical position (1) at the end of parking lock engagement valve and latching valve hydraulic off state, see Summary tabel attachments
C_SID_ASV_CM P_VA_EN_PLK_STUCK_ON

Parking lock logical position (1) at the end of forced low system pressure state, see Summary tabel attachments
C_SID_ASV_CM P_VA_EN_PLK_STUCK_ON

= Open

= Locked

= Open

= Between Hold and Locked

Enable Conditions:

Diagnostic reset event

Application state is unequal to error state

Application state is unequal to bypass state

Electrical fault detected for the parking lock hold solenoid

Electrical fault detected for the parking lock engagement valve

Electrical fault detected for the parking lock latching valve

Electrical fault detected for the parking lock stepper motor
Electrical fault detected for the parking lock position sensor

Parking lock actuation strategy

Parking lock engagement valve logical position

Parking lock latching valve logical position

Measured system pressure < 8 bar

System pressure sensor electrical fault detected = False

System pressure sensor electrical fault detected = False

System pressure low confirmation timer >= 100 ms

Fault confirmation time

Parking lock engagement valve off state timer >= 500 ms

Parking lock forced low system pressure timer >= 600 ms

= False

= True

= True

= False

= False

= False

= False

= Parking lock standstill engage strategy

= Hydraulic Off

= Hydraulic Off

Runs Continuously

24OBDG07 TCM Summary Tables

		<p>This diagnostic detects a hydraulic stuck on parking lock engagement valve by use of the parking low speed engagement routine. This routine is used when parking lock engagement is requested at low speed based on PRND and there are no electrical faults present for the parking lock components.</p>	<p>Parking lock logical position (1) at the end of parking lock engagement valve and latching valve hydraulic off state, see Summary tabel attachments C_SID_ASV_CM P_VA_EN_PLK_STUCK_ON</p>	=	Open	<p>Enable Conditions:</p>	=	False	<p>Runs Continuously</p>
		<p>During the parking lock low speed engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is kept in the electrical on position untill the vehicle speed falls below the parking lock engagment speed. When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.</p> <p>If both the parking lock latching valve and the parking lock engagement valve are set hydraulic off and the parking lock position sensor does not read locked, the system pressure is forced low to attempt parking lock engagement.</p> <p>If during the low system pressure phase, the parking lock position sensor reads locked, the parking lock engagement valve is diagnosed hydraulic stuck on.</p>	<p>Parking lock logical position (1) during forced low system pressure state, see Summary tabel attachments C_SID_ASV_CM P_VA_EN_PLK_STUCK_ON</p>	=	Locked		=	True	
							=	True	
							=	False	
							=	False	
							=	False	
							=	False	
							=	False	
							=	Parking lock low speed engage strategy	
							=	Hydraulic Off	
							=	Hydraulic Off	
							<	8 bar	
							=	False	
							=	False	
							>=	100 ms	
							>=	200 ms	
							>=	600 ms	

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Lube valve stuck	P2735	This diagnostic detects clutch lube valve stuck faults. This is done by time based and when driving conditons allow, triggering a current profile check for the clutch lube valve. If the triggered current profile check consistently indicate fail, the clutch lube valve is diagnosed stuck.	Current profile check for clutch lube valve consistenly indicates fail	= True	<div> <div>Enable Conditions:</div> <div> Diagnostic reset event active </div> </div> <div> <div>Transmission oil temperature</div> <div>Electrical fault present for the clutch lube valve</div> <div>Synchronizer shift busy</div> <div>Clutch state is closed</div> <div>Transmission clutch and gear actuation stable (t), see Summary table attachments</div> <div>C_SID_ASV_CM P_VA_FLW_LUBE</div> <div>Adaptation routine active</div> <div>Zero clutch cooling flow is allowed for odd clutch</div> <div>Zero clutch cooling flow is allowed for even clutch</div> <div>Clutch cooling flow target</div> <div>Application state is unequal to error state</div> <div>Application state is unequal to bypass state</div> <div>Microslip feature active on odd clutch</div> <div>Microslip feature active on even clutch</div> </div> <div> <div>Fault confirmation</div> <div>Lube current profile check fail confirmation counter</div> <div>Lube current profile check repeat time in case of confirmed status succes</div> <div>Lube current profile check repeat in case of confirmed status succes enabled</div> <div>Lube current profile check repeat time in case of confirmed status fail</div> <div>Lube current profile check repeat time in case of unbounced status succes</div> <div>Lube current profile check repeat time in case of unbounced status fail</div> </div>	<div>= False</div> <div>>= 60 °C</div> <div>= False</div> <div>= False</div> <div>= True</div> <div>= True</div> <div>= False</div> <div>= True</div> <div>= True</div> <div>< 3 lpm</div> <div>= True</div> <div>= True</div> <div>= False</div> <div>= False</div> <div>>= 5 count</div> <div>= 900000 ms</div> <div>= 1</div> <div>= 30000 ms</div> <div>= 3000 ms</div> <div>= 3000 ms</div>	Runs continuously	C

24OBDG07 TCM Summary Tables

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Park lock latching valve stuck off	P187E	<p>This diagnostic detects a hydraulic stuck off parking lock latching valve.</p> <p>If driver attempts to drive away and the parking lock position sensor indicate the parking remains engaged, no output speed or vehicle speed is detected, the parking lock is considered stuck in park.</p> <p>This stuck in park behaviour is considered caused by either the parking lock engagement valve or the parking lock latching valve not pressurizing the parking lock piston which corresponds to parking lock engagement valve hydraulically stuck off or latching valve hydraulically stuck.</p> <p>To differentiate between the parking lock engagement valve and the parking lock latching valve hydraulically stuck off, the current profile check is used for the parking lock engagement valve.</p> <p>If the current profile check for the parking lock engagement valve consistently passes, the parking lock latching valve is diagnosed hydraulically stuck off.</p>	<p>Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCKOFF</p> <p>Currently profile check for the parking lock engagement valve consistently indicate pass</p>	<p>= Locked</p> <p>True</p> <p>=</p>	<p>Enable Conditions:</p> <p>Absolute vehicle speed</p> <p>Output speed</p> <p>Clutch torque</p> <p>Brake bressed</p> <p>Parking lock position sensor electrical fault detected</p> <p>Parking lock latching valve electrical fault detected</p> <p>Parking lock latching valve logical position</p> <p>Transmission oil temperature</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation</p> <p>Drive away fail confirmation time</p> <p>Current profile check pass</p> <p>confirmation count</p>	<p><= 10 kph</p> <p><= 100 rpm</p> <p>> 75</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= Hydraulic On</p> <p>>= 40 °C</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>>= 3000 ms</p> <p>>= 3 count</p>	Runs Continuously	B

24OBDG07 TCM Summary Tables

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Park lock latching valve stuck on	P187D	<p>This diagnostic detects a hydraulic stuck on parking lock latching valve by use of the parking lock diagnostic disengagement routine. This routine is used when parking lock disengagement is requested based on PRND and there are no electrical faults present for the parking lock components.</p> <p>During the parking lock diagnostic disengagement routine, the parking lock components are tested by first disengaging the parking lock completely. This is done by setting both the parking lock latching valve and parking lock engagement valve to the hydraulic on position.</p> <p>Once the parking position sensor shows parking lock disengagement, the parking hold solenoid is actuated to keep the parking lock disengaged even if hydraulic pressure to the parking lock piston is lost.</p> <p>After the parking lock has been disengaged and the parking lock hold solenoid is actuated, the parking lock engagement valve is tested by draining the parking lock piston with the parking lock engagement valve only.</p> <p>After the parking lock engagement hydraulic stuck on test, the parking lock engagement valve is set to the hydraulic on position.</p> <p>When the parking lock position sensor reads open after the parking engagement valve test, the parking lock latching valve is tested by draining the parking lock piston with the parking lock latching valve only.</p> <p>If the parking lock position sensor keeps reading open instead of hold when the parking lock latching valve is set to the hydraulic off after a time, the parking lock latching valve is diagnosed hydraulic stuck on.</p>	<p>Parking lock logical position (1) at the end of parking lock engagement valve hydraulic off test state, see Summary tabel attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	= Open	<p>Enable Conditions:</p> <p>Absolute vehicle speed</p> <p>Transmission oil temperature</p> <p>Battery voltage</p> <p>Parking lock latching valve logical position</p> <p>Parking lock actuation strategy</p> <p>Parking lock engagement valve position target</p> <p>Parking lock latching valve position target</p> <p>Parking lock hold solenoid position target</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault detected for the parking lock hold solenoid</p> <p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve</p> <p>Electrical fault detected for the parking lock stepper motor</p> <p>Electrical fault detected for the parking lock position sensor</p> <p>Fault confirmation time</p> <p>Parking lock engagement valve off test state timer</p>	<p><= 3</p> <p><= 120 °C</p> <p>>= 10000 mV</p> <p>= Hydraulic Off</p> <p>= Parking lock diagnostic disengage strategy</p> <p>= Hydraulic On</p> <p>= Hydraulic Off</p> <p>= Electrical On</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>> 500 ms</p>	Runs Continuously	B

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	<p>This diagnostic detects a hydraulic stuck on parking lock latching valve by use of the parking standstill engagement routine. This routine is used when parking lock engagement is requested at standstill based on PRND and there are no electrical faults present for the parking lock components.</p> <p>During the parking lock standstill engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is set to the electrical off position immediately.</p> <p>When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.</p> <p>If the parking lock position sensor still reads open when the latching valve was moved to the hydraulic off position, the latching valve is suspicious stuck on.</p> <p>If the parking lock position sensor shows parking lock engagement occurs when the parking lock engagement valve is set to the hydraulic off position the latching valve is diagnosed hydraulically stuck on.</p>	<p>Parking lock logical position (1) at the end of parking lock latching valve hydraulic off state, see Summary tabel attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p> <p>Parking lock logical position (1) during the parking lock engagement valve hydraulic off state, see Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	=	Open	<p>Enable Conditions:</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault detected for the parking lock hold solenoid</p> <p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve</p> <p>Electrical fault detected for the parking lock stepper motor</p> <p>Electrical fault detected for the parking lock position sensor</p> <p>Parking lock actuation strategy</p> <p>Parking lock engagment valve logical position</p> <p>Parking lock latching valve logical position at the end of the latching valve of state</p> <p>Fault confirmation time Parking lock latching valve off state timer</p>	=	False	Runs Continuously
	<p>This diagnostic detects a hydraulic stuck on parking lock latching valve by use of the parking standstill engagement routine. This routine is used when parking lock engagement is requested at standstill based on PRND and there are no electrical faults present for the parking lock components.</p>	<p>Parking lock logical position (1) at the end of parking lock engagement valve and latching valve hydraulic off state, see Summary tabel attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	=	Open	<p>Enable Conditions:</p> <p>Diagnostic reset event</p>	=	False	

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<p>During the parking lock standstill engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is set to the electrical off position immediately.</p> <p>When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.</p> <p>If the parking lock position sensor still reads open when the latching valve was moved to the hydraulic off position, the latching valve is suspicious stuck on.</p> <p>If both the parking lock latching valve and the parking lock engagement valve are set hydraulic off and the parking lock position sensor does not read locked, the system pressure is forced low to attempt parking lock engagement.</p> <p>If during the low system pressure phase, the parking lock position sensor reads locked, the parking lock latch valve is diagnosed hydraulic stuck on.</p>	<p>Parking lock logical position (1) during forced low system pressure state, see Summary tabel attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	=	Locked		<p>Application state is unequal to error state</p>	=	True		
	OR				<p>Application state is unequal to bypass state</p>	=	True		
	<p>Parking lock logical position (1) at the end of parking lock engagement valve and latching valve hydraulic off state, see Summary tabel attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	=	Open		<p>Electrical fault detected for the parking lock hold solenoid</p>	=	False		
	<p>Parking lock logical position (1) at the end of forced low system pressure state, see Summary tabel attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	=	Between Hold and Locked		<p>Electrical fault detected for the parking lock engagement valve</p>	=	False		
					<p>Electrical fault detected for the parking lock latching valve</p>	=	False		
					<p>Electrical fault detected for the parking lock stepper motor</p>	=	False		
					<p>Electrical fault detected for the parking lock position sensor</p>	=	False		
					<p>Parking lock actuation strategy</p>	=	Parking lock standstill engage strategy		
					<p>Parking lock engagment valve logical position</p>	=	Hydraulic Off		
					<p>Parking lock latching valve logical position</p>	=	Hydraulic Off		
<p>This diagnostic detects a hydraulic stuck on parking lock latch valve by use of the parking low speed engagement routine. This routine is used when parking lock engagement is requested at low speed based on PRND and there are no electrical faults present for the parking lock components.</p>	<p>Parking lock logical position (1) at the end of parking lock latching valve hydraulic off state, see Summary tabel attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	=	Open	<p>Fault confirmation time</p>	<p>Measured system pressure</p>	<	8	bar	
					<p>System pressure sensor electrical fault detected</p>	=	False		
					<p>System pressure sensor electrical fault detected</p>	=	False		
					<p>System pressure low confirmation timer</p>	>=	100	ms	
					<p>Parking lock engagement valve off state timer</p>	>=	500	ms	
					<p>Parking lock forced low system pressure timer</p>	>=	600	ms	
				<p>Enable Conditions:</p>					
					<p>Diagnostic reset event</p>				

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	<p>During the parking lock low speed engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is kept in the electrical on position until the vehicle speed falls below the parking lock engagement speed. When the parking lock engagement by use of the parking lock latching valve has succeeded or if parking lock engagement with parking lock latching valve attempt times out, the parking lock engagement valve is set to the hydraulic off position.</p> <p>If the parking lock position sensor still reads open when the latching valve was moved to the hydraulic off position, the latching valve is suspicious stuck on.</p> <p>If the parking lock position sensor shows parking lock engagement occurs when the parking lock engagement valve is set to the hydraulic off position the latching valve is diagnosed hydraulically stuck on.</p>	<p>Parking lock logical position (1) during the parking lock engagement valve hydraulic off state, see Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p> <p>OR</p> <p>Parking lock logical position (1) during the parking lock engagement valve hydraulic off state, see Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p> <p>OR</p> <p>Parking lock logical position (1) during the parking lock engagement valve hydraulic off state, see Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	<p>= Hold</p> <p>= Between Locked and Hold</p> <p>= Locked</p>	<p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Electrical fault detected for the parking lock hold solenoid</p> <p>Electrical fault detected for the parking lock engagement valve</p> <p>Electrical fault detected for the parking lock latching valve</p> <p>Electrical fault detected for the parking lock stepper motor</p> <p>Electrical fault detected for the parking lock position sensor</p> <p>Parking lock actuation strategy</p> <p>Parking lock engagement valve logical position</p> <p>Parking lock latching valve logical position at the end of the latching valve of state</p> <p>Fault confirmation time</p>	<p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= Parking lock low speed engage strategy</p> <p>= Hydraulic Off</p> <p>= Hydraulic Off</p> <p>>= 200 ms</p>		
	<p>This diagnostic detects a hydraulic stuck on parking lock latch valve by use of the parking low speed engagement routine. This routine is used when parking lock engagement is requested at low speed based on PRND and there are no electrical faults present for the parking lock components.</p>	<p>Parking lock logical position (1) at the end of parking lock engagement valve and latching valve hydraulic off state, see Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	<p>= Open</p>	<p>Enable Conditions:</p> <p>Diagnostic reset event</p>	<p>= False</p>		Runs Continuously
	<p>During the parking lock low speed engagement routine, the parking lock components are tested by first attempting to drain the parking lock piston by setting the parking lock latching valve to drain. The parking lock hold solenoid is kept in the electrical on position until the vehicle speed falls below the parking lock engagement speed.</p>	<p>Parking lock logical position (1) during forced low system pressure state, see Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON</p>	<p>= Locked</p>	<p>Application state is unequal to error state</p>	<p>= True</p>		

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[illegible]

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Clutch 1 proportional pressure valve stuck on	P0747	<p>This diagnostic detects a clutch pressure control valve hydraulically stuck on fault. This is done by using the clutch recovery routine which is triggered by the setting of a clutch system or component diagnostic failure.</p> <p>The clutch pressure control valve is verified for functionality by use of the current profile check. If the clutch pressure control valve current profile check fails consistently, the valve is stuck in either the hydraulic on or hydraulic off position.</p> <p>By setting the redundant shutdown position to the hydraulic on position while zero current is supplied to the pressure control valve, it can be determine dif the pressure control valve is hydraulically stuck on of hydraulically stuck off.</p> <p>If the pressure sensor measures a high pressure during this stage, the pressure control valve is diagnosed stuck on.</p>	<p>Current profile checks consistently failed for the odd clutch pressure control valve</p> <p>Odd clutch pressure measured during stuck check</p>	<p>= True</p> <p>>= 4 bar</p>	<p>Enable Conditions: Diagnostic reset event</p> <p>Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRSJZLU</p> <p>Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRSJZLU</p> <p>Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine</p> <p>Odd clutch redundant shutdown valve stuck on fault detected druing this instance of the odd clutch recovery routine</p> <p>Odd clutch redundant shutdown valve stuck off fault detected druing this instance of the odd clutch recovery routine</p> <p>Time zero current is commanded for the odd clutch pressure control valve before triggering the current profile check</p> <p>Fault confirmation Odd clutch current profile check consist fail confirmation count Odd clutch pressure above stuck on detection level</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= 100 ms</p> <p>= 3 count</p> <p>> 500 ms</p>	Runs Continuously	A
Clutch 1 proportional pressure valve stuck off	P0746	<p>This diagnostic detects a clutch pressure control valve hydraulically stuck off fault. This is done by using the clutch recovery routine which is triggered by the setting of a clutch system or component diagnostic failure.</p> <p>The clutch pressure control valve is verified for functionality by use of the current profile check. If the clutch pressure control valve current profile check fails consistently, the valve is stuck in either the hydraulic on or hydraulic off position.</p> <p>By setting the redundant shutdown position to the hydraulic on position while zero current is supplied to the pressure control valve, it can be determine dif the pressure control valve is hydraulically stuck on of hydraulically stuck off.</p>	<p>Current profile checks consistently failed for the odd clutch pressure control valve</p> <p>Odd clutch pressure measured during stuck check</p>	<p>= True</p> <p>< 4 bar</p>	<p>Enable Conditions: Diagnostic reset event</p> <p>Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRSJZLU</p> <p>Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRSJZLU</p>	<p>= False</p> <p>= True</p> <p>= True</p>	Runs Continuously	A

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		If the pressure sensor measures a low pressure during this stage, the pressure control valve is diagnosed stuck off.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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Clutch 2 proportional pressure valve stuck off	P0776	<p>This diagnostic detects a clutch pressure control valve hydraulically stuck off fault. This is done by using the clutch recovery routine which is triggered by the setting of a clutch system or component diagnostic failure.</p> <p>The clutch pressure control valve is verified for functionality by use of the current profile check. If the clutch pressure control valve current profile check fails consistently, the valve is stuck in either the hydraulic on or hydraulic off position.</p>	Current profile checks consistently failed for the even clutch pressure control valve	=	True	bar	Enable Conditions:	Diagnostic reset event	=	False	Runs Continuously	A	
		<p>By setting the redundant shutdown position to the hydraulic on position while zero current is supplied to the pressure control valve, it can be determine dif the pressure control valve is hydraulically stuck on of hydraulically stuck off.</p>	Odd clutch pressure measured during stuck check	<	4		Even clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRSJZLU	=	True				
		<p>If the pressure sensor measures a low pressure during this stage, the pressure control valve is diagnosed stuck off.</p>			Even clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRSJZLU		=	True					
					Even clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine		=	False					
					Even clutch redundant shutdown valve stuck on fault detected druing this instance of the odd clutch recovery routine		=	False					
							Even clutch redundant shutdown valve stuck off fault detected druing this instance of the odd clutch recovery routine	=	True				
							Time zero current is commanded for the even clutch pressure control valve before triggering the current profile check	=	100	ms			
							Fault confirmation	Even clutch current profile check consist fail confirmation count	=	3	count		
								Even clutch pressure below stuck on detection level	>	500	ms		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
LSDproportional pressure valve stuck on	P2809	<p>This diagnostic detects a limited slip differential pressure control valve hydraulically stuck on fault. This is done by using the limited slip differential recovery routine which is triggered by the setting of a limited slip differential system or component diagnostic failure.</p> <p>The limited slip differential pressure control valve is verified for functionality by use of the current profile check. If the limited slip differential pressure control valve current profile check fails consistently, the valve is stuck in either the hydraulic on or hydraulic off position.</p> <p>By setting the limited slip differential redundant shutdown valve to the hydraulic on position while zero current is supplied to the pressure control valve, it can be determined if the pressure control valve is hydraulically stuck on or hydraulically stuck off.</p> <p>If the pressure sensor measures a high pressure during this stage, the pressure control valve is diagnosed stuck on.</p>	<p>Current profile checks consistently failed for the limited slip differential pressure control valve</p> <p>Limited slip differential pressure measured during stuck check</p>	<p>= True</p> <p>>= 4 bar</p>	<p>Enable Conditions: Diagnostic reset event</p> <p>Limited slip differential recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRS_LSD</p> <p>Limited slip differential recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRS_LSD</p> <p>Limited slip differential pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine</p> <p>Limited slip differential redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine</p> <p>Limited slip differential redundant shutdown valve stuck off fault detected during this instance of the odd clutch recovery routine</p> <p>Time zero current is commanded for the limited slip differential pressure control valve before triggering the current profile check</p> <p>Fault confirmation Limited slip differential current profile check consist fail confirmation count</p> <p>Limited slip differential pressure above stuck on detection level</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= 100 ms</p> <p>= 3 count</p> <p>> 500 ms</p>	Runs Continuously	B
LSDproportional pressure valve stuck off	P2808	<p>This diagnostic detects a limited slip differential pressure control valve hydraulically stuck off fault. This is done by using the limited slip differential recovery routine which is triggered by the setting of a limited slip differential system or component diagnostic failure.</p>	<p>Current profile checks consistently failed for the limited slip differential pressure control valve</p>	<p>= True bar</p>	<p>Enable Conditions: Diagnostic reset event</p>	<p>= False</p>	Runs Continuously	B

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		<p>The limited slip differential pressure control valve is verified for functionality by use of the current profile check. If the limited slip differential pressure control valve current profile check fails consistently, the valve is stuck in either the hydraulic on or hydraulic off position.</p> <p>By setting the limited slip differential redundant shutdown valve to the hydraulic on position while zero current is supplied to the pressure control valve, it can be determined if the pressure control valve is hydraulically stuck on or hydraulically stuck off.</p> <p>If the pressure sensor measures a low pressure during this stage, the pressure control valve is diagnosed stuck on.</p>	<p>Limited slip differential pressure measured during stuck check</p>	<p>< 4 bar</p>	<p>Limited slip differential recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRS_LSD</p> <p>Limited slip differential recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRS_LSD</p> <p>Limited slip differential pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine</p> <p>Limited slip differential redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine</p> <p>Limited slip differential redundant shutdown valve stuck off fault detected during this instance of the odd clutch recovery routine</p> <p>Time zero current is commanded for the limited slip differential pressure control valve before triggering the current profile check</p> <p>Fault confirmation Limited slip differential current profile check consist fail confirmation count</p> <p>Limited slip differential pressure below stuck on detection level</p>	<p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= 100 ms</p> <p>= 3 count</p> <p>> 500 ms</p>		
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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
System pressure pilot valve stuck on	P2724	This diagnostic detects a system pressure pilot valve stuck on fault. This is done by use of the system pressure recovery routine which is triggered by the setting of system pressure control system or component diangostic failure.	Current profile check consistently indicated fail for the system pressure pilot valve	= True	Enable Conditions: Diagnostic reset event	= False	Runs Continuously	B
		The system pressure recovery routine first attempts to attain different pressure targets. If this fails, the faulted component is determined: system pressure sensor, system pressure pilot valve or the system pressure relief valve.	Pressure difference between the measured system pressure and the target reference value	< -3 bar	System pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SYS	= True		
		If the system pressure target check has failed for one of the system pressure target, the system pressure sensor measurement is checked against a clutch pressure sensor by disengaging the gear on a clutch shaft when possible and ramping up the clutch pressure control valve current untilll the clutch is completely closed.			System pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SYS	= True		
		When the clutch is completely closed, the system pressure and clutch pressure should be reading a similar value. If this is the the case, the system pressure sensor is operational and the failure to attain the system pressure targets is attributed to the system pressure actuation.			System pressure was unable to attain one of the system pressure steps during this instance of the system pressure recovery routine (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SYS	= True		
		To distinguish between system pressure pilot valve failure and system pressure relief valve failure, the current profile check is used for the system pressure pilot valve.			System pressure sensor check against clutch pressure sensor check passed during this instance of the system pressure recovery routine (4), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SYS	= True		
		If the system pressure pilot valve current profile check consistently indicates fail, the system pressure pilot valve is diagnosed stuck. To differentiate between the system pressure pilot valve being hydraulically stuck on or hydraulically stuck off, the system pressure is controlled open loop to an average system pressure target and the measured system pressure is analyzed.			Transmission oil temperature	>= 60 °C		
		If the measured system pressure is lower than the system pressure target during this check, the system pressure pilot valve is diagnosed hydraulically stuck on.			Engine speed during forced zero current on the system pressure pilot valve	<= 2000 rpm		
					Time zero current is commanded for the system pressure pilot valve before triggering the current profile check	>= 300 ms		
					Fault confirmation System pressure pilot valve current profile check consist fail confirmation count	= 3		
					System pressure below stuck on detection level	> 300 ms		

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System pressure pilot valve stuck off	P2723	<p>This diagnostic detects a system pressure pilot valve stuck on fault. This is done by use of the system pressure recovery routine which is triggered by the setting of system pressure control system or component diagnostic failure.</p>	Current profile check consistently indicated fail for the system pressure pilot valve	=	True	<p>Enable Conditions:</p> <p>Diagnostic reset event</p>	=	False	Runs Continuously	A
		<p>The system pressure recovery routine first attempts to attain different pressure targets. If this fails, the faulted component is determined: system pressure sensor, system pressure pilot valve or the system pressure relief valve.</p> <p>If the system pressure target check has failed for one of the system pressure target, the system pressure sensor measurement is checked against a clutch pressure sensor by disengaging the gear on a clutch shaft when possible and ramping up the clutch pressure control valve current until the clutch is completely closed.</p> <p>When the clutch is completely closed, the system pressure and clutch pressure should be reading a similar value. If this is the case, the system pressure sensor is operational and the failure to attain the system pressure targets is attributed to the system pressure actuation.</p> <p>To distinguish between system pressure pilot valve failure and system pressure relief valve failure, the current profile check is used for the system pressure pilot valve.</p> <p>If the system pressure pilot valve current profile check consistently indicates fail, the system pressure pilot valve is diagnosed stuck. To differentiate between the system pressure pilot valve being hydraulically stuck on or hydraulically stuck off, the system pressure is controlled open loop to an average system pressure target and the measured system pressure is analyzed.</p> <p>If the measured system pressure is higher than the system pressure target during this check, the system pressure pilot valve is diagnosed hydraulically stuck off.</p>	Pressure difference between the measured system pressure and the target reference value	>	3 bar	<p>System pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SYS</p> <p>System pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SYS</p> <p>System pressure was unable to attain one of the system pressure steps during this instance of the system pressure recovery routine (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SYS</p> <p>System pressure sensor check against clutch pressure sensor check passed during this instance of the system pressure recovery routine (4), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SYS</p> <p>Transmission oil temperature</p> <p>Engine speed during forced zero current on the system pressure pilot valve</p> <p>Time zero current is commanded for the system pressure pilot valve before triggering the current profile check</p> <p>System pressure pilot valve current profile check consist fail confirmation count</p> <p>System pressure below stuck on detection level</p>	=	True		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Shift solenoid 1 is hydraulically stuck off	P08C4	This diagnostic detects a synchronizer pressure control valve hydraulically stuck off fault. This is done by use of the synchronizer recovery routine which is triggered by the setting of a synchronizer shift related system or component diagnostic failure or by the synchronizer integrity routine when a, engaged gear mismatch between what was stored in non-volatile memory and what the position and speed sensors indicate as currently engaged gears at controller startup.	C_ROD_1 movement during C_ROD_1 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDN)	<= 100 pm	Enable Conditions: Synchroizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CM P_VA_PRS_SY_STUC KJDF	True	Runs continuously	A
		The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionality.	C_ROD_2 movement during C_ROD_1 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDN)	<= 100 pm	Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CM P_VA_PRS_SY_STUC KJDF	= True		
		The synchronizer integrity routine performs small shift rod movements for all shift rods, synchronizer pressure control valves and synchronizer selector positions corresponding to the clutch shaft for which it is requested. The intent of the synchronizer integrity actuation is to perform small rod movement, not to engage or disengage gears.	C_ROD_2 movement during C_ROD_2 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKJDF F (Synchroizer pressure control C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDF)	<= 100 pm	C ROD1 move C_SY_DIR_B_TO_A test case executed (3), see Summary table attachments C_SID_ASV_CM P_VA_PRS_SY_STUC KJDF (Synchroizer pressure control C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDN)	= True		
		If the synchronizer integrity routine was able to perform the test cases where the synchronizer pressure control valve would be used to move two separate rods corresponding to inverse selector position target, the synchronizer pressure control valve is suspicious hydraulically stuck off.	C_ROD_1 movement during C_ROD_2 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKJDF F (Synchroizer pressure control C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDF)	<= 100 pm	C ROD 2 move C_SY_DIR_A_TO_B test case executed (3), see Summary table attachments C_SID_ASV_CM P_VA_PRS_SY_STUC KJDF (Synchroizer pressure control C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDF)	= True		
		If another test case, using a different pressure control valve, confirms operation of one of the shift rod position sensors from the test mentioned above, the synchronizer pressure control valve hydraulically stuck off result is confirmed and the synchronizer pressure control valve is diagnosed hydraulically stuck off.	C_SID_ASV_CMP_VA_PRS_SY_STUCKJDF F (Synchroizer pressure control C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDN) OR	> 100 pm	C ROD1 move C_SY_DIR_A_TO_B test case executed (3), see Summary table attachments C_SID_ASV_CM P_VA_PRS_SY_STUC KJDF (Synchroizer pressure control C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDN) OR	= True		

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			C_ROD_2 movement during C_ROD_2 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically S_OOSPOS_OFF)	>	100	pm		C ROD 2 move C_SY_DIR_B_TO_A test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDF)	=	True		
							Confirmation count	Synchronizer integrity synchronizer pressure control valve stuck off fault test suite confirmation runs	=	1		
Shift solenoid 2 is hydraulically stuck off	P27B9	This diagnostic detects a synchronizer pressure control valve hydraulically stuck off fault. This is done by use of the synchronizer recovery routine which is triggered by the setting of a synchronizer shift related system or component diagnostic failure or by the synchronizer integrity routine when a, engaged gear mismatch between what was stored in non-volatile memory and what the position and speed sensors indicate as currently engaged gears at controller startup. The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionality. The synchronizer integrity routine performs small shift rod movements for all shift rods, synchronizer pressure control valves and synchronizer selector positions corresponding to the clutch shaft for which it is requested. The intent of the synchronizer integrity actuation is to perform small rod movement, not to engage or disengage gears. If the synchronizer integrity routine was able to perform the test cases where the synchronizer pressure control valve would be used to move two separate rods corresponding to inverse selector position target, the synchronizer pressure control valve is suspicious hydraulically stuck off. If another test case, using a different pressure control valve, confirms operation of one of the shift rod position sensors from the test mentioned above, the synchronizer pressure control valve hydraulically stuck off result is confirmed and the synchronizer pressure control valve is diagnosed hydraulically stuck off.	C_ROD_1 movement during C_ROD_1 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDN) C_ROD_2 movement during C_ROD_1 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDN) C_ROD_2 movement during C_ROD_2 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF F (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDF) C_ROD_1 movement during C_ROD_2 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKJDF F (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDF)	<=	100	pm	Enable Conditions:	Synchronizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF C ROD1 move C_SY_DIR_A_TO_B test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDN) C ROD 2 move C_SY_DIR_B_TO_A test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically SJDOSPOSJDF)	=	True	Runs continuously	A

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			<p>C_ROD_1 movement during C_ROD_1 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDN) OR</p> <p>C_ROD_2 movement during C_ROD_2 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_OFF)</p>	>	100	pm	<p>C ROD1 move C_SY_DIR_B_TO_A test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDN) OR</p> <p>C ROD 2 move C_SY_DIR_A_TO_B test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically SJDOSPOSJDF)</p> <p>Confirmation count Synchronizer integrity synchronizer pressure control valve stuck off fault test suite confirmation runs</p>	=	True		
Shift solenoid 3 is hydraulically stuck off	P27C1	<p>This diagnostic detects a synchronizer pressure control valve hydraulically stuck off fault. This is done by use of the synchronizer recovery routine which is triggered by the setting of a synchronizer shift related system or component diagnostic failure or by the synchronizer integrity routine when a, engaged gear mismatch between what was stored in non-volatile memory and what the position and speed sensors indicate as currently engaged gears at controller startup.</p> <p>The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionality.</p> <p>The synchronizer integrity routine performs small shift rod movements for all shift rods, synchronizer pressure control valves and synchronizer selector positions corresponding to the clutch shaft for which it is requested. The intent of the synchronizer integrity actuation is to perform small rod movement, not to engage or disengage gears.</p>	<p>C_ROD_3 movement during C_ROD_3 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)</p> <p>C_ROD_4 movement during C_ROD_3 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF F (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)</p> <p>C_ROD_4 movement during C_ROD_4 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF F (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDF)</p>	<=	100	pm	<p>Enable Conditions:</p> <p>Synchronizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF</p> <p>Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF</p> <p>C ROD 3 move C_SY_DIR_A_TO_B test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKOFF (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)</p>	=	True	Runs continuously	A

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		<p>If the synchronizer integrity routine was able to perform the test cases where the synchronizer pressure control valve would be used to move two separate rods corresponding to inverse selector position target, the synchronizer pressure control valve is suspicious hydraulically stuck off.</p> <p>If another test case, using a different pressure control valve, confirms operation of one of the shift rod position sensors from the test mentioned above, the synchronizer pressure control valve hydraulically stuck off result is confirmed and the synchronizer pressure control valve is diagnosed hydraulically stuck off.</p>	<p>C_ROD_3 movement during C_ROD_4 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDF)</p>	<=	100	pm	<p>C_ROD_4 move C_SY_DIR_A_TO_B test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUC KJDF (Synchroizer pressure control C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDF)</p>	=	True		
			<p>C_ROD_3 movement during C_ROD_3 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN) OR</p>	>	100	pm	<p>C ROD 3 move C_SY_DIR_B_TO_A test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUC KJDF (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN) OR</p>	=	True		
			<p>C_ROD_4 movement during C_ROD_4 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_OFF)</p>	>	100	pm	<p>C_ROD_4 move C_SY_DIR_B_TO_A test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUC KJDF (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDF)</p>	=	True		
				Confirmation count			Synchronizer integrity synchronizer pressure control valve stuck off fault test suite confirmation runs	=	1		
Shift solenoid 4 is hydraulically stuck off	P27C9	<p>This diagnostic detects a synchronizer pressure control valve hydraulically stuck off fault. This is done by use of the synchronizer recovery routine which is triggered by the setting of a synchronizer shift related system or component diagnostic failure or by the synchronizer integrity routine when a engaged gear mismatch between what was stored in non-volatile memory and what the position and speed sensors indicate as currently engaged gears at controller startup.</p> <p>The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionality.</p>	<p>C_ROD_3 movement during C_ROD_3 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN)</p> <p>C_ROD_4 movement during C_ROD_3 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKJDF F (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN)</p>	<=	100	pm	<p>Enable Conditions:</p> <p>Synchronizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUC KJDF</p> <p>Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUC KJDF</p>	=	True	Runs continuously	A

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The synchronizer integrity routine performs small shift rod movements for all shift rods, synchronizer pressure control valves and synchronizer selector positions corresponding to the clutch shaft for which it is requested. The intent of the synchronizer integrity actuation is to perform small rod movement, not to engage or disengage gears.

C_ROD_4 movement during C_ROD_4 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments
C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_OFF)

<= 100 μm

C ROD 3 move C_SY_DIR_B_TO_A test case executed (3), see Summary table attachments
C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDN)

= True

If the synchronizer integrity routine was able to perform the test cases where the synchronizer pressure control valve would be used to move two separate rods corresponding to inverse selector position target, the synchronizer pressure control valve is suspicious hydraulically stuck off.

C_ROD_3 movement during C_ROD_4 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments
C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDNFF)

<= 100 μm

C_ROD_4 move C_SY_DIR_B_TO_A test case executed (3), see Summary table attachments
C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_4 actuation with selector position target hydraulically SJDOSPOSJDNFF)

= True

If another test case, using a different pressure control valve, confirms operation of one of the shift rod position sensors from the test mentioned above, the synchronizer pressure control valve hydraulically stuck off result is confirmed and the synchronizer pressure control valve is diagnosed hydraulically stuck off.

C_ROD_3 movement during C_ROD_3 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments
C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)
OR

> 100 μm

C ROD 3 move C_SY_DIR_A_TO_B test case executed (3), see Summary table attachments
C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDN)
OR

= True

C_ROD_4 movement during C_ROD_4 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments
C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_OFF)

> 100 μm

C_ROD_4 move C_SY_DIR_A_TO_B test case executed (3), see Summary table attachments
C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_3 actuation with selector position target hydraulically SJDOSPOSJDNFF)

= True

Confirmation count

Synchronizer integrity synchronizer pressure control valve stuck off fault test suite confirmation runs

= 1

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Shift solenoid 5 is hydraulically stuck off	P27D1	This diagnostic detects a synchronizer pressure control valve hydraulically stuck off fault. This is done by use of the synchronizer recovery routine which is triggered by the setting of a synchronizer shift related system or component diagnostic failure or by the synchronizer integrity routine when a, engaged gear mismatch between what was stored in non-volatile memory and what the position and speed sensors indicate as currently engaged gears at controller startup.	C_ROD_5 movement during C_ROD_5 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDN)	<=	100	pm	Enable Conditions:	True			
			C_ROD_5 movement during C_ROD_5 move C_SY_DIR_A_TO_B test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchroizer pressure control C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDN)	<=	100	µm	Synchronizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUC KJDF			Runs continuously	A
		The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionality.					Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUC KJDF	=	True		
		The synchronizer integrity routine performs small shift rod movements for all shift rods, synchronizer pressure control valves and synchronizer selector positions corresponding to the clutch shaft for which it is requested. The intent of the synchronizer integrity actuation is to perform small rod movement, not to engage or disengage gears.	C_ROD_5 movement during C_ROD_5 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKJDF F (Synchroizer pressure control C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDF)	<=	100	µm	C ROD 5 move C_SY_DIR_A_TO_B test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUC KJDF (Synchroizer pressure control C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDN)	=	True		
		If the synchronizer integrity routine was able to perform the test cases where the synchronizer pressure control valve would be used to move two separate rods corresponding to inverse selector position target, the synchronizer pressure control valve is suspicious hydraulically stuck off.	C_ROD_5 movement during C_ROD_5 move C_SY_DIR_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCKJDF F (Synchroizer pressure control C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDF)	<=	100	µm	C ROD 5 move C_SY_DIR_B_TO_A test case executed (3), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUC KJDF (Synchroizer pressure control C_SPV_5 actuation with selector position target hydraulically SJDOSPOSJDF)	=	True		
		As there is no redundant path using another synchronizer pressure control valve and shift rod position sensor to verify the suspicious hydraulic stuck off result determined by the synchronizer integrity routine, the current profile check is used to distinguish between the synchronizer pilot valve being hydraulically stuck off or the shift rod position sensor being stuck at value. If the synchronizer pressure control valve current profile check consistently indicates fail, the synchronizer pressure control valve is diagnosed hydraulically stuck off.	Synchronizer pressure control valve C_SPV_5 current profile check consistently indicates FAIL	=	True		Transmission oil temperature	>=	40 °C		
							Fault confirmation Synchronizer pressure control valve C_SPV_5 current profile check fail confirmation count	=	3 count		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Shift solenoid 1 is hydraulically stuck on	P08C5	This diagnostic detects a synchronizer pressure control valve hydraulic stuck on fault.	Selector target position	= Hydraulic on	Enable Conditions: Diagnostic reset event active Time since start of selector pilot valve position target change Electrical fault for C_ROD_1 position sensor active Electrical fault for C_ROD_2 position sensor active Electrical fault for synchronizer pressure valve C_SPV_1 active Electrical fault for synchronizer pressure valve C_SPV_2 active C ROD1 force target C ROD2 force target Application state is equal to error state Application state is equal to bypass state	= False	Runs continuously	A
		This is done by analyzing rod movement during and shortly after a selector position change.	Difference between C_ROD_1 position at start of selector change and C_ROD_1 position measured (unintended rod movement detected)	>= 1000 pm		< 200 ms		
		If a synchronizer pressure control valve is hydraulically stuck on, there is a constant force being applied to a shift rod by the pressure from the synchronizer pressure control valve. When the selector position changes, the pressure from the stuck on pressure control valve is routed differently which will lead to the relaxation of one rod and the unintentional movement of another.	Difference between C_ROD_2 position at start of selector change and C_ROD_2 position measured (rod relaxation detected)	>= 125 pm		= False		
		If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding synchronizer pressure control valve is determined and considered suspicious hydraulically stuck on.	OR	= False				
		If the other rod movement corresponding to this synchronizer pressure control valve shows relaxation, the synchronizer pressure control valve is diangosed hydraulically stuck on.	Selector target position	= Hydraulic off		= False		
			Difference between C_ROD_2 position at start of selector change and C_ROD_2 position measured (unintended rod movement detected)	>= 1000 pm		= 0 N		
			Difference between C_ROD_1 position at start of selector change and C_ROD_1 position measured (rod relaxation detected)	>= 125 pm		= 0 N		
				= False				
				= False				
		Shift solenoid 2 is hydraulically stuck on	P27BA	This diagnostic detects a synchronizer pressure control valve hydraulic stuck on fault.		Selector target position			= Hydraulic on	Enable Conditions: Diagnostic reset event active Time since start of selector pilot valve position target change Electrical fault for C_ROD_1 position sensor active Electrical fault for C_ROD_2 position sensor active	= False	Runs continuously	A
This is done by analyzing rod movement during and shortly after a selector position change.	Difference between C_ROD_1 position at start of selector change and C_ROD_1 position measured (unintended rod movement detected)			>= 1000 pm	< 200 ms			
If a synchronizer pressure control valve is hydraulically stuck on, there is a constant force being applied to a shift rod by the pressure from the synchronizer pressure control valve. When the selector position changes, the pressure from the stuck on pressure control valve is routed differently which will lead to the relaxation of one rod and the unintentional movement of another.	Difference between C_ROD_2 position at start of selector change and C_ROD_2 position measured (rod relaxation detected)			>= 125 pm	= False			
				= False				

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		<p>If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding synchronizer pressure control valve is determined and considered suspicious hydraulically stuck on.</p> <p>If the other rod movement corresponding to this synchronizer pressure control valve shows relaxation, the synchronizer pressure control valve is diagnosed hydraulically stuck on.</p>	<p>OR</p> <p>Selector target position</p> <p>Difference between C_ROD_2 position at start of selector change and C_ROD_2 position measured (unintended rod movement detected)</p> <p>Difference between C_ROD_1 position at start of selector change and C_ROD_1 position measured (rod relaxation detected)</p>	<p>= Hydraulic off</p> <p>>= 1000 pm</p> <p>>= 125 pm</p>	<p>Electrical fault for synchronizer pressure valve C_SPV_2active</p> <p>Electrical fault for synchronizer pressure valve C_SPV_1active CROD1 force target</p> <p>CROD2 force target</p> <p>Application state is equal to error state</p> <p>Application state is equal to bypass state</p>	<p>= False</p> <p>= False</p> <p>= 0 N</p> <p>= 0 N</p> <p>= False</p> <p>= False</p>		
Shift solenoid 3 is hydraulically stuck on	P27C2	<p>This diagnostic detects a synchronizer pressure control valve hydraulic stuck on fault.</p> <p>This is done by analyzing rod movement during and shortly after a selector position change.</p> <p>If a synchronizer pressure control valve is hydraulically stuck on, there is a constant force being applied to a shift rod by the pressure from the synchronizer pressure control valve. When the selector position changes, the pressure from the stuck on pressure control valve is routed differently which will lead to the relaxation of one rod and the unintentional movement of another.</p> <p>If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding synchronizer pressure control valve is determined and considered suspicious hydraulically stuck on.</p> <p>If the other rod movement corresponding to this synchronizer pressure control valve shows relaxation, the synchronizer pressure control valve is diagnosed hydraulically stuck on.</p>	<p>Selector target position</p> <p>Difference between C_ROD_3 position at start of selector change and C_ROD_3 position measured (unintended rod movement detected)</p> <p>Difference between C_ROD_4 position at start of selector change and C_ROD_4 position measured (rod relaxation detected)</p> <p>OR</p> <p>Selector target position</p> <p>Difference between C_ROD_4 position at start of selector change and C_ROD_4 position measured (unintended rod movement detected)</p> <p>Difference between C_ROD_3 position at start of selector change and C_ROD_3 position measured (rod relaxation detected)</p>	<p>= Hydraulic on</p> <p>>= 1000 pm</p> <p>>= 125 pm</p> <p>= Hydraulic off</p> <p>>= 1000 pm</p> <p>>= 125 pm</p>	<p>Enable Conditions: Diagnostic reset event active</p> <p>Time since start of selector pilot valve position target change</p> <p>Electrical fault for C_ROD_3 position sensor active</p> <p>Electrical fault for C_ROD_4 position sensor active</p> <p>Electrical fault for synchronizer pressure valve C_SPV_3active</p> <p>Electrical fault for synchronizer pressure valve C_SPV_4active CROD3 force target</p> <p>C_ROD_4 force target</p> <p>Application state is equal to error state</p> <p>Application state is equal to bypass state</p>	<p>= False</p> <p>< 200 ms</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= 0 N</p> <p>= 0 N</p> <p>= False</p> <p>= False</p>	Runs continuously	A

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Shift solenoid 4 is hydraulically stuck on	P27CA	<p>This diagnostic detects a synchronizer pressure control valve hydraulic stuck on fault.</p> <p>This is done by analyzing rod movement during and shortly after a selector position change.</p> <p>If a synchronizer pressure control valve is hydraulically stuck on, there is a constant force being applied to a shift rod by the pressure from the synchronizer pressure control valve. When the selector position changes, the pressure from the stuck on pressure control valve is routed differently which will lead to the relaxation of one rod and the unintentional movement of another.</p> <p>If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding synchronizer pressure control valve is determined and considered suspicious hydraulically stuck on.</p> <p>If the other rod movement corresponding to this synchronizer pressure control valve shows relaxation, the synchronizer pressure control valve is diagnosed hydraulically stuck on.</p>	<p>Selector target position</p> <p>Difference between C_ROD_3 position at start of selector change and C_ROD_3 position measured (unintended rod movement detected)</p> <p>Difference between C_ROD_4 position at start of selector change and C_ROD_4 position measured (rod relaxation detected)</p> <p>OR</p> <p>Selector target position</p> <p>Difference between C_ROD_4 position at start of selector change and C_ROD_4 position measured (unintended rod movement detected)</p> <p>Difference between C_ROD_3 position at start of selector change and C_ROD_3 position measured (rod relaxation detected)</p>	<p>= Hydraulic on</p> <p>>= 1000 pm</p> <p>>= 125 pm</p> <p>= Hydraulic off</p> <p>>= 1000 pm</p> <p>>= 125 Lim</p>	<p>Enable Conditions:</p> <p>Diagnostic reset event active</p> <p>Time since start of selector pilot valve position target change</p> <p>Electrical fault for C_ROD_3 position sensor active</p> <p>Electrical fault for C_ROD_4 position sensor active</p> <p>Electrical fault for synchronizer pressure valve C_SPV_4 active</p> <p>Electrical fault for synchronizer pressure valve C_SPV_3 active C ROD3 force target</p> <p>C_ROD_4 force target</p> <p>Application state is equal to error state</p> <p>Application state is equal to bypass state</p>	<p>= False</p> <p>< 200 ms</p> <p>= False</p> <p>= False</p> <p>= False</p> <p>= 0 N</p> <p>= 0 N</p> <p>= False</p> <p>= False</p>	Runs continuously	A
	P27D2	<p>This diagnostic detects a synchronizer pressure control valve hydraulic stuck on fault.</p> <p>This is done by analyzing rod movement during and shortly after a selector position change.</p> <p>If a synchronizer pressure control valve is hydraulically stuck on, there is a constant force being applied to a shift rod by the pressure from the synchronizer pressure control valve. When the selector position changes, the pressure from the stuck on pressure control valve is routed differently which will lead to the relaxation of one rod and the unintentional movement of another.</p> <p>If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding synchronizer pressure control valve is determined and considered suspicious hydraulically stuck on.</p>	<p>Selector target position</p> <p>Difference between C_ROD_5 position at start of selector change and C_ROD_5 position measured (unintended rod movement detected)</p> <p>OR</p>	<p>= Hydraulic on</p> <p>>= 4000 Lim</p>	<p>Enable Conditions:</p> <p>Diagnostic reset event active</p> <p>Time since start of selector pilot valve position target change</p> <p>Electrical fault for C_ROD_5 position sensor active</p> <p>Electrical fault for synchronizer pressure valve C_SPV_5 active</p> <p>C_ROD_5 force target</p>	<p>= False</p> <p>< 200 ms</p> <p>= False</p> <p>= False</p> <p>= 0 N</p>		

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		<div>If the other rod movement corresponding to this synchronizer pressure control valve shows relaxation, the synchronizer pressure control valve is diagnosed hydraulically stuck on.</div>	<div>Selector target position</div>	<div>=</div>	<div>Hydraulic off</div>	<div>Application state is equal to error state</div>	<div>=</div>	<div>False</div>		
			<div>Difference between C_ROD_5 position at start of selector change and C_ROD_5 position measured (unintended rod movement detected)</div>	<div>>=</div>	<div>4000 μm</div>	<div>Application state is equal to bypass state</div>	<div>=</div>	<div>False</div>		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Clutch 1 Rsp stuck off	P0796	<p>This diagnostic detects a clutch redundant shutdown valve hydraulically stuck off fault. This is done by using the clutch recovery routine which is triggered by the setting of a clutch system or component diagnostic failure.</p> <p>To determine if the redundant shutdown valve is hydraulically stuck on, the redundant shutdown valve is set to the hydraulically on position and the clutch pressure control valve current is ramped up. If no clutch pressure is detected during this stage, the redundant pressure control valve is determined not to be stuck on.</p> <p>The clutch pressure redudant shutdown valve is further verified for functionallity by use of the current profile check. If the clutch redundant shutdown valve current profile check fails consistently, the redundant shutdown shutdown valve is diagnosed hydraulically stuck off.</p>	Current profile check failed for the odd redundant shutdown valve (ORSV)	= True	<p>Enable Conditions: Diagnostic reset event</p> <p>Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STU CKJDF</p> <p>Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CM P_VA_RSP_CLU_STU CKJDF</p> <p>Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine</p> <p>Odd clutch redundant shutdown valve stuck on fault detected druing this instance of the odd clutch recovery routine</p> <p>Time zero current is commanded for the odd clutch redundant shutdown valve before triggering the current profile check</p> <p>Fault confirmation Odd clutch redundant shutdown valve current profile check consist fail confirmation count</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= 100 ms</p> <p>= 3 count</p>	Runs Continuously	A
Clutch 2 Rsp stuck off	P2714	<p>This diagnostic detects a clutch redundant shutdown valve hydraulically stuck off fault. This is done by using the clutch recovery routine which is triggered by the setting of a clutch system or component diagnostic failure.</p> <p>To determine if the redundant shutdown valve is hydraulically stuck on, the redundant shutdown valve is set to the hydraulically on position and the clutch pressure control valve current is ramped up. If no clutch pressure is detected during this stage, the redundant pressure control valve is determined not to be stuck on.</p> <p>The clutch pressure redudant shutdown valve is further verified for functionality by use of the current profile check. If the clutch redundant shutdown valve current profile check fails consistently, the redundant shutdown shutdown valve is diagnosed hydraulically stuck off.</p>	Current profile check failed for the even redundant shutdown valve (ERSV)	= True	<p>Enable Conditions: Diagnostic reset event</p> <p>Even clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CM P_VA_RSP_CLU_STU CKJDF</p> <p>Even clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CM P_VA_RSP_CLU_STU CKJDF</p>	<p>= False</p> <p>= True</p> <p>= True</p>	Runs Continuously	A

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						Even clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False		
						Even clutch redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine	=	False		
						Time zero current is commanded for the even clutch redundant shutdown valve before triggering the current profile check	=	100ms		
					Fault confirmation	Even clutch redundant shutdown valve current profile check consist fail confirmation count	=	3count		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Clutch 1 Rsp stuck on	P0797	<p>This diagnostic detects a clutch redundant shutdown valve hydraulically stuck onn fault.</p> <p>To determine if the redundant shutdown valve is hydraulically stuck on, the redundant shutdown valve is set to the hydraulically on position and the clutch pressure control valve current is ramped up. If no clutch pressure is detected during this stage, the redundant pressure control valve is determined diagnosed to be stuck on.</p> <p>This check is performed time based and when allowed by running conditions as part of clutch pressure valve cleaning routine or as part of the clutch recovery routine which is triggered by the setting of a clutch system or component diagnostic failure.</p>	Current odd clutch pressure	> 1 bar	<p>Enable Conditions: Diagnostic reset event</p> <p>Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STU CK_ON</p> <p>Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STU CK_ON</p> <p>Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine</p> <p>OR</p> <p>Time based clutch pressure valve cleaning request (3), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STU CK_ON</p> <p>Time based clutch pressure valve run conditions met (4), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STU CK_ON</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= True</p> <p>= True</p>	Runs Continuously	A
Clutch 2 Rsp stuck on	P2715	<p>This diagnostic detects a clutch redundant shutdown valve hydraulically stuck onn fault.</p> <p>To determine if the redundant shutdown valve is hydraulically stuck on, the redundant shutdown valve is set to the hydraulically on position and the clutch pressure control valve current is ramped up. If no clutch pressure is detected during this stage, the redundant pressure control valve is determined diagnosed to be stuck on.</p> <p>This check is performed time based and when allowed by running conditions as part of clutch pressure valve cleaning routine or as part of the clutch recovery routine which is triggered by the setting of a clutch system or component diagnostic failure.</p>	Current even clutch pressure	> 1 bar	<p>Enable Conditions: Diagnostic reset event</p> <p>Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STU CK_ON</p> <p>Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STU CK_ON</p> <p>Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine</p> <p>OR</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p>	Runs Continuously	A

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					<div>Time based clutch pressure valve cleaning request (3), see Summary table attachments C_SID_ASV_CM P_VA_RSP_CLU_STU CKON</div>	<div>=</div>	<div>True</div>		
					<div>Time based clutch pressure valve run conditions met (4), see Summary table attachments C_SID_ASV_CM P_VA_RSP_CLU_STU CKON</div>	<div>=</div>	<div>True</div>		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
LSD Rsp stuck off	P2817	<p>This diagnostic detects a limited slip differential redundant shutdown valve hydraulically stuck off fault. This is done by using the limited slip differential recovery routine which is triggered by the setting of a limited slip differential system or component diagnostic failure.</p> <p>To determine if the redundant shutdown valve is hydraulically stuck on, the redundant shutdown valve is set to the hydraulically on position and the limited slip differential pressure control valve current is ramped up. If no limited slip differential pressure is detected during this stage, the redundant pressure control valve is determined not to be stuck on.</p> <p>The limited slip differential pressure redudant shutdown valve is further verified for functionality by use of the current profile check. If the limited slip differential redundant shutdown valve current profile check fails consistently, the redundant shutdown valve is diagnosed hydraulically stuck off.</p>	Current profile check failed for the limited slip differential redundant shutdown valve (ERSV)	= True	<p>Enable Conditions: Diagnostic reset event</p> <p>Limited slip differential recovery routine is requested (1), see Summary table attachments C_S/D_ASV_CM P_VA_RSP_LSD_STU CKJDF</p> <p>Limited slip differential recovery routine run conditions met (2), see Summary table attachments C_S/D_ASV_CM P_VA_RSP_LSD_STU CKJDF</p> <p>Limited slip differential pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine</p> <p>Limited slip differential redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine</p> <p>Fault confirmation time</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= 3 count</p>	Runs Continuously	B

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
LSD Rsp stuck on	P2818	<p>This diagnostic detects a limited slip differential redundant shutdown valve hydraulically stuck on fault.</p> <p>To determine if the redundant shutdown valve is hydraulically stuck on, the redundant shutdown valve is set to the hydraulically on position and the limited slip differential pressure control valve current is ramped up. If no limited slip differential pressure is detected during this stage, the redundant pressure control valve is determined diagnosed to be stuck on.</p> <p>This check is performed time based and when allowed by running conditions as part of limited slip differential pressure valve cleaning routine or as part of the limited slip differential recovery routine which is triggered by the setting of a limited slip differential system or component diagnostic failure.</p>	Current limited slip differential pressure	> 1 bar	<p>Enable Conditions: Diagnostic reset event</p> <p>Limited slip differential recovery routine is requested (1), see Summary table attachments C_SID_ASV_CM P_VA_RSP_LSD_STU CKJDF</p> <p>Limited slip differentail recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CM P_VA_RSP_LSD_STU CKJDF</p> <p>Limited slip differential sensor out-of-window drift fault detected during this instance of the limited slip differential recovery routine</p> <p>OR</p> <p>Time based limited slip differential pressure valve cleaning request (3), see Summary table attachments C_SID_ASV_CM P_VA_RSP_LSD_STU CKJDF</p> <p>Time based limited slip differential pressure valve run conditions met (4), see Summary table attachments C_SID_ASV_CM P_VA_RSP_LSD_STU CKJDF</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= True</p> <p>= True</p>	Runs Continuously	B

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Incorrect adaptation data	P287C	At controller initialization, the transmission learn data is verified. If a data check fails, the adaptation data is diagnosed faulted.	Odd clutch preload pressure end-of-line data invalid	= True			Runs at controller initialization	C
			Odd clutch preload pressure online learn data invalid	= True				
			Even clutch preload pressure end-of-line data invalid	= True				
			Even clutch preload pressure online learn data invalid	= True				
			Odd clutch kisspoint pressure end-of-line data invalid	= True				
			Odd clutch kisspoint pressure online learn data invalid	= True				
			Even clutch kisspoint pressure end-of-line data invalid	= True				
			Even clutch kisspoint pressure online learn data invalid	= True				
			Odd clutch fill volume end-of-line data invalid	= True				
			Odd clutch fill volume online learn data invalid	= True				
			Even clutch fill volume end-of-line data invalid	= True				
			Even clutch fill volume online learn data invalid	= True				
			Odd clutch fast fill factor end-of-line data invalid	= True				
			Odd clutch fast fill factor online learn data invalid	= True				
			Even clutch fast fill factor end-of-line data invalid	= True				
			Even clutch fast fill factor online learn data invalid	= True				
			Odd clutch pressure to current correction end-of-line data invalid	= True				
			Even clutch pressure to current correction end-of-line data invalid	= True				
			Odd clutch torque kisspoint pressure end-of-line data invalid	= True				
			Odd clutch torque kisspoint pressure online learn data invalid	= True				
			Even clutch torque kisspoint pressure end-of-line data invalid	= True				
			Even clutch torque kisspoint pressure online learn data invalid	= True				
			Odd clutch torque gain end-of-line data invalid	= True				
			Odd clutch torque gain online learn data invalid	= True				
			Even clutch torque gain end-of-line data invalid	= True				
			Even clutch torque gain online learn data invalid	= True				
			System pressure current correction end-of-line data invalid	= True				
			Odd clutch pressure sensor offset online learn data invalid	= True				
			Even clutch pressure sensor offset online learn data invalid	= True				

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System pressure offset sensor online learn data invalid	=	True
Limited slip differential pressure sensor offset online learn data invalid	=	True
Rod 1 synchronizer positions end-of-line data invalid	=	True
Rod 1 synchronizer positions online learn data invalid	=	True
Rod 2 synchronizer positions end-of-line data invalid	=	True
Rod 2 synchronizer positions online learn data invalid	=	True
Rod 3 synchronizer positions end-of-line data invalid	=	True
Rod 3 synchronizer positions online learn data invalid	=	True
Rod 4 synchronizer positions end-of-line data invalid	=	True
Rod 4 synchronizer positions online learn data invalid	=	True
Rod 5 synchronizer positions end-of-line data invalid	=	True
Rod 5 synchronizer positions online learn data invalid	=	True
Limited slip differential pressure to current correction end-of-line data invalid	=	True
Odd clutch superfill time adaptation online learn data invalid	=	True
Even clutch superfill time adaptation online learn data invalid	=	True
Parking lock positions end-of-line data invalid	=	True
Parking lock positions online learn data invalid	=	True
Synchronizer pressure control valve 1 pressure to current end-of-line data invalid	=	True
Synchronizer pressure control valve 2 pressure to current end-of-line data invalid	=	True
Synchronizer pressure control valve 3 pressure to current end-of-line data invalid	=	True
Synchronizer pressure control valve 4 pressure to current end-of-line data invalid	=	True
Synchronizer pressure control valve 5 pressure to current end-of-line data invalid	=	True
Lube solenoid flow to current correction end-of-line data invalid	=	True
Odd clutch speed sensor end-of-line data invalid	=	True
Even clutch speed sensor end-of-line data invalid	=	True
Output speed sensor end-of-line data invalid	=	True
Limited slip differential torque kisspoint end-of-line data invalid	=	True
Limited slip differential torque gain end-of-line data invalid	=	True

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Limited slip differential kisspoint pressure end-of-line data invalid	=	True			
End-of-line data version loaded not compatible with current software	=	True			
Odd clutch preload pressure end-of-line learn routine not finished successfully	=	True	Odd clutch preload pressure end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Even clutch preload pressure end-of-line learn routine not finished successfully	=	True	Even clutch preload pressure end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Odd clutch kisspoint pressure end-of-line learn routine not finished successfully	=	True	Odd clutch kisspoint pressure end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Even clutch kisspoint pressure end-of-line learn routine not finished successfully	=	True	Even clutch kisspoint pressure end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Odd clutch fill volume end-of-line learn routine not finished successfully	=	True	Odd clutch fill volumen pressure end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Even clutch fill volume end-of-line learn routine not finished successfully	=	True	Even clutch fill volume pressure end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Odd clutch fast fill factor end-of-line learn routine not finished successfully	=	True	Odd clutch fast fill factor end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Even clutch fast fill factor end-of-line learn routine not finished successfully	=	True	Even clutch fast fill factor end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Odd clutch pressure to current correction end-of-line learn routine not finished successfully	=	True	Odd clutch pressure to current correction end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Even clutch pressure to current correction end-of-line learn routine not finished successfully	=	True	Even clutch pressure to current correction end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Rod 1 synchronizer positions end-of-line learn routine not finished successfully	=	True	Rod 1 synchronizer positions end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Rod 2 synchronizer positions end-of-line learn routine not finished successfully	=	True	Rod 2 synchronizer positions end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Rod 3 synchronizer positions end-of-line learn routine not finished successfully	=	True	Rod 3 synchronizer positions end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Rod 4 synchronizer positions end-of-line learn routine not finished successfully	=	True	Rod 4 synchronizer positions end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Rod 5 synchronizer positions end-of-line learn routine not finished successfully	=	True	Rod 5 synchronizer positions end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
System pressure current correction end-of-line learn routine not finished successfully	=	True	System pressure current correction end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously
Limited slip differential pressure to current correction end-of-line learn routine not finished successfully	=	True	Limited slip differential pressure to current correction end-of-line learn routine triggered by operator/mechanic	=	True Runs continuously

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			Parking lock positions end-of-lie learn routine not finished successfully	=	True		Parking lock positions end-of-lie learn routine triggered by operator/mechanic	=	True	Runs continuously	
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24OBDG07 TCM Summary Tables

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Odd clutch driving gear lost	P277E	<p>This diagnostic detects unintentional gear disengagement while driving on the odd clutch. This is detected by seeing synhronizer differential speed for the current driving gear while the clutch is not slipping.</p> <p>When synchronizer differential speed for the current driving gear is detected while the clutch is not slipping, the gear is diagnosed unintentionally mechanically disengaged.</p>	<p>Engaged gear for the synchronizer corresponding to the driving gear based on speed sensor information indicates neutral (1), see Summary table attachments C_SID_ASVSYSG EAR_ACT_LOST</p> <p>Odd clutch slip</p>	<p>True</p> <p>50 rpm</p> <p><</p>	<p>Enable Conditions:</p> <p>Driving gear selected</p> <p>Synchronizer shift busy for an odd gear synchronizer</p> <p>Driving gear corresponds to odd gear shaft</p> <p>Driving gear equals logical engaged gear on odd clutch shaft</p> <p>Fault confirmation time:</p>	<p>True</p> <p>=</p> <p>False</p> <p>True</p> <p>=</p> <p>True</p> <p>=</p> <p>1000 ms</p>	Runs Continuously	A
Even clutch driving gear lost	P277F	<p>This diagnostic detects unintentional gear disengagement while driving on the odd clutch. This is detected by seeing synhronizer differential speed for the current driving gear while the clutch is not slipping.</p> <p>When synchronizer differential speed for the current driving gear is detected while the clutch is not slipping, the gear is diagnosed unintentionally mechanically disengaged.</p>	<p>Engaged gear for the synchronizer corresponding to the driving gear based on speed sensor information indicates neutral (1), see Summary table attachments C_SID_ASVSYSG EAR_ACT_LOST</p> <p>Even clutch slip</p>	<p>True</p> <p>50 rpm</p> <p><</p>	<p>Enable Conditions:</p> <p>Driving gear selected</p> <p>Synchronizer shift busy for an even gear synchronizer</p> <p>Driving gear corresponds to even gear shaft</p> <p>Driving gear equals logical engaged gear on even clutch shaft</p> <p>Fault confirmation time:</p>	<p>True</p> <p>=</p> <p>False</p> <p>True</p> <p>=</p> <p>True</p> <p>=</p> <p>1000 ms</p>	Runs Continuously	A

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Gear 1 performance	P1946	This diagnostic detects a failure to control the shift rod corresponding with a gear to neutral when a gear determination fault at controller initialization has been detected.	Difference between measured C_ROD_1 positon and the learned rod neutral position	>=600pm	Enable Conditions: <			

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					Fault confirmation	Rod drift correction actuation to neutral active time	>= 2000 ms		
Gear 3 performance	P1948	<p>This diagnostic detects a failure to control the shift rod corresponding with a gear to neutral when a gear determination fault at controller initialization has been detected.</p> <p>If the engaged gears according to the rod position sensors don't match with engaged gear data stored in non-volatile-memory at the end of the previous power cycle of the transmission controller, the intrusive synchronizer integrity routine is used to determine reliability of the rod position sensor.</p> <p>If the rod position sensors are diagnosed ok by the synchronizer integrity routine, but the gear determination based on the rod position does not show an allowable gear engagement state, the rod drift correction routine is used to control the rods to their respective neutral positions.</p> <p>If the rod drift correction routine fails to properly control the rods to neutral, the corresponding gears for this shift rod are diagnosed with a performance fault.</p>	<p>Difference between measured C_ROD_1 position and the learned rod neutral position</p> <p>OR</p> <p>Force target to control C_ROD_1 to neutral</p>	<p>>= 600 pm</p> <p>>= 200 N</p>	<p>Enable Conditions:</p> <p>Transmission engaged gear for the clutch shaft based on rod position sensor information not match with engaged gears stored in non-volatile memory at controller initialization</p> <p>Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>C_ROD_1 position sensor diagnosed ok by the synchronizer integrity routine OR the result could not be diagnosed due to a selector fault (3)/(4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>CROD1 drift correction active (2), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>System pressure</p>	<p>True</p> <p>=</p> <p>= True</p> <p>= True</p> <p>> 4.5 bar</p>		Runs Continuously	A
					Fault confirmation	Rod drift correction actuation to neutral active time	>= 2000 ms		
Gear 4 performance	P1949	<p>This diagnostic detects a failure to control the shift rod corresponding with a gear to neutral when a gear determination fault at controller initialization has been detected.</p> <p>If the engaged gears according to the rod position sensors don't match with engaged gear data stored in non-volatile-memory at the end of the previous power cycle of the transmission controller, the intrusive synchronizer integrity routine is used to determine reliability of the rod position sensor.</p> <p>If the rod position sensors are diagnosed ok by the synchronizer integrity routine, but the gear determination based on the rod position does not show an allowable gear engagement state, the rod drift correction routine is used to control the rods to their respective neutral positions.</p> <p>If the rod drift correction routine fails to properly control the rods to neutral, the corresponding gears for this shift rod are diagnosed with a performance fault.</p>	<p>Difference between measured C_ROD_3 position and the learned rod neutral position</p> <p>OR</p> <p>Force target to control C_ROD_3 to neutral</p>	<p>>= 600 pm</p> <p>>= 200 N</p>	<p>Enable Conditions:</p> <p>Transmission engaged gear for the clutch shaft based on rod position sensor information not match with engaged gears stored in non-volatile memory at controller initialization</p> <p>Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>C_ROD_3 position sensor diagnosed ok by the synchronizer integrity routine OR the result could not be diagnosed due to a selector fault (3)/(4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>CROD3 drift correction active (2), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p>	<p>True</p> <p>True</p> <p>=</p> <p>= True</p> <p>= True</p>		Runs Continuously	A

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						System pressure	>	4.5	bar		
						Fault confirmation	Rod drift correction actuation to neutral active time	>=	2000	ms	
Gear 5 performance	P194A	This diagnostic detects a failure to control the shift rod corresponding with a gear to neutral when a gear determination fault at controller initialization has been detected.	Difference between measured C_ROD_2 position and the learned rod neutral position	>=	600	pm	Enable Conditions:	Transmission engaged gear for the clutch shaft based on rod position sensor information not match with engaged gears stored in non-volatile memory at controller initialization		True	Runs Continuously
		If the engaged gears according to the rod position sensors don't match with engaged gear data stored in non-volatile-memory at the end of the previous power cycle of the transmission controller, the intrusive synchronizer integrity routine is used to determine reliability of the rod position sensor.	OR					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED		=	
		If the rod position sensors are diagnosed ok by the synchronizer integrity routine, but the gear determination based on the rod position does not show an allowable gear engagement state, the rod drift correction routine is used to control the rods to their respective neutral positions.	Force target to control C_ROD_2 to neutral	>=	200	N		C_ROD_2 position sensor diagnosed ok by the synchronizer integrity routine OR the result could not be diagnosed due to a selector fault (3)/(4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED		= True	
		If the rod drift correction routine fails to properly control the rods to neutral, the corresponding gears for this shift rod are diagnosed with a performance fault.						CROD2 drift correction active (2), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED		= True	
						Fault confirmation	Rod drift correction actuation to neutral active time	>=	2000	ms	
Gear 6 performance	P194B	This diagnostic detects a failure to control the shift rod corresponding with a gear to neutral when a gear determination fault at controller initialization has been detected.	Difference between measured C_ROD_3 position and the learned rod neutral position	>=	600	pm	Enable Conditions:	Transmission engaged gear for the clutch shaft based on rod position sensor information not match with engaged gears stored in non-volatile memory at controller initialization		True	Runs Continuously
		If the engaged gears according to the rod position sensors don't match with engaged gear data stored in non-volatile-memory at the end of the previous power cycle of the transmission controller, the intrusive synchronizer integrity routine is used to determine reliability of the rod position sensor.	OR					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED		=	
		If the rod position sensors are diagnosed ok by the synchronizer integrity routine, but the gear determination based on the rod position does not show an allowable gear engagement state, the rod drift correction routine is used to control the rods to their respective neutral positions.	Force target to control C_ROD_3 to neutral	>=	200	N		C_ROD_3 position sensor diagnosed ok by the synchronizer integrity routine OR the result could not be diagnosed due to a selector fault (3)/(4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED		= True	

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		If the rod drift correction routine fails to properly control the rods to neutral, the corresponding gears for this shift rod are diagnosed with a performance fault.				CROD3 drift correction active (2), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			
						System pressure	>	4.5	bar		
						Fault confirmation Rod drift correction actuation to neutral active time	>=	2000	ms		
Gear 7 performance	P194C	This diagnostic detects a failure to control the shift rod corresponding with a gear to neutral when a gear determination fault at controller initialization has been detected.	Difference between measured C_ROD_2 position and the learned rod neutral position	>=	600	pm	Enable Conditions:	True		Runs Continuously	A
		If the engaged gears according to the rod position sensors don't match with engaged gear data stored in non-volatile-memory at the end of the previous power cycle of the transmission controller, the intrusive synchronizer integrity routine is used to determine reliability of the rod position sensor.	OR					True			
		If the rod position sensors are diagnosed ok by the synchronizer integrity routine, but the gear determination based on the rod position does not show an allowable gear engagement state, the rod drift correction routine is used to control the rods to their respective neutral positions.	Force target to control C_ROD_2 to neutral	>=	200	N		True			
		If the rod drift correction routine fails to properly control the rods to neutral, the corresponding gears for this shift rod are diagnosed with a performance fault.						True			
						Fault confirmation Rod drift correction actuation to neutral active time	>=	2000	ms		
Gear 8 performance	P194D	This diagnostic detects a failure to control the shift rod corresponding with a gear to neutral when a gear determination fault at controller initialization has been detected.	Difference between measured C_ROD_5 position and the learned rod neutral position	>=	600	pm	Enable Conditions:	True		Runs Continuously	A
		If the engaged gears according to the rod position sensors don't match with engaged gear data stored in non-volatile-memory at the end of the previous power cycle of the transmission controller, the intrusive synchronizer integrity routine is used to determine reliability of the rod position sensor.	OR					True			

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		<p>If the rod position sensors are diagnosed ok by the synchronizer integrity routine, but the gear determination based on the rod position does not show an allowable gear engagement state, the rod drift correction routine is used to control the rods to their respective neutral positions.</p> <p>If the rod drift correction routine fails to properly control the rods to neutral, the corresponding gears for this shift rod are diagnosed with a performance fault.</p>	Force target to control C_ROD_5 to neutral	<p>>= 200 N</p>	<p>C_ROD_5 position sensor diagnosed ok by the synchronizer integrity routine OR the result could not be diagnosed due to a selector fault (3)/(4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>C_ROD_5 drift correction active (2), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>System pressure</p> <p>Rod drift correction actuation to neutral active time</p>	<p>= True</p> <p>= True</p> <p>> 4.5 bar</p> <p>>= 2000 ms</p>		
Gear R performance	P194E	<p>This diagnostic detects a failure to control the shift rod corresponding with a gear to neutral when a gear determination fault at controller initialization has been detected.</p> <p>If the engaged gears according to the rod position sensors don't match with engaged gear data stored in non-volatile-memory at the end of the previous power cycle of the transmission controller, the intrusive synchronizer integrity routine is used to determine reliability of the rod position sensor.</p> <p>If the rod position sensors are diagnosed ok by the synchronizer integrity routine, but the gear determination based on the rod position does not show an allowable gear engagement state, the rod drift correction routine is used to control the rods to their respective neutral positions.</p> <p>If the rod drift correction routine fails to properly control the rods to neutral, the corresponding gears for this shift rod are diagnosed with a performance fault.</p>	<p>Difference between measured C_ROD_4 position and the learned rod neutral position</p> <p>OR</p> <p>Force target to control C_ROD_4 to neutral</p>	<p>>= 600 pm</p> <p>>= 200 N</p>	<p>Enable Conditions:</p> <p>Transmission engaged gear for the clutch shaft based on rod position sensor information not match with engaged gears stored in non-volatile memory at controller initialization</p> <p>Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>C_ROD_4 position sensor diagnosed ok by the synchronizer integrity routine OR the result could not be diagnosed due to a selector fault (3)/(4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>C_ROD_4 drift correction active (2), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED</p> <p>System pressure</p> <p>Rod drift correction actuation to neutral active time</p>	<p>True</p> <p>True</p> <p>= True</p> <p>= True</p> <p>> 4.5 bar</p> <p>>= 2000 ms</p>	Runs Continuously	A

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Stuck in Gear 1	P072C	This diagnostic detects a stuck gear by monitoring gear disengagement attempts. The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral. The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear disengagement stare are not met. If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	Synchronizer shift to neutral Shift fork position sensor 1 electrical or consistency fault detected during the shift. OR Gear disengagement actuation state transition conditions met (1), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_DISEN Gear disengagement actuation state timer	= True = True = False >= Gear disengagement actuation state timeout (2), see Summary table attachements	Enable Conditions: Gear 1 disengagement requested Gear 1 disengagement active System pressure Application state is unequal to error state Application state is unequal to bypass state Fault confirmation Gear 1 disengagement attempts	= True = True > 4.5 bar = True = True >= 4 count	Runs Continuously	A
Stuck in Gear 2	P072D	This diagnostic detects a stuck gear by monitoring gear disengagement attempts. The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral. The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear disengagement stare are not met. If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	Synchronizer shift to neutral Shift fork position sensor 4 electrical or consistency fault detected during the shift. OR Gear disengagement actuation state transition conditions met (1), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_DISEN Gear disengagement actuation state timer	= True = True = False >= Gear disengagement actuation state timeout (2), see Summary table attachements	Enable Conditions: Gear 2 disengagement requested Gear 2 disengagement active System pressure Application state is unequal to error state Application state is unequal to bypass state Fault confirmation Gear 2 disengagement attempts	= True = True > 4.5 bar = True = True >= 4 count	Runs Continuously	A
Stuck in Gear 3	P072E	This diagnostic detects a stuck gear by monitoring gear disengagement attempts. The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral. The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear disengagement stare are not met. If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	Synchronizer shift to neutral Shift fork position sensor 1 electrical or consistency fault detected during the shift. OR Gear disengagement actuation state transition conditions met (1), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_DISEN Gear disengagement actuation state timer	= True = True = False >= Gear disengagement actuation state timeout (2), see Summary table attachements	Enable Conditions: Gear 3 disengagement requested Gear 3 disengagement active System pressure Application state is unequal to error state Application state is unequal to bypass state Fault confirmation Gear 3 disengagement attempts	= True = True > 4.5 bar = True = True >= 4 count	Runs Continuously	A

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Stuck in Gear 4	P072F	This diagnostic detects a stuck gear by monitoring gear disengagement attempts. The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral. The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear disengagement state are not met. If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	Synchronizer shift to neutral	=	True	Enable Conditions:	Gear 4 disengagement requested	=	True	Runs Continuously	A
			Shift fork position sensor 3 electrical or consistency fault detected during the shift.	=	True		Gear 4 disengagement active	=	True		
			OR				System pressure	>	4.5 bar		
			Gear disengagement actuation state transition conditions met (1), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_DISEN	=	False		Application state is unequal to error state	=	True		
Stuck in Gear 5	P073A	This diagnostic detects a stuck gear by monitoring gear disengagement attempts. The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral. The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear disengagement state are not met. If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	Synchronizer shift to neutral	=	True	Enable Conditions:	Gear 5 disengagement requested	=	True	Runs Continuously	A
			Shift fork position sensor 2 electrical or consistency fault detected during the shift.	=	True		Gear 5 disengagement active	=	True		
			OR				System pressure	>	4.5 bar		
			Gear disengagement actuation state transition conditions met (1), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_DISEN	=	False		Application state is unequal to error state	=	True		
Stuck in Gear 6	P073B	This diagnostic detects a stuck gear by monitoring gear disengagement attempts. The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral. The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear disengagement state are not met. If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	Synchronizer shift to neutral	=	True	Enable Conditions:	Gear 6 disengagement requested	=	True	Runs Continuously	A
			Shift fork position sensor 3 electrical or consistency fault detected during the shift.	=	True		Gear 6 disengagement active	=	True		
			OR				System pressure	>	4.5 bar		
			Gear disengagement actuation state transition conditions met (1), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_DISEN	=	False		Application state is unequal to error state	=	True		
Stuck in Gear 7	P073C	This diagnostic detects a stuck gear by monitoring gear disengagement attempts.	Synchronizer shift to neutral	=	True	Enable Conditions:	Gear 7 disengagement requested	=	True	Runs Continuously	A

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		<p>The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral.</p> <p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear disengagement stare are not met.</p> <p>If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.</p>	<p>Shift fork position sensor 2 electrical or consistency fault detected during the shift.</p> <p>OR</p> <p>Gear disengagement actuation state transition conditions met (1), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_DISEN</p> <p>Gear disengagement actuation state timer</p>	<p>= True</p> <p>= False</p> <p>>= Gear disengagement actuation state timeout (2), see Summary table attachements</p>	<p>Fault confirmation</p> <p>Gear 7 disengagement attempts</p>	<p>= True</p> <p>> 4.5 bar</p> <p>= True</p> <p>= True</p>		
Stuck in Gear 8	P07D7	<p>This diagnostic detects a stuck gear by monitoring gear disengagement attempts.</p> <p>The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral.</p> <p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear disengagement stare are not met.</p> <p>If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.</p>	<p>Synchronizer shift to neutral</p> <p>Shift fork position sensor 5 electrical or consistency fault detected during the shift.</p> <p>OR</p> <p>Gear disengagement actuation state transition conditions met (1), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_DISEN</p> <p>Gear disengagement actuation state timer</p>	<p>= True</p> <p>= True</p> <p>= False</p> <p>>= Gear disengagement actuation state timeout (2), see Summary table attachements</p>	<p>Enable Conditions:</p> <p>Gear 8 dfisengagement requested</p> <p>Gear 8 disengagement active</p> <p>System pressure</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation</p> <p>Gear 8 disengagement attempts</p>	<p>= True</p> <p>= True</p> <p>> 4.5 bar</p> <p>= True</p> <p>= True</p> <p>>= 4 count</p>	Runs Continuously	A
Stuck in Gear R	P072B	<p>This diagnostic detects a stuck gear by monitoring gear disengagement attempts.</p> <p>The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral.</p> <p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear disengagement stare are not met.</p> <p>If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.</p>	<p>Synchronizer shift to neutral</p> <p>Shift fork position sensor 4 electrical or consistency fault detected during the shift.</p> <p>OR</p> <p>Gear disengagement actuation state transition conditions met (1), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_DISEN</p> <p>Gear disengagement actuation state timer</p>	<p>= True</p> <p>= True</p> <p>= False</p> <p>>= Gear disengagement actuation state timeout (2), see Summary table attachements</p>	<p>Enable Conditions:</p> <p>Gear R dfisengagement requested</p> <p>Gear R disengagement active</p> <p>System pressure</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation</p> <p>Gear R disnoagement attempts</p>	<p>= True</p> <p>= True</p> <p>> 4.5 bar</p> <p>= True</p> <p>= True</p> <p>>= 4 count</p>	Runs Continuously	A

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Unable to Engage Gear 1	P073F	<p>This diagnostic detects a stuck gear by monitoring gear engagement attempts. The gear engagement can fail when the differential speed is too high.</p> <p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear engagement state are not met.</p> <p>If consecutive gear engagement attempts fail, the gear is diagnosed unable to engage gear.</p>	<p>Absolute synchronizer differential speed for the gear to engage</p> <p>OR</p> <p>Gear engagement actuation state transition conditions met (2), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_EN</p> <p>Gear engagement actuation state timer</p> <p>OR</p> <p>Absolute synchronizer differential speed for the gear to engage</p>	<p>Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary table attachments C_SID_ASV SY SG EAR_SY_EN rpm</p> <p>></p> <p>= False</p> <p>>= Gear engagement actuation state timeout (3), see Summary table attachments</p> <p>> Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV SY SG EAR_SY_EN</p>	<p>Enable Conditions:</p> <p>Gear 1 engagement requested</p> <p>Gear 1 engagement active</p> <p>System pressure bar</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation Gear 1 engagement attempts</p>	<p>= True</p> <p>= True</p> <p>> 4.5</p> <p>= True</p> <p>= True</p> <p>>= 4 count</p>	Runs Continuously	A
Unable to Engage Gear 2	P074A	<p>This diagnostic detects a stuck gear by monitoring gear engagement attempts. The gear engagement can fail when the differential speed is too high.</p> <p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear engagement state are not met.</p> <p>If consecutive gear engagement attempts fail, the gear is diagnosed unable to engage gear.</p>	<p>Absolute synchronizer differential speed for the gear to engage</p> <p>OR</p> <p>Gear engagement actuation state transition conditions met (2), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_EN</p> <p>Gear engagement actuation state timer</p> <p>OR</p> <p>Absolute synchronizer differential speed for the gear to engage</p>	<p>Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary table attachments C_SID_ASV SY SG EAR_SY_EN rpm</p> <p>></p> <p>= False</p> <p>>= Gear engagement actuation state timeout (3), see Summary table attachments</p> <p>> Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV SY SG EAR_SY_EN</p>	<p>Enable Conditions:</p> <p>Gear 2 engagement requested</p> <p>Gear 2 engagement active</p> <p>System pressure bar</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation Gear 2 engagement attempts</p>	<p>= True</p> <p>= True</p> <p>> 4.5</p> <p>= True</p> <p>= True</p> <p>>= 4 count</p>	Runs Continuously	A
Unable to Engage Gear 3	P074B	<p>This diagnostic detects a stuck gear by monitoring gear engagement attempts. The gear engagement can fail when the differential speed is too high.</p> <p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear engagement state are not met.</p> <p>If consecutive gear engagement attempts fail, the gear is diagnosed unable to engage gear.</p>	<p>Absolute synchronizer differential speed for the gear to engage</p> <p>OR</p> <p>Gear engagement actuation state transition conditions met (2), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_EN</p> <p>Gear engagement actuation state timer</p>	<p>Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary table attachments C_SID_ASV SY SG EAR_SY_EN rpm</p> <p>></p> <p>= False</p> <p>>= Gear engagement actuation state timeout (3), see Summary table attachments</p>	<p>Enable Conditions:</p> <p>Gear 3 engagement requested</p> <p>Gear 3 engagement active</p> <p>System pressure bar</p> <p>Application state is unequal to error state</p>	<p>= True</p> <p>= True</p> <p>> 4.5</p> <p>= True</p>	Runs Continuously	A

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			OR	Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASVSYSG EAR_SY_EN	Application state is unequal to bypass state	= True		
			Absolute synchronizer differential speed for the gear to engage	>	Fault confirmation Gear 3 engagement attempts	>= 4 count		
Unable to Engage Gear 4	P074C	This diagnostic detects a stuck gear by monitoring gear engagement attempts. The gear engagement can fail when the differential speed is too high. The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear engagement state are not met. If consecutive gear engagement attempts fail, the gear is diagnosed unable to engage gear.	Absolute synchronizer differential speed for the gear to engage OR Gear engagement actuation state transition conditions met (2), see Summary table attachments C_SID_ASV_SYSG_GEAR_SY_EN Gear engagement actuation state timer OR Absolute synchronizer differential speed for the gear to engage	> 250, see Summary table attachments C_SID_ASVSYSG EAR_SY_EN rpm = False Gear engagement actuation state timeout (3), see Summary table attachments Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASVSYSG EAR_SY_EN	Enable Conditions: Gear 4 engagement requested Gear 4 engagement active System pressure Application state is unequal to error state Application state is unequal to bypass state	= True = True > 4.5 bar = True = True	Runs Continuously	A
				Fault confirmation Gear 3 engagement attempts	>= 4 count			
Unable to Engage Gear 5	P074D	This diagnostic detects a stuck gear by monitoring gear engagement attempts. The gear engagement can fail when the differential speed is too high. The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear engagement state are not met. If consecutive gear engagement attempts fail, the gear is diagnosed unable to engage gear.	Absolute synchronizer differential speed for the gear to engage OR Gear engagement actuation state transition conditions met (2), see Summary table attachments C_SID_ASV_SYSG_GEAR_SY_EN Gear engagement actuation state timer OR Absolute synchronizer differential speed for the gear to engage	> 250, see Summary table attachments C_SID_ASVSYSG EAR_SY_EN rpm = False Gear engagement actuation state timeout (3), see Summary table attachments Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASVSYSG EAR_SY_EN	Enable Conditions: Gear 5 engagement requested Gear 5 engagement active System pressure Application state is unequal to error state Application state is unequal to bypass state	= True = True > 4.5 bar = True = True	Runs Continuously	A
				Fault confirmation Gear 4 engagement attempts	>= 4 count			
Unable to Engage Gear 6	P074E	This diagnostic detects a stuck gear by monitoring gear engagement attempts. The gear engagement can fail when the differential speed is too high.	Absolute synchronizer differential speed for the gear to engage OR	> 250, see Summary table attachments C_SID_ASVSYSG EAR_SY_EN rpm	Enable Conditions: Gear 6 engagement requested Gear 6 engagement active	= True = True	Runs Continuously	A
				Fault confirmation Gear 5 engagement attempts	>= 4 count			

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		<p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear engagement state are not met.</p> <p>If consecutive gear engagement attempts fail, the gear is diagnosed unable to engage gear.</p>	<p>Gear engagement actuation state transition conditions met (2), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_EN</p> <p>Gear engagement actuation state timer</p> <p>OR</p> <p>Absolute synchronizer differential speed for the gear to engage</p>	<p>= False</p> <p>>= Gear engagement actuation state timeout (3), see Summary table attachements</p> <p>> Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachements C_SID_ASV_SYSG_EAR_SY_EN</p>		<p>System pressure</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p>	<p>> 4.5 bar</p> <p>= True</p> <p>= True</p>		
					Fault confirmation	Gear 6 engagement attempts	>= 4 count		
Unable to Engage Gear 7	P074F	<p>This diagnostic detects a stuck gear by monitoring gear engagement attempts.</p> <p>The gear engagement can fail when the differential speed is too high.</p> <p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear engagement state are not met.</p> <p>If consecutive gear engagement attempts fail, the gear is diagnosed unable to engage gear.</p>	<p>Absolute synchronizer differential speed for the gear to engage</p> <p>OR</p> <p>Gear engagement actuation state transition conditions met (2), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_EN</p> <p>Gear engagement actuation state timer</p> <p>OR</p> <p>Absolute synchronizer differential speed for the gear to engage</p>	<p>> Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYSG_EAR_SY_EN rpm</p> <p>= False</p> <p>>= Gear engagement actuation state timeout (3), see Summary table attachements</p> <p>> Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYSG_EAR_SY_EN</p>	Enable Conditions:	<p>Gear 7 engagement requested</p> <p>Gear 7 engagement active</p> <p>System pressure</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p>	<p>= True</p> <p>= True</p> <p>> 4.5 bar</p> <p>= True</p> <p>= True</p>	Runs Continuously	A
					Fault confirmation	Gear 7 engagement attempts	>= 4 count		
Unable to Engage Gear 8	P07D8	<p>This diagnostic detects a stuck gear by monitoring gear engagement attempts.</p> <p>The gear engagement can fail when the differential speed is too high.</p> <p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear engagement state are not met.</p> <p>If consecutive gear engagement attempts fail, the gear is diagnosed unable to engage gear.</p>	<p>Absolute synchronizer differential speed for the gear to engage</p> <p>OR</p> <p>Gear engagement actuation state transition conditions met (2), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_EN</p> <p>Gear engagement actuation state timer</p> <p>OR</p> <p>Absolute synchronizer differential speed for the gear to engage</p>	<p>> Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYSG_EAR_SY_EN rpm</p> <p>= False</p> <p>>= Gear engagement actuation state timeout (3), see Summary table attachements</p> <p>> Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYSG_EAR_SY_EN</p>	Enable Conditions:	<p>Gear 8 engagement requested</p> <p>Gear 8 engagement active</p> <p>System pressure</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p>	<p>= True</p> <p>= True</p> <p>> 4.5 bar</p> <p>= True</p> <p>= True</p>	Runs Continuously	A
					Fault confirmation	Gear 8 engagement attempts	>= 4 count		

Unable to Engage Gear R	P073E	<p>This diagnostic detects a stuck gear by monitoring gear engagement attempts.</p> <p>The gear engagement can fail when the differential speed is too high.</p> <p>The gear disengagement can fail when the gear disengagement actuation state times out because the transition condition to go the next gear engagement state are not met.</p> <p>If consecutive gear engagement attempts fail, the gear is diagnosed unable to engage gear.</p>	<p>Absolute synchronizer differential speed for the gear to engage</p> <p>OR</p> <p>Gear engagement actuation state transition conditions met (2), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN</p> <p>Gear engagement actuation state timer</p> <p>OR</p> <p>Absolute synchronizer differential speed for the gear to engage</p>	<p>> Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary table attachments C_SID_ASV_SYSG_EAR_SY_EN rpm</p> <p>= False</p> <p>>= Gear engagement actuation state timeout (3), see Summary table attachments</p> <p>> Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYSG_EAR_SY_EN</p>	<p>Enable Conditions:</p> <p>Gear R engagement requested</p> <p>Gear R engagement active</p> <p>System pressure</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation Gear R engagement attempts</p>	<p>= True</p> <p>= True</p> <p>> 4.5 bar</p> <p>= True</p> <p>= True</p> <p>>= 4 count</p>	Runs Continuously	A

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.	
Rod 1 drift fault	P284D	This diagnostic detect rod drift by detected a rod position measured which is outside wide tolerances compared to the current logically engaged gear.	Rod 1 position measurement	Rod drift fault high limit (1), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	pm	Enable Conditions: No rod 1 force present condition (3) confirmation time, see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	100 ms	Runs Continuously	A
		OR				Electrical fault for rod 1 position sensor	False		
		Rod 1 position measurement	Rod drift fault low limit (2), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	mm	Consistency fault rod 1 position sensor Synchronizer shift busy on corresponding clutch shaft No electrical odd clutch speed sensor OR output speed sensor fault time	False False 100 ms			
						Logically engaged gear matches rod 1 speed gear (4), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	True		
						Output speed available from sensor OR substituted by CAN info Odd clutch speed available from sensor	True True		
						End-of-line rod 1 position learn routine busy	= False		
						End-of-line rod 2 position learn routine busy	= False		
						End-of-line rod 3 position learn routine busy	= False		
						End-of-line rod 4 position learn routine busy	= False		
						End-of-line rod 5 position learn routine busy	= False		
						Application state is unequal to error state	= True		
						Application state is unequal to bypass state	= True		
					Fault confirmation time:		500 ms		
		This diagnostic detects rod drift by determining too many active occurrences of the rod drift correction.	Rod 1 drift correction active counter	>=	10 count	Enable Conditions: Rod drift correction for rod 1 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	True =	Runs Continuously	
		The rod drift correction is triggered when the rod position measured is outside narrow tolerances compared to the current logically engaged gear.				Rod drift correction for rod 1 transition to active (13), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active counter)	True =		
		This diagnostic detects rod drift by determining too long active occurrence of the rod drift correction.	Rod 1 drift correction active timer	>	5000 ms	Enable Conditions: Rod drift correction for rod 1 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	True =	Runs Continuously	

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		The rod drift correction is triggered when the rod position measured is outside narrow tolerances compared to the current logically engaged gear.				Rod drift correction for rod 1 active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active timer)	=	True		
Rod 2 drift fault	P284E	This diagnostic detect rod drift by detected a rod position measured which is outside wide tolerances compared to the current logically engaged gear.	Rod 2 position measurement	>	Rod drift fault high limit (1), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU μm	Enable Conditions: No rod 2 force present condition (3) confirmation time, see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU Electrical fault for rod 2 position sensor Consistency fault rod 2 position sensor Synchronizer shift busy on corresponding clutch shaft No electrical odd clutch speed sensor OR output speed sensor fault time Logically engaged gear matches rod 2 speed gear (4), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU Output speed available from sensor OR substituted by CAN info Odd clutch speed available from sensor End-of-line rod 1 position learn routine busy End-of-line rod 2 position learn routine busy End-of-line rod 3 position learn routine busy End-of-line rod 4 position learn routine busy End-of-line rod 5 position learn routine busy Application state is unequal to error state Application state is unequal to bypass state	>=	100 ms	Runs Continuously	A
		The logically engaged gear is verified by seeing there is a match with the engaged gear based on the clutch and output speed sensors.	OR	<	Rod drift fault low limit (2), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU μm			False		
			Rod 2 position measurement				>-	100 ms		
								True		
								True		
								False		
								False		
								False		
								False		
								False		
								False		
								True		
								True		
								500 ms		
		This diagnostic detects rod drift by determining too many active occurrences of the rod drift correction.		>=	10 count	Enable Conditions: Rod drift correction for rod 2 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU Rod drift correction for rod 2 transition to active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active counter)	=	True	Runs Continuously	
		The rod drift correction is triggered when the rod position measured is outside narrow tolerances compared to the current logically engaged gear.	Rod 2 drift correction active counter				=	True		

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		<p>This diagnostic detects rod drift by determining too long active occurrence of the rod drift correction.</p> <p>The rod drift correction is triggered when the rod position measured is outside narrow tolerances compared to the current logically engaged gear.</p>	Rod 2 drift correction active timer	> 5000 ms	<p>Enable Conditions:</p> <p>Rod drift correction for rod 2 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU</p> <p>Rod drift correction for rod 2 active (13), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active timer)</p>	= True	Runs Continuously	
Rod 3 drift fault	P284F	<p>This diagnostic detect rod drift by detected a rod position measured which is outside wide tolerances compared to the current logically engaged gear.</p> <p>The logically engaged gear is verified by seeing there is a match with the engaged gear based on the clutch and output speed sensors.</p>	<p>Rod 3 position measurement</p> <p>OR</p> <p>Rod 3 position measurement</p>	<p>Rod drift fault high limit (1), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU μm</p> <p>></p> <p>Rod drift fault low limit (2), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU μm</p> <p><</p>	<p>Enable Conditions:</p> <p>No rod 3 force present condition (3) confirmation time, see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU</p> <p>Electrical fault for rod 3 position sensor</p> <p>Consistency fault rod 3 position sensor</p> <p>Synchronizer shift busy on corresponding clutch shaft</p> <p>No electrical even clutch speed sensor OR output speed sensor fault time</p> <p>Logically engaged gear matches rod 3 speed gear (4), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU</p> <p>Output speed available from sensor OR substituted by CAN info</p> <p>Even clutch speed available from sensor</p> <p>End-of-line rod 1 position learn routine busy</p> <p>End-of-line rod 2 position learn routine busy</p> <p>End-of-line rod 3 position learn routine busy</p> <p>End-of-line rod 4 position learn routine busy</p> <p>End-of-line rod 5 position learn routine busy</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation time:</p>	<p>100 ms</p> <p>False</p> <p>False</p> <p>False</p> <p>100 ms</p> <p>True</p> <p>True</p> <p>True</p> <p>False</p> <p>False</p> <p>False</p> <p>False</p> <p>False</p> <p>True</p> <p>True</p> <p>500 ms</p>	<p>Runs Continuously</p>	A
		<p>This diagnostic detects rod drift by determining too many active occurrences of the rod drift correction.</p>	Rod 3 drift correction active counter	>= 10 count	<p>Enable Conditions:</p> <p>Rod drift correction for rod 3 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU</p>	= True	Runs Continuously	

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		The rod drift correction is triggered when the rod position measured is outside narrow tolerances compared to the current logically engaged gear.				Rod drift correction for rod 3 transition to active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active counter)	=	True			
		This diagnostic detects rod drift by determining too long active occurrence of the rod drift correction. The rod drift correction is triggered when the rod position measured is outside narrow tolerances compared to the current logically engaged gear.	Rod 3 drift correction active timer	>	5000	ms	Enable Conditions: Rod drift correction for rod 3 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	=	True	Runs Continuously	
						Rod drift correction for rod 3 active (13) (increments active timer)	=	True			
Rod 4 drift fault	P2850	This diagnostic detect rod drift by detected a rod position measured which is outside wide tolerances compared to the current logically engaged gear. The logically engaged gear is verified by seeing there is a match with the engaged gear based on the clutch and output speed sensors.	Rod 4 position measurement OR Rod 4 position measurement	>	Rod drift fault high limit (1)	µm	Enable Conditions: No rod 4 force present condition (3) confirmation time, see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	>=	100 ms	Runs Continuously	A
				<	Rod drift fault low limit (2)	µm	Electrical fault for rod 4 position sensor Consistency fault rod 4 position sensor Synchronizer shift busy on corresponding clutch shaft No electrical even clutch speed sensor OR output speed sensor fault time	>=	False False False 100 ms		
							Logically engaged gear matches rod 4 speed gear (4), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU		True		
							Output speed available from sensor OR substituted by CAN info Even clutch speed available from sensor		True True		
							End-of-line rod 1 position learn routine busy	=	False		
							End-of-line rod 2 position learn routine busy	=	False		
							End-of-line rod 3 position learn routine busy	=	False		
							End-of-line rod 4 position learn routine busy	=	False		
							End-of-line rod 5 position learn routine busy	=	False		
							Application state is unequal to error state	=	True		
							Application state is unequal to bypass state	=	True		
							Fault confirmation time:		500 ms		
		This diagnostic detects rod drift by determining too many active occurrences of the rod drift correction.	Rod 4 drift correction active counter	>=	10	count	Enable Conditions: Rod drift correction for rod 4 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	=	True	Runs Continuously	

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		The rod drift correction is triggered when the rod position measured is outside narrow tolerances compared to the current logically engaged gear.				Rod drift correction for rod 4 transition to active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active counter)	=	True			
		This diagnostic detects rod drift by determining too long active occurrence of the rod drift correction.	Rod 4 drift correction active timer	>	5000	ms	Enable Conditions:	True		Runs Continuously	
		The rod drift correction is triggered when the rod position measured is outside narrow tolerances compared to the current logically engaged gear.				Rod drift correction for rod 4 active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active timer)	=	True			
Rod 5 drift fault	P286A	This diagnostic detect rod drift by detected a rod position measured which is outside wide tolerances compared to the current logically engaged gear.	Rod 5 position measurement	>	Rod drift fault high limit (1), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	μm	Enable Conditions:	100	ms	Runs Continuously	A
		The logically engaged gear is verified by seeing there is a match with the engaged gear based on the clutch and output speed sensors.	OR				Electrical fault for rod 5 position sensor	False			
			Rod 5 position measurement	<	Rod drift fault low limit (2), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	μm	Consistency fault rod 5 position sensor	False			
							Synchronizer shift busy on corresponding clutch shaft	False			
							No electrical even clutch speed sensor OR output speed sensor fault time	100	ms		
							Logically engaged gear matches rod 5 speed gear (4), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	True			
							Output speed available from sensor OR substituted by CAN info	True			
							Even clutch speed available from sensor	True			
							End-of-line rod 1 position learn routine busy	False			
							End-of-line rod 2 position learn routine busy	False			
							End-of-line rod 3 position learn routine busy	False			
							End-of-line rod 4 position learn routine busy	False			
							End-of-line rod 5 position learn routine busy	False			
							Application state is unequal to error state	True			
							Application state is unequal to bypass state	True			
							Fault confirmation time:	500	ms		

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	<p>This diagnostic detects rod drift by determining too many active occurrences of the rod drift correction.</p> <p>Rod 5 drift correction active counter</p>		<p>>=</p> <p>10</p> <p>count</p>	<p>Enable Conditions:</p> <p>Rod drift correction for rod 5 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU</p> <p>Rod drift correction for rod 5 transition to active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active counter)</p>	<p>=</p> <p>True</p> <p>=</p> <p>True</p>	<p>Runs Continuously</p>	
	<p>This diagnostic detects rod drift by determining too long active occurrence of the rod drift correction.</p> <p>Rod 5 drift correction active timer</p>		<p>></p> <p>5000</p> <p>ms</p>	<p>Enable Conditions:</p> <p>Rod drift correction for rod 5 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU</p> <p>Rod drift correction for rod 5 active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active timer)</p>	<p>=</p> <p>True</p> <p>=</p> <p>True</p>	<p>Runs Continuously</p>	

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters		Enable Conditions	Time Required	MIL ilium.
Park lock disengage retry fault	P07E6	<p>This diagnostic detects a failure to disengage the parking lock.</p> <p>When parking lock disengagement is possible (presence of hydraulic power in the system) and the parking lock disengagement is requested, the time for parking lock disengagement is monitored.</p> <p>If the parking lock disengagement takes too long, a parking lock disengagement retry counter is incremented.</p> <p>When the parking lock disengagement retry counter reaches the maximum retry count, the parking lock is diagnosed stuck in park.</p>	<p>The difference between the adapted parklock hold position and the measured parklock position</p>	>	500	um	<p>Enable Conditions: Parklock engage park request</p>	= False	Runs Continuously	A
			<p>The difference between the measured parklock position and the adapted parklock open position</p>	>	500	um	<p>Parklock disengagement possible (1), Summary table attachments C_SID_ASV_SYS_PLKDISEN</p> <p>Parking lock state is Disengaging (4), Summary table attachments C_SID_ASV_SYS_PLKDISEN</p> <p>System pressure</p> <p>Parking lock position sensor electrical or consistency fault detected</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation Disengage active timer</p> <p>Parking lock disengaging retry counter</p>	<p>= True</p> <p>= True</p> <p>>= 15 bar</p> <p>= False</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>Disengage timeout (2), Summary table attachments C_SID_ASV_SYS_PLKDISEN ms</p> <p>= 3 count</p>		
		<p>This diagnostic detects an unintended parking lock engagement.</p> <p>When the parking lock was disengaged and the parking lock position sensor reads parking lock engagement for a confirmation time, the parking lock open fault retry counter is incremented.</p> <p>When the parking lock open fault retry counter reaches the maximum fault count, the parking lock is diagnosed stuck in park.</p>	<p>The difference between the adapted parklock hold position and the measured parklock position</p>	>	500	um	<p>Enable Conditions: Parklock engage park request</p>	= False	Runs Continuously	
			<p>The difference between the measured parklock position and the adapted parklock open position</p>	>	500	um	<p>Parking lock state is Open (4), Summary table attachments C_SID_ASV_SYS_PLKDISEN</p> <p>Diagnostic reset event</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation Open fault timer</p> <p>Parking lock open fault retry counter</p>	<p>= True</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>= 250 ms</p> <p>= 3 count</p>		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Park lock engage retry fault	P07E4	<p>This diagnostic detects a failure to engage the parking lock. If the parking lock engagement takes too long, the parking lock engage retry counter is incremented.</p> <p>If the parking lock retry counter reaches the maximum parking lock engagement retry count, the parking lock is diagnosed unable to engage.</p>	Absolute difference between the parklock locked position and the measured parklock position	> 500 um	<p>Enable Conditions:</p> <p>Parklock state transition to engaging allowed (1), see Summary table attachments C_SID_ASV_SYS_PLK_EN Vehicle speed acceptable for engaging parklock (2), see Summary table attachments C_SID_ASV_SYS_PLK_EN Parklock engage park request</p> <p>Parking lock state is Disengaging Parking lock piston sensor (PLPS) fault detected Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state</p> <p>Fault confirmation</p> <p>Parking lock engagement timer Engaging retry counter</p>	<p>= True</p> <p>= True</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>Engage timeout (3), see Summary table attachments C_SID_ASV_SYS_PLKEN ms count</p>	Runs Continuously	B
		<p>This diagnostic detects unintentional parking lock disengagement by measuring a parking lock position outside the parking lock locked position tolerances or a too higher vehicle or output speed.</p> <p>If the parking lock shows unintended parking lock disengagement, the parking lock locked fault counter is incremented.</p> <p>If the parking lock locked fault counter reaches the maximum parking lock locked fault count, the parking lock is diagnosed unable to engage.</p>	<p>Absolute difference between the parklock locked position and the measured parklock position</p> <p>OR</p> <p>Absolute vehicle speed</p> <p>OR</p> <p>Absolute speed of the output shaft</p>	<p>> 500 um</p> <p>> 3 kph</p> <p>> 30 rpm</p>	<p>Enable Conditions:</p> <p>Parking lock state is Locked (4), see Summary table attachments C_SID_ASV_SYS_PLK_EN</p> <p>Parklock engage park request</p> <p>Diagnostic reset event Application state is unequal to error state Application state is unequal to bypass state</p> <p>Fault confirmation</p> <p>Parking lock locked fault timer Locked retry counter</p>	<p>= True</p> <p>= True</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>= 50 ms</p> <p>= 1 count</p>	Runs Continuously	

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Transmission Clutch 1 Pressure Control Too High	P2855	This diagnostic detects a clutch pressure that is above the modeled pressure at the sensor. If the measured pressure is above the modeled pressure for too long, the clutch pressure control is diagnosed faulted with a pressure charge performance fault.	Difference between clutch 1 pressure sensor reading and modeled pressure Hysteresis	Pressure difference fault threshold > (1), see Summary table attachments C_SID_ASV_SYS_PRS_CLU bar = 2 bar	Enable Conditions: Diagnostic clear event Electrical fault for clutch 1 pressure sensor Electrical fault for clutch 1 pressure control valve Electrical fault for clutch 1 redundant shutdown valve Clutch 1 redundant shutdown valve position Clutch 1 recovery request Adaptive routine overrule for clutch 1 clutch pressure control valve current Adaptive routine overrule for clutch 1 fast filling Adaptive routine overrule for clutch 1 pressure control flow influence calculations Clutch 1 superfill active Last superfill on clutch 1 end Application state is unequal to error state Application state is unequal to bypass state Fault confirmation time:	= False = False = False = False = Hydraulic On = False = False = False = False = False = False = 80 ms = True = True Pressure difference too high confirmation time (2), see Summary table attachments C_SID_ASV_SYS_PRS_CLU ms	Runs Continuously	A
		This diagnostic detects an absolute difference between the measured pressure and the modeled pressure at the sensor. If absolute pressure difference is too high for too long and the measured pressure is higher than the modeled pressure, the clutch pressure control is diagnosed faulted with a pressure charge fault.	Absolute difference between clutch 1 pressure sensor reading and modeled pressure Hysteresis Difference between clutch 1 pressure sensor reading and modeled pressure	Absolute pressure difference fault threshold (3), see Summary table attachments C_SID_ASV_SYS_PRS_CLU bar = 0.5 bar > bar	Enable Conditions: Diagnostic clear event Electrical fault for clutch 1 pressure sensor Electrical fault for clutch 1 pressure control valve Electrical fault for clutch 1 redundant shutdown valve Clutch 1 redundant shutdown valve position Clutch 1 recovery request Adaptive routine overrule for clutch 1 clutch pressure control valve current Adaptive routine overrule for clutch 1 fast filling	= False = False = False = False = Hydraulic On = False = False = False	Runs Continuously	

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					Adaptive routine overrule for clutch 1 pressure control flow influence calculations Clutch 1 superfill active Last superfill on clutch 1 end Application state is unequal to error state Application state is unequal to bypass state	= False = False > 80 ms = True = True		
					Fault confirmation time: Absolute pressure too high difference timer	Absolute pressure difference confirmation time (4), see Summary table attachments C_SID_ASV_SYS_PRSJZLU ms >=		
		This diagnostic detects a fault to control the clutch pressure around the hold pressure. When the clutch is currently not in used, it is controlled around hold pressure which is a region where no torque will be transmitted through the clutch. If the clutch is being controlled around hold pressure and the measured pressure is above the hold pressure too much for too long, the clutch pressure control is diagnosed faulted with a pressure charge fault.	Absolute difference between clutch 1 target pressure and hold pressure Difference between clutch 1 pressure sensor reading and modeled pressure Hysteresis	< 0.05078125 bar > 1.19921875 bar = 0.5 bar	Enable Conditions: Diagnostic clear event Electrical fault for clutch 1 pressure sensor Electrical fault for clutch 1 pressure control valve Electrical fault for clutch 1 redundant shutdown valve Clutch 1 redundant shutdown valve position Clutch 1 recovery request Adaptive routine overrule for clutch 1 clutch pressure control valve current Adaptive routine overrule for clutch 1 fast filling Adaptive routine overrule for clutch 1 pressure control flow influence calculations Clutch 1 superfill active Last superfill on clutch 1 end Application state is unequal to error state Application state is unequal to bypass state	= False = False = False = Hydraulic On = False = False = False = False = False = False = False = False = False = False = False = False = False = False = True = True	Runs Continuously	
Transmission Clutch 1 Pressure Control Too Low	P2853	This diagnostic detects a fault to control the clutch pressure above zero pressure. If the model pressure at the sensor is bigger than a threshold and the clutch pressure sensor is measuring below a low the pressure detection level for too long, the clutch pressure control is diagnosed with a pressure discharge fault.	Clutch 1 modeled pressure Clutch 1 pressure sensor reading	> 1 bar < 0.5 bar	Enable Conditions: Diagnostic clear event Electrical fault for clutch 1 pressure sensor	= False = False	Runs Continuously	A

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					Electrical fault for clutch 1 pressure control valve	=	False		
					Electrical fault for clutch 1 redundant shutdown valve	=	False		
					Clutch 1 redundant shutdown valve position	=	Hydraulic On		
					Clutch 1 recovery request	=	False		
					Adaptive routine override for clutch 1 clutch pressure control valve current	=	False		
					Adaptive routine override for clutch 1 fast filling	=	False		
					Adaptive routine override for clutch 1 pressure control flow influence calculations	=	False		
					Clutch 1 superfill active	=	False		
					Last superfill on clutch 1 end	>	80	ms	
					Application state is unequal to error state	=	True		
					Application state is unequal to bypass state	=	True		
				Fault confirmation time:	No pressure detected fault timer	>=	5000	ms	
This diagnostic detects an absolute difference between the measured pressure and the modeled pressure at the sensor. If absolute pressure difference is too high for too long and the measured pressure is lower than the modeled pressure, the clutch pressure control is diagnosed faulted with a pressure discharge fault.	Absolute difference between clutch 1 pressure sensor reading and modeled pressure	>	Absolute pressure difference fault threshold (3), see Summary table attachments C_SID_ASV_SYS_PRS_CLU	bar	Enable Conditions:	Diagnostic clear event	=	False	Runs Continuously
	Hysteresis	=	0.5	bar	Electrical fault for clutch 1 pressure sensor	=	False		
	Difference between clutch 1 pressure sensor reading and modeled pressure	<		bar	Electrical fault for clutch 1 pressure control valve	=	False		
					Electrical fault for clutch 1 redundant shutdown valve	=	False		
					Clutch 1 redundant shutdown valve position	=	Hydraulic On		
					Clutch 1 recovery request	=	False		
					Adaptive routine override for clutch 1 clutch pressure control valve current	=	False		
					Adaptive routine override for clutch 1 fast filling	=	False		
					Adaptive routine override for clutch 1 pressure control flow influence calculations	=	False		
					Clutch 1 superfill active	=	False		
					Last superfill on clutch 1 end	>	80	ms	
					Application state is unequal to error state	=	True		
					Application state is unequal to bypass state	=	True		

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						Fault confirmation time:	Absolute pressure too high difference timer	>=	Absolute pressure difference confirmation time (4), see Summary table attachments C_SID_ASV_SYS_PRSJZLU ms		
Transmission Clutch 1 2 Pressure Control Too High	P2856	This diagnostic detects a clutch pressure that is above the modeled pressure at the sensor. If the measured pressure is above the modeled pressure for too long, the clutch pressure control is diagnosed faulted with a pressure charge performance fault.	Difference between clutch 2 pressure sensor reading and modeled pressure Hysteresis	Pressure difference fault threshold > (1), see Summary table attachments C_SID_ASV_SYS_PRS_CLU bar = 2 bar	Enable Conditions:	Diagnostic clear event Electrical fault for clutch 2 pressure sensor Electrical fault for clutch 2 pressure control valve Electrical fault for clutch 2 redundant shutdown valve Clutch 2 redundant shutdown valve position Clutch 2 recovery request Adaptive routine overrule for clutch 2 clutch pressure control valve current Adaptive routine overrule for clutch 2 fast filling Adaptive routine overrule for clutch 2 pressure control flow influence calculations Clutch 2 superfill active Last superfill on clutch 2 end Application state is unequal to error state Application state is unequal to bypass state	= False = False = False = False = Hydraulic On = False = False				

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[illegible]

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		<p>If the model pressure at the sensor is bigger than a threshold and the clutch pressure sensor is measuring below a low the pressure detection level for too long, the clutch pressure control is diagnosed with a pressure discharge fault.</p>	Clutch 2 pressure sensor reading	<p>< 0.5 bar</p>	<p>Electrical fault for clutch 2 pressure sensor = False</p> <p>Electrical fault for clutch 2 pressure control valve = False</p> <p>Electrical fault for clutch 2 redundant shutdown valve = False</p> <p>Clutch 2 redundant shutdown valve position = Hydraulic On</p> <p>Clutch 2 recovery request = False</p> <p>Adaptive routine overrule for clutch 2 clutch pressure control valve current = False</p> <p>Adaptive routine overrule for clutch 2 fast filling = False</p> <p>Adaptive routine overrule for clutch 2 pressure control flow influence calculations = False</p> <p>Clutch 2 superfill active = False</p> <p>Last superfill on clutch 2 end > 80 ms</p> <p>Application state is unequal to error state = True</p> <p>Application state is unequal to bypass state = True</p>		
		<p>This diagnostic detects an absolute difference between the measured pressure and the modeled pressure at the sensor.</p> <p>If absolute pressure difference is too high for too long and the measured pressure is lower than the modeled pressure, the clutch pressure control is diagnosed faulted with a pressure discharge fault.</p>	<p>Absolute difference between clutch 2 pressure sensor reading and modeled pressure</p> <p>Hysteresis</p> <p>Difference between clutch 2 pressure sensor reading and modeled pressure</p>	<p>Absolute pressure difference fault threshold (3), see Summary table attachments</p> <p>C_SID_ASV_SYS_PRS_CLU bar</p> <p>= 0.5 bar</p> <p>< bar</p>	<p>Fault confirmation time:</p> <p>No pressure detected fault timer</p> <p>= 5000 ms</p>		
				<p>Enable Conditions:</p> <p>Diagnostic clear event = False</p> <p>Electrical fault for clutch 2 pressure sensor = False</p> <p>Electrical fault for clutch 2 pressure control valve = False</p> <p>Electrical fault for clutch 2 redundant shutdown valve = False</p> <p>Clutch 2 redundant shutdown valve position = Hydraulic On</p> <p>Clutch 2 recovery request = False</p> <p>Adaptive routine overrule for clutch 2 clutch pressure control valve current = False</p> <p>Adaptive routine overrule for clutch 2 fast filling = False</p> <p>Adaptive routine overrule for clutch 2 pressure control flow influence calculations = False</p> <p>Clutch 2 superfill active = False</p> <p>Last superfill on clutch 2 end > 80 ms</p> <p>Application state is unequal to error state = True</p> <p>Application state is unequal to bypass state = True</p>		Runs Continuously	

					<div>Fault confirmation time:</div> <div>Absolute pressure too high difference timer</div>	<div>Absolute pressure difference confirmation time (4), see Summary table attachments C_SID_ASV_SYS_ PRS_CLU</div> <div>>=</div> <div>ms</div>		
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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Limited Slip Differential Clutch Pressure Control Too High	C2A18	<p>This diagnostic detects an absolute difference between the measured pressure and the modeled pressure at the sensor.</p> <p>If absolute pressure difference is too high for too long and the measured pressure is higher than the modeled pressure, the limited slip differential pressure control is diagnosed faulted with a too high pressure fault.</p>	<p>Absolute difference between limited slip differential pressure sensor reading and target pressure</p> <p>Hysteresis</p> <p>Difference between limited slip differential pressure sensor reading and target pressure</p>	<p>> 2 bar</p> <p>= 0.5</p> <p>> 0 bar</p>	<p>Enable Conditions:</p> <p>Electrical fault for limited slip differential pressure sensor</p> <p>Electrical fault for limited slip differential pressure control valve</p> <p>Electrical fault for limited slip differential redundant shutdown valve</p> <p>Limited slip differential redundant shutdown valve position</p> <p>Limited slip differential recovery request</p> <p>Adaptive routine overrule for limited slip differential pressure control valve current</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation time:</p>	<p>False</p> <p>=</p> <p>False</p> <p>=</p> <p>False</p> <p>=</p> <p>Hydraulic On</p> <p>=</p> <p>False</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p>=</p> <p>True</p> <p>500 ms</p>	Runs Continuously	B
Limited Slip Differential Clutch Pressure Control Too Low	C2A19	<p>This diagnostic detects an absolute difference between the measured pressure and the modeled pressure at the sensor.</p> <p>If absolute pressure difference is too high for too long and the measured pressure is lower than the modeled pressure, the limited slip differential pressure control is diagnosed faulted with a too low pressure fault.</p>	<p>Absolute difference between limited slip differential pressure sensor reading and target pressure</p> <p>Hysteresis</p> <p>Difference between limited slip differential pressure sensor reading and target pressure</p>	<p>> 2 bar</p> <p>= 0.5</p> <p>< 0 bar</p>	<p>Enable Conditions:</p> <p>Electrical fault for limited slip differential pressure sensor</p> <p>Electrical fault for limited slip differential pressure control valve</p> <p>Electrical fault for limited slip differential redundant shutdown valve</p> <p>Limited slip differential redundant shutdown valve position</p> <p>Limited slip differential recovery request</p> <p>Adaptive routine overrule for limited slip differential pressure control valve current</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault confirmation time:</p>	<p>False</p> <p>=</p> <p>False</p> <p>=</p> <p>False</p> <p>=</p> <p>Hydraulic On</p> <p>=</p> <p>False</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p>=</p> <p>True</p> <p>500 ms</p>	Runs Continuously	B

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
System Pressure Control Too High	P0869	This diagnostic detects a system pressure above the target pressure fault. If the measured system pressure is above the target system pressure for too long, the system pressure control is diagnosed with a pressure too high fault.	Difference between Measured system pressure and System pressure target Hysteresis low limit	> 5 bar = 3 bar	Enable Conditions: Electrical fault for system pressure sensor Electrical fault for sytem pressure pilot valve Hydraulic power available from main pump or from auxiliary pump Adaptive routine overrule for system pressure pilot valve current System pressure forced low waiting on steady flow No system pressure fault fail conditions System pressure recovery request System pressure recovery after system pressure drop check active (2), see Summary table attachments C_SID_ASV_SYS_PRSSYS Application state is unequal to error state Application state is unequal to bypass state Fault confirmation time:	= False = False True False False False False = False False = = True = True 1500 ms	Runs Continuously	A
System Pressure Control Too Low	P0868	This diagnostic detects a system pressure below the target pressure fault. If the measured system pressure is below the target system pressure for too long, the system pressure control is diagnosed with a pressure too low fault.	Difference between System pressure target and Measured system pressure Hysteresis low limit	System pressure fault low limit (1), see Summary table attachments C_SID_ASV_SYS_PRS_SYS bar 2 bar	Enable Conditions: Electrical fault for system pressure sensor Electrical fault for sytem pressure pilot valve Hydraulic power available from main pump or from auxiliary pump Adaptive routine overrule for system pressure pilot valve current System pressure forced low waiting on steady flow No system pressure fault fail conditions System pressure recovery request System pressure recovery after system pressure drop check active (2), see Summary table attachments C_SID_ASV_SYS_PRSSYS Application state is unequal to error state Application state is unequal to bypass state	= False = False True False False False False = False False = = True = True	Runs Continuously	A

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					Fault confirmation time:	1500 ms		
No System Pressure Fault	P0867	<p>This diagnostic detetcs a fault where there is no system pressure buildup as it is expected.</p> <p>If the transmission pump(s) are running, minimal system pressure buildup is expected. If this does not occur a system pressure performance fault is diagnosed.</p>	Measured system pressure	< 4 bar	<p>Enable Conditions:</p> <p>System pressure recovery request</p> <p>System pressure recovery after system pressure drop check active (2), see Summary table attachments C_SID_ASV_SYS_PRSSYS</p> <p>Electrical fault for system pressure sensor</p> <p>Hydraulic power available from main pump or from auxiliary pump</p> <p>Fault confirmation time:</p>	<p>= False</p> <p>= False</p> <p>= False</p> <p>= True</p> <p>2000 ms</p>	Runs Continuously	A

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Complement rod move caused by selector routing hydraulically off	P194F	<p>This diagnostic detects a selectory hydraulic stuck off fault.</p> <p>During a gear engagement or a gear disengagement, the corresponding rod positon sensor and the complement rod position sensor are analyzed.</p> <p>If no rod movement is detected for the rod corresponding to the intended gear engagement/disengagement and rod movement is detected for the complement rod and the intended selector position is hydraulically on, the selector mechanism is diagnosed hydraulically stuck off.</p>	<p>The difference between the actual rod sensor measurement and the actual rod start position</p>	<p><= 1100 um</p>	<p>Enable Conditions:</p> <p>Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASVSYSEL_SY</p> <p>Synchronizer shift started Flow of main pump Application state is unequal to error state Application state is unequal to bypass state Fault active of active rod sensor Expected position of synchronizer actuation selector pilot valve Actual rod force target</p> <p>Complement rod movement direction for shift solenoid in use</p>	<p>= False</p> <p>= True</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= Hydraulic On</p> <p>> 0 N</p> <p>= B to A</p>	Runs Continuously	A
			<p>The difference between the complement rod start position and the complement rod sensor measurement</p>	<p>> 1100 um</p>		<p>= 40 ms</p>		
		<p>This diagnostic detects a selectory hydraulic stuck off fault.</p> <p>During a gear engagement or a gear disengagement, the corresponding rod positon sensor and the complement rod position sensor are analyzed.</p> <p>If no rod movement is detected for the rod corresponding to the intended gear engagement/disengagement and rod movement is detected for the complement rod and the intended selector position is hydraulically on, the selector mechanism is diagnosed hydraulically stuck off.</p>	<p>The difference between the actual rod start position and the actual rod sensor measurement</p>	<p><= 1100 um</p>	<p>Enable Conditions:</p> <p>Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASVSYSEL_SY</p> <p>Synchronizer shift started Flow of main pump Application state is unequal to error state Application state is unequal to bypass state Fault active of active rod sensor Expected position of synchronizer actuation selector pilot valve Actual rod force target</p> <p>Complement rod movement direction for shift solenoid in use</p>	<p>= False</p> <p>= False</p> <p>= True</p> <p>= True</p> <p>= False</p> <p>= Hydraulic On</p> <p><= 0 N</p> <p>= A to B</p>	Runs Continuously	
			<p>The difference between the complement rod sensor measurement and the complement rod start position</p>	<p>> 1100 um</p>				

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					Fault confirmation time	= 40 ms	
This diagnostic detects a selectory hydraulic stuck off fault. During a gear engagement or a gear disengagement, the corresponding rod positon sensor and the complement rod position sensor are analyzed. If no rod movement is detected for the rod corresponding to the intended gear engagement/disengagement and rod movement is detected for the complement rod and the intended selector position is hydraulically on, the selector mechanism is diagnosed hydraulically stuck off.	The difference between the actual rod sensor measurement and the actual rod start position	<=	1100	urn	Enable Conditions: Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASVSYSSEL_SY Synchronizer shift started Flow of main pump Application state is unequal to error state Application state is unequal to bypass state Fault active of active rod sensor Expected position of synchronizer actuation selector pilot valve Actual rod force target Complement rod movement direction for shift solenoid in use	= False False =	Runs Continuously
	The difference between the complement rod sensor measurement and the complement rod start position	>	1100	urn		= True > Not Found + 0.5 lpm = True = True = False = Hydraulic On > 0 N = A to B = 40 ms	
This diagnostic detects a selectory hydraulic stuck off fault. During a gear engagement or a gear disengagement, the corresponding rod positon sensor and the complement rod position sensor are analyzed. If no rod movement is detected for the rod corresponding to the intended gear engagement/disengagement and rod movement is detected for the complement rod and the intended selector position is hydraulically on, the selector mechanism is diagnosed hydraulically stuck off.	The difference between the actual rod start position and the actual rod sensor measurement	<=	1100	urn	Enable Conditions: Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASVSYSSEL_SY Synchronizer shift started Flow of main pump Application state is unequal to error state Application state is unequal to bypass state Fault active of active rod sensor Expected position of synchronizer actuation selector pilot valve Actual rod force target Complement rod movement direction for shift solenoid in use	= False False =	Runs Continuously
	The difference between the complement rod start position and the complement rod sensor measurement	>	1100	urn		= True > Not Found + 0.5 lpm = True = True = False = Hydraulic On <= 0 N = B to A =	

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						Fault confirmation time	= 40 ms			
		<p>This diagnostic detects a hydraulically stuck off selector mechanism. This is by use of the synchronizer integrity routine which can be triggered by the setting by a gear system or component diagnostic failure or by a mismatch between the engaged gears stored in non-volatile memory and the engaged gears according to position and speed sensors. The synchronizer integrity routine performs small rod movement actuations and evaluates the actual rod movements caused by this.</p> <p>When no rod movement is detected corresponding to the acuated rod but its complement rod showed rod movement when the selector target position is hydraulically on, the selector stuck off confirmation counter is incremented.</p> <p>If the selector stuck off confirmation counter reaches the selector hydraulically stuck off fault confirmation count, the selector mechsanim is diagnosed hydraulically stuck off.</p>	<p>Rod movement in intended move direction during a synchronizer integrity test case (7), see Summary table attachments C_SID_ASVSYSSEL_SY</p> <p>Complement rod movement for actuated shift solenoid during a synchronizer integrity test case (7), see Summary table attachments C_SID_ASVSYSSEL_SY</p>	<p><=</p> <p>></p>	<p>100</p> <p>100</p>	<p>µm</p> <p>µm</p>	<p>Enable Conditions:</p> <p>Synchronizer integrity intrusive routine triggered (2), see Summary table attachments C_SID_ASVSYSSEL_SY</p> <p>Synchronizer integrity routine running conditions (3), see Summary table attachments C_SID_ASVSYSSEL_SY</p> <p>Expected position of synchronizer actuation selector pilot valve</p> <p>Synchronizer test case conditions met (4), see Summary table attachments C_SID_ASVSYSSEL_SY</p> <p>Fault confirmation count</p> <p>Selector stuck off fault detection during synchronizer test suite confirmation count</p> <p>Synchronizer integrity selector stuck off fault test suite confirmation runs</p>	<p>True</p> <p>True</p> <p>=</p> <p>Hydraulic On</p> <p>=</p> <p>True</p> <p>=</p> <p>1</p> <p>=</p> <p>1</p>	Runs Continuously	
Complement rod move caused by selector routing hydraulically on	P1950	<p>This diagnostic detects a selectory hydraulic stuck on fault.</p> <p>During a gear engagement or a gear disengagement, the corresponding rod positon sensor and the complement rod position sensor are analyzed.</p> <p>If no rod movement is detected for the rod corresponding to the intended gear engagement/disengagement and rod movement is detected for the complement rod and the intended selector position is hydraulically off, the selector mechanism is diagnosed hydraulically stuck on.</p>	<p>The difference between the actual rod sensor measurement and the actual rod start position</p> <p>The difference between the complement rod start position and the complement rod sensor measurement</p>	<p><=</p> <p>></p>	<p>1100</p> <p>1100</p>	<p>µm</p> <p>µm</p>	<p>Enable Conditions:</p> <p>Diagnostic reset event</p> <p>Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASVSYSSEL_SY</p> <p>Synchronizer shift started</p> <p>Flow of main pump</p> <p>Application state is unequal to error state</p> <p>Application state is unequal to bypass state</p> <p>Fault active of active rod sensor</p> <p>Expected position of synchronizer actuation selector pilot valve</p> <p>Actual rod force target</p>	<p>=</p> <p>False</p> <p>=</p> <p>False</p> <p>=</p> <p>True</p> <p>></p> <p>Not Found + 0.5 lpm</p> <p>=</p> <p>True</p> <p>=</p> <p>True</p> <p>=</p> <p>False</p> <p>=</p> <p>Hydraulic Off</p> <p>></p> <p>0 N</p>	Runs Continuously	A

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					Complement rod movement direction for shift solenoid in use	=	B to A		
					Fault confirmation time	=	40 ms		
This diagnostic detects a selectory hydraulic stuck on fault. During a gear engagement or a gear disengagement, the corresponding rod position sensor and the complement rod position sensor are analyzed. If no rod movement is detected for the rod corresponding to the intended gear engagement/disengagement and rod movement is detected for the complement rod and the intended selector position is hydraulically off, the selector mechanism is diagnosed hydraulically stuck on.	The difference between the actual rod start position and the actual rod sensor measurement	<=	1100	um	Enable Conditions: Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASVSYSSEL_SY	=	False	Runs Continuously	
	The difference between the complement rod sensor measurement and the complement rod start position	>	1100	um		=	False		
					Synchronizer shift started	=	True		
					Flow of main pump	>	Not Found + 0.5 lpm		
					Application state is unequal to error state	=	True		
					Application state is unequal to bypass state	=	True		
					Fault active of active rod sensor	=	False		
					Expected position of synchronizer actuation selector pilot valve	=	Hydraulic Off		
					Actual rod force target	<=	0 N		
					Complement rod movement direction for shift solenoid in use	=	A to B		
					Fault confirmation time	=	40 ms		
This diagnostic detects a selectory hydraulic stuck on fault. During a gear engagement or a gear disengagement, the corresponding rod position sensor and the complement rod position sensor are analyzed. If no rod movement is detected for the rod corresponding to the intended gear engagement/disengagement and rod movement is detected for the complement rod and the intended selector position is hydraulically off, the selector mechanism is diagnosed hydraulically stuck on.	The difference between the actual rod sensor measurement and the actual rod start position	<=	1100	um	Enable Conditions: Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASVSYSSEL_SY	=	False	Runs Continuously	
	The difference between the complement rod sensor measurement and the complement rod start position	>	1100	um		=	False		
					Synchronizer shift started	=	True		
					Flow of main pump	>	Not Found + 0.5 lpm		
					Application state is unequal to error state	=	True		
					Application state is unequal to bypass state	=	True		
					Fault active of active rod sensor	=	False		
					Expected position of synchronizer actuation selector pilot valve	=	Hydraulic Off		
					Actual rod force target	>	0 N		

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					Complement rod movement direction for shift solenoid in use	=	A to B		
					Fault confirmation time	=	40 ms		
This diagnostic detects a selectory hydraulic stuck on fault. During a gear engagement or a gear disengagement, the corresponding rod position sensor and the complement rod position sensor are analyzed. If no rod movement is detected for the rod corresponding to the intended gear engagement/disengagement and rod movement is detected for the complement rod and the intended selector position is hydraulically off, the selector mechanism is diagnosed hydraulically stuck on.	The difference between the actual rod start position and the actual rod sensor measurement The difference between the complement rod start position and the complement rod sensor measurement	<=	1100	Enable Conditions: Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASVSYSEL_SY Synchronizer shift started Flow of main pump Application state is unequal to error state Application state is unequal to bypass state Fault active of active rod sensor Expected position of synchronizer actuation selector pilot valve Actual rod force target Complement rod movement direction for shift solenoid in use	=	False	Runs Continuously		
		>	1100		=	False			
						=	True		
						>	Not Found + 0.5 lpm		
						=	True		
						=	True		
						=	False		
						=	Hydraulic Off		
						<=	0 N		
						=	B to A		
					Fault confirmation time	=	40 ms		
This diagnostic detects a hydraulically stuck on selector mechanism. This is by use of the synchronizer integrity routine which can be triggered by the setting by a gear system or component diagnostic failure or by a mismatch between the engaged gears stored in non-volatile memory and the engaged gears according to position and speed sensors. The synchronizer integrity routine performs small rod movement actuations and evaluates the actual rod movements caused by this. When no rod movement is detected corresponding to the actuated rod but its complement rod showed rod movement when the selector target position is hydraulically off, the selector stuck on confirmation counter is incremented. If the selector stuck on confirmation counter reaches the selector hydraulically stuck off fault confirmation count, the selector mechanism is diagnosed hydraulically stuck on.	Rod movement in intended move direction during a synchronizer integrity test case (7), see Summary table attachments C_SID_ASVSYSEL_SY Complement rod movement for actuated shift solenoid during a test case (7), see Summary table attachments C_SID_ASV_SYSEL_SY	<=	100 pm	Enable Conditions: Synchronizer integrity intrusive routine triggered (2), see Summary table attachments C_SID_ASVSYSEL_SY Synchronizer integrity routine running conditions (3), see Summary table attachments C_SID_ASVSYSEL_SY Expected position of synchronizer actuation selector pilot valve		True	Runs Continuously		
		>	100 pm		=	True			
							Hydraulic Off		
						=			

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					<div>Synchronizer test case conditions met (4), see Summary table attachments C_SID_ASVSYSEL_SY</div>		True		
					<div>Fault confirmation count</div>	<div>Selector stuck on fault detection during synchronizer test suite confirmation count</div>	<div>=</div>	<div>1</div>	
						<div>Synchronizer integrity selector fault stuck on test suite confirmation runs</div>	<div>=</div>	<div>1</div>	

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.			
Serial Data Message Safety Performance 1	P1967	The safety software partition A detects incorrect values for safety relevant CAN signals. On the one hand, the safety software A side considers certain values for the transmission actual range signal determined by application software which are always unacceptable. On the other hand, the safety software A side considers values for the transmission actual range signal determined by application software which are acceptable according to the working conditions/states. The DTC is set when transmission actual range signal reported by application software reports an illegal value or when none of the acceptable situations are detected.	Values determined by application software, <u>which are always deemed unacceptable by safety software A side</u>	Park Position or Reverse Position or Neutral Position or First Drive Position !=	Application software reports transmission actual range as invalid	=	False	Runs continuously	B		
			Transmission actual range reported by application software								
			<u>Situations which are deemed acceptable by safety software A side</u>								
			Transmission actual range reported by application software								
			Transmission actual range determined by safety software A partition								
			Transmission actual range reported by application software								
		Transmission actual range determined by safety software A partition	=	Park	Fault confirmation time	Fault confirmation time before safety software intervention	>=	450 ms			
		Transmission actual range reported by application software	=	Drive or Reverse							
		Transmission actual range determined by safety software A partition	=	Neutral							
		The safety software partition A detects incorrect values for safety relevant CAN signals. On the one hand, the safety software A side considers certain values for the shift lever position signal determined by application software which are always unacceptable. On the other hand, the safety software A side considers values for the shift lever position signal determined by application software which are acceptable according to the working conditions/states. The DTC is set when the shift lever position determined by application software reports an illegal value or when none of the acceptable situations are detected.	Values determined by application software, <u>which are always deemed unacceptable by safety software A side</u>	<	Park Range	Application software reports shift lever position as invalid	=	False	Runs continuously		
			Shift lever position reported by application software								
			Shift lever position reported by application software	>	Forward Range B						
			<u>Situations which are deemed acceptable by safety software A side</u>								
			Transmission actual range determined by safety software A partition	=	Park						
			Shift lever position reported by application software	!=	Park						
			Transmission actual range determined by safety software A partition	=	Neutral						
			Shift lever position reported by application software	=	Forward Range A or Forward Range B						
Transmission actual range determined by safety software A partition	=		Drive								
Shift lever position reported by application software	=		Reverse Range								

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	Transmission actual range determined by safety software A partition	=	Reverse	Fault confirmation time	Fault confirmation time before safety software intervention	>=	450	ms	
The safety software partition A detects incorrect values for safety relevant CAN signals.	Values determined by application software, which are always deemed unacceptable by safety software A side			Enable conditions:	Application software reports engaged power flow as invalid	=	False		Runs continuously
On the one hand, the safety software A side considers certain values for the engaged power flow signal determined by application software which are always unacceptable.	Engaged power flow reported by application software	<	No Powerflow						
On the other hand, the safety software A side considers values for the engaged power flow signal determined by application software which are acceptable according to the working conditions/states.	Engaged power flow reported by application software	>	Reverse Engaged						
The DTC is set when the engaged power flow reported by application software reports an illegal value or when none of the acceptable situations are detected.	Situations which are deemed acceptable by safety software A side								
	Transmission actual range determined by safety software A partition	=	Park						
	Transmission actual range determined by safety software A partition	=	Neutral						
	Engaged power flow reported by application software	=	Drive Engaged						
	Transmission actual range determined by safety software A partition	=	Drive						
	Engaged power flow reported by application software	=	Reverse Engaged						
	Transmission actual range determined by safety software A partition	=	Reverse	Fault confirmation time	Fault confirmation time before safety software intervention	>=	450	ms	
The safety software partition A detects incorrect values for safety relevant CAN signals.	Values determined by application software, which are always deemed unacceptable by safety software A side			Enable conditions:	Application software reports engaged transmission output speed as invalid	=	True		Runs continuously
On the one hand, the safety software A side considers certain values for the transmission output speed signal determined by application software which are always unacceptable.	Transmission output speed reported by application software	>	16383.75	rpm					
On the other hand, the safety software A side considers values for the transmission output speed signal determined by application software which are acceptable according to the working conditions/states.	Situations which are deemed acceptable by safety software A side								
The DTC is set when the transmission output speed reported by application software reports an illegal value or when none of the acceptable situations are detected.	Absolute difference between transmission output speed reported by application software with applied delay and absolute transmission output speed determined by safety software A partition	<=	Transmission output speed tolerance (1), see summary table attachments C_SID_SSWA_CAN	rpm					
	Delay applied for transmission output speed reported by application software	=	50	ms	Fault confirmation time	Fault confirmation time before safety software intervention	>=	450	ms
The safety software partition A detects incorrect values for safety relevant CAN signals.	Values determined by application software, which are always deemed unacceptable by safety software A side			Enable conditions:	Application software reports transmission active gear as invalid	=	False		Runs continuously
On the one hand, the safety software A side considers certain values for the transmission active gear signal determined by application software which are always unacceptable.	Transmission active gear reported by application software	>	Park Gear						

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On the other hand, the safety software A side considers values for the transmission active gear signal determined by application software which are acceptable according to the working conditions/states.	Transmission active gear reported by application software	<	First Gear					
The DTC is set when the transmission active gear reported by application software reports an illegal value or when none of the acceptable situations are detected.	Transmission active gear reported by application software	>	Eight Gear					
	Transmission active gear reported by application software	<	Neutral Gear					
	Transmission active gear determined by safety software A partition	=	Park					
	Transmission active gear determined by safety software A partition	=	Neutral					
	Transmission active gear reported by application software	!=	Park					
	Transmission active gear determined by safety software A partition	=	Reverse					
	Transmission active gear reported by application software	=	Reverse					
	Transmission active gear determined by safety software A partition	>=	Gear 1					
	Transmission active gear determined by safety software A partition	<=	Gear 8					
	Transmission active gear reported by application software	>=	Gear 1					
	Transmission active gear reported by application software	<=	Transmission active gear determined by safety software A partition					
	Transmission active gear determined by safety software A partition	>=	Gear 1					
	Transmission active gear determined by safety software A partition	<=	Gear 8					
	Time since last clutch shift was busy	<	2000	ms				
	Situation allowed enable	=	C_SE_TRUE					
	Transmission active gear determined by safety software A partition	=	Reverse					
	Time since last clutch shift was busy	<	2000	ms				
	Situation allowed enable	=	C_SE_TRUE					
				Fault confirmation time	Fault confirmation time before safety software intervention	>=	450	ms
The safety software partition A detects incorrect values for safety relevant CAN signals.	Values determined by application software, which are always deemed unacceptable by safety software A side			Enable conditions:	Application software reports transmission active gear ratio as invalid	=	False	Runs continuously
On the one hand, the safety software A side considers certain values for the transmission active gear ratio signal determined by application software which are always unacceptable.	Transmission active gear reported by application software	>	7.99609375					
On the other hand, the safety software A side considers values for the transmission active gear ratio signal determined by application software which are acceptable according to the working conditions/states.	Values determined by application software, which are always deemed unacceptable by safety software A side							

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24OBDG07 TCM Summary Tables

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Odd Gear Clutch Safety Performance 1	P1960	<p>The safety software partition A prevents unintended acceleration.</p> <p>If the odd clutch torque is too high while the odd clutch is slipping and a gear is engaged on the odd clutch shaft, the safety software partition A can detect a safety goal violation.</p> <p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.</p> <p>When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 1 DTC is set.</p>	Difference between actual torque on odd clutch and driver demanded engine torque	>= Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWA_SG_CLU Nm	Range request	= Drive or Reverse	Runs Continuously	A
			Odd clutch slip speed	>= 1000 rpm	Odd gear shaft is in neutral	= False		
					Fault confirmation for L1 intervention Fault confirmation time before application software intervention	>= 350 ms		
					Application software intervention limit before latching	>= 2 count		
					Fault confirmation for L2 intervention Fault confirmation time before safety software intervention	>= 420 ms		
		<p>The safety software partition A prevents unintended acceleration.</p> <p>If the actual clutch torque is too high and the torque request towards the engine is too high while the odd clutch is not slipping and a gear is engaged on the odd clutch shaft, the safety software partition A can detect a safety goal violation.</p> <p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.</p> <p>When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 1 DTC is set.</p>	Difference between actual torque on odd clutch and driver demanded engine torque	>= Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWA_SG_CLU Nm	Odd gear shaft is in neutral	= False	Runs Continuously	
			Odd clutch slip speed	<= 250 rpm	Slow engine torque request active	= True		
			Odd clutch slip speed	>= -250 rpm	or			
			Difference between slow torque request towards the engine and driver demanded engine torque	>= Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWA_SG_CLU Nm	Fast engine torque request active	= True		
			Difference between fast torque request towards the engine and driver demanded engine torque	>= Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWA_SG_CLU Nm	Fault confirmation for L1 intervention Fault confirmation time before application software intervention	>= 350 ms		
					Application software intervention limit before latching	>= 2 count		
					Fault confirmation for L2 intervention Fault confirmation time before safety software intervention	>= 420 ms		
		<p>The safety software partition A prevents unintended change in driving direction.</p> <p>If the unintendend change in driving direction condition is detected for the odd clutch shaft defined by acceleration in forward direction while request is reverse, the safety software can detect a safety goal violation.</p>	Absolute vehicle speed	<= 18 kph	Range request	= Reverse	Runs Continuously	
			Absolute vehicle speed hysteresis	> 19 kph	Vehicle speed	>= 0 kph		

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If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.

When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 1 DTC is set.

Total transmission output torque

>= 394 Nm

Odd clutch shaft has forward gear engaged

= True

Transmission output torque contribution from odd clutch shaft

> 394 Nm

Fault confirmation for L1 intervention

Fault confirmation time before application software intervention

>= 350

ms

or

Application software intervention limit before latching

>= 2

count

Transmission output torque contribution from odd clutch shaft

>= Transmission output torque contribution from even clutch shaft

Fault confirmation for L2 intervention

Fault confirmation time before safety software intervention

>= 420

ms

The safety software partition A prevents unintended propulsion engagement, If the unintended propulsion engagement condition is detected defined by acceleration in drive or reverse while request is park or neutral, the safety software can detect a safety goal violation.

Total transmission output torque

> 394 Nm

Range request

= Park or Neutral

Runs Continuously

Transmission output torque contribution from odd clutch shaft

> 394 Nm

Odd clutch shaft has forward gear engaged

= True

or

Fault confirmation for L1 intervention

Fault confirmation time before application software intervention

>= 350

ms

If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.

When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 1 DTC is set.

Transmission output torque contribution from odd clutch shaft

>= Transmission output torque contribution from even clutch shaft

Application software intervention limit before latching

>= 2

count

Fault confirmation for L2 intervention

Fault confirmation time before safety software intervention

>= 420

ms

The safety software partition A prevents unintended deceleration caused by clutch tie up.

Odd clutch torque

>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWA_SG_CLU Nm

Odd clutch shaft has forward gear engaged

= True

Runs Continuously

If both clutch shafts have a gear engaged and both clutches show torque at the same time, a clutch tie up condition is detected.

Odd clutch torque hysteresis

< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWA_SG_CLU Nm

Even clutch shaft has reverse gear engaged

= True

Clutch tie up can be caused by clutch torque being applied on both clutches while one clutch shaft has a forward gear engaged and the other clutch shaft or has a forward gear engaged.

Even clutch torque

>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWA_SG_CLU Nm

Vehicle speed

<= -18

kph

Even clutch torque hysteresis

< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWA_SG_CLU Nm

Vehicle speed reset threshold

> -17

kph

Total transmission output torque

> 820 Nm

Clutch tie up can be caused by clutch torque being applied on both clutch with at least one of the clutches showing high negative slip.

Odd clutch torque

>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWA_SG_CLU Nm

Odd clutch shaft has gear engaged

= True

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The clutch shaft being targeted for reaction is chosen based on whether both clutches show high negative slip in which case the clutch with the highest clutch torque is chosen.

In case only a single clutch is showing high negative slip, this clutch shaft is targeted.

Odd clutch torque hysteresis

< Clutch tie up torque recovery limit (3), see Summary table attachments C_SID_SSWA_SG_CLU Nm

Even clutch torque

>= Clutch tie up torque limit (2), see Summary table attachments C_SID_SSWA_SG_CLU Nm

Even clutch torque hysteresis

< Clutch tie up torque recovery limit (3), see Summary table attachments C_SID_SSWA_SG_CLU Nm

Absolute total transmission output torque

> 820 Nm

Odd clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWA_SG_CLU rpm

or

Even clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWA_SG_CLU rpm

Determination of odd clutch targeted for reaction

Odd clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWA_SG_CLU rpm

Even clutch slip speed

>= Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWA_SG_CLU rpm

or

Odd clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWA_SG_CLU rpm

Even clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWA_SG_CLU rpm

Odd clutch torque

> Even clutch torque

Even clutch shaft has gear engaged

= True

Absolute vehicle speed

> 18 kph

Vehicle speed reset threshold

<= 17 kph

If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.

When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 1 DTC is set.

Fault confirmation for L1 intervention

Fault confirmation time before application software intervention

>= 350 ms

Application software intervention limit before latching

>= 2 count

Fault confirmation for L2 intervention

Fault confirmation time before safety software intervention

>= 420 ms

The safety software partition A prevents unintended deceleration caused by clutch apply with a too low gear engaged.

Odd clutch torque

>= Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachments C_SID_SSWA_SG_CLU Nm

Clutch tie up safety goal violation detected

= False

Runs Continuously

If clutch torque is applied with high negative slip a clutch actuation with too low gear engaged condition is detected.

Clutch torque hysteresis

< Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachments C_SID_SSWA_SG_CLU Nm

Odd clutch shaft has gear engaged

= True

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			Odd clutch slip	<	Clutch actuation with too low gear engaged clutch slip limit (7), see Summary table attachements C_SID_SSW_SG_CLU	rpm	Absolute vehicle speed	>=	18	kph		
			Engine speed gradient	>=	1	rpm/IOms	Absolute vehicle speed hysteresis	<	17	kph		
		The safety software partition A prevents unintended deceleration caused by clutch apply in forwards direction while moving in the backwards direction.	Odd clutch torque	>=	Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachements C_SID_SSWA_SG_CLU	Nm	Odd clutch shaft has a forward gear engaged	=	True			
		If too much clutch torque is applied with a forwards gear enaged while vehicle is moving in backwards direction, the safety software partition A can detect a safety goal violation.	Clutch torque hysteresis	<	Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachements C_SID_SSWA_SG_CLU	Nm	Vehicle speed	<=	-18	kph		
							Vehicle speed hysteresis	>	-17	kph		
		If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.					Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>=	350	ms	
		When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 1 DTC is set.						Application software intervention limit before latching	>=	2	count	
							Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>=	420	ms	
Even Gear Clutch Safety Performance 1	P1961	The safety software partition A prevents unintended acceleration.	Difference between actual torque on even clutch and driver demanded engine torque	>=	Clutch torque high acceleration limit depending on gear (1), see Summary tabel attachements C_SID_SSWA_SG_CLU	Nm	Range request	=	Drive or Reverse		Runs Continuously	A
		If the even clutch torque is too high while the even clutch is slipping and a gear is engaged on the even clutch shaft, the safety software partition A can detect a safety goal violation.	Even clutch slip speed	>=	1000	rpm	Even gear shaft is in neutral	=	False			
		If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.					Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>=	350	ms	
		When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 1 DTC is set.						Application software intervention limit before latching	>=	2	count	
							Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>=	420	ms	
		The safety software partition A prevents unintended acceleration.	Difference between actual torque on odd clutch and driver demanded engine torque	>=	Clutch torque high acceleration limit depending on gear (1), see Summary tabel attachements C_SID_SSWA_SG_CLU	Nm	Even gear shaft is in neutral	=	False		Runs Continuously	

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<p>If the actual clutch torque is too high and the torque request towards the engine is too high while the even clutch is not slipping and a gear is engaged on the even clutch shaft, the safety software partition A can detect a safety goal violation.</p> <p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.</p> <p>When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 1 DTC is set.</p>	Even clutch slip speed	<=	250	rpm		Slow engine torque request active	=	True		
	Even clutch slip speed	>=	-250	rpm		or				
	Difference between slow torque request towards the engine and driver demanded engine torque	>=	Clutch torque high acceleration limit depending on gear (1), see Summary label attachements C_SID_SSWA_SG_CLU		Nm		Fast engine torque request active	=	True	
	Difference between fast torque request towards the engine and driver demanded engine torque	>=		Clutch torque high acceleration limit depending on gear (1), see Summary label attachements C_SID_SSWA_SG_CLU	Nm	Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>=	350	ms
							Application software intervention limit before latching	>=	2	count
						Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>=	420	ms
<p>The safety software partition A prevents unintended change in driving direction,</p> <p>If the unintended change in driving direction condition is detected for the even clutch shaft defined by acceleration in forward direction while request is reverse or acceleration in reverse direction while request is forward, the safety software partition A can detect a safety goal violation.</p> <p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.</p> <p>When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 1 DTC is set.</p>	Absolute vehicle speed	<=	18	kph		Range request	=	Drive	Runs Continuously	
	Absolute vehicle speed hysteresis	>	19	kph		Vehicle speed	<=	0		kph
	Total transmission output torque	<	-394	Nm		Even clutch shaft has reverse gear engaged	=	True		
	Absolute vehicle speed	<=	18	kph		Range request	=	Reverse		
	Absolute vehicle speed hysteresis	>	19	kph		Vehicle speed	>=	0		kph
	Total transmission output torque	>=	394	Nm		Even clutch shaft has forward gear engaged	=	True		
	Transmission output torque contribution from even clutch shaft or	>	394	Nm						
	Transmission output torque contribution from even clutch shaft	>=	Transmission output torque contribution from odd clutch shaft							
					Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>=	350		ms
						Application software intervention limit before latching	>=	2		count

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				Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>= 420 ms	
The safety software partition A prevents unintended propulsion engagement.	Total transmission output torque	< -394 Nm			Range request	= Park or Neutral	Runs Continuously
If the unintended propulsion engagement condition is detected defined by acceleration in drive or reverse while request is park or neutral, the safety software partition A can detect a safety goal violation.	Transmission output torque contribution from even clutch shaft	< -394 Nm			Even clutch shaft has forward gear engaged	= True	
If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.	or						
When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 1 DTC is set.	Transmission output torque from even clutch shaft	< Transmission output torque from odd clutch shaft					
	Total transmission output torque	> 394 Nm					
	Transmission output torque contribution from even clutch shaft	> 394 Nm		Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>= 350 ms	
	or				Application software intervention limit before latching	>= 2 count	
	Transmission output torque contribution from even clutch shaft	>= Transmission output torque contribution from odd clutch shaft		Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>= 420 ms	
The safety software partition A prevents unintended deceleration caused by clutch tie up.	Odd clutch torque	>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWA_SG_CLU Nm			Odd clutch shaft has forward gear engaged	= True	Runs Continuously
If both clutch shafts have a gear engaged and both clutches show torque at the same time, a clutch tie up condition is detected.	Odd clutch torque hysteresis	< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWA_SG_CLU Nm			Even clutch shaft has reverse gear engaged	= True	
Clutch tie up can be caused by clutch torque being applied on both clutches while one clutch shaft has a forward gear engaged and the other clutch shaft or has a forward gear engaged.	Even clutch torque	>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWA_SG_CLU Nm			Vehicle speed	>= 18 kph	
	Even clutch torque hysteresis	< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWA_SG_CLU Nm			Vehicle speed reset threshold	< 17 kph	
	Total transmission output torque	< -820 Nm					
Clutch tie up can be caused by clutch torque being applied on both clutch with at least one of the clutches showing high negative slip.	Odd clutch torque	>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWA_SG_CLU Nm			Odd clutch shaft has gear engaged	= True	
The clutch shaft being targeted for reaction is chosen based on whether both clutches show high negative slip in which case the clutch with the highest clutch torque is chosen.	Odd clutch torque hysteresis	< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWA_SG_CLU Nm			Even clutch shaft has gear engaged	= True	
In case only a single clutch is showing high negative slip, this clutch shaft is targeted.	Even clutch torque	>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWA_SG_CLU Nm			Absolute vehicle speed	> 18 kph	

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			Even clutch torque hysteresis	<	Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWA_SG_CLU	Nm	Vehicle speed reset threshold	<=	17	kph	
			Absolute total transmission output torque	>	820	Nm					
			Odd clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachements C_SID_SSWA_SG_CLU	rpm					
			or								
			Even clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachements C_SID_SSWA_SG_CLU	rpm					
			<u>Determination of even clutch targeted for reaction</u>								
			Odd clutch slip speed	>=	Clutch tie up slip threshold (4), see Summary table attachements C_SID_SSWA_SG_CLU	rpm					
			Even clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachements C_SID_SSWA_SG_CLU	rpm					
			or								
			Odd clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachements C_SID_SSWA_SG_CLU	rpm					
			Even clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachements C_SID_SSWA_SG_CLU	rpm					
			Even clutch torque	>=	Odd clutch torque						
			<p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.</p> <p>When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 1 DTC is set.</p>				Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>=	350	ms
								Application software intervention limit before latching	>=	2	count
							Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>=	420	ms
			The safety software partition A prevents unintended deceleration caused by clutch apply with a too low gear engaged.	>=	Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachements C_SID_SSWA_SG_CLU	Nm		Clutch tie up safety goal violation detected	=	False	Runs Continuously
			If clutch torque is applied with high negative slip a clutch actuation with too low gear engaged condition is detected.	<	Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachements C_SID_SSWA_SG_CLU	Nm		Odd clutch shaft has gear engaged	=	True	
			Even clutch slip	<	Clutch actuation with too low gear engaged clutch slip limit (7), see Summary table attachements C_SID_SSW_SG_CLU	rpm		Absolute vehicle speed	>=	18	kph
			Engine speed gradient	>=	1	rpm/IOms		Absolute vehicle speed hysteresis	<	17	kph

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		<p>The safety software partition A prevents unintended deceleration caused by clutch apply in forwards direction while moving in the backwards direction.</p> <p>If too much clutch torque is applied with a forwards gear enaged while vehicle is moving in backwards direction, the safety software partition A can detect a safety goal violation.</p>	Even clutch torque	<p>>=</p> <p>Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachements C_SID_SSWA_SG_CLU</p> <p>Nm</p>	Even clutch shaft has a forward gear engaged	=	True		
			Clutch torque hysteresis	<p><</p> <p>Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachements C_SID_SSWA_SG_CLU</p> <p>Nm</p>	Vehicle speed	<=	-18	kph	
					Vehicle speed hysteresis	>	-17	kph	
			Even clutch torque	<p>>=</p> <p>Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachements C_SID_SSWA_SG_CLU</p> <p>Nm</p>	Even clutch shaft has a reverse gear engaged	=	True		
		<p>The safety software partition A prevents unintended deceleration caused by clutch apply in reverse direction while moving in the forward direction.</p> <p>If too much clutch torque is applied with a reverse gear enaged while vehicle is moving in toward direction, the safety software partition A can detect a safety goal violation.</p>	Clutch torque hysteresis	<p><</p> <p>Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachements C_SID_SSWA_SG_CLU</p> <p>Nm</p>	Vehicle speed	>=	18	kph	
					Vehicle speed hysteresis	<	17	kph	
					<p>Fault confirmation for L1 intervention</p> <p>Fault confirmation time before application software intervention</p>	>=	350	ms	
					<p>Application software intervention limit before latching</p>	>=	2	count	
		<p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition A will intervene.</p> <p>When the safety software partition A intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 1 DTC is set.</p>			<p>Fault confirmation for L2 intervention</p> <p>Fault confirmation time before safety software intervention</p>	>=	420	ms	

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Park System Safety Performance 1	P1964	The safety software partition A detects unintended parking lock disengagement.	Absolute difference between parking lock position measured and learned parking lock engaged position	> 500 pm	Enable Conditions: Parking lock was previously confirmed engaged (1), see Summary table attachements C_SID\$SWASG_PLK Range request	= True = Park	Runs Continuously	B
		The safety software partition A detects failure to engage parking lock.	Absolute difference between parking lock position measured and learned parking lock engaged position	> 500 pm	Enable Conditions: Driver range request Absolute Vehicle speed Parking lock was previously confirmed engaged during park request (2), see Summary table attachements C_SID_SSWB_SG_PLK	= Park < 0.25 kph = False	Runs Continuously	
					Fault confirmation time Fault confirmation time before safety software intervention	>= 450 ms		

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL ilium.
Serial Data Message Safety Performance 1	P1968	<p>The safety software partition B detects incorrect values for safety relevant CAN signals.</p> <p>On the one hand, the safety software B side considers certain values for the transmission actual range signal determined by application software which are always unacceptable.</p> <p>On the other hand, the safety software B side considers values for the transmission actual range signal determined by application software which are acceptable according to the working conditions/states.</p> <p>The DTC is set when transmission actual range signal reported by application software reports an illegal value or when none of the acceptable situations are detected.</p>	<p>Values determined by application software, <u>which are always deemed unacceptable by safety software B side</u></p> <p>Transmission actual range reported by application software</p>	<p>!=</p> <p>Park Position or Reverse Position or Neutral Position or First Drive Position</p>	<p>Enable conditions:</p> <p>Application software reports transmission actual range as invalid</p>	<p>=</p> <p>False</p>	<p>Runs continuously</p>	<p>B</p>
			<p><u>Situations which are deemed acceptable by safety software B side</u></p> <p>Transmission actual range determined by safety software B partition</p>	<p>=</p> <p>Park</p>				
			<p>Absolute transmission output speed</p> <p>Transmission actual range reported by application software</p>	<p>></p> <p>50 rpm</p> <p>=</p> <p>Transmission actual range determined by safety software B partition</p>				
			<p>Absolute transmission output speed</p> <p>Transmission actual range reported by application software</p>	<p>></p> <p>50 rpm</p> <p>=</p> <p>Drive or Reverse</p>				
			<p>Transmission actual range determined by safety software B partition</p> <p>Absolute transmission output speed</p>	<p>=</p> <p>Neutral</p> <p><=</p> <p>50 rpm</p>				
			<p>Transmission actual range reported by application software</p> <p>Transmission actual range determined by safety software B partition</p>	<p>!=</p> <p>Park Neutral or Drive or Reverse</p> <p>=</p>				
			<p>Transmission actual range determined by safety software B partition</p>	<p>=</p> <p>Park</p>				
			<p>Absolute transmission output speed</p>	<p>></p> <p>50 rpm</p>				
			<p>Transmission actual range reported by application software</p>	<p>!=</p> <p>Park Neutral or Drive or Reverse</p>				
			<p>Transmission actual range determined by safety software B partition</p>	<p>=</p> <p>Park</p>				
			<p>Absolute transmission output speed</p>	<p>></p> <p>50 rpm</p>				
			<p>Transmission actual range reported by application software</p>	<p>!=</p> <p>Park Neutral or Drive or Reverse</p>				
			<p>Transmission actual range determined by safety software B partition</p>	<p>=</p> <p>Park</p>				
			<p>Absolute transmission output speed</p>	<p>></p> <p>50 rpm</p>				
Serial Data Message Safety Performance 1	P1968	<p>The safety software partition B detects incorrect values for safety relevant CAN signals.</p> <p>On the one hand, the safety software B side considers certain values for the shift lever position signal determined by application software which are always unacceptable.</p> <p>On the other hand, the safety software B side considers values for the shift lever position signal determined by application software which are acceptable according to the working conditions/states.</p> <p>The DTC is set when the shift lever position determined by application software reports an illegal value or when none of the acceptable situations are detected.</p>	<p>Values determined by application software, <u>which are always deemed unacceptable by safety software B side</u></p> <p>Shift lever position reported by application software</p>	<p><</p> <p>Park Range</p>	<p>Enable conditions:</p> <p>Application software reports shift lever position as invalid</p>	<p>=</p> <p>False</p>	<p>Runs continuously</p>	<p>B</p>
			<p>Shift lever position reported by application software</p>	<p>></p> <p>Forward Range B</p>				
			<p><u>Situations which are deemed acceptable by safety software B side</u></p> <p>Transmission actual range determined by safety software B partition</p>	<p>=</p> <p>Park</p>				
			<p>Absolute transmission output speed</p>	<p>></p> <p>50 rpm</p>				
			<p>Transmission actual range reported by application software</p>	<p>!=</p> <p>Park Neutral or Drive or Reverse</p>				
			<p>Transmission actual range determined by safety software B partition</p>	<p>=</p> <p>Park</p>				
			<p>Absolute transmission output speed</p>	<p>></p> <p>50 rpm</p>				
			<p>Transmission actual range reported by application software</p>	<p>!=</p> <p>Park Neutral or Drive or Reverse</p>				
			<p>Transmission actual range determined by safety software B partition</p>	<p>=</p> <p>Park</p>				
			<p>Absolute transmission output speed</p>	<p>></p> <p>50 rpm</p>				
			<p>Transmission actual range reported by application software</p>	<p>!=</p> <p>Park Neutral or Drive or Reverse</p>				
			<p>Transmission actual range determined by safety software B partition</p>	<p>=</p> <p>Park</p>				
			<p>Absolute transmission output speed</p>	<p>></p> <p>50 rpm</p>				
			<p>Transmission actual range reported by application software</p>	<p>!=</p> <p>Park Neutral or Drive or Reverse</p>				
			<p>Transmission actual range determined by safety software B partition</p>	<p>=</p> <p>Park</p>				

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	<p>Transmission actual range determined by safety software B partition Shift lever position reported by application software</p> <p>Absolute transmission output speed Transmission actual range determined by safety software B partition Shift lever position reported by application software</p> <p>Absolute transmission output speed Transmission actual range determined by safety software B partition Shift lever position reported by application software</p> <p>Absolute transmission output speed Transmission actual range determined by safety software B partition Shift lever position reported by application software</p>	<p>= Neutral</p> <p>!= Park Range</p> <p>> 50 rpm</p> <p>= Drive Forward Range A or Forward Range B</p> <p>> 50 rpm</p> <p>= Reverse Reverse Range</p> <p><= 50 rpm</p> <p>= Neutral or Drive or Reverse</p> <p>!= Park Range</p>				
<p>The safety software partition B detects incorrect values for safety relevant CAN signals.</p> <p>On the one hand, the safety software B side considers certain values for the engaged power flow signal determined by application software which are always unacceptable.</p> <p>On the other hand, the safety software B side considers values for the engaged power flow signal determined by application software which are acceptable according to the working conditions/states.</p> <p>The DTC is set when the engaged power flow reported by application software reports an illegal value or when none of the acceptable situations are detected.</p>	<p><u>Values determined by application software, which are always deemed unacceptable by, safety software B side</u></p> <p>Engaged power flow reported by application software</p> <p>Engaged power flow reported by application software</p> <p><u>Situations which are deemed acceptable by, safety software B side</u></p> <p>Absolute transmission output speed Absolute transmission output speed Transmission actual range determined by safety software B partition Absolute transmission output speed Engaged power flow reported by application software Transmission actual range determined by safety software B partition Absolute transmission output speed Engaged power flow reported by application software Transmission actual range determined by safety software B partition</p>	<p>< No Powerflow</p> <p>> Reverse Engaged</p> <p><= 50 rpm</p> <p>> 50 rpm Park or Neutral</p> <p>> 50 rpm</p> <p>= Drive Engaged</p> <p>= Drive</p> <p>> 50 rpm</p> <p>= Reverse Engaged</p> <p>= Reverse</p>	<p>Fault confirmation time</p> <p>Fault confirmation time before safety software intervention</p>	<p>>= 450 ms</p>		
<p>The safety software partition B detects incorrect values for safety relevant CAN signals.</p>	<p><u>Values determined by application software, which are always deemed unacceptable by, safety software B side</u></p>		<p>Enable conditions:</p> <p>Application software reports engaged power flow as invalid</p>	<p>= False</p>	Runs continuously	
<p>The safety software partition B detects incorrect values for safety relevant CAN signals.</p>	<p><u>Values determined by application software, which are always deemed unacceptable by, safety software B side</u></p>		<p>Fault confirmation time</p> <p>Fault confirmation time before safety software intervention</p> <p>Enable conditions:</p> <p>Application software reports engaged transmission output speed as invalid</p>	<p>>= 450 ms</p> <p>= True</p>	Runs continuously	

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<p>On the one hand, the safety software B side considers certain values for the transmission output speed signal determined by application software which are always unacceptable.</p> <p>On the other hand, the safety software B side considers values for the transmission output speed signal determined by application software which are acceptable according to the working conditions/states.</p> <p>The DTC is set when the transmission output speed reported by application software reports an illegal value or when none of the acceptable situations are detected.</p>	<p>Transmission output speed reported by application software</p> <p><u>Situations which are deemed acceptable by safety software B side</u></p> <p>Absolute difference between transmission output speed reported by application software and absolute transmission output speed determined by safety software B partition</p>	<p>></p> <p>16383.75</p> <p>rpm</p> <p><=</p> <p>Transmission output speed tolerance (1), see summary table attachments C_SID_SSWB_CAN</p>	<p>rpm</p>	<p>Fault confirmation time</p>	<p>Fault confirmation time before safety software intervention</p>	<p>>=</p> <p>450</p> <p>ms</p>	
<p>The safety software partition B detects incorrect values for safety relevant CAN signals.</p> <p>On the one hand, the safety software B side considers certain values for the transmission active gear ratio signal determined by application software which are always unacceptable.</p> <p>On the other hand, the safety software B side considers values for the transmission active gear ratio signal determined by application software which are acceptable according to the working conditions/states.</p> <p>The DTC is set when the transmission active gear ratio reported by application software reports an illegal value or when none of the acceptable situations are detected.</p>	<p>Values determined by application software, which are always deemed unacceptable by safety software B side</p> <p>Transmission active gear reported by application software</p> <p>Values determined by application software, which are always deemed unacceptable by safety software B side</p> <p>Absolute transmission output speed</p> <p>Absolute difference between transmission gear ratio reported by application software and transmission gear ratio determined by safety software B partition</p> <p>Transmission active gear reported by application software</p> <p>Situation allowed enable</p> <p>Time since last clutch shift was busy</p> <p>Transmission active gear reported by application software</p>	<p>></p> <p>7.99609375</p> <p><=</p> <p>50</p> <p>rpm</p> <p><=</p> <p>Transmission active gear ratio tolerance (2), see summary table attachments C_SID_SSWB_CAN</p> <p>>=</p> <p>Transmission gear ratio determined by safety software B partition - Transmission active gear ratio tolerance (2), see summary table attachments C_SID_SSWB_CAN</p> <p>=</p> <p>C_SE_TRUE</p> <p><</p> <p>2000</p> <p>ms</p> <p><=</p> <p>Maximum of transmission active gear ratio calculated from odd and even clutch shaft engaged gears + Transmission active gear ratio tolerance (2), see Summary table attachments C_SID_SSWB_CAN</p>	<p>rpm</p>	<p>Enable conditions:</p>	<p>Application software reports transmission active gear ratio as invalid</p>	<p>=</p> <p>False</p>	<p>Runs continuously</p>

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[illegible]

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Odd Gear Clutch Safety Performance 2	P1962	<p>The safety software partition B prevents unintended acceleration.</p> <p>If the odd clutch torque is too high while the odd clutch is slipping and a gear is engaged on the odd clutch shaft, the safety software partition B can detect a safety goal violation.</p> <p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene.</p> <p>When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 2 DTC is set.</p>	<p>Difference between actual torque on odd clutch and driver demanded engine torque</p> <p>Odd clutch slip speed</p>	<p>>= Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWB_SG_CLU Nm</p> <p>>= 1000 rpm</p>	Range request	= Drive or Reverse	Runs Continuously	A
					Odd gear shaft is in neutral	= False		
					Fault confirmation for L1 intervention Fault confirmation time before application software intervention	>= 390 ms		
					Application software intervention limit before latching	>= 2 count		
					Fault confirmation for L2 intervention Fault confirmation time before safety software intervention	>= 440 ms		
		<p>The safety software partition B prevents unintended acceleration.</p> <p>If the actual clutch torque is too high and the torque request towards the engine is too high while the odd clutch is not slipping and a gear is engaged on the odd clutch shaft, the safety software partition B can detect a safety goal violation.</p> <p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene.</p> <p>When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 2 DTC is set.</p>	<p>Difference between actual torque on odd clutch and driver demanded engine torque</p> <p>Odd clutch slip speed</p> <p>Odd clutch slip speed</p>	<p>>= Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWB_SG_CLU Nm</p> <p><= 250 rpm</p> <p>>= -250 rpm</p>	Odd gear shaft is in neutral	= False	Runs Continuously	
					Slow engine torque request active	= True		
					or			
					Fast engine torque request active	= True		
			<p>Difference between slow torque request towards the engine and driver demanded engine torque</p> <p>Difference between fast torque request towards the engine and driver demanded engine torque</p>	<p>>= Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWB_SG_CLU Nm</p> <p>>= Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWB_SG_CLU Nm</p>	Fault confirmation for L1 intervention Fault confirmation time before application software intervention	>= 390 ms		
					Application software intervention limit before latching	>= 2 count		
					Fault confirmation for L2 intervention Fault confirmation time before safety software intervention	>= 440 ms		
					Range request	= Reverse		
		<p>The safety software partition B prevents unintended change in driving direction.</p> <p>If the unintendend change in driving direction condition is detected for the odd clutch shaft defined by acceleration in forward direction while request is reverse, the safety software can detect a safety goal violation.</p>	Absolute vehicle speed	<= 18 kph	Vehicle speed	>= 0 kph	Runs Continuously	
			Absolute vehicle speed hysteresis	> 19 kph				

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If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene.

When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 2 DTC is set.

Total transmission output torque

>= 394 Nm

Odd clutch shaft has forward gear engaged

= True

Transmission output torque contribution from odd clutch shaft

> 394 Nm

Fault confirmation for L1 intervention

Fault confirmation time before application software intervention

>= 390

ms

or

Application software intervention limit before latching

>= 2

count

Transmission output torque contribution from odd clutch shaft

>= Transmission output torque contribution from even clutch shaft

Fault confirmation for L2 intervention

Fault confirmation time before safety software intervention

>= 440

ms

The safety software partition B prevents unintended propulsion engagement, If the unintended propulsion engagement condition is detected defined by acceleration in drive or reverse while request is park or neutral, the safety software can detect a safety goal violation.

Total transmission output torque

> 394 Nm

Range request

= Park or Neutral

Runs Continuously

Transmission output torque contribution from odd clutch shaft

> 394 Nm

Odd clutch shaft has forward gear engaged

= True

or

Fault confirmation for L1 intervention

Fault confirmation time before application software intervention

>= 390

ms

If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene.

When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 2 DTC is set.

Transmission output torque contribution from odd clutch shaft

>= Transmission output torque contribution from even clutch shaft

Application software intervention limit before latching

>= 2

count

Fault confirmation for L2 intervention

Fault confirmation time before safety software intervention

>= 440

ms

The safety software partition B prevents unintended deceleration caused by clutch tie up.

Odd clutch torque

>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWB_SG_CLU Nm

Odd clutch shaft has forward gear engaged

= True

Runs Continuously

If both clutch shafts have a gear engaged and both clutches show torque at the same time, a clutch tie up condition is detected.

Odd clutch torque hysteresis

< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWB_SG_CLU Nm

Even clutch shaft has reverse gear engaged

= True

Clutch tie up can be caused by clutch torque being applied on both clutches while one clutch shaft has a forward gear engaged and the other clutch shaft or has a forward gear engaged.

Even clutch torque

>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWB_SG_CLU Nm

Vehicle speed

<= -18

kph

Even clutch torque hysteresis

< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWB_SG_CLU Nm

Vehicle speed reset threshold

> -17

kph

Total transmission output torque

> 820 Nm

Clutch tie up can be caused by clutch torque being applied on both clutch with at least one of the clutches showing high negative slip.

Odd clutch torque

>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWB_SG_CLU Nm

Odd clutch shaft has gear engaged

= True

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The clutch shaft being targeted for reaction is chosen based on whether both clutches show high negative slip in which case the clutch with the highest clutch torque is chosen.

In case only a single clutch is showing high negative slip, this clutch shaft is targeted.

Odd clutch torque hysteresis

< Clutch tie up torque recovery limit (3), see Summary table attachments C_SID_SSWB_SG_CLU Nm

Even clutch torque

>= Clutch tie up torque limit (2), see Summary table attachments C_SID_SSWB_SG_CLU Nm

Even clutch torque hysteresis

< Clutch tie up torque recovery limit (3), see Summary table attachments C_SID_SSWB_SG_CLU Nm

Absolute total transmission output torque

> 820 Nm

Odd clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU rpm

or

Even clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU rpm

Determination of odd clutch targeted for reaction

Odd clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU rpm

Even clutch slip speed

>= Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU rpm

or

Odd clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU rpm

Even clutch slip speed

< Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU rpm

Odd clutch torque

> Even clutch torque

Even clutch shaft has gear engaged

= True

Absolute vehicle speed

> 18 kph

Vehicle speed reset threshold

<= 17 kph

If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene.

When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 2 DTC is set.

Fault confirmation for L1 intervention

Fault confirmation time before application software intervention

>= 390 ms

Application software intervention limit before latching

>= 2 count

Fault confirmation for L2 intervention

Fault confirmation time before safety software intervention

>= 440 ms

The safety software partition B prevents unintended deceleration caused by clutch apply with a too low gear engaged.

Odd clutch torque

>= Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachments C_SID_SSWB_SG_CLU Nm

Clutch tie up safety goal violation detected

= False

Runs Continuously

If clutch torque is applied with high negative slip a clutch actuation with too low gear engaged condition is detected.

Clutch torque hysteresis

< Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachments C_SID_SSWB_SG_CLU Nm

Odd clutch shaft has gear engaged

= True

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			Odd clutch slip	<	Clutch actuation with too low gear engaged clutch slip limit (7), see Summary table attachements C_SID_SSWB_SG_CLU	rpm	Absolute vehicle speed	>=	18	kph			
			Engine speed gradient	>=	1	rpm/IOms	Absolute vehicle speed hysteresis	<	17	kph			
		The safety software partition B prevents unintended deceleration caused by clutch apply in forwards direction while moving in the backwards direction. If too much clutch torque is applied with a forwards gear enaged while vehicle is moving in backwards direction, the safety software partition B can detect a safety goal violation. If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene. When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the odd gear clutch safety performance 2 DTC is set.	Odd clutch torque	>=	Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachements C_SID_SSWB_SG_CLU	Nm	Odd clutch shaft has a forward gear engaged	=	True				
			Clutch torque hysteresis	<	Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachements C_SID_SSWB_SG_CLU	Nm	Vehicle speed	<=	-18	kph			
							Vehicle speed hysteresis	>	-17	kph			
							Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>=	390	ms		
							Application software intervention limit before latching	>=	2	count			
							Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>=	440	ms		
Even Gear Clutch Safety Performance 2	P1963	The safety software partition B prevents unintended acceleration. If the even clutch torque is too high while the even clutch is slipping and a gear is engaged on the even clutch shaft, the safety software partition B can detect a safety goal violation. If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene. When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 2 DTC is set.	Difference between actual torque on even clutch and driver demanded engine torque	>=	Clutch torque high acceleration limit depending on gear (1), see Summary tabel attachements C_SID_SSWB_SG_CLU	Nm	Range request	=	Drive or Reverse			A	
			Even clutch slip speed	>=	1000	rpm	Even gear shaft is in neutral	=	False				
							Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>=	390	ms		
								Application software intervention limit before latching	>=	2	count		
						Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>=	440	ms			
				The safety software partition B prevents unintended acceleration.	Difference between actual torque on odd clutch and driver demanded engine torque	>=	Clutch torque high acceleration limit depending on gear (1), see Summary tabel attachements C_SID_SSWB_SG_CLU	Nm	Even gear shaft is in neutral	=	False		

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<p>If the actual clutch torque is too high and the torque request towards the engine is too high while the even clutch is not slipping and a gear is engaged on the even clutch shaft, the safety software partition B can detect a safety goal violation.</p> <p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene.</p> <p>When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 2 DTC is set.</p>	Even clutch slip speed	<=	250	rpm	Slow engine torque request active	=	True
	Even clutch slip speed	>=	-250	rpm	or		
	Difference between slow torque request towards the engine and driver demanded engine torque	>=	Clutch torque high acceleration limit depending on gear (1), see Summary label attachements C_SID_SSWB_SG_CLU	Nm	Fast engine torque request active	=	True
	Difference between fast torque request towards the engine and driver demanded engine torque	>=	Clutch torque high acceleration limit depending on gear (1), see Summary label attachements C_SID_SSWB_SG_CLU	Nm	Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>= 390 ms
						Application software intervention limit before latching	>= 2 count
					Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>= 440 ms
	Absolute vehicle speed	<=	18	kph	Range request	=	Drive
	Absolute vehicle speed hysteresis	>	19	kph	Vehicle speed	<=	0 kph
	Total transmission output torque	<	-394	Nm	Even clutch shaft has reverse gear engaged	=	True
	Absolute vehicle speed	<=	18	kph	Range request	=	Reverse
<p>The safety software partition B prevents unintended change in driving direction,</p> <p>If the unintended change in driving direction condition is detected for the even clutch shaft defined by acceleration in forward direction while request is reverse or acceleration in reverse direction while request is forward, the safety software partition B can detect a safety goal violation.</p> <p>If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene.</p> <p>When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 2 DTC is set.</p>	Absolute vehicle speed hysteresis	>	19	kph	Vehicle speed	>=	0 kph
	Total transmission output torque	>=	394	Nm	Even clutch shaft has forward gear engaged	=	True
	Transmission output torque contribution from even clutch shaft or	>	394	Nm			
	Transmission output torque contribution from even clutch shaft	>=	Transmission output torque contribution from odd clutch shaft				
					Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>= 390 ms
						Application software intervention limit before latching	>= 2 count

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				Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>= 440 ms	
The safety software partition B prevents unintended propulsion engagement.	Total transmission output torque	< -394 Nm			Range request	= Park or Neutral	
If the unintended propulsion engagement condition is detected defined by acceleration in drive or reverse while request is park or neutral, the safety software partition B can detect a safety goal violation.	Transmission output torque contribution from even clutch shaft	< -394 Nm			Even clutch shaft has forward gear engaged	= True	
If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene.	or						
When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 2 DTC is set.	Transmission output torque from even clutch shaft	< Transmission output torque from odd clutch shaft					
	Total transmission output torque	> 394 Nm					
	Transmission output torque contribution from even clutch shaft	> 394 Nm		Fault confirmation for LI intervention	Fault confirmation time before application software intervention	>_ 390 ms	
	or				Application software intervention limit before latching	>_ 2 count	
	Transmission output torque contribution from even clutch shaft	>= Transmission output torque contribution from odd clutch shaft		Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>= 440 ms	
The safety software partition B prevents unintended deceleration caused by clutch tie up.	Odd clutch torque	>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWB_SG_CLU Nm			Odd clutch shaft has forward gear engaged	= True	
If both clutch shafts have a gear engaged and both clutches show torque at the same time, a clutch tie up condition is detected.	Odd clutch torque hysteresis	< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWB_SG_CLU Nm			Even clutch shaft has reverse gear engaged	= True	
Clutch tie up can be caused by clutch torque being applied on both clutches while one clutch shaft has a forward gear engaged and the other clutch shaft or has a forward gear engaged.	Even clutch torque	>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWB_SG_CLU Nm			Vehicle speed ,	>= 18 kph	
	Even clutch torque hysteresis	< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWB_SG_CLU Nm			Vehicle speed reset threshold ,	< 17 kph	
	Total transmission output torque	< -820 Nm					
Clutch tie up can be caused by clutch torque being applied on both clutch with at least one of the clutches showing high negative slip.	Odd clutch torque	>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWB_SG_CLU Nm			Odd clutch shaft has gear engaged	= True	
The clutch shaft being targeted for reaction is chosen based on whether both clutches show high negative slip in which case the clutch with the highest clutch torque is chosen.	Odd clutch torque hysteresis	< Clutch tie up torque recovery limit (3), see Summary table attachements C_SID_SSWB_SG_CLU Nm			Even clutch shaft has gear engaged	= True	
In case only a single clutch is showing high negative slip, this clutch shaft is targeted.	Even clutch torque	>= Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWB_SG_CLU Nm			Absolute vehicle speed ,	> 18 kph	

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			Even clutch torque hysteresis	<	Clutch tie up torque recovery limit (3), see Summary table attachments C_SID_SSWB_SG_CLU	Nm	Vehicle speed reset threshold	<=	17	kph	
			Absolute total transmission output torque	>	820	Nm					
			Odd clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU	rpm					
			or								
			Even clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU	rpm					
			Determination of even clutch targeted for reaction								
			Odd clutch slip speed	>=	Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU	rpm					
			Even clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU	rpm					
			or								
			Odd clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU	rpm					
			Even clutch slip speed	<	Clutch tie up slip threshold (4), see Summary table attachments C_SID_SSWB_SG_CLU	rpm					
			Even clutch torque	>=	Odd clutch torque						
		If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene.					Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>=	390	ms
		When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 2 DTC is set.						Application software intervention limit before latching	>=	2	count
							Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>=	440	ms
	The safety software partition B prevents unintended deceleration caused by clutch apply with a too low gear engaged.	Even clutch torque	>=	Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachments C_SID_SSWB_SG_CLU	Nm		Clutch tie up safety goal violation detected	=	False		Runs Continuously
	If clutch torque is applied with high negative slip a clutch actuation with too low gear engaged condition is detected.	Clutch torque hysteresis	<	Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachments C_SID_SSWB_SG_CLU	Nm		Odd clutch shaft has gear engaged	=	True		
		Even clutch slip	<	Clutch actuation with too low gear engaged clutch slip limit (7), see Summary table attachments C_SID_SSW_SG_CLU	rpm		Absolute vehicle speed	>=	18	kph	
		Engine speed gradient	>=	1	rpm/I/Oms		Absolute vehicle speed hysteresis	<	17	kph	

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		The safety software partition B prevents unintended deceleration caused by clutch apply in forwards direction while moving in the backwards direction. If too much clutch torque is applied with a forwards gear enaged while vehicle is moving in backwards direction, the safety software partition B can detect a safety goal violation.	Even clutch torque	>=	Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachements C_SID_SSWB_SG_CLU	Nm	Even clutch shaft has a forward gear engaged	=	True			
			Clutch torque hysteresis	<	Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachements C_SID_SSWB_SG_CLU	Nm	Vehicle speed	<=	-18	kph		
							Vehicle speed hysteresis	>	-17	kph		
		The safety software partition B prevents unintended deceleration caused by clutch apply in reverse direction while moving in the forward direction. If too much clutch torque is applied with a reverse gear enaged while vehicle is moving in toward direction, the safety software partition B can detect a safety goal violation.	Even clutch torque	>=	Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachements C_SID_SSWB_SG_CLU	Nm	Even clutch shaft has a reverse gear engaged	=	True			
			Clutch torque hysteresis	<	Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachements C_SID_SSWB_SG_CLU	Nm	Vehicle speed	>=	18	kph		
							Vehicle speed hysteresis	<	17	kph		
		If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene. When the safety software partition B intervention or the application software intervention which consist of the corresponding clutch shaft disablement persists too long, the even gear clutch safety performance 2 DTC is set.					Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>=	390	ms	
									Application software intervention limit before latching	>=	2	count
								Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>=	440	ms

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Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters		Enable Conditions	Time Required	MIL ilium.
Electronic Limited Slip Differential Safety Performance	P1966	The safety software partition B detects unintended unintended lateral vehicle movement by wrong eLSDtorque application. If this safety goal violation is detected for too long, the application software will attempt intervention by eLSDdisable. If the safety goal violation persists, the safety software partition B will intervene. When the safety software partition B intervention or the application software intervention persists too long, the Electronic Limited Slip Differential Safety Performance DTC is set.	Limited slip differential torque	>= Limited slip differential torque threshold (1), see summary table attachments C_SID_SSWB_SG_LSD Nm	Enable Conditions:	Absolute vehicle speed	>= 3 kph	Runs Continuously	B
						Absolute vehicle speed hysteresis	< 2 kph		
						eLSDdrain active based on actuator currents	= False		
						Driver intended braking torque	>= 400 Nm		
					Fault confirmation for L1 intervention	Fault confirmation time before application software intervention	>= 120 ms		
						Application software intervention limit before latching	>= 2 count		
					Fault confirmation for L2 intervention	Fault confirmation time before safety software intervention	>= 150 ms		

24OBDG07 TCM Summary Tables

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters		Enable Conditions	Time Required	MIL illum.
Park System Safety Performance 2	P1965	The safety software partition B detects unintended park state disengagement. If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene. When the safety software partition B intervention or the application software intervention persists too long, the park system safety performance 2 DTC is set.	Estimated parking lock stepper motor position	>=	1000	pm	Enable Conditions: Parking lock was previously engaged (1), see Summary table attachments C_SID_SSWB_SG_PLK	= True	Runs Continuously	B
			Parking lock stepper motor speed	>=	0	mm/s	Range request	= Park		
				<=	200	mA				
			Parking lock engagement valve current	>	12	bar				
			System pressure	>	70	rpm	Fault confirmation time Fault confirmation time before safety software intervention	>= 450 ms		
		The safety software partition B detects unintended loss of park state engagement. If this safety goal violation is detected for too long, the application software will attempt intervention. If the safety goal violation persists, the safety software partition B will intervene. When the safety software partition B intervention or the application software intervention persists too long, the park system safety performance 2 DTC is set.	Estimated parking lock stepper motor position	>=	1000	pm	Enable Conditions: Range request	= Park	Runs Continuously	
			Parking lock stepper motor speed	>=	0	mm/s	Absolute vehicle speed	< 0.300000011920 929 kph		
				<=	200	mA	Parking lock was previously engaged during park request (2), see Summary table attachments C_SID_SSWB_SG_PLK	= False		
			Parking lock engagement valve current	>	12	bar	OR			
			System pressure	>	70	rpm	Range request	= Park		
			Engine speed				Vehicle speed low during park request (3), see Summary table attachments C_SID_SSWB_SG_PLK	= True		
							Parking lock was previously engaged during park request (2), see Summary table attachments C_SID_SSWB_SG_PLK	= False		
							Fault confirmation time Fault confirmation time before safety software intervention	>= 450 ms		