Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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 claibration check, NVM static data checksum, NVM dynamic data checksum, page 0 checksum, and wakeup timer check. Once all checks are completed in IBS the result is transmitted to BCM where appropriate DTC will be reported to DFIR. This diagnostic occurs once upon LIN wakeup, and the result is transmitted to BCM within 6 seconds.	IBS Sensor Internal Fault is TRUE (Internal IBS diagnostic)	= CeEM_e_IBS_DiagFailed	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** Battery Monitor Module Performance Diagnostic Enable is **TRUE** No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC	>11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE U01B000 P15FF00	6 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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	All of the following conditoins are met:		80 seconds (4 fails out of 5 samples at 16 seconds per sample)	Type B, 2 Trips
					System 12V Battery Voltage is above threshold	>11.00 volts (with hysteresis disable < 10.00)		
					IBS NormalCommEnable is **TRUE**	= TRUE		
					IBS Current Performance Diagnostic Enable is **TRUE**	= TRUE		
					IBS Current Performance Continuous Diagnostic Enable is **TRUE**	= TRUE		
					No Active Lost Communication with Intelligent Battery Sensor Module DTC	= U01B00		
					No Active Battery Sensor Signal Message Counter Incorrect DTC	= P15FF00		
					Battery Current Rationality Historical Diagnostic Enable is **FALSE**	= FALSE		
			IBS has open shunt condition: Battery Current Rationality Diagnostic Determination equals Diagnostic Failed	= CeEM_e_IBS_DiagFail	All of the following conditions are met:		1 second	
					System 12V Battery Voltage is above threshold	> 11.00 volts (with		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Monitor Module Temperature Monitoring Performance	P058C	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	All of the following conditions are met:		8 seconds out of a 10 seconds window	Type B, 2 Trips
					System 12V Battery Voltage is above threshold	>11.00 volts (with hysteresis disable < 10.00)		
					IBS NormalCommEnable is **TRUE**	= TRUE		
					Outside Air Temperature is within range	> -30.00 degrees Celsius AND < 50.00 degrees Celsius		
					IBS Temperature Performance Diagnostic Enable is **TRUE**	= TRUE		
					IBS Temperature Performance Continuous Diagnostic Enable is **TRUE**	= TRUE		
					No Active Lost Communication with Intelligent Battery Sensor Module DTC	= U01B000		
					No Active Battery Sensor Signal Message Counter Incorrect DTC	= P15FF00		
					No Active IBS Temperature Out of Range DTCs	= P058E00, P058F00, P16DE00, P16DF00		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Absolute difference between ASIC Raw Temperature and NTC Raw Temperature is above threshold	> 10.00 degrees Celsius	All of the following conditions are met:		8 seconds out of a 10 seconds window	
					System 12V Battery Voltage is above threshold	> 11.00 volts (with hysteresis disable < 10.00)		
					IBS NormalCommEnable is **TRUE**	= TRUE		
					Outside Air Temperature is within range	> -30.00 degrees Celsius AND < 50.00 degrees Celsius		
					IBS Temperature Performance Diagnostic Enable is **TRUE**	= TRUE		
					IBS Temperature Performance Historical Diagnostic Enable is **TRUE**	= TRUE		
					No Active Lost Communication with Intelligent Battery Sensor Module DTC	= U01B000		
					No Active Battery Sensor Signal Message Counter Incorrect DTC	= P15FF00		
					Historical Temperature Data Down Count is in ranoe	> 0		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Monitor Module Voltage Monitoring Performance	P058D	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	All of the following conditions are met:		8 seconds out of a 10 seconds window	Type B, 2 Trips
					System 12V Battery Voltage is above threshold	>11.00 volts (with hysteresis disable < 10.00)		
					IBS NormalCommEnable is **TRUE**	= TRUE		
					Battery Monitor Module Voltage Performance Diagnostic Enable is **TRUE**	= TRUE		
					No Active Lost Communication with Intelligent Battery Sensor Module DTC	= U01B000		
					No Active Battery Sensor Signal Message Counter Incorrect DTC	= P15FF00		
					No Active Battery Voltage Out of Range DTCs	= P16D400, P16D500		
					Powertrain Crank Active is **FALSE**	= FALSE		
					Post-Crank Time Delay has elapsed	>5,000.00 seconds		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** Outside Air Temperature is within range IBS Temperature High Diagnostic Enable is **TRUE** IBS Temperature High Continuous 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 > -30.00 degrees Celsius AND < 50.00 degrees Celsius = TRUE = TRUE = U01B000 = P15FF00	4 seconds out of a 5 seconds window	Type B, 2 Trips
			Battery Monitor Module ASIC Temperature above threshold	> 120.00 degrees Celsius	All of the following conditions are met: System 12V Battery Voltage is above threshold	>11.00 volts (with hysteresis disable <	4 seconds out of a 5 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						10.00)		
					IBS NormalCommEnable is **TRUE**	= TRUE		
					Outside Air Temperature is in range	> -30.00 degrees Celsius AND < 50.00 degrees Celsius		
					IBS Temperature High Diagnostic Enable is **TRUE**	= TRUE		
					IBS Temperature High Historical Diagnostic Enable is **TRUE**	= TRUE		
					No Active Lost Communication with Intelligent Battery Sensor Module DTC	= U01B000		
					No Active Battery Sensor Signal Message Counter Incorrect DTC	= P15FF00		
					Historical Temperature Data Down Count is in range	> 0 AND <= 24		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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	<-43.00 degrees Celsius	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** Outside Air Temperature is within range IBS Temperature Low Diagnostic Enable is **TRUE** IBS Temperature Low Continuous 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 > -30.00 degrees Celsius AND < 50.00 degrees Celsius = TRUE = TRUE = U01B000 = P15FF00	4 seconds out of a 5 seconds window	Type B, 2 Trips
			Battery Monitor Module ASIC Temperature below threshold	<-43.00 degrees Celsius	All of the following conditions are met: System 12V Battery Voltage is above threshold	>11.00 volts (with hysteresis disable <	4 seconds out of a 5 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
						10.00)		
					IBS NormalCommEnable is **TRUE**	= TRUE		
					Outside Air Temperature is in range	> -30.00 degrees Celsius AND < 50.00 degrees Celsius		
					IBS Temperature Low Diagnostic Enable is **TRUE**	= TRUE		
					IBS Temperature Low Historical Diagnostic Enable is **TRUE**	= TRUE		
					No Active Lost Communication with Intelligent Battery Sensor Module DTC	= U01B000		
					No Active Battery Sensor Signal Message Counter Incorrect DTC	= P15FF00		
					Historical Temperature Data Down Count is in range	> 0 AND <= 24		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Driver Mode Select Switch A Circuit Low	P05D1	This DTC will detect an OBD-compliant analog switch bank 1 inputthat is too low (out-of-range low).	Analog Mode Switch low voltage threshold	< 1.0030 V	VehicleSwitchBankl Diagnostic Enable calibration is **TRUE** VehicleSwitchBankl Circuit Diagnostic Enable calibration is **TRUE** VehicleSwitchBankl Circuit Out-Of-Range Low Diagnostic Enable calibration is **TRUE**	= TRUE = TRUE = TRUE	4 seconds out of a 5 seconds window	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Driver Mode Select Switch A Circuit High	P05D2	This DTC will detect an OBD-compliant analog switch bank 1 inputthat is too high (out-of-range high).	Analog Mode Switch high voltage threshold	> 4.7410 V	VehicleSwitchBankl Diagnostic Enable calibration is **TRUE**	= TRUE	4 seconds out of a 5 seconds window	Type B, 2 Trips
					VehicleSwitchBankl Circuit Diagnostic Enable calibration is **TRUE**	= TRUE		
					VehicleSwitchBankl Circuit Out-Of-Range High Diagnostic Enable calibration is **TRUE**	= TRUE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Driver Mode Select Switch A Range/ Performance	P05D3	This DTC will detect an OBD-compliant analog switch bank 1 inputthat 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	VehicleSwitchBankl Diagnostic Enable calibration is TRUE VehicleSwitchBankl Circuit Diagnostic Enable calibration is TRUE VehicleSwitchBankl Circuit Performance Diagnostic Enable calibration is TRUE	= TRUE = TRUE = TRUE	4 seconds out of a 5 seconds window	Type B, 2 Trips

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module RAM Failure	P0604	Indicates that the control module has detected a RAM fault. This includes read/ write failures such as a Primary Processor System RAM Fault, Primary Processor Cache RAM Fault, and Primary Processor eTPU RAM Fault. This diagnostic runs continuously.	Indicates that the primary processor is unable to correctly read data from or write data to system RAM. Detects data read does not match data written	>= 254 counts			Fault indication fed from HWIO- diagnostic runs continuously (background loop)	Type B, 2 Trips
			Indicates that the primary processor is unable to correctly read data from or write data to cached RAM. Detects data read does not match data written	>= 254 counts			Fault indication fed from HWIO- diagnostic runs continuously (background loop)	
			Indicates that the primary processor is unable to correctly read data from or write data to TPU RAM. Detects data read does not match data written	>= 3 counts			Fault indication fed from HWIO - diagnostic runs continuously (background loop)	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Internal Control Module Processor Integrity Fault	P0606	Indicates that the control module has detected an internal processor integrity fault. These include diagnostics done on the SPI Communication as well as a host of diagnostics for the primary processor.	2 fails in a row in the MAIN processor's ALU check		ALU diagnostic enable per CPU is **CbTRUE**	= CbTRUE	Run periodically at 25 ms loop rate	Type B, 2 Trips
			Checks number of stack over/under flow since last powerup reset	>= 5	Stack Llimit Test diagnostic enable is **CbTRUE**	= CbTRUE	Run periodically at 100ms loop rate	
			Voltage deviation	> 0.4500 V	ADC Test diagnostic enable is **CbTRUE** A2D Test voltages used in diagnosis: **Test Voltage 1** **Test Voltage 2** **Test Voltage 3** **Test Voltage 4** Arbitrated Battery Voltage	= CbTRUE = 0 = 0 = 1 = 1 (1 means enabled, 0 means disabled) > 7.00 V	10 / 20 counts or 0.250 seconds continuous - Note: 50 ms/ count	
			MAIN processor DMA transfer test failures:	10/20 counts	DMA Transfer Test diagnostic enable is **CbTRUE**	= CbTRUE	Run periodically at 50ms loop rate	
			Safety critical software is not executed in proper order. End task calculation does not match expected value for failures	>= 1 incorrect sequence	Program Sequence Watch diagnostic enable calibration per task rate is **CbTRUE** **5ms** **10ms** **25ms** **50ms** **100ms**	= CbTRUE = CbTRUE = CbTRUE = CbTRUE = CbTRUE	Fail time interval determined per task rate: 5ms: 8/10 counts 10ms: 8/10 counts 25ms: 8/10 counts 50ms: 4/5 counts	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
							100ms: 3/4 counts Note: 50 ms/ count	
			MAIN processor determines a Program Sequence Watch seed has not changed within a specified time period.	Current seed value equals previous seed value.	Last Seed Timeout diagnostic enable is **CbTRUE**	= CbTRUE	Fail tolerant time set per task rate enabled through the Program Sequence Watch function: 5ms: 950 ms 10ms: 950 ms 25ms: 950 ms 50ms: 950 ms 100ms: 1,000 ms Note: 50 ms monitoring task rate	

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
5 Volt Reference #3 Circuit	P0697	Detects a continuous or intermittent short on the 5 volt reference circuit #3 by monitoring the reference percent Vref3 and failing the diagnostic when the percent Vref3 is too low or 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 Ilium.
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	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** Outside Air Temperature is within range Temperature Erratic 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 > -30.00 degrees Celsius AND < 50.00 degrees Celsius = TRUE = U01B000 = P15FF00	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 Ilium.
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	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** Outside Air Temperature is within range Temperature Circuit Erratic 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 > -30.00 degrees Celsius AND < 50.00 degrees Celsius = TRUE = U01B000 = P15FF00	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 Ilium.
Battery Monitor Sensor Signal Message Counter Incorrect	P15FF	This DTC monitors for an internal error or error in communication with the Battery Monitor Signal	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 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 Ilium.
			IBSVltgFOMARC:	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 Ilium.
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	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** Battery Voltage Out of Range Low Diagnostic Enable is **TRUE** Battery Voltage Out of Range Low Continuous Diagnostic Enable is **TRUE** No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC Battery Voltage Out of Range Low Historical Diagnostic Enable is **FALSE**	>11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE = TRUE = U01B000 = P15FF00 = FALSE	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	All of the following conditions are met: System 12V Battery Voltage is above threshold	> 11.00 volts (with	1 second	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** Battery Voltage Out of Range High Diagnostic Enable is **TRUE** Battery Voltage Out of Range High Continuous Diagnostic Enable is **TRUE** No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC Battery Voltage Out of Range High Historical Diagnostic Enable is **FALSE**	>11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE = TRUE = U01B000 = P15FF00 = FALSE	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	All of the following conditions are met: System 12V Battery Voltage is above threshold	> 11.00 volts (with	1 second	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Monitor Module Current Low	P16D6	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	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** IBS Current Out of Range Low Diagnostic Enable is **TRUE** IBS Current Out of Range Low Continuous Diagnostic Enable is **TRUE** No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC Shunt Voltage Out of Range Low Historical Diagnostic Enable is **FALSE**	>11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE = TRUE = U01B000 = P15FF00 = FALSE	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	All of the following conditions are met: System 12V Battery Voltage is above threshold	> 11.00 volts (with	1 second	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Monitor Module Current High	P16DD	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	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** IBS Current Out of Range High Diagnostic Enable is **TRUE** IBS Current Out of Range High Continuous Diagnostic Enable is **TRUE** No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC Shunt Voltage Out of Range High Historical Diagnostic Enable is **FALSE**	 >11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE = TRUE = U01B000 = P15FF00 = FALSE	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	All of the following conditions are met: System 12V Battery Voltage is above threshold	 > 11.00 volts (with	1 second	

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** Outside Air Temperature is within range Temperature Circuit Low Diagnostic Enable is **TRUE** Temperature Circuit Low Continuous 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 > -30.00 degrees Celsius AND < 50.00 degrees Celsius = TRUE = TRUE = U01B000 = P15FF00	4 seconds out of a 5 seconds window	Type B, 2 Trips
			Battery Monitor Module NTC Temperature above threshold	> 120.00 degrees Celsius	All of the following conditions are met: System 12V Battery Voltage is above threshold	> 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 Ilium.
						hysteresis disable < 10.00)		
					IBS NormalCommEnable is **TRUE**	= TRUE		
					Outside Air Temperature is in range	> -30.00 degrees Celsius AND < 50.00 degrees Celsius		
					Temperature Circuit Low Diagnostic Enable is **TRUE**	= TRUE		
					Temperature Circuit Low Historical Diagnostic Enable is **TRUE**	= TRUE		
					No Active Lost Communication with Intelligent Battery Sensor Module DTC	= U01B000		
					No Active Battery Sensor Signal Message Counter Incorrect DTC	= P15FF00		
					Historical Temperature Data Down Count is in range	> 0 AND <= 24		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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	<-43.00 degrees Celsius	All of the following conditions are met: System 12V Battery Voltage is above threshold IBS NormalCommEnable is **TRUE** Outside Air Temperature is within range Temperature Circuit High Diagnostic Enable is **TRUE** Temperature Circuit High Continuous 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 > -30.00 degrees Celsius AND < 50.00 degrees Celsius = TRUE = TRUE = U01B000 = P15FF00	4 seconds out of a 5 seconds window	Type B, 2 Trips
			Battery Monitor Module NTC Temperature below threshold	<-43.00 degrees Celsius	All of the following conditions are met: System 12V Battery Voltage is above		4 seconds out of a 5 seconds window	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					threshold	> 11.00 volts (with hysteresis disable < 10.00)		
					IBS NormalCommEnable is TRUE	= TRUE		
					Outside Air Temperature is within range	> -30.00 degrees Celsius AND < 50.00 degrees Celsius		
					Temperature Circuit High Diagnostic Enable is **TRUE**	= TRUE		
					Temperature Circuit High Historical Diagnostic Enable is **TRUE**	= TRUE		
					No Active Lost Communication with Intelligent Battery Sensor Module DTC	= U01B000		
					No Active Battery Sensor Signal Message Counter Incorrect DTC	= P15FF00		
					Historical Temperature Data Down Count is in range	> 0 AND <= 24		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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 = TRUE = U01B000 = P15FF00	60 seconds	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Battery Monitor Module Data Incompatible 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: 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 = TRUE >0.01 >0.01 >0.01	All of the following conditions are met: System 12V Battery Voltage is above threshold 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	>11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE = FALSE = U01B000 = P15FF00	5 seconds out of a 6 seconds window	Type B, 2 Trips
			Any of the following criteria are met IBS Config Return		All of the following conditions are met: System 12V Battery Voltage is above		1 second	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			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 = TRUE >0.01 >0.01 >0.01	threshold IBS NormalCommEnable is TRUE IBS Configuration Diagnostic Historical Enable is TRUE No Active Lost Communication with Intelligent Battery Sensor Module DTC No Active Battery Sensor Signal Message Counter Incorrect DTC	> 11.00 volts (with hysteresis disable < 10.00) = TRUE = TRUE = U01B000 = P15FF00		

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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		Diagnostic Enabled: KaSSAR_h_DiagEnableCals [CeSSAR_e_SecurePeripheralError] CbTRUE		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Communication Bus A Off	U0073	This DTC monitors for a BUS A off condition	Bus off failures equals or exceeds before the sample time of is reached	3 counts (equivalent to 600.01 milliseconds) 1,000.01 milliseconds	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	>= 5,000 milliseconds >= 3,000 milliseconds >11.00 Volts <=18.00 Volts CbFALSE (CbTRUE indicates enabled)	Diagnostic runs in 10 ms loop	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communicati on With TCM	U0101	This DTC monitors for a loss of communication with the Transmission Control Module.	Message is not received from controller for Message $02E Message $031 Message $452	 >10,043.75 milliseconds >10,043.75 milliseconds >12,500.00 milliseconds	General Enable Criteria: Time since power-up reset, running reset, recovery from under/over voltage condition All below criteria have been met for If message is on Bus A: LI0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller	 >= 5,000 milliseconds >= 3,000 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 10 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					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 Ilium.
Lost Communication With Gateway A	U0146	This DTC monitors for a loss of communication with Gateway A.	Message is not received from controller for Message $209 Message $561 Message $425 Message $562 Message $427 Message $20D	 > 10,250.00 milliseconds > 12,500.00 milliseconds > 12,500.00 milliseconds > 12,500.00 milliseconds > 12,500.00 milliseconds > 10,625.00 milliseconds	General Enable Criteria: Time since power-up reset, running reset, recovery from under/over voltage condition All below criteria have been met for If message is on Bus A: LI0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller	 >= 5,000 milliseconds >=3,000 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 10 ms loop	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			_PDU	milliseconds	Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	CbFALSE (CbTRUE indicates enabled) >=11.00 Volts		

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

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

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

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Body Control Module Local Interconnect Network 9	U152D	This DTC monitors for a loss of communication on the LIN bus.	Loss of Communication Method: The total number of diagnostic enabled slave nodes on LIN Bus Or LIN channel Wakeup Method: LIN channel wakeup repetition counter	= Total number of slave nodes on LIN Bus that have reported lost communications DTCs >= 10 counts	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. Dependent on bus loading.	Type B, 2 Trips

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

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Lost Communication 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	Message is not received from controller for Message $211 Message $21B Message $42A Message $417 Message $4B5 Message $012 Message $415	 >10,625.00 milliseconds >10,625.00 milliseconds >12,500.00 milliseconds >12,500.00 milliseconds >12,500.00 milliseconds >10,037.50 milliseconds >10,250.00 milliseconds	General Enable Criteria: Time since power-up reset, running reset, recovery from under/over voltage condition All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller	 >= 5,000 milliseconds >= 3,000 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 10 ms loop	Type B, 2 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
					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 Ilium.
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.	Message is not received from controller for Message $011 Message $01C Message $01D Message $213 Message $214 Message $21D Message $227 Message $229 Message $22A Message $41D Message $499 Message $4BB Message $4BC	>10,043.75 milliseconds >10,043.75 milliseconds >10,043.75 milliseconds >10,250.00 milliseconds >10,150.00 milliseconds >10,250.00 milliseconds >10,625.00 milliseconds >10,250.00 milliseconds >10,625.00 milliseconds >12,500.00 milliseconds >12,500.00 milliseconds >12,500.00 milliseconds >12,500.00 milliseconds	General Enable Criteria: Time since power-up reset, running reset, recovery from under/over voltage condition All below criteria have been met for If message is on Bus A: U0073 not active If message is on Bus B: U0074 not active If message is on Bus S: U0076 not active CAN channel is requesting full communications Normal CAN transmission on Bus is enabled If bus type is Sensor Bus, sensor bus relay is on Accessory mode to off mode not pending Battery voltage Controller is an OBD controller Or Battery Voltage Controller type: OBD Controller	>= 5,000 milliseconds >= 3,000 milliseconds >11.00 Volts <=18.00 Volts	Diagnostic runs in 10 ms loop	Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
			Message $4BD Message $4C1 Message $254	>12,500.00 milliseconds >11,250.00 milliseconds >10,625.00 milliseconds	If power mode = Run/Propulsion/Start: Power Mode is run If power mode = Accessory: Off key cycle diagnostics are enabled Or Controller is an OBD controller Controller shutdown is not impending Power Mode is not run/ crank Battery voltage	CbFALSE (CbTRUE indicates enabled) >=11.00 Volts		

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

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 authenticatioon Authoritative Counters are at MAX value	During controller initialization:
			
			IF (Any Security Peripheral Key Slot reports as Empty)
			-OR-
			(Any Authoritative Counter is at MAX value)
			
			During controller operation:
			
			IF (A Security Peripheral Key Slot reports as Empty)
			-OR-
			(An Authoritative Counter is at MAX value)
						Diagnostic Enabled:
						
						KaSSAR_h_DiagEnableCals[1] == 1
								Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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.			Diagnostic Enabled: KaSSAR_h_DiagEnableCals[2] == 1		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
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		Diagnostic Enabled: KaSSAR_h_DiagEnableCals[0] == 1		Type A, 1 Trips

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Ilium.
Control Module Input Power Circuit A/B Correlation	U3018	This diagnostic verifies that both (A and B) control module input power voltage sensors (when there are two) are neither inappropriately high nor low. It compares the sensed control module voltage A with sensed control module voltage B. If the absolute value of the difference between voltage A and B is greater than the failure threshold for sufficient time, the diagnostic will fail.	Difference between 12V Battery Power Circuit A and 12V Battery Power Circuit B	> 4.00V	Control Module Input Power Circuit A/B Correlation Diagnostic Enable calibration is **CbTRUE** 12V Starter Engaged	= CbTRUE = FALSE	4 seconds out of a 5 seconds window	Type B, 2 Trips

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 = 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	▪	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	< 0.2 [V] = 5	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips
Brake Booster Temperature Sensor B										
Brake Booster Temperature Sensor "B"	C057A	All	This monitoring checks if the BLM Temperature Signal 2 is shorted to Supply.	Temperature Sensor 2 signal voltage value AND	> 3.14 [V]	Ignition state ON	= True	0.600 [s]	Continuous	Type B, 2 Trips

Circuit High				For a consecutive number of times	= 5					
Brake Booster Temperature Sensor "B" Circuit Low	C0579	■	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
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 > 0 [m/s^2] > 4.47 [mph] = 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/s^2]	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

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.	|PTS1 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 fmm] < -1.5 fmm]	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^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 freguency OR PWM freguency 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										
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	No valid SENT messages received for time	>0.1 [s]	Ignition state ON	= True	0.1 [s]	Continuous	Type A, 1 Trip

			pressure sensor SENT line is shorted to ground or the sensor supply is interrupted.	AND Digital level of SENT line is low	= True					
		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 movement is sufficient according to the expected pressure value.	Calculated pressure - Pressure sensor 2 value OR Pressure sensor 2 value - Calculated pressure	> 40 [bar] > 108 [bar]	Ignition state ON	= True	0.2 [s]	Continuous	Type A, 1 Trip
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	> 2.252 [V] > 2.252 [V] > 4327 [Digit]	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the vector length value of RPS is out of range high.	Calculated vector length sqrt(sin^2+cos^2)	> 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 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	< 1.047 [V] < 1.047 [V] < 3876 [Digit]	Ignition state ON	= True	0.01 [s]	Continuous	Type A, 1 Trip
		All	This monitoring checks if the vector length value of RPS is out of range low.	Calculated vector length sqrt(sin^2+cos^2)	<0.25	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 jumps.	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 'SrlDat31_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 'SrlDat31_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 'SrlDat19_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 'TrnsEstGr_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 'ActAxlTrq_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 'TrnsEstGr_Prtctd_MSG' (Transmission Estimated Gear 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 Message Authentication Code of the message 'ActAxlTrq_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 'SrlDat19_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 'SrlDat20_Prtctd_MSG' (Serial Data 20 Protected) from Engine Control Module is	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	= True	0.25 [s]	Continuous	Type B, 2 Trips

			received with the expected value.			Communication related conditions fulfilled (No error passive, no undervoltage)	= True			
		All	This monitoring checks if the Alive Rolling Count of the message 'SrlDat26_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 'ChsSysBrkAxlTrqInfo1_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 'ChsSysBrkAxlTrqInfo1_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 'TrnsEstGr_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 'TrnsEstGr_Prtctd_MSG' (Transmission Estimated Gear Protected) signal group from Transmission 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 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 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 'SysPwrMode_Prtctd_MSG' signal group	Message is not received for time	>= 1.25 [s]	Ignition state ON AND	= True	1.25 [s]	Continuous	Type B, 2 Trips

			from Body Control 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 '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 'MSGJ9092' 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_'9O89' 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_'9O94' 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 'SrlDat6_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 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_2022' 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_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 [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 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 fsl	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	U1611	All	This monitoring checks if the message 'TrnsEstGr_Prtctd_MSG' signal group from	Message is not received for time	>= 0.25 Fs]	Ignition state ON AND	- True	0.25 [s]	Continuous	Type B, 2 Trips

Module			Engine Control 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_2027' PDU from Engine 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_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 [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_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_204T PDU 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 '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
		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 fsl	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 'SrlDat18_Prtctd_MSG' signal group 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 'SrlDat19_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 'SrlDat20_Prtctd_MSG' signal group 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 'SrlDat21_Prtctd_MSG' signal group from	Message is not received for time	>= 0.3 Fsl	Ignition state ON AND	= True	0.3 [s]	Continuous	Type B, 2 Trips

			Engine Control 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 'SrlDat22_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 'SrlDat25_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 'SrlDat26_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 'SrlDat29_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 Module 1	U1612	All	This monitoring checks if the message 'MSG_2246' PDU from Hybrid Powertrain Control Module 1 is received within the specified cycle time.	Message is not received for time	>= 0.25 Fs]	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 'SrlDat31_Prtctd_MSG' signal group from Hybrid Powertrain 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
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 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'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 'ChsSysBrkAxlTrqInfo1_Prtctd_MSG_CAN 2' signal group from Transmission Control Module is received within the specified cycle time.	Message is not received for time	>= 0.1 [si	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 [si	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 'SrlDat48_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 'SrlDat9_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 'MSG_3017' 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_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	All	This monitoring checks if the ABS is correctly triggered.	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 Hydraulic Enable is pulled low) AND MRG is switched on	= True = True = 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 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 counterworks 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
		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 = 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 = 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	= True = True	Ignition state ON	= True	0.05 [s]	Continuous	Type A, 1 Trip

				Defect in SPI line OR Defect in ASIC	= True = True					
		All	This monitoring checks the SPI communication between 2nd 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 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 [%]	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 [V]	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 Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507)	= True = True = True	0.1 [s]	Continuous	Type A, 1 Trip

						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 > 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
		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
		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	= OxFF = 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
		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
		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	P0604	All	This monitoring checks if the LBIST and MBIST are working properly.	Test result bits set do no match reference register value	= True	Ignition state ON	= True	Immediately	Once	Type A, 1 Trip

Memory (RAM) Error				OR Signature register values do no match reference register value	 = True					
		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 existing overvoltage situation while other LIN failure is present.	ECU Supply voltage AND Another LIN failure has been detected	> 16 [V] = True	Cranking	= False	Immediately	Continuous	Type B, 2 Trips
		Brembo	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	> 16.1 [V] > 0.050 Fsl >= 2 [s[	Actuation has been requested	= True	2[s]	Continuous	Type B, 2 Trips
				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.	= True	Actuation has been requested	= True			
		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 [VI = 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	(DMA buffer state OR	= Overflow	Ignition state ON AND	= True	0.03 [s]	Continuous	Type A, 1 Trip

			Transfer Unit.	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)	= True = 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			
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) AND BBF System state	= True = True = Full	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]	Ignition state ON AND Braking is requested (either by driver or by external)	= True = True	0.3 [s]	Continuous	Type A, 1 Trip
Brake Fluid	C0049	All	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 aur 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	= Full system OR Degraded pedal feel OR Hydraulic backup with actuators = False = 9.32..43.5 [mph]			

						AND Pressure sensor 1 value AND Ignition state ON	 > 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	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		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	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		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	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		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 AND Braking is requested (either by driver or by external)	= One circuit = True	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
		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 AND Braking is requested (either by driver or by external)	= Full = True	0.100 ... 0.500 [s]	Continuous	Type A, 1 Trip
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	< 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]	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

				Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	> 20 [%]					
		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
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	< 2-2.5 [V] < 0.075-0.125 [A] > 5 - 8 [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

				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(ON/OFF) 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) 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
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	>= 8 [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

				Calculated leakage	> 800 [mm^3/s]	Braking is requested (either by driver or by external) AND Vehicle speed	= False < 156.6 [mph]			
		All	This monitoring checks if the pressure build capability is reduced.	Calculated air in plunger	> 5 [cm^3]	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 up during replenishment is possible.	Pressure sensor 2 value gradient AND Plunger volume	< 300 [bar] > plunger volume at start of replenishment + 1 cm^3	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	= True > 20 [%] = 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

				Wrong GateQx OFF feedback bit is set	= True					
		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 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 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

			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
Left Rear Inlet Control	CO018	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	< 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]	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

				Deviation of measured currents right before and right after switching point (Hs-Ls Compare feedback bit is set)	> 20 [%]					
		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 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

				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(ON/OFF) 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
Low Brake Fluid Indicated - Short to around	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]	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 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 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	>4-6.5 [A] > 195-220 [°C]	Ignition state ON AND Any valve test is activated	= True = False	0.03 [s]	Continuous	Type A, 1 Trip

				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)	> 0.4-0.9 [V] > 32.8-39.4 [V]					
		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 (Linder 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 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 (ONZOFF))	= 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 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	= True = True	Ignition state ON AND Valve relay supply voltage AND	= True > 6.9 [V]	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

				Unexpected ASIC valve driver feedback (considered ASIC bits: OpenLoad, Undercurrent, GateQx (ON/OFF))	= True	Outside of valve control AND Hydraulic request is set	= True = False			
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 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(ON/OFF) 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 (ONZOFF))	= 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 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	Failure in actuation logic and actuation compare logic OR	= True	Ignition state ON AND	= True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

			valve driver ADC unit.	Failure in low-side ADC measurement OR Failure in high-side ADC measurement OR Failure in PWM compare unit	= True = True = True	Outside of valve control AND Hydraulic reguest 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 "A" Valve 2	C0002	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(ON/OFF) 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	Measured valve resistance OR Measured valve resistance	> 6.9 [Ohm] < 2.2 [Ohm]	Ignition state ON AND Outside of valve control	= True = True	20 [s]	Cyclically every 20 [s]	Type A, 1 Trip

			software.			AND Hydraulic request is set	= False			
		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 "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	< 2-2.5 [V]	Ignition state ON AND	= True	0.03 [s]	Continuous	Type A, 1 Trip

				Current through valve coil (Linder Current feedback bit is set)	< 0.075-0.125 [A]	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
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	= True > 20 [%] = 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

				OR Wrong GateQx OFF feedback bit is set	= True					
		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 > 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	[illegible]	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 = True	0.120 [s]	Continuous	Type A, 1 Trip
Left Front Wheel Speed Sensor Circuit Low	C0502	All	This monitoring checks for implausible error patterns of the signal which cannot be	Current value monitoring does not detect failure AND	= True	Ignition state ON AND	= True	0.120 [s]	Continuous	Type A, 1 Trip

			classified either as an electrical fault (such as supply to ground which are covered by other monitorings) or valid signal.	Supply line monitoring does not detect failure AND Voltage value monitoring does not detect failure AND Signal is not valid	= True = True = False	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			
		All	This monitoring checks if there is supply line short to ground failure in case of front leftWSS.	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 = True	0.120 [s]	Continuous	Type A, 1 Trip
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) 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
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[V] = True = True = True = True	3[s]	Continuous	Type A, 1 Trip
		DF11l	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

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 = True	1 [s]	Continuous	Type A, 1 Trip
Left Front Wheel Speed Sensor Range/Performance	C0501	DF11I BoschVDA ContiVdaR	This monitoring checks if there is an incorrect air gap between the impulse wheel and the front 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 Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Vehicle speed	= True = True = True = True = True >1.24 [mph]	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 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) 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 >6 [VI			
		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 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 [VI	3.6 [s]	Continuous	Type B, 2 Trips
		BoschVDA	This monitoring checks if there is an undervoltage on the WSS Front Left Supply Line.	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 [VI	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	ECU supply line	< 9.3 [V[	Ignition state ON AND	- True	1.2 [s]	Initial and Continuous	Type B, 2 Trips

			Supply Line.			During initialization	= True			
				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
				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]		
		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	> 981 [m/s^2] = 2 < 1.2 [S] > 500 [m/s^2] > 4	Ignition state ON	= True	20 [s]	Continuous	Type B, 2 Trips

				(Number of detected increasing edges AND Within time)	>= 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 FL is within a valid range.	[Difference between maximum and minimum wheel speedl	> 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 speedl	> 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 speedl	> 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 speedl	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed	= True >=62.13 [mph]	9 - 18 [s]		
				[Difference between maximum and minimum wheel speedl	> 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	= True = True	0.120 [s]	Continuous	Type A, 1 Trip

						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			
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 = 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 = 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	= True = True = True	0.120 [s]	Continuous	Type A, 1 Trip

						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			
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 = 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 = True	3[s]	Continuous	Type A, 1 Trip
Left Rear Wheel Speed Sensor Intermittent/Erratic	C0510	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	= True = True	0.03 [s]	Continuous	Type A, 1 Trip

						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			
		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 = 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 airgap 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 Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Vehicle speed	= True = True = True = True = True > 1.24 [mph]	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 left 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	= True = True	3.6 [s]	Continuous	Type B, 2 Trips

						Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND	= True			
						Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND	= True			
						Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND	= True			
						Sensor supply voltage	> 6 [V]			
		DF11i	This monitoring checks if stop pulses are not received from rear left WSS.	Sensor is not sending speed/stop pulses	= True	Ignition state ON AND	= True	3.6 [s]	Continuous	Type B, 2 Trips
						Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND	= True			
						Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND	= True			
						Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND	= True			
						Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND	= True			
						Sensor supply voltage	> 6 [V]			
		BoschVDA	This monitoring checks if there is an undervoltage on the WSS Rear Left Supply Line.	ECU supply line	< 9 [V]	Ignition state ON AND	= True	1.2 [s]	Continuous	Type B, 2 Trips
						During initialization	= True			
				Supply voltage across the WSS	< 5.15 [V]	Ignition state ON AND	= True	0.06 [s]		
						Front Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0501) AND	= True			
						Front Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0507) AND	= True			
						Rear Left WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C050D) AND	= True			
						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	= True	1.2 [s]	Initial and Continuous	Type B, 2 Trips
						During initialization	= True			
				Supply voltage across the WSS	< 5.65 [V]	Ignition state ON AND	= True	0.06 [s]		

						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 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	< 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]		
		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 fmphl = 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]	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 RL is within a valid range.	[Difference between maximum and minimum wheel speedl	> 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 speedl	> 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 speedl	> 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 speedl	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed	= True >=62.13 [mph]	9 - 18 [s]		
				[Difference between maximum and minimum wheel speedl	> 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]		
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	= True = True = True	0.120 [s]	Continuous	Type A, 1 Trip

						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			
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 line short to ground failure in case of rear leftWSS.	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 = True	0.120 [s]	Continuous	Type A, 1 Trip
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	= True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip

						Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True			
Right Front Wheel Speed Sensor Direction (Incorrect Mounting)	C0057	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 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
		DF11l	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	= True >6[V] = True	3[s]	Continuous	Type A, 1 Trip

						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			
Right Front Wheel Speed Sensor Intermittent/Erratic	C050A	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 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 = 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	= 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

						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 >1.24 [mph[			
		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 = 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]	3.6 [s]	Continuous	Type B, 2 Trips
		DF11I	This monitoring checks if stop pulses are not received from front right WSS.	Sensor is not sending speed/stop pulses	= 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[	3.6 [s]	Continuous	Type B, 2 Trips
		BoschVDA	This monitoring checks if there is an undervoltage on the WSS Front 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	- True	0.06 [s]		

						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			
		ContiVdaR	This monitoring checks if there is an undervoltage on the WSS Front 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 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 Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	= True = True = True = True = True	0.06 [s]		
		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 [si > 500 [m/s^2] > 4 >= 3 = 0.005 [si	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 speedl	> 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 speedl	> 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 speedl	> 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 speedl	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed	= True >=62.13 [mph]	9 - 18 [s]		
				[Difference between maximum and minimum wheel speedl	> 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	= 0 [mph] > 7.38 [mph] = 0 [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

				Vehicle speed increase)	>12.97 (all wheel drive) or 7.38 (two wheel drive) [mph]					
				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 = 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 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 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]	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)	= True = True = True = True	0.120 [s]	Continuous	Type A, 1 Trip

						AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513)	 = True			
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 fmphl = 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	<> 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 = 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	= True = True = True	3[s]	Continuous	Type A, 1 Trip

						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			
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 = True	0.03 [s]	Continuous	Type A, 1 Trip
		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 = 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)	= 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

						AND Rear Right WSS Test is finished as sensor undervoltage fault is not logged (SAE code: C0513) AND Vehicle speed	= True > 1.24 [mph]			
		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 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]	3.6 [s]	Continuous	Type B, 2 Trips
		DF11i	This monitoring checks if stop pulses are not received from rear right WSS.	Sensor is not sending speed/stop pulses	= 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 [VI	3.6 [s]	Continuous	Type B, 2 Trips
		BoschVDA	This monitoring checks if there is an undervoltage on the WSS Rear Right Supply Line.	ECU supply line	<9 [VI	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	= True = True = True	0.06 [s]		

						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			
		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 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]		
		DF11i	This monitoring checks if there is an undervoltage on the WSS Rear Right 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	< 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]		
		All	This monitoring checks if the system can recognize a WSS RR 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 RR 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	> 981 [m/s^2]	Ignition state ON	= True	20 [s]	Continuous	Type B, 2 Trips

				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)	= 2 < 12 [s] > 500 [m/s^2] >4 >= 3 = 0.005 [si					
		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 speedl	> 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 speedl	> 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 speedl	> 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 speedl	> 6 [%] of the vehicle speed	Ignition state ON AND Vehicle speed	= True >=62.13 [mph]	9 - 18 [s]		
				[Difference between maximum and minimum wheel speedl	> 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]		

Component/ System	SAE J2012 Fault Code	Monitor Strategy Description	Primary Malfunction Signal and Criteria	Threshold Values	Secondary Parameters	Enable Values	Time Required	MIL Ilium.
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		
					(			
			Borderline OSC (see Look-Up-Table #101)	=0.125 to 0.3(g)	Deceleration Fuel Cut-Off (DFCO)	=False		
			Corrected OSC: ((a) - (b)) * (c) / (d)		for time	>10(s)		
			(a) Measured OSC bank 1		Vehicle speed	>6.25(mph)		
			(b) O2 mass for OSC correction using Sec. O2 performance diag. results		engine speed	<4000(rpm)		
			(c) Correction map for transition and delayed response time		engine speed	>1000(rpm)		
			(d) compensation time for OSC correction using Sec. O2 performance diag. results		engine load (see Look-Up-Table #20)	> 13.00 to 1536(%)		
					Integrated air mass flow	>60(°C)		
					measured ambient temperatuer	>-48(°C)		
					measured ambient pressure	>0(kPa)		
					measured engine coolant temperature	>57.96(°C)		
					no transmission gear change	=True		
					for time	>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)	<1.11(g/s)
Change of exhaust gas mass flow bank 1: (a) - (b)	>-1.11(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	<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	<O(g/s)
High window exhaust gas mass flow bank 1	>1820(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	=5(s)
PT1 time constant	=0.2(s)
Low window modeled catalyst	<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	>345(°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	=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 O2 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank1	<0(V)
Secondary O2 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 O2 sensor voltage gradient over 0.05s	>0.1(V/s)
Secondary O2 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary O2 sensor voltage bank1	>0(V)
)	
Integrated exhaust mass flow bank 1	≥O(g)
if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)

Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
And	
(	
Secondary O2 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage	<0.1(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.2(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.1(V/s)
Secondary O2 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) - 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 O2 sensor voltage bank 1	<0.1(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 1	<0.2(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.1(V/s)
Secondary O2 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 O2 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 O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 Maximum number of samples per trip	=0.2 =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)) (a) measured Oxygen Storage Capacity (b) EWMA filtered normalized monitoring result (c) Step change detection factor	>(b) * (c) =0.3		
				EWMA filter constant Maximum number of samples per trip	=0.2 =2(counts)		
				Total number of samples for RSC mode	=3(counts)		
				EWMA filter constant Total number of samples for stablilized mode	=0.2 =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		

Corrected OSC: ((a) - (b)) * (c) / (d)	for time	>10(s)
(a) Measured OSC bank 2	Vehicle speed	>6.25(mph)
	engine speed	<4000(rpm)
(b) O2 mass for OSC correction using Sec. O2 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 temperatuer	>-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: (a) - (b)	<1.11(g/s)
	Change of exhaust gas mass flow bank 2: (a) - (b)	>-1.11(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	<111.1(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)

High window exhaust gas mass flow bank 2	<O(g/s)
High window exhaust gas mass flow bank 2) (	>1820.4(g/s)
Modeled catalyst temperature gradient bank 2: (a) - (b)	<40(°C)
Modeled catalyst temperature gradient bank 2: (a) - (b) (a) Modeled catalyst temperature bank 2	>-40(°C)
(b) filtered modeled catalyst temperature bank 2 PT1 time constant	=5(s)
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	S5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b) (a) fuel mass supplied by canister purge control (b) fuel mass supplied by injection Or	<0.3
open loop canister purge control Or	=True
canister purge control mass flow into the manifold ((	<7.11(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 (Secondary O2 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	=False
primary A/F commanded lambda	
if the following conditions are met, sm moves to sm = 2	
Secondary O2 sensor voltage bank 2	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank 2	<0(V)
Secondary O2 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	=0.87
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	>0.1(V/s)

Secondary O2 sensor voltage bank 2	>0.68(V)
)	
Or	
Secondary O2 sensor voltage bank 2	>0(V)
)	
Integrated exhaust mass flow bank 2	≥O(g)
if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 O2 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 sensor	=0.02(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 O2 sensor voltage	<0.1(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage bank 2	<0.2(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.1(V/s)
Secondary O2 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	
a commanded lambda active bank 2	
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 O2 sensor voltage bank 2	<0.1(V)
for time	>0.1(s)
Or	

(	
Secondary O2 sensor voltage bank 2	<0.2(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.1(V/s)
Secondary O2 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 O2 sensor voltage bank 2 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 2 starts	
(	
Secondary O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 stablilized mode	=1(counts)
No pending or confirmed DTCs	=see sheet inhibit table
Basic enable conditions met	=see sheet enable tables

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 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)		
			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)				
			or		Engine coolant temperature at engine start	>-12.04(°C)		
			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(rad/s^2)	or			
			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	=TRUE		

		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 2048(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 2048(deg/s^2)	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(%)

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	>2048(deg/s^2)		
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	>2048(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		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		for	
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		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
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)		
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 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)
Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	where 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	
[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 6 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 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 multiple cylinder fault code	=10(%)
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 multiple cylinder 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 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	
	[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 6 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 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 multiple cylinder fault code	=10(%)
	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 multiple cylinder 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	
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	>3000(counts)
	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	=10(%)
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	=10(%)
and/or	
Total weighted misfire counts for cylinder 3 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	=10(%)
and/or	
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 multiple cylinder fault code	=10(%)
and/or	
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 multiple cylinder fault code	=10(%)
and/or	
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 multiple cylinder fault code	=10(%)
and/or	
Total weighted misfire counts for cylinder 7 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	=10(%)
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 multiple cylinder fault code	=10(%)
with	
[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)		
			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)				
			or		Engine coolant temperature at engine start	>-12.04(°C)		
			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)	or			
			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 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(%)

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)		
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	

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		for	
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	>measured parameter(deg/s^2)	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
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)
Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	where 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	=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 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	=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	
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	>3000(counts)
	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 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 [B] Test frame extension factor for first interval after engine start]	=20(%) =200(revolutions) =[A] x [B](revolutions) =200(revolutions) =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		Engine speed	<8600(rpm)		
		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)				
		or		Engine coolant temperature at engine start	>-12.04(°C)		

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)	or	
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)
		Zero torque detection is not active means	
or			
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(%)
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)		

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	
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	>[A]+[B](deg/s^2)	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)	or	

[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](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	=measured
	where	
Fault Path 1: Emission relevant misfire rate within first	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] 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 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 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)				
	Fault Path 3: Catalyst damaging misfire rate	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 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 cylinder-individual fault code	=20(%)				
		with [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)				
		[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	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)		

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)		
or		Engine coolant temperature at engine start	>-12.04(°C)
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)	or	
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)
		Zero torque detection is not active means	
or			
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 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(%)

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)		
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	
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		for	

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](deg/s^2)	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
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 where	=measured parameter(deg/s^2)
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 3 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 [One test frame defined by:	=10(%)

	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	=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	
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	>3000(counts)
	and/or	
	Total weighted misfire counts for cylinder 3 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	=20(%)
	with	
	[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)				
		[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(deg/s^2)	Engine speed	>600(rpm)	see Fault Paths 1-3 below	2 Trip
		or		Engine speed	<8600(rpm)		
		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)				
		or		Engine coolant temperature at engine start	>-12.04(°C)		
		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)	or			
		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)
		Zero torque detection is not active means	
or 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(%)
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)		
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	
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		for	
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](deg/s^2)	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

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)		
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 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	=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 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	=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	
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	>3000(counts)
	and/or	

		Total weighted misfire counts for cylinder 4 within test frame where [A] Total weighted misfire counts per exhaust bank within test frame [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 [B] Test frame extension factor for first interval after engine start]	>[A] x [B] =measured parameter =20(%) =200(revolutions) =[A] x [B](revolutions) =200(revolutions) =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^2)	Engine speed	>600(rpm)	see Fault Paths 1-3 below	2 Trip
		or		Engine speed	<8600(rpm)		
		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)				
		or		Engine coolant temperature at engine start	>-12.04(°C)		

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)	or	
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)
		Zero torque detection is not active means	
or			
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(%)
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)		

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	
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	>[A]+[B](deg/s^2)	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
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)
Fault Path 1: Emission relevant misfire rate within first 1000 crankshaft revolutions after engine start	where 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	=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)
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)
	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	=10(%)
	with [One test frame defined by:	

		Total number of crankshaft revolutions in test frame for emission relevant misfire rate and Misfire test frame counter] or	=1000(counts) =4(counts)					
	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 5 within test frame where [A] Total weighted misfire counts per exhaust bank within test frame [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 [B] Test frame extension factor for first interval after engine start]	>3000(counts) >3000(counts) >[A] x [B] =measured parameter =20(%) =200(revolutions) =[A] x [B](revolutions) =200(revolutions) =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		Engine speed		<8600(rpm)		

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)		
or		Engine coolant temperature at engine start	>-12.04(°C)
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)	or	
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 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(%)

	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	
	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		for	

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](deg/s^2)	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
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	>[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 6 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 6 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	
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	>3000(counts)
	and/or	
	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	=20(%)
	with	
	[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)

		[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 or	>-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)		

	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(%)

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)		
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	

	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		for	
	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](deg/s^2)	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
	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)
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	
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	>3000(counts)
	and/or	

			Total weighted misfire counts for cylinder 7 within test frame where [A] Total weighted misfire counts per exhaust bank within test frame [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 [B] Test frame extension factor for first interval after engine start]	>[A] x [B] =measured parameter =20(%) =200(revolutions) =[A] x [B](revolutions) =200(revolutions) =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)	>195 to 1400(deg/s^2)	Engine speed	>600(rpm)	see Fault Paths 1-3 below	2 Trip
			or		Engine speed	<8600(rpm)		
			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)				
			or		Engine coolant temperature at engine start	>-12.04(°C)		

	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)	or	
	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(%)
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)		
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	
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	>[A]+[B](deg/s^2)	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
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)		

	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 where	=measured parameter(deg/s^2)
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 or	>80(counts)
	Total misfire counts across all cylinders within first test frame during catalyst heating and/or	>80(counts)
	Total misfire counts for cylinder 8 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 [One test frame defined by:	=10(%)
	Total number of crankshaft revolutions in first test frame specific to emission relevant misfire rate at engine start or	=1000(counts)
Fault Path 2: Emission relevant misfire rate after the first 1000 crankshaft revolutions	Total misfire counts across all cylinders within test frame and/or	>80(counts)
	Total misfire counts for cylinder 8 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 [One test frame defined by:	=10(%)				
			Total number of crankshaft revolutions in test frame for emission relevant misfire rate and	=1000(counts)				
			Misfire test frame counter] or	=4(counts)				
		Fault Path 3: Catalyst damaging misfire rate	Weighted misfire counter for exhaust bank or	>3000(counts)				
			Weighted misfire counter for exhaust bank during first interval after engine start and/or	>3000(counts)				
			Total weighted misfire counts for cylinder 8 within test frame where	>[A] x [B]				
			[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:	=20(%)				
			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				
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

FLOW			or		Diagnosis of canister purge system is active	=TRUE		
			Integrated CPV mass flow during vacuum build-up	>0.09(g)	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	<0.126(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		
	P0496	Monitoring of fuel tank pressure while CPV and CVV are closed (CPV stuck open)	Difference between low pass filtered tank and start pressure for Tank leakage diagnosis	<-0.06(kPa)	Basic Enable conditions are fulfilled as following conditions:	=TRUE	1(s)	2 Trip
					Diagnosis of canister purge system is active	=TRUE		
					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		
P04DF	Canister purge valve Bank1 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	≥O(g)	1(s)	2 Trip

		Counter is incremented if the following occurs (during intrusive purge valve command):		filtered difference of environmental pressure and intake manifold pressure	<30(kPa)		
		difference in intake manifold pressure bank1 (difference is between intake manifold pressure bank 1 at the beginning of intrusive canister purge valve activation and the end)	<0.5(kPa)	**Canister purge valve release conditions met:**	=TRUE		
				(			
				engine coolant temperature	>69.8(°C)		
				ambient air pressure correction factor	>0.69		
				ambient air temperature	>-7.5(°C)		
				)			
				time in between diagnostic events has elapsed. Waiting time betwee 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		
P04AE	Canister purge valve Bank2 is monitored for further pinpointing of a stuck open pruge 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):		filtered difference of environmental pressure and intake manifold pressure	<30(kPa)		

			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)	**Canister purge valve release conditions met:**	=TRUE		
					(			
					engine coolant temperature	>69.8(°C)		
					ambient air pressure correction factor	>0.69		
					ambient air temperature	>-7.5(°C)		
					)			
					time in between diagnostic events has elapsed. Waiting time betwee 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		
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		
			Difference between tank pressure filtered for offset and ccv error threshold because cpv can not open because of vacuum	<0(kPa)	Basic enable conditions met	=see sheet enable tables		
			)					
			for time	>5(s)				
		Path 2 : Monitoring of Canister Ventilation Valve control - based on environmental pressure	Tank pressure	>-0.9(kPa)	Diagnosis of canister purge system is active	=TRUE		
					Mass flow through purge control valve for tank leakage diagnosis	<0.008(g/s)		

				time for miscellaneous measurements	>5(s)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P0455	Monitoring of tank pressure while CVV closed and CPV open (large leakage / open filler cap)	(		Basic Enable conditions are fulfilled as following conditions	=TRUE	1(s)	2 Trip
		Differential tank pressure	>-0.05(kPa)	Diagnosis of canister purge system is active	=TRUE		
		OR		and			
		Integrated CPV - mass flow for tank leakage diagnosis	>0.2(l)	(			
		)		Purge mass flow for DTEV is active	<0.008(g/s)		
		OR		and			
		(		(			
		Differential tank pressure	>A+B	Lowpass filtered tank pressure	>-0.9(kPa)		
		where A is pressure difference for termination of vacuum built-up	=-0.05(kPa)	OR			
		and B is pressure difference for further vacuum built up (0.5-mm-check)	=-0.05(kPa)	Time for miscellaneous measurements	>5(s)		
		OR		)			
		Integrated CPV - mass flow for tank leakage diagnosis	>0.2(g)	and			
		)		(			
				Absolute reference value of differential tank pressure	<0.04(kPa)		
				for time	>2(s)		
				)			
				(			
				Time for miscellaneous measurements	>3(s)		
				OR			
				Difference between low pass filtered tank and start pressure for TLD	<-0.06(kPa)		
				)			
				OR			
				(			
				Absolute reference value of differential tank pressure	<0.04(kPa)		
				for time	>2(s)		
				)			
				and			
				Tank cap open check finished	=TRUE		
				)			

and	
(	
Reference value of differential tank pressure	<O(kPa)
OR	
Time for miscellaneous measurements	>0(s)
)	
and	
(	
Absolute reference value of differential tank pressure	<-0.007(kPa)
OR	
Integrated CPV - mass flow for tank leakage diagnosis	>0.09(g)
)	
)	
and	
(	
Error message for driving distance debounce for DTESK required	=FALSE
OR	
Distance travelled since rough leak recognized	>300(m)
)	
and	
High canister load detected (0.5mm check)	=TRUE
(	
(	
(	
Condition for adaptive Lambda pilot control successful	=TRUE
and	
(	
time counter at first end of start in cycle (16 bit)	>900(s)
OR	
Engine coolant downstream temperature during the first engine start of the driving cycle.	>143.3(°C)
)	
)	
and	
Filtered charcoal canister charge	>40
and	
Inhibition time for tank leakage diagnosis (0.5mm) after high canister load	>0(s)
)	
and	
Vehicle conditions for enabling diagnosis:	=TRUE
(	

					Condition idle speed control and Engine is in running state and Vehicle speed) and Conditions for 0.5mm tank leak diagnosis fulfilled, which is the following conditions: (Absolute difference between current ambient pressure and old value for time and Condition canister purge active for time and Integral of purge mass flow after a longer purge stop and (Difference between engine coolant downstream temperature during the first engine start of the driving cycle and ambient air temperature and Ambient air temperature sensormodel is error free and Condition first end of start in cycle) and Engine coolant downstream temperature during the first engine start of the driving cycle and Engine coolant downstream temperature during the first engine start of the driving cycle) No pending or confirmed DTCs Basic enable conditions met	=TRUE =TRUE <0.13(mph) =TRUE <1.6(kPa) >600(s) =TRUE >20(s) >4(g) <99.8(°C) =TRUE =TRUE >-7.5(°C) <100.5(°C) =see sheet inhibit tables =see sheet enable tables		
5. DIAGNOSIS OF LEAK IN EVAPORATIVE SYSTEM	P0442	**Phase 1:** Monitoring of vacuum decay gradient while CPV and CVV **Phase 2:** Monitoring of tank pressure while CPV and CVV are closed	Engine Off Natural Vacuum Test: EWMA filtered fault index	 >0.5	**Conditions specific to Phase 1(engine running):** Tank pressure vacuum decay gradient while CPV and CVV are closed	 >0(kPa/s)	1(s)	1Trip EWMA

based on:		Engine coolant temperature at start	>-7.5(°C)
(		Engine coolant temperature at start	<100.5(°C)
Difference between max. tank differential pressure & min. tank differential pressure (A-B) (see Look-Up-Table #58)	<0.3 to 0.96(kPa)	Ambient temperature	<35.3(°C)
Max. & min differential		Ambient temperature	>-7.5(°C)
		Fuel tank level	>7(l)
Phase 1 (CPV and CVV are		Fuel tank level	<63(l)
(		(	
A (Maximum pressure)	>0(kPa)	Absolute change in barometric	<1.6(kPa/s)
Stabilization phase (CPV		for time	=600(s)
Wait for pressure to reach	=300(s)	)	
)		Canister purge active	
		Minimum purging time of the charcoal	>20(s)
Phase 2 (CPV and CVV are		Time since last charcoal canister	<35(s)
(		Load factor of charcoal canister	<40
Wait for pressure to reach		for time	>30(s)
B: Minimum pressure	=0(kPa)		
)			
)		**Conditions specific to Phase 2**	
		Canister purge valve (CPV)	=TRUE
		Canister vent valve (CVV)	=TRUE
		P0446, P0496, P0455 diagnostics	=TRUE
		Ambient temperature	<-7.5(°C)
		Ambient temperature	>35.3(°C)
		Engine coolant temperature at start	<100.5(°C)
		Engine coolant temperature at start -	<99.8(°C)
		Engine had been running for time	>600(s)
		Driving distance covered in current	>8100(m)
		(	
		Load factor of charcoal canister	<64
		for time	>30(s)
		)	
		Barometric pressure	>70(kPa)
		Engine coolant temperature at engine	>60(°C)
		Battery voltage	>10.9(V)
		Condition - refueling detected	=FALSE
		Condition filler cap has been opened	=FALSE
		Condition - Sloshing of fuel detected	=FALSE
		EWMA Filter Normal Mode:	
		Filter coefficient for stabilized mode	=0.18
		Number of measurements for	=6(counts)

					EWMA Filter Fast Initial Response Filter coefficient for Fast Initial	 =0.2		
					EWMA Filter Rapid Response (RR) Filter coefficient for Rapid Responde	 =0.2		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
6. FUEL SUPPLY SYSTEM DIAGNOSIS	P0171	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	>0.23	(		10(s)	2 Trip Sim Cond
					((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 <0.5 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	 =FALSE		

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 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	>0(s)
)	
)	
)	
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 senor	=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	>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
(	
(	
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	<A-B
where	
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) No pending or confirmed DTCs Basic enable conditions met	>100(s) =see sheet inhibit tables =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	(((Unrestricted operation of Upstream closed loop lambda controller is active (Enleanment protection of lambda controller (Large deceleration enleanment protection of lambda controller for time (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))) and Upstream Lambda closed loop control for bank 1 (Lambda control after injection cut off or fuel cut off is disabled and Lambda swtiched ON after fuel cutoff (Fuel cut off is active and (	 =TRUE =FALSE =FALSE <0.3 to 1(s) =FALSE <0.5 to 1(s) =TRUE =FALSE =TRUE =FALSE	10(s)	2 Trip Sim Cond

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 a-(b+c)	>0(s)
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 senor	=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	>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
(	
(	
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	<A-B
where	
A is Threshold for significant evaporation of fuel from oil	=0.25
B is Delta hysteresis for significant evaporation from oil	=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	<0.5 to 1(s)		
				(see Look-Up-Table #96)			
				)			
				)			
				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 swtiched 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 diffence in lambda of bank 2	<0.2
and	
Difference of counter time and plant time constant a-(b+c)	>0(s)
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 senor	=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)
)	
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	<A-B
where	
A is Threshold for significant evaporation of fuel from oil	=0.25
B is Delta hysteresis for significant evaporation from oil	=0.1
)	
)	
for time	>100(s)
)	
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	=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	<0.5 to 1(s)		
				(see Look-Up-Table #96)			
				)			
				)			
				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 swtiched 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 diffence in lambda of bank 2	<0.2		
				and			

Difference of counter time and plant time constant 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	>0(s)
)	
)	
)	
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 senor	=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)
)	
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	<A-B
where	
A is Threshold for significant evaporation of fuel from oil	=0.25
B is Delta hysteresis for significant evaporation from oil	=0.1
)	
)	
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	>1.27	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
(	
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	
Conditiion 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
for time (blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	>0.3 to 1(s)
)	
)	
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 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 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	>0.8(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 continuos 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	

Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92))	<4.99 to 49.99(%/seg)
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 and	=FALSE
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 2 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 of bank 2 for continuous air/fuel control c is plant parameter of bank 2 for dead time for lambda control))) and	>0(s)
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	
Lamda control active due to GDI mode change	=TRUE
(	
GDI mode homogeneous	=TRUE
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 continuos 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) 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) and Lambda closed loop control upstream catalyst, bank 1) Multiplicative adaptation correction factor))) No pending or confirmed DTCs Basic enable conditions met	 >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		
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 (LTFT multiplicative part Bank 1 Integrator is stable which is of the following conditions ((Condition diagnostic thresholds of multiplicative correction currently exceeded of bank 1 is stable	=TRUE =TRUE =TRUE	0.2(s)	2 Trip Sim Cond

(	
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
(	
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	
Conditiion 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
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	
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	>0(s)

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	>0.8(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 continuos 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
for time (blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	<0.3 to 1(s)

)	
)	
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 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	>0(s)
)	
)	
)	
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	
Lamda 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 continuos 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 tables		
	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	=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	<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	>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	
Conditiion 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	

Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
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	
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 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	>0.8(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 continuos 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
for time (blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	<0.3 to 1(s)
)	
)	
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 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	>0(s)
)	
)	
)	
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	
Lamda 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 continuos 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 2	=TRUE

				) Multiplicative adaptation correction factor of bank 2)))	>0		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=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	=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 OR	>1.27		
				Multiplicative part of LTFT for bank 2) OR	<0.77		
				Similar conditions for multiplicative fuel adaptation fulfilled for bank 2 (	=TRUE		
				Difference between Measured and reference Engine speed, bank 2 and	<375(rpm)		
				Difference between reference and measured Engine speed, bank 2 and	<375(rpm)		
				Difference between measured load value to reference load, bank 2 and	<20		
				Difference between reference load value to measured load, bank 2)) and	<20		

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	>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	
Conditiion 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
for time (blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	>0.3 to 1(s)

)	
)	
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 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 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	>0.8(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 continuos 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
for time (blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	<0.3 to 1(s)
)	
)	
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 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	>0(s)
LSU sensor upstream to catalyst ready for operation (	=TRUE
Level of lambda sensor 1, bank 2 signal quality) and	<12
Lambda control disabled by a fault (	=FALSE
Catalyst damaging misfire rate exceeded and	=FALSE
Injector power stage fault is active and	=FALSE
Camshaft fault in critical operating range present and MAF is main air charge sensor) and	=FALSE
lambda control is active since warmup is finished and	=TRUE
Relative air charge	>0(%)
(for time) and	>2(s)
Lamda control active due to GDI mode change (	=TRUE
GDI mode homogeneous	=TRUE
for time)) and	>0.8(s)
Lambda set point and	>0.65
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 continuos 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 2	=TRUE
)	
Multiplicative adaptation correction factor of bank 2	>0
)	
)	
)	

				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P2187	Additive part of the Long Term Fuel Trim for Bank 1 in gasoline mode is greater than a calibrated threshold	Additive part of LTFT, Bank 1	>5.48(%)	LTFT Additive 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
(	
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	
Conditiion 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	
(	
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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
for time (blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	>0.3 to 1(s)
)	
)	
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 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 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	
Lamda 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 is active	=FALSE
and	
(	
Width of dead zone for lambda control deviation	<0
OR	
Lambda control continuos 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
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 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	>0(s)
)	

)	
)	
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	
Lamda 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 continuos 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(%)
)	
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
)	
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
(	

				(Additive mixture adaptation is active, which is the following conditions: (Ora operational readiness independent of the operating mode is active, which is the following conditions for time (Fundamental operating mode independent operation readiness of mixture adaption and ORA adaption physically enabled (Torque commanded to charge control (see Look-Up-Table #63) and Torque commanded to charge control (see Look-Up-Table #62))) and Operating mode dependent Readiness LRA) and Lambda closed loop control upstream catalyst, bank 1) and Additive adaptation correction factor, bank 1))) No pending or confirmed DTCs Basic enable conditions met	=TRUE >2(s) =TRUE =TRUE >2.499 to 99.998(%) <0 to 17.999(%) =TRUE =TRUE >0 =see sheet inhibit tables =see sheet enable tables		
P2188	Additive part of the Long Term Fuel Trim for Bank 1 in gasoline mode is less than a calibrated threshold	Additive part of LTFT, Bank 1	<-5.48(%)	LTFT Additive 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
(	
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	
Conditiion 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	
(	
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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
for time (blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	>0.3 to 1(s)
)	
)	
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	
Lamda 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 is active	=FALSE
and	
(	
Width of dead zone for lambda control deviation	<0
OR	
Lambda control continuos 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	

Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
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 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	>0(s)
)	
)	
)	
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	
Lamda 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 continuos 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(%)
)	
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
)	
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
(	
(	
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 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	<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	>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	
Conditiion 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
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	
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	>0(s)

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	
Lamda 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 is active	=FALSE
and	
(	
Width of dead zone for lambda control deviation	<0
OR	
Lambda control continuos 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
for time (blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	<0.3 to 1(s)

)	
)	
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 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	>0(s)
)	
)	
)	
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	
Lamda 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 continuos 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 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	
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
(	
(	
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))) and Operating mode dependent Readiness LRA) and Lambda closed loop control upstream catalyst, bank 2) and Additive adaptation correction factor, bank 2))) No pending or confirmed DTCs Basic enable conditions met	<0 to 17.999(%) =TRUE =TRUE >0 =see sheet inhibit tables =see sheet enable tables		
P2190	Additive part of the Long Term Fuel Trim for Bank 2 in gasoline mode is less than a calibrated threshold	Additive part of LTFT, Bank 2	<-5.48(%)	LTFT Additive 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 (Multiplicative part of LTFT for bank 2 OR Multiplicative part of LTFT for bank 2) OR Similar conditions for multiplicative fuel adaptation fulfilled for bank 2 (Difference between Measured and reference Engine speed, bank 2	=TRUE =TRUE =TRUE >1.27 <0.77 =TRUE <375(rpm)	0.2(s)	2 Trip Sim Cond

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	>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	
Conditiion 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)

and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
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	
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 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	
Lamda 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 is active	=FALSE
and	
(	
Width of dead zone for lambda control deviation	<0
OR	
Lambda control continuos 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) (see Look-Up-Table #91)	<4.99 to 49.99(%/seg)
and	
Relative fuel mass transient componet threshold for acceleration enrichment (Bank 2) (see Look-Up-Table #92)	<4.99 to 49.99(%/seg)
)	
for time (blocking time for activation LC after acceleration enrichment) (see Look-Up-Table #95)	<0.3 to 1(s)
)	
)	
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 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	>0(s)
)	
)	
)	
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	
Lamda 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 continuos 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) (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 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	
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
(	
(	
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
			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 eqaul 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		(	
Fuel trim minimum fault is set in the previous driving cycle	=TRUE	Lambda control disabled during or after cylinder cut-off	=FALSE
)		Lambda swtiched 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 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)
		)	
		)	
		)	
		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
Lamda 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
OR	
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	
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 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)
(	
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	>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	<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 betweeen 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)		
				)			
				)			
				)			
				)			
				)			
				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 eqaul 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		(	
Fuel trim minimum fault is set in the previous driving cycle	=TRUE	Lambda control disabled during or after cylinder cut-off	=FALSE
)		Lambda swtiched 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 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)
)	
)	
)	
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
Lamda 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
OR	
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	<0.322266(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)
)	
(	
Sensor open circuit fault existed in previous trip	=TRUE
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)
)	
)	
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
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(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(s)
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	>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	>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	<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 betweeen 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)		
				)			
				)			
				)			
				)			
				)			
				No pending or confirmed DTCs	=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 controlability 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	(	
)		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 eqaul to 0	=TRUE
OR		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 enleanmant 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 OR	=TRUE	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 swtiched 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 OR (	>8(s)
		Absolute value of control difference in lambda, bank 2	<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, bank 2 c is plant parameter for dead time for lambda control, bank 2)))	>0(s)
		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
		Lamda 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
(	
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)
)	
(	
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 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
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
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)
)	
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 betweeen 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			
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 controlability 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	(				

	)		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 eqaul to 0	=TRUE
	OR		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 enleanmant protection	>0
	)		Lambda (measured and setpoint) is below minimal measurable lambda (bank 2)	=FALSE
	)		and	
	)		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 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	<0.2
			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, bank 2	>0(s)

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)
)	
HEM condition to block lambda closed loop control upstream catalyst, bank 2	=FALSE
Lamda 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
(	
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)
)	
(	
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 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
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(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	=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	
(	
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)
)	
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 betweeen 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 OR	>2(counts)		
					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	2 Trip
	and		
	Condition segment duration plausible	=TRUE	
	and		
	Active rough road detection	=FALSE	
	and		
	Clutch operator is active	=FALSE	
	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 nmot 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 hystersis 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	
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	=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 hysterisis 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	=FALSE
and	
Homogenous mode is activated	=1
and	
Air fuel ratio commanded rich for component protection is active	=FALSE
)	
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 adaptions 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		
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	=FALSE	
	and Clutch operator is active	=FALSE	
	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) where	<A-B(%)	
	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 (see Look-Up-Table #3)	=50.3 to 54.8(%)	
	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) (see Look-Up-Table #4)	>20.3 to 24.8(%)	
	and Engine speed (with AT) where	<A-B(rpm)	

A is Upper engine speed threshold for determining for operating range LOW, AT	=2320(rpm)
B is the hystersis 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	
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	=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 hysterisis 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) Where: a is Maximum catalyst 1 temperature at bank 1 b is Maximum catalyst 1 temperature at bank 2	<950(°C)
and	
max(a,b) Where: a is Minimum catalyst 1 temperature at bank 1 b is Minimum catalyst 1 temperature at bank 2	>400(°C)
)	
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	=FALSE
and	
Homogenous mode is activated	=1
and	
Air fuel ratio commanded rich for component protection is active	=FALSE
)	
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 adaptions 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		
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		Pause time	=0		
		(		OR			
		Desired Open time(ti) on ballisitic area for CVO base adaption	<0.0002(s)	Pause time	>0.003(s)		
		and		)			
		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)	<0.00062(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 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		
				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	=FALSE	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 ballisitic area for CVO base adaption	>0.0002(s)	and			2 Trip Sim Cond
P10AF		and		Base Adaption is active	=FALSE		2 Trip Sim Cond
P10B1		Total calculated injection time correction (dti)	<-0.00005(s)	and			2 Trip Sim Cond
		) OR (Desired Open time(ti) on ballisitic area for CVO base adaption and	<0.0002(s)	(Pause time OR Pause time)	=0 >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	(			
					CVO monitoring generally active	=True		
					Or CVO monitoring generally active and Engine temperature will be used, the next condictions need to met:	=True		
					(Coolant temperature at engine output	>-20.04(°C)		
					Coolant temperature at engine output	<119.96(°C)		
					))			
11. CHIP DIAGNPSIS OF UPSTREAM EXHAUST GAS SENSOR	P064D	**ECU: Self Check for Sensor ASIC of UEGO Sensor 1 Bank 1** An error is reported if the ASIC detects it or it delivers unplausible measurement values	**Monitoring of ASIC power supply:** Undervoltage at UB: Battery voltage < 6V		Diagnosis register of the ASIC is valid	=TRUE	0.01(s)	2 Trip
			ASIC has shut off due to low battery voltage (failure transition into IDLE state) **OR**	=TRUE	(Battery voltage	<16.1(V)		
					Battery voltage)	>10.7(V)		
			Tests for production checks are active		for time	>0.1(s)		
			SPI test access port active	=TRUE	Basic enable conditions are met	=see sheet enable tables		
			OR		No pending or confirmed DTCs	=see sheet inhibit tables		
			Built-in self-test failed **OR**	=TRUE				

Monitoring of ASIC internal sequencing Internal sequencing does not work			
Error of watchdog signal of the sequencer OR	=TRUE		
Watchdog signal of the SP-unit Interrupt to close OR	=TRUE		
Watchdog signal of the SP-unit reading error of the Program rom if set without Over- or Undervoltage Flags **OR**	=TRUE		
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
		(Battery voltage	<16.1(V)
Bidirectional interrupt signal between ASIC and ECU-Microcontroller: too slow- or too fast response or no response	=TRUE	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 Causes for error: ADC defect, 3,3V source not operational, low-pass defect		Cj135 is neither in IDLE nor in SWITCHON mode	=TRUE
		(Battery voltage	<16.1(V)
Conversion value of the analog digital converter (amplifier mode 1) OR	<0.00040(V)	Battery voltage)	>10.7(V)
		for time	>0.1(s)
Conversion value of the analog digital converter (amplifier mode 1) OR	>0.0007(V)	Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables

Conversion value of the analog digital converter (amplifier mode 2) OR	<0.00110(V)		
Conversion value of the analog digital converter (amplifier mode 2) OR	>0.002(V)		
Conversion value of the analog digital converter (amplifier mode 3) OR	<0.00310(V)		
Conversion value of the analog digital converter (amplifier mode 3)	>0.0054(V)		
Current source Isq/ Rgnd resistance check Causes for error: Isq defect, Rgnd damaged or wrong calibration value of Rgnd		Cj135 is not in IDLE mode	=TRUE
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/ Rcal resistance check Causes for error: Isqr defect, Rcal damaged		Cj135 is neither in IDLE nor in SWITCHON mode	=TRUE
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 Since Rmeas cannot be alone measured by ECU, then the entire resistance between pin APE and MES (Rparl) will be checked here		Cj135 is in SWITCHON mode	=TRUE		
				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:**		Diagnosis register of the ASIC is valid	=TRUE	0.01(s)	2 Trip
		Undervoltage at UB: Battery voltage < 6V. ASIC has shut off due to low battery voltage (failure transition into IDLE state)	=TRUE	(Battery voltage	<16.1(V)		
		OR		Battery voltage)	>10.7(V)		
		Tests for production checks are active		for time	>0.1(s)		
		SPI test access port active	=TRUE	Basic enable conditions are met	=see sheet enable tables		

OR		No pending or confirmed DTCs	=see sheet inhibit tables
Built-in self-test failed	=TRUE		
OR			
Monitoring of ASIC internal sequencing			
Internal sequencing does not work			
Error of watchdog signal of the sequencer	=TRUE		
OR			
Watchdog signal of the SP-unit Interrupt to close	=TRUE		
OR			
Watchdog signal of the SP-unit reading error of the Program rom if set without Over- or Undervoltage Flags	=TRUE		
OR			
Check ASIC Chip			
ASIC chip ID is lower than BA-step	=TRUE		
Monitoring of ASIC interrupt handling		Validity of IRQ diagnosis information	=TRUE
Interrupt handling at ASIC base software does not work			
		(Battery voltage	<16.1(V)
Bidirectional interrupt signal between ASIC and ECU-Microcontroller: too slow- or too fast response or no response	=TRUE	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			
		(Battery voltage	<16.1(V)
Conversion value of the analog digital converter (amplifier mode 1)	<0.00040(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)	>0.0019(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 Causes for error: Isq defect, Rgnd damaged or wrong calibration value of Rgnd		Cj135 is not in IDLE mode	=TRUE
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		(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/ Rcal resistance check Causes for error: Isqr defect, Rcal damaged		Cj135 is neither in IDLE nor in SWITCHON mode	=TRUE
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 Since Rmeas cannot be alone measured by ECU, then the entire resistance between pin APE and MES (Rparl) will be checked here		Cj135 is in SWITCHON mode	=TRUE		
				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		
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 **Monitoring ASIC (Chip) response/error**		No pending or confirmed DTCs	=see sheet inhibit tables		
			Availability of diagnostic register (	=TRUE				
			ASIC initialization wasn't successful OR	=TRUE				
			Respond/actual state of the ASIC wasn't as expected of base software OR	=TRUE				
			The bank wasn't switched between interrupt change) **OR** **Monitoring setting register and operation mode**	=TRUE				
			Register could not be set	=TRUE				
			Number of rejected requests OR	>200(counts)				
			No values found in diagnosis register OR	=TRUE				
			The ASIC does not switch to the requested mode for time	>2(s)				
12. DIAGNOSIS OF O2 SENSOR HEATER CIRCUIT	P0135	**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 1 has reached (heating up is released) and (	=TRUE		
					Engine is running (	=TRUE		
					Coolant temperature at engine start) OR	>-40.04(°C)		
					Engine is running (	=FALSE		
					Coolant temperature at engine output)	>-40.04(°C)		

			) and (Battery voltage and Battery voltage) for time and **Deactivation after release of Start Check** 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 and (All injectors active in operation by running engine OR Engine is running)) Basic enable conditions are met and No pending or confirmed DTCs	 >10.7(V) <16.1(V) >0.1(s) >10(s) <16.1(V) =TRUE =FALSE =see sheet enable tables =see sheet inhibit tables	
Path 2: Permanent diagnosis Monitoring of ceramic temperature against low rationality threshold	Ceramic temperature of upstream O2 sensor	<735(°C)	(Battery voltage and Battery voltage) for time and Engine is running and Modelled exhaust gas temperature at upstream O2 sensor bank 1 and Fuel cut off is active for time	<10.7(V) >16.1(V) >0.1(s) =TRUE >450(°C) =FALSE >50(s)	60(s)

			and HO2S closed loop heating control (inaccurate), which is the following condition for time: (Deviation between actual 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	
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 and Battery voltage) for time and Engine is running and Modelled exhaust gas temperature at upstream O2 sensor bank 1 and Fuel cut off is active for time and HO2S 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	<10.7(V) >16.1(V) >0.1(s) =TRUE >350(°C) =FALSE >50(s) >50(s) >50(°C) =see sheet enable tables =see sheet inhibit tables	10(s)

P2243	Lambda sensor wire diagnosis Circuit countinuity - 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 countinuiuty measurement was done before ASIC abort		(Battery voltage	<16.1(V)	0.2(s)	2 Trip
		Short circuit to battery fault is detected at sensor lines IPE/APE/MES as per last accessed ASIC diagnostic register, means	=FALSE	Battery voltage)	>10.7(V)		
				for time	>0.1(s)		
		Voltage at least at one of the sensor lines IPE/APE/MES	<9.1 to 10.3(V)	Requested mode of UEGO sensor 1 Bank 1 is in WARMUP mode	=TRUE		
		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 "RE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM	=TRUE	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		
				)			
				Basic enable conditions are met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
	Lambda sensor wire diagnosis Circuit countinuity - open load at pin RE detected by means of aborted RAM check at NORMAL mode	**Aborted RAM check at ASIC shut-off when CJ135 in NORMAL mode** Open load at pin RE detected if current via Nernst cell is not OK		(Battery voltage	<16.1(V)		
		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		
	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	>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 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 pumpsell 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)
	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 (Ug0iai - Ug0)	≥E * F	Battery voltage)	>10.7(V)
			for time	>0.1(s)
	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 (Ug0iei - Ug0)	<E * F	Upstream HO2S Sensor is heated up, which is the following conditions:	=TRUE
	(E) Measured amplitude of the reference pump current source	=measured value	(	
	(F) Minimum sensitivity of the continuiuity 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) OR (	=TRUE =TRUE
Last packet transfer aborted of sensor 1 bank 1	
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
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** 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:	>10(s)		
				(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 Monitoring of ceramic temperature against low rationality threshold	Ceramic temperature of upstream O2 sensor	<735(°C)	(Battery voltage	<10.7(V)	60(s)
			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	>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 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	>16.1(V)	
			)		
			for time	>0.1(s)	
			and		
			Engine is running		
			and		

				Modelled exhaust gas temperature at upstream O2 sensor bank 2 and Fuel cut off is active for time and HO2S 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	>350(°C) =FALSE >50(s) >50(s) >50(°C) =see sheet enable tables =see sheet inhibit tables		
P2247	Lambda sensor wire diagnosis Circuit countinuity - 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 countinuiuty measurement was done before ASIC abort		(Battery voltage	<16.1(V)	0.2(s)	2 Trip
		Short circuit to battery fault is detected at sensor lines IPE/APE/MES as per last accessed ASIC diagnostic register, means	=FALSE	Battery voltage) for time	>10.7(V) >0.1(s)		
		Voltage at least at one of the sensor lines IPE/APE/MES	<9.1 to 10.3(V)	Requested mode of UEGO sensor 1 Bank 2 is in WARMUP mode	=TRUE		
		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 "RE" via internal switches and the sensor line "IPE" is directly connected to RGnd) is available in RAM	=TRUE	Upstream HO2S Sensor is heated up, which is the following conditions: (Upstream HO2S Sensor ceramic temperature	=TRUE >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 Circuit countinuity - open load at pin RE detected by means of aborted RAM check at NORMAL mode	**Aborted RAM check at ASIC shut-off when CJ135 in NORMAL mode** Open load at pin RE detected if current via Nernst cell is not OK		(Battery voltage	<16.1(V)
	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 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** 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)	>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 pumpsell 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 (Ug0iai - Ug0)	≥E * F	Battery voltage)	>10.7(V)
		for time	>0.1(s)
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 (Ug0iei - Ug0)	<E * F	Upstream HO2S Sensor is heated up, which is the following conditions:	=TRUE
(E) Measured amplitude of the reference pump current source	=measured value	(	
(F) Minimum sensitivity of the continuiuity measurements to resistance RGnd	=66(Ohm)	Upstream HO2S Sensor ceramic temperature	>790(°C)
		OR	
		Heating-up phase of the sensor is completed)	=TRUE
		Requested mode of UEGO sensor 1 Bank 2 is in WARMUP mode and (	=TRUE
		(Last packet transfer aborted of sensor 1 bank 2	=FALSE
		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	
		(Last packet transfer aborted of sensor 1 bank 2	=TRUE

					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		
					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 O 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		
					(			
					(			
					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 1	>4(%)		
					Basic enable conditions met	=see sheet enable tables		
					No Pending or Confirmed DTCs	=see sheet inhibit tables		

P0031	Diagnoses the UEGO 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	=TRUE	2(s)	2 Trip
				The following release condition of diagnosis report of bank 1 sensor 1 is satisfied ((Battery Voltage for time Battery Voltage) for time)	=TRUE > 10.7(V) =1.5(s) <16.1(V) >0.1(s)		
				Basic enable conditions met	=see sheet enable tables		
				No Pending or Confirmed DTCs	=see sheet inhibit tables		
P0030	Diagnoses the UEGO 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	=TRUE	0.5(s)	2 Trip
				The following release condition of diagnosis report of bank 1 sensor 1 is satisfied ((Battery Voltage for time Battery Voltage) for time)	=TRUE > 10.7(V) =1.5(s) <16.1(V) >0.1(s)		
				Basic enable conditions met	=see sheet enable tables		
				No Pending or Confirmed DTCs	=see sheet inhibit tables		
P0052	Diagnoses the UEGO 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 ((Battery Voltage for time	=TRUE > 10.7(V) =1.5(s)		

				Battery Voltage) for time) Duty cycle control powerstage heater sensor 1 bank 2 Basic enable conditions met No Pending or Confirmed DTCs	<16.1(V) >0.1(s) >4(%) =see sheet enable tables =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 ((Battery Voltage for time Battery Voltage) for time) Basic enable conditions met No Pending or Confirmed DTCs	=TRUE > 10.7(V) =1.5(s) <16.1(V) >0.1(s) =see sheet enable tables =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 for time Battery Voltage) for time) Basic enable conditions met	=TRUE > 10.7(V) =1.5(s) <16.1(V) >0.1(s) =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 continiuity - 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		(Battery voltage	<16.1(V)	0.01(s)	2 Trip
			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 (Ug0iai - Ug0)	<E * F(V)	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 (Ug0iei - Ug0)	≥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 continuiuity measurements to resistance RGnd	=66(Ohm)	(			
					Upstream HO2S Sensor ceramic temperature			

	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		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	
	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 (Ug0iai - Ug0)	<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 (Ug0iei - Ug0)	>D * F(V)				
		(D) Requested amplitude of the reference pump current source	=commanded value(A)				
		(F) Minimum sensitivity of the continuiuity measurements to resistance RGnd	=66(Ohm)				
		<u>Aborted RAM check at ASIC shut-off when CJ135 in NORMAL mode</u> Open load at pin Apes detected if countinuiuty 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					
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)	=TRUE >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 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
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 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	>10.7(V)
for time	>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	>9.8(V)
for time	>0.5(s)
Battery voltage	>8(V)
for time	>0.05(s)
Status auxillary 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
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	>10.7(V)
			for time	>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	<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 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	>10.7(V)
for time	>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	>9.8(V)
for time	>0.5(s)
Battery voltage	>8(V)
for time	>0.05(s)
Status auxillary 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
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
Path 4: Monitoring of the non-availability of the sensor signals for a prolonged duration	(		(	

Physical release conditions for oxygen sensor are fulfilled	=FALSE	Release of diagnosis report sensor 1 bank 1	=TRUE
OR		(	
Oxygen sensor signals are of high precision	=FALSE	(	
)		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
		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	>10.7(V)
for time	>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	>9.8(V)
for time	>0.5(s)
Battery voltage	>8(V)
for time	>0.05(s)
Status auxillary power relay	=TRUE
ECU in drive state	=TRUE

)	
Evaluation temperature is valid, sensor 1 bank 1	=TRUE
(	
Temperature of ceramic sensor 1 bank 1 where	>A - B(°C)
(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 continiuity - 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		(Battery voltage	<16.1(V)	0.01(s)	2 Trip
			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 (Ug0iai - Ug0)	<E * F(V)	Battery voltage)	>10.7(°C)		
			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 (Ug0iei - Ug0)	>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 continuiuity measurements to resistance RGnd	=66(Ohm)	(			
					Upstream HO2S Sensor ceramic temperature OR	>790(°C)		
			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					

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
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 (Ug0iai - Ug0)	<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 (Ug0iei - Ug0)	>D * F(V)		
(D) Requested amplitude of the reference pump current source	=commanded value(A)		
(F) Minimum sensitivity of the continuiuity 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 countinuiuty 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	=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	>10.7(V)		
				for time	>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 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
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 (see Look-Up-Table #33)	>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 2 (see Look-Up-Table #31)	>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	>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 auxillary 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)
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 (see Look-Up-Table #33)	>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 2 (see Look-Up-Table #31)	>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	>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 auxillary 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)
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 Current pump package is valid) No pending or confirmed DTCs Basic enable conditions met	!=0 =TRUE =see sheet inhibit table =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 OR Oxygen sensor signals are of high precision) for time	 =FALSE =FALSE >10(s)	(Release of diagnosis report sensor 1 bank 2 ((Battery voltage for time Battery voltage) for time) Sensor in hot state (Sensor operation release, Sensor 1 bank 2 (Battery voltage for time (((End of start reached OR Engine operation in stopping and finish state (	 =TRUE >10.7(V) >1.5(s) <16.1(V) >0.1(s) =TRUE =TRUE <16.1(V) >0.06(s) =FALSE =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 (see Look-Up-Table #33)	>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 2 (see Look-Up-Table #31)	>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	>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 auxillary 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)
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		(Battery voltage	<16.1(V)	0.01(s)	2 Trip
		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	=FALSE	Battery voltage)	>10.7(V)		
		(		for time	>0.1(s)		
		If control deviation of heater control of upstream HO2S Sensor (HO2S Sensor heater control is inaccurate)	>49.9922(K)	Upstream HO2S Sensor is heated up, which is the following conditions:	=TRUE		
		for time (	>0.1(s)	(Upstream HO2S Sensor ceramic temperature	>790(°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 (Ug0 - 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 (Ug0 - 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 (Ug0 - 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 (Ug0 - 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 (Ug0iai - Ug0)	<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 (Ug0iei - Ug0)	<E * F
(E) Measured amplitude of the reference pump current source	=measured value
(F) Minimum sensitivity of the continuiuity 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 (Ug0iai - Ug0)	<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 (Ug0iei - Ug0)	<D * F
(D) Requested amplitude of the reference pump current source	

		(F) Minimum sensitivity of the continuiuity measurements to resistance RGnd	=66				
		<u>Aborted RAM check at ASIC shut-off when CJ135 in NORMAL mode</u> Open load at pin IPE detected if no countinuiuty 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	=FALSE				
P2254	Lambda sensor wire diagnosis for UEGO sensor 1 bank 2 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		(Battery voltage	<16.1(V)	0.01(s)	2 Trip
		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	=FALSE	Battery voltage)	>10.7(V)		
		(		for time	>0.1(s)		
		If control deviation of heater control of upstream HO2S Sensor (HO2S Sensor heater control is inaccurate)	>49.9922(K)	Upstream HO2S Sensor is heated up, which is the following conditions:	=TRUE		
		for time	>0.1(s)	(			
		(		Upstream HO2S Sensor ceramic temperature	>790(°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 (Ug0 - 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 (Ug0 - 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 (Ug0 - 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 (Ug0 - 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 (Ug0iai - Ug0)	<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 (Ug0iei - Ug0)	<E * F
(E) Measured amplitude of the reference pump current source	=measured value(A)
(F) Minimum sensitivity of the continuiuity 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 (Ug0iai - Ug0)	<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 (Ug0iei - Ug0)	<D * F
(D) Requested amplitude of the reference pump current source	=commanded value
(F) Minimum sensitivity of the continuiuity 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 countinuiuty 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	=FALSE

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

				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		(Battery voltage	<16.1(V)	0.01(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 1	=FALSE		
				Requested mode of UEGO Sensor 1 E	=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 : Monitoring of abnormalities at sensor lines APE/IPE during the normal ASIC operation when CJ135 is in SWITCHON or WARMUP mode		(Battery voltage	<16.1(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	>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 (Ug0i - Ug0)	>0.07008(V)	for time	>0.1(s)
	OR		Last packet transfer aborted of sensor 1 bank 1	=FALSE
	(		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 (Ug0e - Ug0)	>0.07008(V)	Basic enable conditions are met	=see sheet enable tables

)		No pending or confirmed DTCs	=see sheet inhibit tables
Path 3 : **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		(Battery voltage	<16.1(V)
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 (Ug0a - Ug0)	>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 (Ug0i - Ug0)	>0.0438(V)	Measured CJ135 Mode sensor 1 bank 1 is not in IDLE mode	=TRUE
OR		Last packet transfer aborted of sensor	=TRUE

	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
	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: 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 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) =TRUE
	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 No pending or confirmed DTCs	=see sheet enable tables =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	=FALSE
Results of both continuity measurement of sensor pumpcell using current source ISQr are available in RAM accessed ASIC diagnistic register	=TRUE
Voltage at least at one of the sensor lines (RE/IPE/APE/MES) AND (	>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 (Ug0iai-Ug0) AND	>D * F(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 "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 (Ug0iei-Ug0)	>D * F(V)				
		(D) Requested amplitude of the reference pump current source ISQr	=commanded value(A)				
		(F) Minimum sensitivity of the continuiuity 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	=FALSE		
				Requested mode of UEGO sensor 1 b	=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 : **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		(Battery voltage	<16.1(V)
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 (Ug0a - Ug0)	>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 (Ug0i - Ug0)	>0.07008(V)	for time	>0.1(s)
		Last packet transfer aborted of sensor 1 bank 2	=FALSE
OR		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 (Ug0e - Ug0)	>0.07008(V)	Basic enable conditions are met	=see sheet enable tables
		No pending or confirmed DTCs	=see sheet inhibit tables
Path 3 : 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		(Battery voltage	<16.1(V)
Voltage at RGnd resistor	>4(V)	and Battery voltage)	<10.7(V)
OR		for time	>0.1(s)
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 (Ug0a - Ug0)	>0.0438(V)	Measured CJ135 Mode sensor 1 bank 2 is not in IDLE mode	=TRUE
OR		Last packet transfer aborted of sensor 1 bank 2	=TRUE

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 (Ug0i - Ug0)	>0.0438(V)	Basic enable conditions are met	=see sheet enable tables
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)
(		Measured CJ135 Mode sensor 1 bank 2 is in WARMUP mode	=TRUE
Upstream HO2S Sensor ceramic temperature	>790(°C)	Last packet transfer aborted of sensor 1 bank 2	=TRUE
OR		Basic enable conditions are met	=see sheet enable tables

Heating-up phase of the sensor is completed	=TRUE	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	=FALSE		
Results of both continuity measurement of sensor pumpcell using current source ISQr are available in RAM accessed ASIC diagnistic register	=TRUE		
Voltage at least at one of the sensor lines (RE/IPE/APE/MES) AND (	>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 (Ug0iai-Ug0) OR	>D * F(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 "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 (Ug0iei-Ug0)	>D * F(V)					
		(D) Requested amplitude of the reference pump current source of UEGO sensor 1 Bank 2	=commanded value(A)					
		(F) Minimum sensitivity of the continuiuity 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)	Battery voltage and	>10.7(V)			
				Battery voltage)	<16.1(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)						
				for time	>0.1(s)			
				Requested mode of UEGO Sensor 1 bank 1 in IDLE mode	=TRUE			

		Validity of the diagnosis register of the	=TRUE
		Last packet transfer aborted of sensor	=FALSE
		Internal Control Module O2 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 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 (Ug0 - Ug0a)	>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 (Ug0 - Ug0i))	>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 sensor	=TRUE
		Internal Control Module O2 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 (Ug0 - Ug0a)	>0.07008(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 "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 (Ug0 - Ug0e)	>0.07008(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 (Ug0 - Ug0i)	>0.07008(V)	) for time	>0.1(s)
)		(Requested mode of UEGO Sensor 1 bank 1 in SWITCHON mode or WARMUP mode	=TRUE
		for number of counts	>10(counts)
		)	
		Last packet transfer aborted of sensor	=FALSE
		Internal Control Module O2 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		
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		(		0.5(s)	2 Trip
		Voltage at least at one of the sensor lines RE/IPE/APE/MES	<-0.15(V)	Battery voltage and	>10.7(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)	<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 O2 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 (Ug0 - Ug0a)	>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 (Ug0 - Ug0i))	>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 sensor	=TRUE
		Internal Control Module O2 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 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 (Ug0 - Ug0a)	>0.07008(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 "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 (Ug0 - Ug0e)	>0.07008(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 (Ug0 - Ug0i)	>0.07008(V)	for time	>0.1(s)		
			)		(Requested mode of UEGO Sensor 1 bank 2 in SWITCHON mode or WARMUP mode for number of counts)	=TRUE >10(counts)		
					Last packet transfer aborted of sensor	=FALSE		
					Internal Control Module O2 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	Path 1: Step response/identifcation 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)	(			

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	>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	<12(%)
Identified transition time in lean-rich direction	>1.5(s)	for time	=1(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 cylinder cut-off	=FALSE
Lambda swtiched 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 diffence in lambda of bank 1	<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 c is plant parameter for dead time for lambda control	>0(s)
)	
)	
)	
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)
Lamda 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	S5.56(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

(	
Number of step response measurements in lean-rich direction for driving 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 lambda	=1.07
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	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded lambda bank1	=0.87
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 lambda	=0.87
for time	>3(s)
for time	>0.1(s)

(	
Secondary O2 sensor voltage	>0.86(V)
Or	
(	
Secondary O2 sensor voltage	>0.76(V)
Secondary O2 sensor voltage	<66.5(V/s)
Secondary O2 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(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 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	>(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)
)	
)	
OR	
(	
(	
Rich lamda is requested to empty the oxygen gas from the cat	=TRUE
a commanded lambda active	=TRUE

primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)
(	
Secondary O2 sensor voltage	>0.86(V)
Or	
(	
Secondary O2 sensor voltage	>0.76(V)
Secondary O2 sensor voltage	<66.5(V/s)
Secondary O2 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(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 rich exhaust gas mass flow bank 1	≥5(g)
and	
(	
Lean lambda is requested and the cat is filled with oxygen gas due to high sensor voltage	=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	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.2(V)

Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage	<0.45(V)
)	
)	
for time where in (A) LRS-plantparameter deadtime	=A * 0.8(s)
(	
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)
)	
)	

)	
Absolute difference between reciprocal of desired lamda 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) where in	<A - ((A - B)* (C / D))(s)
			(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) where in	<A - ((A - B)* (C / D))(s)
			(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)
			))	
Path 2: Step response/identifcation measurement of Oxygen sensor 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 OR	>0.3(s)	Vehicle speed and	>3.125(mph)

	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	$-^{2}$ (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 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)	>0.2(s)

(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	<12(%)
for time	=3(s)
)	
)	
OR	
Fault suspicion reported by continuous identification	=FALSE
(	
Absolute value of filling gradient	<12(%)
for time	=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 swtiched 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 diffence in lambda of bank 1	<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)
)	
)	
)	
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)
Lamda 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
)	
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 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 lambda	=1.07
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	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded lambda bank1	=0.87
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 lambda	=0.87
for time	>3(s)
for time	>0.1(s)
(	
Secondary O2 sensor voltage	>0.86(V)
Or	
(	

Secondary O2 sensor voltage	>0.76(V)
Secondary O2 sensor voltage	<66.5(V/s)
Secondary O2 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(g)
))	
(	
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 mass flow bank 1	- ^{5} (g)
)	
)	
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 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 lamda is requested to empty the oxygen gas from the cat	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded lambda	=0.87
for time	>3(s)
for time	>0.1(s)

(	
Secondary O2 sensor voltage	>0.86(V)
Or	
(	
Secondary O2 sensor voltage	>0.76(V)
Secondary O2 sensor voltage	<66.5(V/s)
Secondary O2 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow bank 1	>0.2(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 rich exhaust gas mass flow bank 1	-5(g)
and	
(	
Lean lambda is requested and the cat is filled with oxygen gas due to high sensor voltage	=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	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage	<0.45(V)
)	
)	
for time where in (A) LRS-plantparameter deadtime	=A * 0.8(s)
(	
Reciprocal of actual lambda value where in (A) Minimal or maximal value of reciprocal lambda after step	<(A - (B*C))
(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 lamda 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) 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)	<A - ((A - B)* (C / D))(s) =0.6(s) =0.38(s) =3(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)) OR	<A - ((A - B)* (C / D))(s) =0.9(s) =0.4(s) =3(counts)		
				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/identifcation 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
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 (detected pattern, bank 2)	>0	)	
(		End of start is reached	=TRUE
Identified delay time in lean-rich direction, bank 2	>1(s)	for time	=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 swtiched 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 diffence in lambda of 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)
)	
)	
)	
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(%)
for time	>2(s)
Lamda 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)
)	
(	
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 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	=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)
(	
Rich lambda is requested and the cat is filled with rich gas due to low sensor voltage, bank 2	=TRUE
a commanded lambda active	=TRUE
primary A/F commanded lambda bank2	=0.87
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 lambda	=0.87
for time	>3(s)
for time	>0.1(s)
(	
Secondary O2 sensor voltage	>0.86(V)
Or	
(	
Secondary O2 sensor voltage	>0.76(V)
Secondary O2 sensor voltage	<66.5(V/s)
Secondary O2 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0.2(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 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	
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 lambda	=0.87
for time	>3(s)
for time	>0.1(s)
(	
Secondary O2 sensor voltage	>0.86(V)
Or	
(	
Secondary O2 sensor voltage	>0.76(V)
Secondary O2 sensor voltage	<66.5(V/s)
Secondary O2 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0.2(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 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 lambda	=1.07
for time	>3(s)
for time	>0.1(s)
((	
Secondary O2 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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)
)	
OR	
Lean lambda is requested and the cat is filled with oxygen gas, 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 O2 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 lamda 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) where in	<A - ((A - B)* (C / D))(s)
(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) where in	<A - ((A - B)* (C / D))(s)
(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) where in	<A - ((A - B)* (C / D))(s)
(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)
			)	
			)	
Path 2: Step response/identifcation 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
(		for time	=5(s)
Sum time of identification in lean-rich direction (sensor 1, bank 2)	>1.5(s)	(	
OR		Fault suspicion reported by continuous identification	=TRUE
Sum time of identification in rich-lean direction (sensor 1, bank 2)	>1.5(s)	(	
)		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 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)	>0.2(s)
		OR	
		Negative value of the sum of delay times and transition times in rich to lean and lean to rich directions respectively 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)	>0.2(s)
		(	
		Absolute value of filling gradient	<12(%)

for time	=3(s)
)	
)	
OR	
Fault suspicion reported by continuous identification	=FALSE
(	
Absolute value of filling gradient	<12(%)
for time	=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 swtiched 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 diffence in lambda of 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	>0(s)

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 charge sensor	=FALSE
)	
lambda control is active since warmup is finished	=TRUE
Relative air charge	>0(%)
for time	>2(s)
Lamda 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)
)	
(	
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 lambda	=1.07
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 active	=TRUE
primary A/F commanded lambda bank2	=0.87
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 lambda	=0.87
for time	>3(s)
for time	>0.1(s)
(	
Secondary O2 sensor voltage	>0.86(V)
Or	
(	
Secondary O2 sensor voltage	>0.76(V)
Secondary O2 sensor voltage	<66.5(V/s)
Secondary O2 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0.2(g)
))	
(	
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 mass flow bank 2	≥5(g)
)	
)	
for time	=A * 0.8(s)
where in	
(A) LRS-plantparameter deadtime, bank 2	
and	
(	
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	
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 lambda	=0.87
for time	>3(s)
for time	>0.1(s)
(	
Secondary O2 sensor voltage	>0.86(V)
Or	
(	

Secondary O2 sensor voltage	>0.76(V)
Secondary O2 sensor voltage	<66.5(V/s)
Secondary O2 sensor voltage	>-66.5(V/s)
Integrated Oxygen mass flow bank 2	>0.2(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 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 lambda	=1.07
for time	>3(s)
for time	>0.1(s)
((	
Secondary O2 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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)
OR	
Lean lambda is requested and the cat is filled with oxygen gas, 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 O2 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 lamda 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) where in	<A - ((A - B)* (C / D))(s)		
					(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) where in	<A - ((A - B)* (C / D))(s)		
					(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)		
					)			
					)			
					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 controlability 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 eqaul 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 swtiched 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 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)
)	
)	
)	
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
Lamda 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
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	
(	
(	
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	
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 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	=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	>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	*1 00(g)		
				Difference betweeen 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 adaptation	>6(counts)		
				)))))			
				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 controlability 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 eqaul 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 swtiched 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 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)
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
Lamda 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 OR	=TRUE
HEGO sensor 2 bank 1, signal valid (	=TRUE
Status of heating enable conditions for the sensor operating readiness (Protective heating is finished	=TRUE
for time OR	>25(s)
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	>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	
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 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	=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 control upstream catalyst; bank 1	=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 betweeen 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 adaptation	>6(counts)
)	
)	
)	
)	
)	
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	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 is not eqaul to 0	=TRUE		
					Difference between upper limit action value lambda control and temporary value before test for enleanment 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 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)
)	
)	
)	
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
Lamda 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)
)	
)	
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)
)	
(	
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 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
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(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 bank 2	£100(g)
Difference betweeen 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		
P2197	Plausibility check of upstream exhaust gas sensor when the lambda offset is greater than the calibrated threshold	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	=TRUE		
				OR (			
				Lambda setpoint for sensor after addition of trim control action, bank 2 is not eqaul to 0	=TRUE		
				Difference between upper limit action value lambda control and temporary value before test for enleanment 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 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)
)	
)	
)	
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
Lamda 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)
)	
)	
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)
)	
(	
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(%)
)	
)	
)	
)	
)	
(	
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	=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 betweeen 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 ceramic Sensor	>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	=FALSE		
				(			
				Condition for evaluation temperature valid sensor 1 bank 1	=TRUE		
				for time	=1(s)		
				)			
				Condition of UN0 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 sensor1 bank2 :	=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		
				Valid status of correction	=TRUE		
				for time	=0.5(s)		
				)			
				Validity of Reverse Pump Current Mode Sensor 1 Bank 2	=FALSE		
				(			
				Condition for evaluation temperature valid sensor 1 bank 2	=TRUE		
				for time	=1(s)		
				)			
				Condition of UN0 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 Seconday O2 sensor 2 bank 1 with the calibrated threshold when the sensor voltage changes Rich	arithmetic filtered delay response time of Secondary O2 sensor 2, bank 1, 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 O2 S2B1 Rich to Lean		Vehicle speed	>6.25(mph)		
			(b) Exhaust mass flow dependent correction for transition response time of secondary O2 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 temperatuer	>-48(°C)		
					measured ambient pressure	>O(kPa)		
					measured engine coolant temperature	>57.96(°C)		
					no transmission gear change	=True		
					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: (a) - (b)	<11.11(g/s)		

Change of exhaust gas mass flow Bank 2: (a) - (b) (a) exhaust gas mass flow Bank 2 (b) filtered exhaust gas mass flow Bank 2	>-11.11(g/s)
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	<O(g/s)
High window exhaust gas mass flow bank 1) (	>1820.42(g/s)
Modeled catalyst temperature gradient bank 1: (a) - (b)	<40(°C)
Modeled catalyst temperature gradient bank 1: (a) - (b) (a) Modeled catalyst temperature bank 1	>-40(°C)
(b) filtered modeled catalyst temperature bank 1 PT1 time constant	=5(s)
Low window modeled catalyst	<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 (Secondary O2 sensor readiness bank 1 Primary A/F sensor readiness bank 1)	>100(g)
	>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	=1

if the following conditions are met, sm moves to sm = 2	
Secondary O2 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank1	<0(V)
Secondary O2 sensor voltage bank1	>0.45(V)
statemachine (sm=1) - rich mixture in catalyst	
a commanded lambda active	
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 O2 sensor voltage gradient over 0.05s	>0.0994(V/s)
Secondary O2 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary O2 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 O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 O2 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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) 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 O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 1	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage difference: (a) - (b) (a) old Secondary O2 sensor voltage bank 1 (b) Secondary O2 sensor voltage bank 1	<0.015(V)
Secondary O2 sensor voltage bank 1	<0.202637(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	
(	
Secondary O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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	<(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 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 Seconday O2 sensor 2 bank 1 with the calibrated threshold when the sensor voltage changes Lean	arithmetic filtered delay response time of Secondary O2 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 O2 S2B1 Lean to Rich		Vehicle speed	>6.25(mph)		
		(b) Exhaust mass flow dependent correction for transition response time of secondary O2 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 temperatuer measured ambient pressure measured engine coolant temperature no transmission gear change for time)	>-48(°C) >O(kPa) >57.96(°C) =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) (a) exhaust gas mass flow bank 1 (b) filtered exhaust gas mass flow bank 1	>-11.11(g/s)
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	<O(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) (a) Modeled catalyst temperature bank 1	>-40(°C)
(b) filtered modeled catalyst temperature bank 1 PT1 time constant	=4.999(s)
Low window modeled catalyst	<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 (Secondary O2 sensor readiness bank 1 Primary A/F sensor readiness bank 1)	>100(g)
	>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 O2 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank1	<0(V)
Secondary O2 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 O2 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary O2 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary O2 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 O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
And	
(	
Secondary O2 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.2001 95(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 1	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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	
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 O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
And	
(	
Secondary O2 sensor voltage difference: (a) - (b)	>0.0147(V)
(a) old Secondary O2 sensor voltage bank 1	
(b) Secondary O2 sensor voltage bank 1	
Secondary O2 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 Seconday O2 sensor 2 bank 2 with the calibrated threshold when the sensor voltage changes Rich	arithmetic filtered delay response time of Secondary O2 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 O2 S2B2 Rich to Lean		Vehicle speed	>6.25(mph)		
		(b) Exhaust mass flow dependent correction for transition response time of secondary O2 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 temperatuer	>-48(°C)		
				measured ambient pressure	>O(kPa)		
				measured engine coolant temperature	>57.96(°C)		
				no transmission gear change	=True		
				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: (a) - (b)	<11.11(g/s)		

Change of exhaust gas mass flow Bank 2: (a) - (b) (a) exhaust gas mass flow Bank 2 (b) filtered exhaust gas mass flow Bank 2	>-11.11(g/s)
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	<O(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) (a) Modeled catalyst temperature bank 2	>-40(°C)
(b) filtered modeled catalyst temperature bank 2 PT1 time constant	=4.999(s)
Low window modeled catalyst	<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	<7.11(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 O2 sensor readiness bank 2 Primary A/F sensor readiness bank 2	
)	
	>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 O2 sensor voltage bank1	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank1	<0(V)
Secondary O2 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 O2 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary O2 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary O2 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 O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 O2 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 2	<0.100098(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 2	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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)
)	
(	
Secondary O2 sensor voltage difference: (a) - (b)	<0.015(V)
(a) old Secondary O2 sensor voltage bank 2	
(b) Secondary O2 sensor voltage bank 2	
Secondary O2 sensor voltage bank 2	<0.202637(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	
(	
Secondary O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
(	

				No pending or confirmed DTCs	=see sheet inhibit table		
				Basic enable conditions met	=see sheet enable tables		
P013D	Compares measured transition response time of Seconday O2 sensor 2 bank 2 with the calibrated threshold when the sensor voltage changes Lean	arithmetic filtered delay response time of Secondary O2 sensor 2, bank 2, 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 O2 S2B2 Lean to Rich		Vehicle speed	>6.25(mph)		
		(b) Exhaust mass flow dependent correction for transition response time of secondary O2 S2B2 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	>600(g)		
				measured ambient temperatuer measured ambient pressure measured engine coolant temperature no transmission gear change for time)	>-48(°C) >O(kPa) >57.96(°C) =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) (a) exhaust gas mass flow bank 2 (b) filtered exhaust gas mass flow bank 2	>-11.11(g/s)
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	<O(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) (a) Modeled catalyst temperature bank 2	>-40(°C)
(b) filtered modeled catalyst temperature bank 2 PT1 time constant	=4.999(s)
Low window modeled catalyst	<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	<7.11(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 O2 sensor readiness bank 2	
Primary A/F sensor readiness bank 2	
)	
	>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	<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 bank1	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank1	<0(V)
Secondary O2 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 O2 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary O2 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary O2 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 O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
(	
Secondary O2 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 2	<0.100098(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 2	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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) Primary lambda control set point	<(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 mixture	<0.05
for time	>0.1(s)
Integrated lean exhaust gas mass flow bank 2	≥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 O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 O2 sensor voltage difference: (a) - (b)	>0.014648(V)
(a) old Secondary O2 sensor voltage bank 2	
(b) Secondary O2 sensor voltage bank 2	
Secondary O2 sensor voltage bank 2	>0.749512(V)
)	
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 Seconday O2 sensor 2 bank 1 with the calibrated threshold when the sensor voltage changes Rich	Ewma filtered delay response time of Secondary O2 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 O2 S2B1 Rich to Lean		engine runs	=True		
			(b) Exhaust mass flow dependent correction for delay response time of secondary O2 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 temperatuer	>-48(°C)		
					measured ambient pressure	>0(kPa)		
					measured engine coolant temperature	>57.96(°C)		
					no transmission gear change	=True		
					for time	>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	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 1	<O(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 PT1 time constant	=4.999(s)
Low window modeled catalyst	<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	>1262(°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.H(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 Bank 1	=0.87
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)
Secondary O2 sensor voltage Bank 1	>0.68(V)
)	
Or	
Secondary O2 sensor voltage Bank 1	>0(V)
)	
Integrated exhaust mass flow bank 1	≥O(g)
if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
And	
(	
Secondary O2 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 1	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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)
)	
(	
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	=0.08

Secondary O2 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary O2 voltage Bank 1	
(b) Offset voltage of Secondary O2 sensor	=0.019531(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	
(	
Secondary O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 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		
					Total number of samples for stablilized 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 Seconday O2 sensor 2 bank 1 with the calibrated threshold when the sensor voltage changes Lean to Rich	arithmetic filtered delay response time tiArth of Secondary O2 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 O2 S2B1 Lean to Rich		Vehicle speed	>6.25(mph)		

	(b) Exhaust mass flow dependent correction for delay response time of secondary O2 sensor Lean to Rich (see Look-Up-Table #22)	=0 to 0.04(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 temperatuer	>-48(°C)
			measured ambient pressure	>0(kPa)
			measured engine coolant temperature	>57.96(°C)
			no transmission gear change	=True
			for time	>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)-(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	<O(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) (a) Modeled catalyst temperature bank 1	>-40(°C)
(b) filtered modeled catalyst temperature bank 1 PT1 time constant	=4.999(s)
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	S5.02(g)
HC concentration factor in chacoal canister	<0
relative fuel portion of canister purge to injected fuel mass : (a) / (b) (a) fuel mass supplied by canister purge control (b) fuel mass supplied by injection Or	<0.3
open loop canister purge control Or	=True
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 (Secondary O2 sensor readiness bank 1 Primary A/F sensor readiness bank 1)	>100(g)
	>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 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 Bank 1	=0.87
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)

Secondary O2 sensor voltage Bank 1	>0.68(V)
)	
Or	
Secondary O2 sensor voltage Bank 1	>0(V)
)	
Integrated exhaust mass flow bank 1	≥O(g)
if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
(	
Secondary O2 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)

Or	
(	
Secondary O2 sensor voltage bank 1	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)		
				)			
				(			
				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 O2 sensor voltage bank 1	>(a) + (b)		
				(a) minimum secondary O2 voltage Bank 1			
				(b) Offset voltage of Secondary O2 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 Seconday O2 sensor 2 bank 2 with the calibrated threshold when the sensor voltage changes Rich	Ewma filtered delay response time of Secondary O2 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 O2 S2B2 Rich to Lean		engine runs	=True		
		(b) Exhaust mass flow dependent correction for delay response time of secondary O2 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 temperatuer	>-48(°C)
measured ambient pressure	>O(kPa)
measured engine coolant temperature	>57.96(°C)
no transmission gear change	=True
for time	>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: (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	<O(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) (a) Modeled catalyst temperature bank 2	>-40(°C)
(b) filtered modeled catalyst temperature bank 2 PT1 time constant	=4.999(s)
Low window modeled catalyst	<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	<7.11(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 (Secondary O2 sensor readiness bank 2	>100(g)

Primary A/F sensor readiness bank 2	
)	
	>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	=False
primary A/F commanded lambda	=1
if the following conditions are met, sm moves to sm = 2	
Secondary O2 sensor voltage Bank 2	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage Bank 2	<0(V)
Secondary O2 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 O2 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary O2 sensor voltage Bank 2	>0.68(V)
)	
Or	
Secondary O2 sensor voltage Bank 2	>0(V)
)	
Integrated exhaust mass flow bank 2	≥O(g)

if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 O2 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage	<0.100098(V)

for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.2001 95(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 2	<0.100098(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 2	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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)
)	
(	
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 O2 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary O2 voltage Bank 2	
(b) Offset voltage of Secondary O2 sensor	=0.019531(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	
(	
Secondary O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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

				Total number of samples for stablilized 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 Seconday O2 sensor 2 bank 2 with the calibrated threshold when the sensor voltage changes Lean to Rich	arithmetic filtered delay response time tiArth of Secondary O2 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 O2 S2B2 Lean to Rich		Vehicle speed	>6.25(mph)		
		(b) Exhaust mass flow dependent correction for delay response time of secondary O2 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 temperatuer measured ambient pressure measured engine coolant temperature no transmission gear change for time)	>-48(°C) >O(kPa) >57.96(°C) =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) (a) exhaust gas mass flow bank 2	>-11.11(g/s)
(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	<O(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) (a) Modeled catalyst temperature bank 2	>-40(°C)
(b) filtered modeled catalyst temperature bank 2 PT1 time constant	=4.999(s)
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	<7.11(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	>0.1(g)
(	
Secondary O2 sensor readiness bank 2	
Primary A/F sensor readiness bank 2	
)	
	>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	<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 2	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage Bank 2	<0(V)
Secondary O2 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 O2 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary O2 sensor voltage Bank 2	>0.68(V)
)	
Or	
Secondary O2 sensor voltage Bank 2	>0(V)
)	
Integrated exhaust mass flow bank 2	≥O(g)
if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 O2 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage	<0.100098(V)
for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 2	<0.100098(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 2	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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) - 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 O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
(	
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 O2 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary O2 voltage Bank 2	

					(b) Offset voltage of Secondary O2 sensor) (Secondary O2 sensor voltage bank 2 (a) minimum secondary O2 voltage Bank 2 (b) Offset voltage of Secondary O2 sensor) No pending or confirmed DTCs Basic enable conditions met	=0.019531(V) >(a) + (b) =0.019531(V) =see sheet inhibit table =see sheet enable tables		
20. DOWNSTREAM OXYGEN SENSOR RANGE CHECK DIAGNOSIS	P2270	Compare maximum secondary O2 sensor voltage bank 1 with a calibrated threshold during intrusive commanded rich lambda	Maximum Secondary O2 sensor voltage bank 1 during lambda shifting to rich	<0.76(V)	primary A/F commanded lambda engine runs (Deceleration Fuel Cut-Off (DFCO) for time Vehicle speed engine speed engine speed engine load (see Look-Up-Table #20) Integrated air mass flow measured ambient temperatuer measured ambient pressure measured engine coolant temperature no transmission gear change for time) (	=1 =True =False >10(s) >6.25(mph) <4000(rpm) >1000(rpm) > 13.00 to 1536(%) >60(g) >-48(°C) >0(kPa) >57.96(°C) =True >2(s)	0.1(s)	2 Trip

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	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 1	<O(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 PT1 time constant	=4.999(s)
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	=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	<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 bank1	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank1	<0(V)
Secondary O2 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)
Integrated Rich Gas Storage Capacity	>1.8(g)
for time	
Primary A/F commanded lambda bank 1	<0.8
Integreted Exhaust mass flow	>200(g)
for time	>0(s)
if the following conditions are met, sm moves to sm = 2	
((	
Secondary O2 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary O2 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary O2 sensor voltage bank1	>0(V)
)	
Integrated exhaust mass flow bank 1	≥O(g)

if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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	-60(g)
)	
(	
Secondary O2 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)

)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 1	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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	>1.8(g)
for time	
Primary A/F commanded lambda bank 1	<0.8
Integreted Exhaust mass flow	≥200(g)
for time	>0(s)
if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)		
				)			
				No pending or confirmed DTCs	=see sheet inhibit table		
				Basic enable conditions met	=see sheet enable tables		
P2271	Compare maximum secondary O2 sensor voltage bank 1 with a calibrated threshold during intrusive commanded rich lambda	Minimum secondary O2 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	=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(g)		
				measured ambient temperatuer	>-48(°C)		
				measured ambient pressure	>0(kPa)		
				measured engine coolant temperature	>57.96(°C)		
				no transmission gear change	=True		
				for time	>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) (a) exhaust gas mass flow bank 1	>-11.11(g/s)
(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	<O(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) (a) Modeled catalyst temperature bank 1	>-40(°C)
(b) filtered modeled catalyst temperature bank 1 PT1 time constant	=4.999(s)
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	=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	<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 bank1	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank1	<0(V)
Secondary O2 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 O2 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary O2 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary O2 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 O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)

Secondary O2 sensor voltage gradient over 0.05s	<66.49797(V/s)
Secondary O2 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)
)	
(	
Secondary O2 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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	*i.6(g)
for time	>1(s)
Primary A/F commanded lambda bank 1	>1.1499
Integreted Exhaust mass flow	≥200(g)
for time	>0(s)
)	
if the following conditions are met, sm moves to sm = 4	
((	
Secondary O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)

)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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
Integreted Exhaust mass flow	≥200(g)
for time	>0(s)
)	
if the following conditions are met, sm moves to sm = 4	
(	
Secondary O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	

(	
Secondary O2 sensor voltage bank 1	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)		
					)			
					No pending or confirmed DTCs	=see sheet inhibit table		
					Basic enable conditions met	=see sheet enable tables		
	P2272	Compare maximum secondary O2 sensor voltage bank 1 with a calibrated threshold during intrusive commanded rich lambda	Maximum Secondary O2 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 (see Look-Up-Table #20)	> 13.00 to 1536(%)		
					Integrated air mass flow	>60(g)		
					measured ambient temperatuer	>-48(°C)		
					measured ambient pressure	>0(kPa)		
					measured engine coolant temperature	>57.96(°C)		
					no transmission gear change	=True		
					for time	>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	=5(g/s)
for time	>3(s)
High window exhaust gas mass flow bank 1	<O(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 PT1 time constant	=4.999(s)
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	=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	<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 bank1	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank1	<0(V)
Secondary O2 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)
Integrated Rich Gas Storage Capacity	>1.8(g)
for time	
Primary A/F commanded lambda bank 1	<0.8
Integreted Exhaust mass flow	>200(g)
for time	>0(s)
if the following conditions are met, sm moves to sm = 2	
((	
Secondary O2 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary O2 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary O2 sensor voltage bank1	>0(V)
)	
Integrated exhaust mass flow bank 1	≥O(g)

if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
(	
Secondary O2 sensor voltage bank 1	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)

)	
Or	
(	
Secondary O2 sensor voltage	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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 O2 sensor voltage bank 1	<0.100098(V)
for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 1	<0.200195(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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	>1.8(g)
for time	
Primary A/F commanded lambda bank 1	<0.8
Integreted Exhaust mass flow	≥200(g)
for time	>0(s)
if the following conditions are met, sm moves to sm = 3	
(	
Secondary O2 sensor voltage bank 1	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 1	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)		
				)			
				No pending or confirmed DTCs	=see sheet inhibit table		
				Basic enable conditions met	=see sheet enable tables		
P2273	Compare maximum secondary O2 sensor voltage bank 2 with a calibrated threshold during intrusive commanded rich lambda	Minimum secondary O2 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	=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(g)		
				measured ambient temperatuer	>-48(°C)		
				measured ambient pressure	>0(kPa)		
				measured engine coolant temperature	>57.96(°C)		
				no transmission gear change	=True		
				for time	>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: (a) - (b)	<11.11(g/s)
Change of exhaust gas mass flow bank 2: (a) - (b) (a) exhaust gas mass flow bank 2	>-11.1(g/s)
(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	<O(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) (a) Modeled catalyst temperature bank 2	>-40(°C)
(b) filtered modeled catalyst temperature bank 2 PT1 time constant	=4.999(s)
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	<7.11(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 O2 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	<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 bank1	>0(V)
if the following conditions are met, sm moves to sm = 1	
Secondary O2 sensor voltage bank1	<0(V)
Secondary O2 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 O2 sensor voltage gradient over 0.05s	>0.09944(V/s)
Secondary O2 sensor voltage bank1	>0.68(V)
)	
Or	
Secondary O2 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 O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)

Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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)
)	
(	
Secondary O2 sensor voltage bank 2	>(a) + (b)
(a) minimum secondary O2 voltage	
(b) Offset voltage of Secondary O2 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 2	>1.1499
Integreted Exhaust mass flow	≥200(g)
for time	>0(s)
)	
if the following conditions are met, sm moves to sm = 4	
((	
Secondary O2 sensor voltage bank 2	<0.1(V)

for time	>0.1(s)
)	
Or	
(	
Secondary O2 sensor voltage	<0.2(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.1(V/s)
Secondary O2 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
Integreted Exhaust mass flow	>200(g)
for time	>0(s)
)	
if the following conditions are met, sm moves to sm = 4	
(	
Secondary O2 sensor voltage bank 2	<0.1(V)

for time	>0.1(s)
Or	
(	
Secondary O2 sensor voltage bank 2	<0.2(V)
Secondary O2 sensor voltage gradient over 0.05s	<0.09944(V/s)
Secondary O2 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) - 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 O2 sensor voltage bank 2	>0.86(V)
Or	
(	
Secondary O2 sensor voltage bank 2	>0.76(V)
Secondary O2 sensor voltage gradient over 0.05s	<66.5(V/s)
Secondary O2 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 Primary A/F sensor lambda bank 2 (a) Primary lambda control set point (b) maximum lambda deviation of rich mixture for time Integrated rich exhaust gas mass flow bank 2) No pending or confirmed DTCs Basic enable conditions met	 =0.05 >(a) - (b) <0.05 >0.1(s) ≥5(g) =see sheet inhibit table =see sheet enable tables		
21. UPSTREAM/DOWNSTREAM 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 for time	>3.598633(V) >5(s)	Fault suspicion is active for time, which is the following: (Output voltage of O2 sensor Output voltage of O2 sensor) Enable conditions for operating readiness of O2 sensor 2 bank 1(refer above common conditions)	>3(s) >0.322(V) <0.552(V) =TRUE	0(s)	2 Trip
		Path 2: Internal resistance plausibility - interrupted ground wire	Internal resistance of O2 sensor	>40000(Ohm)	Exhaust gas temperature at O2 sensor Enable conditions for operating readiness of O2 sensor 2 bank 1 (refer above common conditions) Basic enable conditions met No pending or confirmed DTCs	>600(°C) =TRUE =see sheet enable tables =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
		for time	>5(s)	(			
				Output voltage of O2 sensor	>0.322(V)		
				Output voltage of O2 sensor	<0.552(V)		
				)			
				Enable conditions for operating readiness of O2 sensor 2 bank 2 (refer above common conditions)	=TRUE		
	Path 2: Internal resistance plausibility - interrupted ground wire	Internal resistance of O2 sensor	>40000(Ohm)	Exhaust gas temperature at O2 sensor	>600(°C)		
				Enable conditions for operating readiness of O2 sensor 2 bank 2 (refer above common conditions)	=TRUE		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=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 O2 sensor 2 bank 1	=TRUE	0.2(s)	2 Trip
		Output voltage of O2 sensor	>1.201172(V)	(			
				Battery voltage	>10.7(V)		
				Enable conditions for the status of signal fault in the previous driving with the availablilty 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)		
				)			
				O2 Sensor open circuit fault detected	=FALSE		
				)			
				(			
				Expected downstream O2 sensor readiness			
				(			
				Protective heating is finished	=TRUE		

(	
Status of downstream O2 sensor heating for hot engine conditions	
(	
Engine coolant temperature	>-48(°C)
Conditions for enabling sensor heating for O2 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 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)	
)	
Dew point end is reached at upstream of catalyst	
(	
a > (b) * (((c) * (d)) + 1)	
Where:	
(a) Integrated heat release since engine start	
(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	>A+B(s)
where	
A: Operating readiness, HEGO sensor 2 bank 1 / Debouncing time protective heating finished	=25(s)
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	>0.552(V)
and	
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	
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:** Enable conditions for operating readiness of O2 sensor 2 bank 2	=TRUE	0.2(s)	2 Trip
		Output voltage of O2 sensor	>1.201172(V)	(			
				Battery voltage	>10.7(V)		
				Enable conditions for the status of signal fault in the previous driving with the availablilty 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)		
				)			
				O2 Sensor open circuit fault detected	=FALSE		
				)			
				(			
				Expected downstream O2 sensor readiness			
				(			
				Protective heating is finished	=TRUE		
				(			
				Status of downstream O2 sensor heating for hot engine conditions			
				(			
				Engine coolant temperature	>-48(°C)		
				Conditions for enabling sensor heating for O2 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 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)	
)	
Dew point end is reached at upstream of catalyst	
(	
a > (b) * (((c) * (d)) + 1)	
Where:	
(a) Integrated heat release since engine start	
(b) Upstream O2 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 A: Operating readiness, HEGO sensor 2 bank 1 / Debouncing time protective heating finished	=25(s)
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	>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	

				Sensor open circuit fault currently not detected) Electrical diagnostics enabled) for time)) for time))) Basic enable conditions met No pending or confirmed DTCs	=TRUE =TRUE >20(s) >0.2(s) =see sheet enable tables =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 O2 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 O2 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 O2 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	>10(s)		
					Sensor heating is turned on)	=FALSE		
					Enable conditions for operating readiness of O2 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		
	P2235	Heater Coupling- Short Circuit between the sensor signal wire and the sensor heater	Difference of the present and the previous output voltage of O2 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	>10(s)		
					Sensor heating is turned on)	=FALSE		
					Enable conditions for operating readiness of O2 sensor 2 bank 2 (refer above common conditions)	=TRUE		
					Basic enable conditions met	=see sheet enable tables		
					No pending or confirmed DTCs	=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(Ohm)			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)		
		calibrated threshold* = the criteria required to be met by the component vendor for heater circuit performance at high mileage			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
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)
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	=False
for time	>0(s)
state for end of start	=True
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)) (a) Secondary HO2S sensor voltage bank 1 (b) Prior Secondary HO2S sensor voltage bank 1	<0.025(V)

				Secondary HO2S sensor bank 1 heater control on for time	=True >30(s)		
				Internal resistance measurement active of Secondary HO2S sensor bank 1 with	=True		
				Absolute Secondary HO2S sensor bank 1 voltage difference: ABS((a) - (b)) (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 resistance	<0.2(V)		
				Absolute Secondary HO2S sensor bank 1 voltage difference: ABS((a) - (b)) (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	>0.0(V)		
				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(Ohm)		
				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(Ohm)			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)
	calibrated threshold* = the criteria required to be met by the component vendor for heater circuit performance at high mileage	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)
		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	=False
		for time	>0(s)
		state for end of start	=True
		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)) (a) Secondary HO2S sensor voltage bank 2 (b) Prior Secondary HO2S sensor voltage bank 2	<0.025(V)
Secondary HO2S sensor bank 2 heater control on	=True
for time	>30(s)
Internal resistance measurement active of Secondary HO2S sensor bank 2 with	=True
Absolute Secondary HO2S sensor bank 2 voltage difference: ABS((a) - (b)) (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	<0.2(V)
Absolute Secondary HO2S sensor bank 2 voltage difference: ABS((a) - (b)) (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	>0.0(V)
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(Ohm)

					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)			
				)			
				)			
				for time	>10(s)		
				)			
				OR			
				(			
				Battery voltage	<15(V)		
				OR			
				(			
				Environmental temperature	>3003(°C)		
				and			
				Ignition is ON	=TRUE		
				for time	>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)
(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) OR (Battery voltage OR (Environmental temperature and Ignition is ON for time)) for time) Basic enable conditions met No Pending or Confirmed DTCs	 >10(s) <15(V) >3003(°C) =TRUE >0(s) >0(s) =see sheet enable tables =see sheet inhibit tables		
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 Ω impedance between signal and controller power	General enabling condition for powerstage diagnosis (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	=TRUE <25.5(V) >8.9(V) >80(rpm) =TRUE =TRUE <16.5(V) =TRUE =TRUE >(b)*(((c)*(d)) + 1)	0.1(s)	2 Trip

(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)	
)	
)	
for time	>10(s)
)	
OR	
(	
Battery voltage	<15(V)
OR	
(	
Environmental temperature	>3003(°C)
and	
Ignition is ON	=TRUE
for time	>0(s)
)	
)	

				for time) Basic enable conditions met No Pending or Confirmed DTCs	>0(s) =see sheet enable tables =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 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 ((	=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 #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)	=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)		
				) OR (Battery voltage	<15(V)		
				OR (Environmental temperature	>3003(°C)		
				and Ignition is ON	=TRUE		
				for time	>0(s)		
				)) for time	>0(s)		
				) Basic enable conditions met	=see sheet enable tables		
				No Pending or Confirmed DTCs	=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	<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 #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)	=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	>3003(°C)		
				and			
				Ignition is ON	=TRUE		
				for time	>0(s)		
				)			
				)			
				for time	>0(s)		
				)			
				Basic enable conditions met	=see sheet enable tables		
				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 Oimpedance between signal and controller power	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 #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)	=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	>3003(°C)
and	
Ignition is ON	=TRUE

					for time	>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)	>5(°C)	measured engine coolant temperature	<59.86(°C)	20(s)	2 Trip
			(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)		
					measured ambient temperature	>-7.04(°C)		
					Engine running time	<2400(s)		
		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	>6.22(mph)		
					PT1 time constant	=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)
			measured ambient temperature	>-7.04(°C)
Regulating engine coolant temperature : 70 degC			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 temperature:	=((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)				
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 tempearture 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	=FALSE		
				Basic enable conditions are met	=see sheet enable tables		
P0116	Detects if the difference between mean valve and filetered valve of engine coolant tempearture 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	>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)		
				(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		
				Basic enable conditions are met	=see sheet enable tables		
P0116	Detects if the difference between filetered valve and mean valve of engine coolant tempearture sensor during cold start greator 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)		
				(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		
				Basic enable conditions are met	=see sheet enable tables		
				)			
P01E7	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	=FALSE		
				Max Healing in Signal Range Check diagnosis	=FALSE		
				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	=FALSE		
				Max Healing in Signal Range Check diagnosis	=FALSE		
				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)	(	=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		
					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		
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		
				(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	>0.0		
				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 effciency and desired catalyst heating ignition efficiency during idle	>calculated value	Catalyst heating activated	=TRUE	2(s)	2 Trip
		current time for catalyst heating during cold start during idle	>10(s)	(			
				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	=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 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
(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 heating	>0.0		
				)			
				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	=FALSE	7(s)	1 Trip
				Rail pressure sensor voltage is not plausible	=FALSE		
				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 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	=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)
)	
)	
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
)	=25.5(s)
for time	
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	=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
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
(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(°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) where in (A) maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required (B) hysteresis of maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required OR Maximum of two catalyst temperatures in Bank 1 (A - B) where in (A) maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required (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 Basic enable conditions met	<A - B =3003(°C) =0(°C) <A - B =3003(°C) =0(°C) =see sheet inhibit table =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 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	=FALSE <655.34(V) >7.734(%) <3072(%) =FALSE >2(s) =FALSE	5(s)	1 Trip

(	
(	
(	
(	
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 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	=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)
)	
)	
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	=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
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
(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(°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 OR Maximum of two catalyst temperatures in Bank 1 (A - B) where in (A) maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required (B) hysteresis of maximum temperature of the first and second catalyst of Bank2 to which no catalyst warming is required))	=0(°C) <A - B =3003(°C) =0(°C)		
				No pending or confirmed DTCs	=see sheet inhibit table		
				Basic enable conditions met	=see sheet enable table		
P2B95	**Path 1:** 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)	 =FALSE =FALSE =FALSE >100(counts)		
				Monitor has not completed this drive cycle (i.e. monitor runs once per trip)	=TRUE		

				No pending or confirmed DTCs Basic enable conditions are met	=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 injector closing delay of last CVO measurement injector closing delay of last CVO measurement	>0.15 >0.00062(s) <0.0002(s)	ECU is in drive state ((Catalyst heating activated OR Catalyst heating request by cold engine) Condition catalyst heating with desired operation mode for Cold start emission reduction strategy diagnosis time with status of catalyst heating with multiple injections) Counter of CVO-measurements during catalyst heating Monitor has not completed this drive cycle (i.e. monitor runs once per trip) No pending or confirmed DTCs Basic enable conditions are met	=TRUE =FALSE =FALSE =FALSE >9(s) >400(counts) =TRUE =see sheet Inhibit tables =see sheet enable tables	0.02(s)	2 Trip
P2B96	Detection of number of injection output while catalyst heating with multiple injections	Ratio of total number of faulty combustion over total number of cumbustion (during CSERS)	>0.5	ECU is in drive state ((Catalyst heating activated (see parameter definition) OR Catalyst heating request by cold engine (see parameter definition))	=TRUE =FALSE =FALSE	0.02(s)	2 Trip

					Condition catalyst heating with desired operation mode for Cold start emission reduction strategy diagnosis	=FALSE	
					Number of combustions under condition catalyst heating with multiple injection)	>100(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	
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)	
		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	=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 #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	=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	
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	=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	
P000B	Monitoring of outlet camshaft bank 1 position - slow response fault	(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 #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	
				and 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	
P000C	Monitoring of intake camshaft bank 2 position - slow response fault	(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	
P000D	Monitoring of outlet camshaft bank 2 position - slow response fault	(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 #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) No pending or confirmed DTCs Basic enable conditions met	=TRUE >0(s) >10.9(V) =see sheet inhibit tables =see sheet enable tables		
27. CCM - CIRCUIT DIAGNOSIS OF MAF SENSORs - AIRFLOW	P0103	**Path 1:** Signal range check - out of range high	High range SENT data	>16375	Ignition is on Battery voltage Battery voltage Error in the sensor self diagnosis Error in the electric line diagnosis Error in the electric line diagnosis No pending or confirmed DTCs Basic enable conditions met	=TRUE >9(V) <655.34(V) =FALSE =FALSE =FALSE =see sheet inhibit tables =see sheet enable tables	1.5(s)	2 Trip
	P010D	**Path 1:** Signal range check - out of range high	High range SENT data	>16375	Ignition is on Battery voltage Battery voltage Error in the sensor self diagnosis Error in the electric line diagnosis Error in the electric line diagnosis No pending or confirmed DTCs Basic enable conditions met	=TRUE >9(V) <655.34(V) =FALSE =FALSE =FALSE =see sheet inhibit tables =see sheet enable tables	1.5(s)	2 Trip
	P0102	**Path 2:** Signal range check - out of range low	Low range SENT data	<2	Ignition is on Battery voltage Battery voltage	=TRUE >9(V) <655.34(V)	1.5(s)	2 Trip

				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
				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		Battery voltage	>9(V)		
		Data value of the SENT Fast channel	=0	Battery voltage	<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		Battery voltage	>9(V)		
		Data value of the SENT Fast channel	=0	Battery voltage	<655.34(V)		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		

28. MAF SESNORS LOW SIDE SWITCH DIAGNOSIS	P0F51	MAF sensor low side switch controlled by chip heating / standby function (Bank 1)	Line low is detected (Bank 1)	=FALSE	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		
	P0F54	MAF sensor low side switch controlled by chip heating / standby function (Bank 2)	Line low is detected (Bank 2)	=FALSE			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	=TRUE	Ignition is on	=TRUE	1(s)	1 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	=LOW				
U131A	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)	1 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	=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 throttle body	=calculated parameter	Measured air mass flow sensor signal is invalid	=FALSE		
			(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		and			
			(A) Maximum modelled MAF at throttle body	=calculated parameter(g/s)	Measured air mass flow sensor signal at bank 2 is invalid	=FALSE		
			(B) Factor MAF sensor tolerance for min value	=0.920013	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		
					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 (B) Factor MAF sensor tolerance for max value	=calculated parameter(g/s) =1.079987	and Measured air mass flow sensor signal is invalid and	=FALSE		
				Delta mass flow between compressor and DK through Delta pressure is valid for bank1 and	=TRUE		
				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 and	=TRUE		
				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		

31. BAROMETRIC PRESSURE SENSOR DIAGNOSIS	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	>0.2(s)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	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)	=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		
	P222B	**Path 1:** Monitoring of Barometric Pressure Sensor for Plausability Check - Engine runnning - Max	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 High error is False	=FALSE		
			B: Delta modelled pressure upstream throtthle 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)	=TRUE		
			where		for time	>0.2(s)		
			C: upper tolerance limit of pressure upstream of throttle	=2(kPa)	Barometric Pressure Sensor Signal High error is False	=FALSE		

		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)		
P222B	**Path 1:** Monitoring of Barometric Pressure Sensor for Plausability Check - Engine runnning - 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	=FALSE		
		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		
		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	=FALSE		
		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		
				Basic enable conditions met	=see sheet enable tables		
P227B	**Path 1:** Monitoring of Barometric Pressure Sensor for Plausability Check - Engine runnning - Max	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 High error is False	=FALSE		
		B: Delta modelled pressure upstream throtthle 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)	=TRUE		
		where		for time	>0.2(s)		
		C: upper tolerance limit of pressure upstream of throttle	=2(kPa)	Barometric Pressure Sensor Signal High error is False	=FALSE		
		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 runnning - 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	=FALSE		
		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		
		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	=FALSE		
		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)		
U1373	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)		
U1371	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
U068A	Dectects when the frame "PThrVlvUsLineHiB1" is not received from Barometric Pressure Sensor 2	Wrong data length code received by the frame PThrVlvUsLineHiB1 from Barometric Pressure Sensor 2	=TRUE			1.5(s)	2 Trip
U068A	Dectects when the frame "PThrVlvUsLineLoB1" is not received from Barometric Pressure Sensor 2	Wrong data length code received by the frame PThrVlvUsLineLoB1 from Barometric Pressure Sensor 2	=TRUE			1.5(s)	2 Trip

	U0680	Dectects 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
	U0680	Dectects 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
32. INTAKE AIR TEMPERATURE SENSOR	P00AE	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)				
	P00AD	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		
	P00AC	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		
			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		
	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		
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	=FALSE		2 Trip
					Ignition is on for time	=TRUE >1(s)		
					Combustion engine is running (	=TRUE		

Engine is in synchronised state and engine is rotating	=TRUE
for time	>1(s)
)	
End of start is reached and engine is running	=TRUE
(Ignition ON	=TRUE
for time	>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	=FALSE
Diagnosis is inhibited by other temperature sensor errors	=FALSE
(	
(	
(	
Combustion engine is running	=FALSE
or	
Combustion engine end of start is reached	=FALSE
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 for time) No pending or confirmed DTCs Basic enable conditions met	 =TRUE >0(s) =see sheet inhibit table =see sheet enable tables	
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 Ignition is on for time Combustion engine is running (Engine is in synchronised state and engine is rotating for time) End of start is reached and engine is running (Ignition ON for time) (Measured engine stop time (Engine stop time is calculated and is correct) for time) Block heater is activated Diagnosis is inhibited by other temperature sensor errors (((Combustion engine is running or	=FALSE =TRUE >1(s) =TRUE =TRUE >1(s) =TRUE =TRUE >1(s) >28800(s) =TRUE <3(s) =FALSE =FALSE =FALSE	2 Trip

				Combustion engine end of start is reached	=FALSE	
				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 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	>3(counts)	
				Conditions for intake air temperature sensor (high phases):		
				(		
				(		
				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 #54)	>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	
P00AB	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	=FALSE	2 Trip
				Ignition is on	=TRUE	
				for time	>1(s)	
				Combustion engine is running	=TRUE	
				(		
				Engine is in synchronised state and engine is rotating	=TRUE	
				for time	=1(s)	
				)		
				End of start is reached and engine is running	=TRUE	
				(	=TRUE	
				Ignition ON		
				for time	>1(s)	
				)		
				(		
				Measured engine stop time	>28800(s)	
				(	=TRUE	
				Engine stop time is calculated and is correct		
				)		
				)		

for time	<3(s)
)	
Block heater is activated	=FALSE
Diagnosis is inhibited by other temperature sensor errors	=FALSE
(	
(	
(	
Combustion engine is running	=FALSE
or	
Combustion engine end of start is reached	=FALSE
for time	>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

P00AB	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	=FALSE	2 Trip
				Ignition is on for time Combustion engine is running (Engine is in synchronised state and engine is rotating for time) End of start is reached and engine is running (Ignition ON for time) (Measured engine stop time (Engine stop time is calculated and is correct)) for time) Block heater is activated Diagnosis is inhibited by other temperature sensor errors (((Combustion engine is running or Combustion engine end of start is reached for time) (Difference between engine coolant temperature and mean temperature value from temperature sensors OR	=TRUE >1(s) =TRUE =TRUE =1(s) =TRUE =TRUE >1(s) >28800(s) =TRUE <3(s) =FALSE =FALSE =FALSE =FALSE >5(s) >14.96(°C)	

				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		
				for time	>0(s)	
				) No pending or confirmed DTCs	=see sheet inhibit table	
				Basic enable conditions met	=see sheet enable tables	
P00AB	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. CCM - 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		
	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		
35. CCM - BRAKE PEDAL POSITION SENSOR - PERFORMANCE	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) Conditions for slow test scheduler (	>0.051(s)		
				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 OR Brake pedal position sensor voltage	>1.55(V) <0.575(V)	Conditions for first zero point learning (Brake pedal released (Detection through pedal switch)) OR Brake stroke sensor learning Continuous zero point learning conditions (Accelerator pedal position Accelerator pedal position Vehicle speed Vehicle speed Vehicle acceleration Vehicle acceleration Absolute difference between filtered brake pedal volatge and raw value brake pedal position voltage Engine is in running state Starter is not engaged) No pending or confirmed DTCs Basic enable conditions met	 =TRUE =TRUE <70(%) >10(%) <74.58(mph) >7.46(mph) <2(m/s^2) >1.3(m/s^2) <0.03(V) =TRUE =TRUE =see sheet inhibit tables =see sheet enable tables	1.5(s)	1 Trip
	P057B	Monitoring of main brake pedal switch	Value of the main brake switch changes (for time (when brake pedal is pressed) or for time (when brake pedal is not pressed))	=FALSE 3600(s) 36000(s)	Battery voltage Control for starter powerstage for time Conditions for fast test scheduler (Number of reference voltage samples considered for fast EWMA calculation	>10.9(V) >0.04(s) >50(events)	1(s)	1 Trip

					Absolute difference between maximum and minimum voltage obtained during the EWMA calculation in fast test scheduler) Conditions for slow test scheduler (	>0.051(s)		
					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)	<5.0049(%)		
					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		
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	>14.96(°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	=FALSE =FALSE =FALSE =see sheet enable tables =see sheet inhibit tables	5(s)	2 Trip
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	<14.96(°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	=FALSE =FALSE =FALSE =see sheet enable tables	5(s)	2 Trip

				No pending or confirmed DTCs	=see sheet inhibit tables		
P0074	Detects Environment Air Temperature implausible / Environmental temperature signal erratic	Absolute difference between measured and filtered ambient temperatures	>10.06(°C)	Ignition ON	=TRUE	5(s)	2 Trip
		for time	>20(s)	No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
P00F5	Humidity sensor short to power (Bank 1)	Raw sensor value indicating relative humidity of fresh air	>110.5(%)	Ignition is on	=TRUE	1(s)	2 Trip
				Battery Voltage	>9.0(V)		
				Basic enable conditions met	=see sheet enable tables		
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 diffferences between 2 consecutive measurements	>75(%)	Ignition is on	=TRUE	1(s)	2 Trip
		Number of differeneces 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=FALSE		
				Circuit fault	P00F5=FALSE		
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 (Bank 1)		=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 (Bank 1)		=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						
	U13D5	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 humdity sensor temperature	Absolute diffferences 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=FALSE		
					Circuit fault	P0097=FALSE		

	P0096	Diagnostic fault Check for reference sensor of humdity 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 fom digital ambient air pressure sensor returns a CRC (Cyclical Redundancy Checking) error	=TRUE	Reading message A fom 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		
			Error information message A fom 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 fom digital ambient air pressure sensor returns a short circuit to ground	=TRUE	Reading message A fom 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	**Path 1:** 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) No pending or confirmed DTCs Basic enable conditions met	=TRUE >0.2(s) =see sheet inhibit tables =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) OR Engine speed ECU is in DRIVE state	<8.01(%) <1000(rpm) =0(rpm) =TRUE		
		Measured pressure upstream throttle valve is valid)	=TRUE		
		Ambient pressure sensor valid, which is the following condition: (Ambient pressure sensor raw value exceeded for time)	=TRUE =TRUE >0.2(s)		
		Error suspision from contionious check, which is the following condition: (Difference between measured ambient air pressure raw value and its delayed value (20s) OR Fault suspicion from continuity check between the drives, which is the following condition: ((Absolute value of difference between ambient pressure from actual driving cycle and ambient pressure from last driving cycle	=TRUE >5(kPa) =TRUE <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 modells 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 modells for ambient pressure valid	=TRUE		
				(			
				Condition for error suspision from contionious 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	=TRUE		
				for time	>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	<8.01(%)		
		Engine speed	<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 suspision from contionious 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 modells 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 modells for ambient pressure valid	=TRUE		
				(			
				Condition for error suspision from contionious 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 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		
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		(			
			Information from digital ambient pressure sensor for SENSOR DEFECT	=TRUE	Ambient pressure sensor boot done	=TRUE		
			OR		ECU Sub-State in DRIVE	=TRUE		
			Information from digital ambient pressure sensor for VALUE TOO LOW	=TRUE	)			
			OR		No pending or confirmed DTCs	=see sheet inhibit tables		
			Information from digital ambient pressure sensor for VALUE TOO HIGH	=TRUE	Basic enable conditions met	=see sheet enable tables		
39. CCM - FUEL RAIL PRESSURE SENSOR - DUAL PRESSURE-PRIMARY VALUE (SENT)	P128A	Diagnosis of Fuel Rail Pressure Sensor1 Bank1 - Out of Range Error	Raw pressure data of SENT rail pressure sensor channel 1	>4087	Ignition is on	=FALSE	0.5(s)	1 Trip
			OR		Loss due to high level on SENT sensor signal line of SENT Rail	=FALSE		
			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	=FALSE	0.5(s)	1 Trip
and				Loss due to low level on SENT sensor signal line of SENT rail	=FALSE		
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	=FALSE	0.5(s)	1 Trip
and				Loss due to high level on SENT sensor signal line of SENT rail	=FALSE		
U0625				No pending or confirmed DTCs	=see sheet inhibit tables		1 Trip
				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	=FALSE		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 Sensor1 Bank2 - Out of Range Error	Raw pressure data of SENT rail pressure sensor channel 1	>4087	Ignition is on	=FALSE	0.5(s)	1 Trip
		OR		Loss due to high level on SENT sensor signal line of SENT Rail	=FALSE		

		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	=FALSE	0.5(s)	1 Trip
and				Loss due to low level on SENT sensor signal line of SENT rail	=FALSE		
U0665				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions are met	=see sheet enable tables		
U101C	**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	=FALSE	0.5(s)	1 Trip
and				Loss due to high level on SENT sensor signal line of SENT rail	=FALSE		
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	=FALSE		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	**Path 1:** 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	=FALSE		
					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		
	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		
					(			
					(	=FALSE		
					Condition error in stuck check, no voltage difference, which is the following conditions			
					(Rail pressure sensor voltage difference between minimum and maximum value over one cycle	>4		
					(			
					Number of injections	<8		
					ECU is in drive state	=FALSE		
					)			
					)			
					Rail pressure sensor voltage is plausible	=TRUE		
					(			

				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 Sensor channel 2 Data for rail pressure from SENT Sensor channel 2))))) Condition for initial fuelling of fuel supply system is active) No pending or confirmed DTCs Basic enable conditions met	=FALSE <4087 >2 =FALSE <4087 >2 =FALSE =see sheet inhibit tables =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	=TRUE >8 =TRUE =TRUE =FALSE <4087 >2	2(s)	1 Trip

				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		
				Basic enable conditions met	=see sheet enable tables		
P01BF	**Path 1:** 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	=FALSE		
				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	<8(count)		
				ECU is in drive state	=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		
				)			
				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	>8(count)		

					ECU is in drive state	=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		
					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	>4087	Sensor supply voltage error is not reported.	=False	0.5(s)	1 Trip
			or		Basic enable conditions met	=see sheet enable tables		
			Raw pressure data of SENT rail pressure sensor channel 1 bank 2	<2	Message loss due high level on sensor signal line is not reported.	=False		
					Message loss due to low level on sensor signal line is not reported.	=False		
					Error in received data (e.g. wrong checksum) or an error in SENT Protocol is not reported.	=False		
	P128B	Monitoring the range of the Raw Presure Data	Raw pressure data of SENT rail pressure sensor channel 2 bank 1	>4087	Sensor supply voltage error is not reported.	=False	0.5(s)	1 Trip
			or		Basic enable conditions met	=see sheet enable tables		
			Raw pressure data of SENT rail pressure sensor channel 2 bank 1	<2	Message loss due high level on sensor signal line is not reported.	=False		
					Message loss due to low level on sensor signal line is not reported.	=False		

					Error in received data (e.g. wrong checksum) or an error in SENT Protocol is not reported.	=False		
	P312C	Monitoring the range of the Raw Presure Data	Raw pressure data of SENT rail pressure sensor channel 2 bank 2	>4087	Sensor supply voltage error is not reported.	=False	0.5(s)	1 Trip
			or		Basic enable conditions met	=see sheet enable tables		
			Raw pressure data of SENT rail pressure sensor channel 2 bank 2	<2	Message loss due high level on sensor signal line is not reported.	=False		
					Message loss due to low level on sensor signal line is not reported.	=False		
					Error in received data (e.g. wrong checksum) or an error in SENT Protocol is not reported.	=False		
	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)	=TRUE	Sensor supply voltage error is not reported.	=False	0.5(s)	1 Trip
					Basic enable conditions met	=see sheet enable tables		
			An error in received data (e.g. wrong checksum) or an error in SENT Protocol is reported (Sensor 2)		Message loss due high level on sensor signal line is not reported.	=False		1 Trip
					Message loss due to low level on sensor signal line is not reported.	=False		
42. CCM - 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)	>200(rpm)		
					Engine speed	=0(rpm)		
					ECU is in pre-drive state	=FALSE		
					No pending or confirmed DTCs	=See sheet inhibit tables		
					Basic enable conditions met	=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	>200(rpm)		
				)			
				Engine speed	=0(rpm)		
				ECU is in pre-drive state	=FALSE		
				No pending or confirmed DTCs	=See sheet inhibit tables		
				Basic enable conditions met	=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	<0.0005(g/s)		
				(	<0(mph)		
				Vehicle speed			
				(			
				Vehicle speed	>0(mph)		
				Purge mass for tank pressure sensor ((a/36)+b)	>0.3(g)		
				where a - EVAP purge flow			
				where b - Integrated CPV - mass flow for tank pressure sensor			
				)			
				for time	>30(s)		
				)			
				OR			
				(	=TRUE		
				ECU control for ECU switch off delay is available			
				(			
				Condition refueling is recognized	=FALSE		
				(	>0.12(kPa)		
				(			
				Filtered tank pressure			
				Band pass filtered tank pressure signal for refueling or cap opening detection	>0.03(kPa)		
				)			
				OR			

Absolute band pass filtered tank pressure signal for refueling or cap opening detection	>0.04(kPa)
)	
(	=FALSE
Condition refueling is detected	
(	=FALSE
Condition refueling possible	
OR	
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(l)
)	
)	
)	
for time	>300(s)
)	
(	
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)
)	
)	
)	
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 Ambient air temperature sensor model is error free Temperature difference for cold start detection for check of tank pressure sensor for drift)))	=TRUE >5(s) =TRUE <9.86(°C)		
				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
				Ambient pressure for offset diagnosis is fulfilled (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)))	=TRUE <35.26(°C) >-7.04(°C) >70(kPa) =FALSE <63(l) =FALSE <7(l)		

Vehicle speed conditions are fulfilled for offset diagnosis	=TRUE
(Absolute vehicle acceleration for offset-diagnosis of tank pressure sensor	<1,997(m/s^2)
(Vehicle speed	<O(mph)
Vehicle speed	>O(mph)
))	
Tank pressure is stable for offset diagnosis	=TRUE
Fuel tank ventilation adaption factor	<5
(Integrated mass flow for release of offset check tank pressure sensor Engine not stopped after first start)	>34.987(g)
(	
(Condition refueling is detected	=FALSE
(Condition refueling possible	=FALSE
OR	
Difference between unfiltered fuel volume and stopped fuel level	<6(l)
))	
OR	
(Condition refueling bit valid	=FALSE
(Condition refueling possible	=TRUE
OR	
Refuel indication is active	=TRUE
Difference between unfiltered fuel volume and stopped fuel level	>6(l)
))	
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
(	
(	
(Absolute vehicle acceleration for offset-diagnosis tank pressure sensor	<1.997(m/s^2)
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)
(Counter CPV-plausibility-checks	<5(counts)
(CPV active for plausibility check	=FALSE
Pressure from open CPV	=TRUE
max. deviation 1. reference value to 2. reference value tank pressure	<0.05(kPa)
minimum change for pressure because of CPV open and close	>0.05(kPa)
)	
)	
)	
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 and Difference between Max and Min fuel tank pressure during incremental check of tank pressure sensor	>0.42(g/s) <0(kPa)	Condition start increment check of tank pressure sensor (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) No pending or confirmed DTCs Basic enable conditions met	 >O(mph) <50(°C) >-7.04(°C) >70(kPa) =FALSE <63(l) =FALSE <7(l) >0 <0.08(kPa) <1.3(kPa) >-1.2(kPa) =See sheet inhibit tables =See sheet enable tables	0.1(s)	2 Trip
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	=TRUE >4(s) =TRUE	20(s)	2 Trip

					Vehicle is in idle condition which is the following conditions for time	>0.5(s)		
					(			
					(			
					Difference between propulsion torque of cruise control and driver torque propulsion after step limitation	<3(Nm)		
					OR			
					Coordinated status of acceleration request	=FALSE		
					)			
					Difference between minimum wheel torque with internal combustion engine firing and driver torque value after limitation	>O(Nm)		
					)			
					)			
					Overrun fuel cutoff is released	=FALSE		
					)			
					(	<50(°C)		
					Ambient air temperature			
					Ambient air temperature	>-7.04(°C)		
					)			
					Vehicle speed	<3.11(mph)		
					No pending or confirmed DTCs	=See sheet inhibit tables		
					Basic enable conditions met	=See sheet enable tables		
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	=FALSE	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
					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		
44. CCM - FUEL PRESSURE SENSOR	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)				
	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	>0.1 (l/h)		
					Engine is running state	=TRUE		
					Pre-Supply pump is ON	=TRUE		
					)			
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=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	>0.1(l/h)		
					Engine is running state	=TRUE		
					Pre-Supply pump is ON	=TRUE		
					)			
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=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	>15(s)		
					Fuel flow	>1(l/h)		
					Fuel flow	<100(l/h)		
					Fuel level	>2(l)		
					Fuel pressure deviation	>20(kPa)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
45. CCM - 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	
			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)			

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 and the signal level during	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	
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 OR	=TRUE	Basic enable conditions met	=See sheet enable tables	
		Number of erroneous edge positions has exceeded the maximum tolerance) AND	=TRUE			
		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	
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)			
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		
			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)				
46. CCM - 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	=FALSE	3(camshaft revolutions)	1Trip-200ms

				Engine speed based on camshaft is below the higher plausible limit	=FALSE		
				Engine speed based on camshaft is below maximum engine speed	=FALSE		
				Camshaft signal is valid	=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		
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	=FALSE	(		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)) ((Engine speed Synchronization check is completed) OR (Engine speed OR Engine is ready and waiting for engine speed))) OR Starter is active and starter signal is available) No pending or confirmed DTCs Basic enable conditions met	 >550(rpm) >550(rpm) =TRUE =0(rpm) =TRUE =see sheet inhibit tables =see sheet enable tables		
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 Basic enable conditions met	=TRUE =see sheet enable tables	10(events)	1Trip-200ms
P2619	Replicated Crank short circuit to battery	Powerstage reported short circuit to battery	=TRUE	Ignition is ON Battery Voltage	=TRUE >9(V)	1(s)	2 Trip
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	=FALSE		
			Average of angular offset between camshaft and crankshaft)	<-8.79(deg CrS)	NOTE: Pulse length indicates the direction of rotation: 45µs forward rotating shaft, 90µs 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	=FALSE		
			Average of angular offset between camshaft and crankshaft)	<-8.79(deg CrS)	NOTE: Pulse length indicates the direction of rotation: 45µs forward rotating shaft, 90µs 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		
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	=FALSE		
		Average of angular offset between camshaft and crankshaft)	<-8.79(deg CrS)	NOTE: Pulse length indicates the direction of rotation: 45µs forward rotating shaft, 90µs 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		
				Exhaust camshaft: Edge adaptation request	=TRUE		
P0019	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	=FALSE		
		Average of angular offset between camshaft and crankshaft)	<-8.79(deg CrS)	NOTE: Pulse length indicates the direction of rotation: 45µs forward rotating shaft, 90µs 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		
					Exhaust camshaft: Edge adaptation request	=TRUE		
48. CCM - 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 / 2 – 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				
	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) OR	=TRUE >34.99 to 40.0(%)		
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))) 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) Enable knock sensor diagnosis (Knock control synchronization error at phase error	>0.29 to 0.5(s) >550(rpm) =TRUE >20(Counts) =FALSE =FALSE >0(s) =TRUE =FALSE		

				OR State of EPM operation mode should not have valid crankshaft signal present)	=FALSE		
				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)	=FALSE >11 to 40(kPa) =FALSE >0.29 to 0.44(s)		
				Engine speed dynamic for knock detection active (Engine speed gradient averaged during one working cycle (see Look-Up-Table #50) for time)	=FALSE >4500 to 12700(1/min/s) >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 Runs every 15-120 sec (as a function of Engine Speed)	Filtered knock sensor output Where Low pass filter gain - Integration result for short circuit to battery diagnosis	>4.7(V) =0.046875	Engine speed	>500(rpm)	3(events)	2 Trip
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 SCG & SCB diagnostic enabled	<100(%) =TRUE		
P032B	Knock sensor 3 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) OR	=TRUE >34.99 to 40.0(%)		
P1984	Knock sensor 3 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))) Engine Speed Engine start is finished	>0.29 to 0.5(s) >550(rpm) =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 to 40(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

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
		Debounce counter for knock sensor diagnosis	>30(Counts)	Knock control active ((((Relative charge of air in the cylinder (see Look-Up-Table #53) OR	=TRUE >34.99 to 40.0(%)		

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	>550(rpm)		
				Engine start is finished for	=TRUE		
				number of combustions to deactivate knock control after start end	>20(Counts)		
				Fuel Cut off)	=FALSE		
				GDI mode stratified is active)	=FALSE		
				for time))	>0(s)		
				Enable knock sensor diagnosis (	=TRUE		
				Knock control synchronization error at phase error OR	=FALSE		
				State of EPM operation mode should not have valid crankshaft signal present)	=FALSE		
				Engine load dynamic for knock detection active (	=FALSE		
				Intake manifold pressure (see Look-Up-Table #49) Delay for dynamic detection	>11 to 40(kPa)		
				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 (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 >4500 to 12700(1/min/s) >0.15(s) >1600(rpm) =see sheet inhibit tables =see sheet enable tables		
P033D	Knock sensor 3 short circuit to battery Runs every 15-120 sec (as a function of Engine Speed)	Filtered knock sensor output Where Low pass filter gain - Integration result for short circuit to battery diagnosis	>4.7(V) =0.047	Engine speed	>500(rpm)	3(events)	2 Trip
P033C	Knock sensor 3 short circuit to ground Runs every 15-120 sec (as a function of Engine Speed)	Filtered knock sensor output Where Low pass filter gain - Integration result for short circuit to ground diagnosis	<0.2(V) =0.047	Engine speed	>500(rpm)	3(events)	2 Trip
P033A	Knock sensor 3 open circuit Runs every 15-120 sec (as a function of Engine Speed)	Integration result for open load detection Where Low pass filter gain - Integration result for open load diagnosis	>2147483647 =0.047	Knock sensor PWM duty cycle applied Engine speed Engine speed Engine load Engine load SCG & SCB diagnostic enabled	>50(%) >600(rpm) <3000(rpm) >13(%) <100(%) =TRUE	30(events)	2 Trip
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) OR	=TRUE >34.99 to 40.0(%)		
P1985	Knock sensor 4 reference signal rationality check	Normalized reference level of knock control (see Look-Up-Table #47) Debounce counter for knock sensor diagnosis	>0.00156 to 0.00586(V*ms) >30(Counts)	(Engine load dynamic for knock detection active (*) maintained active for time (Knock control: time for dynamic adaptation) (see Look-Up-Table #52))) 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) 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 (	=FALSE >0.29 to 0.5(s) >550(rpm) =TRUE >20(Counts) =FALSE =FALSE >0(s) =TRUE =FALSE =FALSE =FALSE	0.1(s)	2 Trip

					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	>11 to 40(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. CCM - 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) >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
	P02EF	Plausibility check of injector ADC signal buffer	(ADC buffer signal from beginning of Controlled Valve Operation signal evaluation OR	 <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

		ADC buffer signal from end of Controlled Valve Operation signal evaluation)	>5000(counts)				
P02F0	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 OR	<15000(counts)	No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
		ADC buffer signal from end of Controlled Valve Operation signal evaluation)	>5000(counts)				
P02F1	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 OR	<15000(counts)	No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
		ADC buffer signal from end of Controlled Valve Operation signal evaluation)	>5000(counts)				
P02F2	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 OR	<15000(counts)	No pending or confirmed DTCs	=see sheet inhibit tables		
				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)				
			)					
51. CCM - ENGINE OIL TEMPERATURE SENSORS CIRCUIT DIAGNOSIS	P01BC	Monitoring Maxmum error Signal Range Check for oil temperature sensor 2 in sump	ADC-voltage of the oel temperature sensor 2 in sump	>4.95(V)	Battery Voltage	>9(V)	1(s)	2 Trip

sump					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 oel 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 Maxmum 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		
	P2C21	Check the deviation between oil temperature sensor 1 and thesensor 2	The absoulte 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 l-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 l-temperature -sensor 2 in sump)	>9.96(°C)			1(s)	2 Trip
			for time	>A+B(s)				
			where					
			A: debounce time error detection Jitter-Check Oil temperature sensor2	=5(s)				
			B: debounce time error Jitter-Check Oil temperature sensor2	=20(s)				

52. CCM - 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	=TRUE		
					Status CrCtl request exceeds driver's request	<0		
					Status of forward drive request by driver request	<0		
					No active faults associated with the oil pressure sensor	P0523=FALSE		
			OR			P0522=FALSE		
			Relative Oil Pressure	<50(kPa)	Engine speed	>1520(rpm)		
					Time after engine start	>4.96(s)		
					Basic enable conditions met	=see sheet enable tables		
			Fail Case #2 After Run:		**Fail Case #2 Engine Off Enable Conditions:**		3(s)	
			Absolute value of the Relative Oil Pressure	>100(kPa)	(Current system / ECU substate is in POSTDRIVE	=TRUE		
					Time since the status SYC_POSTDRIVE was reached)	>10(s)		
					Oil temperature in the oil sump	>60(°C)		
					No active faults associated with the oil pressure sensor	P0523=FALSE		
						P0522=FALSE		

					Basic enable conditions met	=see sheet enable tables		
			Fail Case #3 Before Engine Start:		**Fail Case #3 Engine Off Enable Conditions:**		3(s)	
			Absolute value of the Relative Oil Pressure	>80(kPa)	Engine off time	>100(s)		
					Engine speed	=0(rpm)		
					Oil temperature in the oil sump	>60(°C)		
					Motor status is cranking	=TRUE		
					No active faults associated with the oil pressure sensor	P0523=FALSE P0522=FALSE		
					Basic enable conditions met	=see sheet enable tables		
53. CCM - 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		
	P2138	Synchronization check	Absolute difference between accelerator pedal position sensor 1 voltage (a) and sensor 2 voltage (b) (see Look-Up-Table #1) where	>0.12 to 0.18(V)	Ignition is ON	=TRUE	0.25(s)	1 Trip
					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		
54. CCM - THROTTLE POSITION SENSOR - SENSOR 1 B1 DIAGNOSIS	P0123	Diagnosis of Throttle Position Sensor1 Bank1 for Signal Range Check-High	Raw voltage value of Throttle Position Sensor1 Bank1	>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	=TRUE		
					OR Engine speed	>2000(rpm)		
					)			
					Limp home position not reached bank	=FALSE		
					)			
					Irreversible safety fuel cut off SKA)	=FALSE		

				No pending or confirmed DTCs	=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	=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 OR	=TRUE		
				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		

P0121	Synchronization check for Throttle Position Sensor1 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	(Absolute difference between relative actual angle calculated based on voltages from sensor 1 and sensor 2 (see Look-Up-Table #93)	>5 to 6.25(%)	OR			
		) for time	>0.14(s)	ECU is in POSTDRIVE state)	=TRUE		
		(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 1, following condition: (	=FALSE		
		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		
	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(%)	OR			
		for time	>0.36(s)	Engine speed	>2000(rpm)		
		) OR		) Limp home position not reached bank 1	=FALSE		
	Error in the main charge sensor	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	=FALSE	(				
		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					
		)						
		)						
		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
		)		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 OR	=TRUE		

					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. CCM - THROTTLE POSITION SENSOR - SENSOR 2 B1 DIAGNOSIS	P0223	Diagnosis of Throttle Position Sensor2 Bank1 for Signal Range Check-High	Raw voltage value of Throttle Position Sensor2 Bank1	>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		
					)			
					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 OR	=TRUE		
				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		
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	(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)	>5 to 6.25(%)	OR	
	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
	OR		OR	
Error in the main charge sensor	Main charge sensor error, following conditions: (	=TRUE	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	=FALSE	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, following condition:	=FALSE
	Flag Variant Diagnosis Error bank 1	=TRUE	(	

		OR		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)	=TRUE	)			
		OR		No pending or confirmed DTCs	=see sheet inhibit tables		
		Flag plausible diagnosis error	=TRUE	Basic enable conditions met	=see sheet enable tables		
		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)				
		)					
U0606	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 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 OR Engine speed	=TRUE >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 and U136D	Invalid data from SENT device	No valid data from the SENT Channel of Throttle Position Sensor 2 Bank 1, following conditions: (	=TRUE	(ECU is in DRIVE state	=TRUE	0.12(s)	1 Trip
		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 OR Engine speed	=TRUE >2000(rpm)		
				) Limp home position not reached bank 1	=FALSE		

					) Irreversible safety fuel cut off SKA bank 1) No pending or confirmed DTCs Basic enable conditions met	=FALSE =see sheet inhibit tables =see sheet enable tables		
56. CCM - 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 OR ECU is in POSTDRIVE state Request safety fuel cut off SKA bank 2, following condition: (Irreversible safety fuel cut off SKA bank 2 Request reversible safety fuel cut off SKA bank 2, following conditions: ((Battery voltage for throttle valve operation sufficient bank 2 OR Engine speed) Limp home position not reached bank 2)) No pending or confirmed DTCs Basic enable conditions met	=TRUE =TRUE =FALSE =FALSE =FALSE =TRUE >2000(rpm) =FALSE =see sheet inhibit tables =see sheet enable tables	0.14(s)	1 Trip
	P0227	Diagnosis of Throttle Position Sensor1 Bank2 for Signal Range Check-Low	Raw voltage value of Throttle Position Sensor1 Bank2	<0.195(V)	ECU is in DRIVE state OR	=TRUE	0.14(s)	1 Trip

				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 OR	=TRUE		
				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 Sensor1 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	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		
		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
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 2	=TRUE
	OR		)	
Error in the main charge sensor	Error main charge sensor, following conditions:	=TRUE	Limp home position not reached bank 2	=FALSE
	(		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	=FALSE	)	
	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			
	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 OR Validity flag of the measured air mass flow sensor signal for bank 2) Release of the HFM diagnosis of the electrical signal)) for time)	 =TRUE =TRUE =TRUE >0.14(s)				
	U0608 and U0688	Diagnosis of Throttle Position Sensor 1 Bank 2 for SENT data - Communication Check Diagnosis of Throttle Position Sensor 2 Bank 2 for SENT data - Communication Check	Communication error from the SENT Channel of Throttle Position Sensor 1 Bank 2, following conditions: (No signal on the line OR Pulse length of SENT message is out of range OR Calibration pulse of SENT message is out of range)	=TRUE =TRUE =TRUE =TRUE	(ECU is in DRIVE state OR ECU is in POSTDRIVE state) Request safety fuel cut off SKA bank 2, following condition: (Irreversible safety fuel cut off SKA bank 2 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))	=TRUE =TRUE =FALSE =FALSE =FALSE =TRUE =FALSE	0.13(s)	1 Trip 1 Trip

					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 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)	=TRUE		1 Trip
			)		Request safety fuel cut off SKA bank 2, following condition: (	=FALSE		
					Irreversible safety fuel cut off SKA bank 2 and	=FALSE		
					Request reversible safety fuel cut off SKA bank 2, following conditions: ((	=FALSE		
					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		
57. CCM - 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	=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: ((Battery voltage for throttle valve OR Engine speed) Limp home position not reached bank 2)) No pending or confirmed DTCs Basic enable conditions met	=FALSE =TRUE >2000(rpm) =FALSE =see sheet inhibit tables =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 OR ECU is in POSTDRIVE state Request safety fuel cut off SKA bank 2, following condition: (Irreversible safety fuel cut off SKA bank 2 Request reversible safety fuel cut off SKA bank 2, following conditions: ((Battery voltage for throttle valve operation sufficient bank 2 OR Engine speed) Limp home position not reached bank 2))	=TRUE =TRUE =FALSE =FALSE =FALSE =TRUE >2000(rpm) =FALSE	0.14(s)	1 Trip

				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	(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)	>5 to 6.25(%)	OR			
		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 OR	>0.36(s)	((			
	Error in the main charge sensor	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		

(		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	=FALSE	(	
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)		
)			

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 and	=FALSE		

					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 Basic enable conditions met	=FALSE =TRUE =FALSE =see sheet inhibit tables =see sheet enable tables		
58. CCM - MANIFOLD ABSOLUTE PRESSURE SENSOR —B1	P0108	Monitoring of Intake manifold pressure sensor bank1 for Signal range check-High	Raw voltage from Intake manifold pressure sensor bank1	>4.499966(V)	No pending or confirmed DTCs Basic enable conditions met	=see sheet inhibit tables =see sheet enable tables	1.5(s)	1 Trip
	P0107	Monitoring of Intake manifold pressure sensor bank1 for Signal range check-Low	Raw voltage from Intake manifold pressure sensor bank1	<0.500005(V)	No pending or confirmed DTCs Basic enable conditions met	=see sheet inhibit tables =see sheet enable tables	1.5(s)	1 Trip
	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 where A: Tolerance manifold pressure sensor to ambient pressure during start B: Delta Intake manifold pressure to ambient pressure during start	>A+B(kPa) 4(kPa) 0(kPa)	(Engine speed ECU is in drive-state) For number of events Condition manifold pressure sensor reference for delta pressure sensor	=0(rpm) =TRUE >2(counts) =FALSE	5(s)	1 Trip

				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	>O(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)		

				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	>O(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 current maximum and minimum manifold pressure from sensor signal wobble check	>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](kPa)	Time counter for valid raw pressure after engine start	<25(s)
	where (a) minimum ambient pressure for intake manifold pressure diagnosis	50(kPa)	Engine speed	<300(rpm)
	(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	=FALSE
			Engine speed	>80(rpm)
			Difference between raw pressure before engine start in the intake manifold and absolute intake manifold pressure	<30(kPa)
			(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 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	>30(°C)		
				for time)	>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		
					Basic enable conditions met	=See sheet enable tables		
59. CCM - MANIFOLD ABSOLUTE PRESSURE SENSOR - B 2	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 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(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 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(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	>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 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	>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 (se inhibit conditions table)	=See sheet enable 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](kPa)	Time counter for valid raw pressure after engine start	<25(s)		
		where (a) minimum ambient pressure for intake manifold pressure diagnosis	50(kPa)	Engine speed	<300(rpm)		
		(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			
				Engine speed	>80(rpm)		
				Difference between raw pressure before engine start in the intake manifold and absolute intake manifold pressure	<30(kPa)		
				(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 failure)	=FALSE		
				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	>30(°C)		
				for time)	>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 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	 >1500(rpm) <10.01(%) <1000(rpm) >19.995(%) >1(s) =See sheet inhibit tables =See sheet enable tables		
60. CCM - 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 Communication error is reported by counter device OR Difference between counter steps compared to ECU system time is out of tolerance	=TRUE =TRUE =TRUE	Ignition is ON Basic enable conditions are met	=TRUE =see sheet enable tables	1(event)	2 Trip
61. CCM - ECM INTERNAL FAILURES	P062B	**Path 1:** Electrical failure with high pressure injection valve powerstage for bank 1	Electrical fault is detected for the control bank 1 (Number of misfire counter for cylinder 0 Number of misfire counter for cylinder 4) and Rail pressure control minimum error is set	=TRUE >100 >100 =TRUE	Diagnosis inhibited by statistical function Engine speed Engine speed relative air charge No pending or confirmed DTCs Basic enable conditions met	=FALSE <6000(rpm) >1520(rpm) <100(%) =see sheet inhibit tables =see sheet enable tables	5(s)	2 Trip

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	=FALSE	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(%)		
		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	=FALSE	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)		
		)		relative air charge	<100(%)		
		and		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	=FALSE	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)		
		)		relative air charge	<100(%)		
		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 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	≥8	Ignition is ON	=TRUE	0.1(s)	2 Trip
			and		No pending or confirmed DTCs	=see sheet inhibit tables		
			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 commmunication 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 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		
P06D1	Detects commmunication 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 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		

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		
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 diabled 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 errror	=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	**Path 1:** 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:	>0.36(V)	(		0.026(s)	
	| max[(a);(b)] - max[(b);(c)] I		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:		OR			
	(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:	>0.36(V)	(			
	| max[(a);(b)] - max[(b);(c)] I		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	
	(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:	>0	Igntion ON	=TRUE	1 Trip
	(d) > (e) where		Basic enable conditions are met	=TRUE	
	(d) Minimum learned normalized pedal voltage L2 - accelerator pedal sensor 1	=measured parameter			
	(e) Minimum learned normalized pedal voltage L1 - accelerator pedal sensor 1 OR	=measured parameter			
	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	>0			
	(f) Minimum learned normalized pedal voltage L2 - accelerator pedal sensor 2	=measured parameter			

		(g) Minimum learned normalized pedal voltage L1 - accelerator pedal sensor 2	=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		
				Synchronization is not lost	=TRUE		
				Calculated high resolution engine speed in function monitoring	>520(rpm)		
				Basic enable conditions are met	=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	=TRUE		
				Basic enable conditions are met	=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	>0.1(s)		
				Basic enable conditions are met	=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		
	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 diagnoctics of Throttle actuator motor control circuit Bank 1	=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 thottle 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 OR	>7.5(V)		
				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 diagnoctics 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 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		
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	>(a*b) + c(%)	Engine Speed	>1200(rpm)		
		where		Injection cut off (ICO) is not requested	=TRUE		
		a : Relative fuel mass for individual cylinder		Injection cut off (ICO) is not requested from function monitoring	=TRUE		
		b : Factor maximum tolerance in check of cylinder-individual fuel in function monitoring	1.1	System voltage exceeds 8V	=TRUE		
		c : Offset tolerance in check of cylinder-individual fuel in function monitoring	10.5(%)	Limp home mode is not requested from function monitoring	=TRUE		
		)		No loss of Synchronisation during function monitoring	=TRUE		
		OR		(			
		(		ECU is not in pre-drive state	=TRUE		
		Cylinder individual fuel correction	<(a*b) - c(%)	OR			

		where		ECU is not in post-drive state	=TRUE		
		a : Relative fuel mass for individual cylinder		)			
		b : Factor maximum tolerance in check of cylinder-individual fuel in function monitoring	0.9	Air-Fuel check is disabled for function monitoring	=FALSE		
		c : Offset tolerance in check of cylinder-individual fuel in function monitoring)	10.5(%)	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
		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 OR	>8	No loss of Synchronisation during function monitoring (	=TRUE		
		Cylinder counter for stratified injection OR	>8	ECU is not in pre-drive state OR	=TRUE		
		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: Plausibility check : Average value for cylinder individual fuel correction in function monitoring is greater than a calibrated threshold for a calibrated period of time	Average value for cylinder individual fuel correction in function monitoring	>1.03	Ignition is ON	=TRUE	4.16(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 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: Mode of operation in gasoline direct injection (GDI) for monitoring)	!=A	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		
				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 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 7: The Lambda setpoint is checked against the range of permissable 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		
				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		
P060C	**Path 9:** Torque comparison - The difference between current torque in the function monitoring and the filtered relative permissible torque is compared with threshold.	(Difference between current torque and filtered relative permissible torque in function monitoring	>0(%)	Ignition is ON	=TRUE	0.52(s)	1 Trip
		for time	>0.04 x A(s)	Injection cut off (ICO) is not requested from function monitoring	=TRUE		
		A: error tolerance time for torque comparison in the function monitoring	=13	Injection cut off (ICO) is not requested	=TRUE		

		OR Error sum of the relative deviation from the permissable torque in function monitoring)	>8(%*s)	System voltage exceeds 8V Limp home mode is not requested from function monitoring No loss of Synchronisation during function monitoring (ECU is not in pre-drive state OR ECU is not in post-drive state) Basic enable conditions are met	=TRUE =TRUE =TRUE =TRUE =TRUE =see sheet inhibit tables		
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 Engine Speed Injection cut off (ICO) is not requested Injection cut off (ICO) is not requested from function monitoring System voltage exceeds 8V Limp home mode is not requested from function monitoring No loss of Synchronisation during function monitoring (ECU is not in pre-drive state OR ECU is not in post-drive state) Air-Fuel check is disabled for function monitoring Basic enable conditions are met	=TRUE >1200(rpm) =TRUE =TRUE =TRUE =TRUE =TRUE =TRUE =TRUE =FALSE =see sheet inhibit tables	0.52(s)	1 Trip
	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		Injection cut off (ICO) is not requested	=TRUE		
	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 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 12: The complement of injection mode timing check in function monitoring.	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: 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.	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
	OR		Engine Speed	>1200(rpm)		
	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: 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	(		All the partial injections are calculated in S0	=TRUE	0.52(s)	1 Trip
	Driver injection demand for homogeneous injection mode	>0	OR			
	(		All the partial injections are calculated in S0 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		
	)		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 S0 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 No loss of Synchronisation during function monitoring (ECU is not in pre-drive state OR ECU is not in post-drive state) Air-Fuel check is disabled for function monitoring Basic enable conditions are met	=TRUE =TRUE =TRUE =TRUE =FALSE =see sheet inhibit tables		
P060C	**Path 16:** Fault check of ECU signal input monitoring Air and fuel	Compliment of synchronous counter S0 is not equal to redundant synchronous counter S0 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 S0 frames in function monitoring based on the course of engine speed and previous synchronous counter S0	>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		
		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)	=10.5(%)	System voltage exceeds 8V	=TRUE		
		OR		Limp home mode is not requested from function monitoring	=TRUE		
		Expected value for relative fuel mass in function monitoring (GDI)	<(A*B) - C(%)	No loss of Synchronisation during function monitoring	=TRUE		
		where		(			
		A: Relative fuel mass		ECU is not in pre-drive state	=TRUE		
		B : Factor minimum tolerance in check of bank selective fuel in function monitoring (GDI)	0.9	OR			
		C : Offset tolerance in check of fuel in function monitoring (GDI)	10.5(%)	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 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)		
		(		Injection cut off (ICO) is not requested	=TRUE		

Additive adaptive correction of the relative fuel amount on GDI path in function monitoring	>8.1(%)	Injection cut off (ICO) is not requested from function monitoring	=TRUE
OR		System voltage exceeds 8V	=TRUE
Additive adaptive correction of the relative fuel amount on GDI path bank 2 in function monitoring	>8.1(%)	Limp home mode is not requested from function monitoring	=TRUE
)		No loss of Synchronisation during function monitoring	=TRUE
OR		(	
(		ECU is not in pre-drive state	=TRUE
lambda collector output in function monitoring	>1.28	OR	
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					
		(					
		(					
		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: (Level 1 request to apply EPB Vehicle speed for counts) OR Change of direction request from level 1 invalid for counts OR Missed level 1 request to apply EPB for counts means: (Level 1 request to apply EPB Level 2 request to apply EPB) OR Park engagement and EPB engagement error set for counts means: (Valid park range request Park engaged by TCU Level 1 request to apply EPB) for counts OR 'Shift away from park range' request from level 1 invalid for counts	 =TRUE >4.69(mph) >5 =TRUE >50 =TRUE >50 =FALSE =TRUE =TRUE >10 =TRUE =FALSE =FALSE >150 =TRUE >50	ECU is not in pre-drive state OR ECU is not in post-drive state) Basic enable conditions are met	=TRUE =TRUE =see sheet enable tables		
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' request from level 1 invalid	=TRUE	ECU is not in pre-drive state	=TRUE		
				OR			
				ECU is not in post-drive state	=TRUE		
				)			
				Basic enable conditions are met	=see sheet enable tables		
P060C	Fault status of Level1 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)		
		Difference between level2 and level1 accelerator effective position	<100(%)	Basic enable conditions met	=see sheet enable tables		
P060C	Fault status of Level1 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	=FALSE			0.04(s)	1 Trip

	P060C	Fault status of Level1 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 Level1 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"	=FALSE	0.04(s)	1 Trip
	P060C	Fault status of Level1 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	=FALSE	0.04(s)	1 Trip
	P060C	Fault status of Level1 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	=FALSE	0.04(s)	1 Trip

	P060C	Fault status of Level1 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 (Standardized accelerator pedal position) - (Position of accelerator pedal in high resolution)	>100(%) <18.9941(%)			50(events)	1 Trip
	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) (see Look-Up-Table #83)	<10 to 300(Nm)			50(events)	1 Trip
	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) or (Accelerated pedal virtual cruise control) - (Handshake signal for the virtual accelerator pedal with level 1)	>100(%) <15.0024(%)			50(events)	1 Trip
62. CCM - ECM PROGRAMIN G ER	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	=FALSE		
					Basic enable conditions are met	=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	=TRUE		
					Counter for proc to be executed alternatively	=FALSE		
					Basic enable conditions are met	=see sheet enable tables		
	P0630		Status of controller transfer detected	=TRUE	Ignition is ON	=TRUE	1(s)	1 Trip
			for time	>5(s)	Basic enable conditions met	=see sheet enable tables		
63. CCM - 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 Hig	=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))
(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(µs)		
[B] Measured segment time	=measured parameter(µs)	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)		
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 threshold exceedance counter	>3(events)
Method 3: Difference between the maximum and minimum segment time adaptation values of the inner five OR	>0.12(deg CrS)
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] x ([B] / [C])
[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 (sample means: Current segment time adaptation value (means: Segment time ratio where [A] Modelled segment time [B] Measured segment time Filtered for N camshaft revolutions where (N where [A] Filter factor lower limit [B] Filter factor upper limit [C] Filter factor slope)))] for Inner five segment time adaptation value difference threshold exceedance counter	60(deg CrS) measured parameter =[A]/[B] =measured parameter(µs) =measured parameter(µs) =(ln([A]/[B]))/(ln[C])(Camshaft revolutions) =0.05 =0.2 =0.9 >3(events)				
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 Basic enable conditions met	=TRUE =see sheet enable tables	1(s)	2 Trip
	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 Basic enable conditions met	=TRUE =see sheet enable tables	1(s)	2 Trip

	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		
	U0404	Dectects 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			1(s)	2 Trip
	U18D2	Dectects 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			1(s)	2 Trip
	U0404	Dectects 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	Dectects 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
	U0404	Dectects 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
	U18D2	Dectects 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	Dectects 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	Dectects 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
	U0404	Checking ARC error in the frame 0x1E4	Frame Counter Error	=TRUE	3(events)	2 Trip

	U0404	Checking Checksum error in the frame 0x1E4	Checksum Error	=TRUE			3(events)	2 Trip
66. TIMEOUT DECTECTION OF FRAMES FROM ENGINE ECU	U0632	Dectects 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 Basic enable conditions met	=TRUE =see sheet enable tables	3(events)	2 Trip
	U0633	Dectects 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	Dectects 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	Dectects 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	Dectects 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	Dectects 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

	U0101	Dectects 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	Dectects 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	Dectects 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	Dectects when the frame ECM_TCM_CAN2_MSG02_DLC is not received Engine ECU Module	ECM_TCM_CAN2_MSG02_DLC message is not being received from Engine ECU Module	=TRUE	1(s)	1 Trip
	U0101	Dectects when the frame ECM_TCM_CAN2_MSG02_TO is not received Engine ECU Module	ECM_TCM_CAN2_MSG02_TO message is not being received from Engine ECU Module	=TRUE	1(s)	1 Trip
	U0402	Dectects 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	Dectects 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

	U0402	Dectects 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	Dectects 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	Dectects 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	Dectects 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
	U0402	Dectects when the frame TrnsGnrInfo_Prtctd_MSG_DLC is not received Engine ECU Module	TrnsGnrInfo_Prtctd_MSG_DLC message is not being received from Engine ECU Module	=TRUE		0.42(s)	1 Trip
	U0101	Dectects 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	Dectects when the frame TrnsGnrInfo2_Prtctd_MSG_DLC is not received Engine ECU Module	TrnsGnrInfo2_Prtctd_MSG_DLC message is not being received from Engine ECU Module	=TRUE		0.42(s)	1 Trip

	U0101	Dectects when the frame TrnsGnrInfo2_Prtctd_MSG_TO is not received Engine ECU Module	TrnsGnrInfo2_Prtctd_MSG_TO 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_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	Dectects 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
	U0101	Dectects 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	Dectects 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	Dectects 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	Dectects 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
	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	Dectects 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	Dectects 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	Dectects 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_DLC" from Body Control Module	Wrong data length code received by the frame BCMGnrlInfo1_Prtctd_MSG_DLC from Body Control Module	=TRUE		2(s)	2 Trip
U0140	Dectects 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_TO from Body Control Module	=TRUE		2(s)	2 Trip
U0422	Detects when wrong data length code received by the frame BdyGenInfo1_Prtctd_MSG_DLC" from Body Control Module	Wrong data length code received by the frame BdyGenInfo1_Prtctd_MSG_DLC from Body Control Module	=TRUE		0.7(s)	2 Trip
U0140	Dectects when the frame "BdyGenInfo1_Prtctd_MSG_TO" 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_DLC" from Body Control Module	Wrong data length code received by the frame BdyGenInfo3_Prtctd_MSG_DLC from Body Control Module	=TRUE		0.43(s)	2 Trip
U0140	Dectects when the frame "BdyGenInfo3_Prtctd_MSG_TO" 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_DLC" from Body Control Module	Wrong data length code received by the frame BdyVehSpdCtl_Prtctd_MSG_DLC from Body Control Module	=TRUE	0.33(s)	2 Trip
U0140	Dectects 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_TO from Body Control Module	=TRUE	0.33(s)	2 Trip
U0422	Detects when wrong data length code received by the frame BkupSysPwrMode_Prtctd_MSG_DLC" from Body Control Module	Wrong data length code received by the frame BkupSysPwrMode_Prtctd_MSG_DLC from Body Control Module	=TRUE	0.33(s)	2 Trip
U0140	Dectects when the frame "BkupSysPwrMode_Prtctd_MSG_TO" is not received from Body Control Module	Wrong data length code received by the frame BkupSysPwrMode_Prtctd_MSG_TO from Body Control Module	=TRUE	0.33(s)	2 Trip
U0422	Dectects 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	Dectects when the frame "DrvrDoorAjarSwtActvMask" 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	Dectects 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	Dectects 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	Dectects 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 RelImblz_Prtctd_MSG_DLC" from Body Control Module	Wrong data length code received by the frame RelImblz_Prtctd_MSG_DLC from Body Control Module	=TRUE		1(s)	2 Trip
	U0140	Dectects 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	Dectects 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	Dectects 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
	U0140	Dectects 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_MSG_DLC" from Brake System Control Module	Wrong data length code received by the frame BrkSysInfoReqs3_Prtctd_MSG_DLC from Brake System Control Module	=TRUE	10(s)	1 Trip
	U160F	Dectects when the frame "BrkSysInfoReqs3_Prtctd_MSG_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	10(s)	2 Trip

	U0418	Detects when wrong data length code received by the frame "BrkSysInfoSts_Prtctd_MSG_DLC" from Brake System Control Module	Wrong data length code received by the frame BrkSysInfoSts_Prtctd_MSG_DLC from Brake System Control Module	=TRUE	0.5(s)	1 Trip
	U1610	Dectects when the frame "BrkSysInfoSts_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame BrkSysInfoSts_Prtctd_MSG_TO from Brake System Control Module	=TRUE	0.5(s)	2 Trip
	U0418	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	Dectects 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
	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_Prtctd_MSG_DLC from Brake System Control Module	=TRUE	10(s)	1 Trip
	U1610	Dectects when the frame "BrkSysStsInfo_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame BrkSysStsInfo_Prtctd_MSG_TO 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_DLC from Brake System Control Module	=TRUE	0.43(s)	1 Trip

U1610	Dectects 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_TO 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	Dectects 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
U1610	Dectects 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	Dectects 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	Dectects 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	Dectects 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
U0418	Detects when wrong data length code received by the frame "FrntAngVel_Prtctd_MSG_DLC" 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	Dectects 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_MSG_DLC" from Brake System Control Module	Wrong data length code received by the frame FrtWhlDistEdgeCnt_Prtctd_MSG_DLC from Brake System Control Module	=TRUE	1(s)	1 Trip

U1610	Dectects when the frame "FrtWhlDistEdgeCnt_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame FrtWhlDistEdgeCnt_Prtctd_MSG_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_DLC" from Brake System Control Module	Wrong data length code received by the frame RearAngVel_Prtctd_MSG_DLC from Brake System Control Module	=TRUE			0.43(s)	1 Trip
U1610	Dectects 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_MSG_DLC" from Brake System Control Module	Wrong data length code received by the frame RrWhlDistEdgeCnt_Prtctd_MSG_DLC from Brake System Control Module	=TRUE			10(s)	1 Trip
U1610	Dectects when the frame "RrWhlDistEdgeCnt_Prtctd_MSG_TO" is not received from Brake System Control Module	Wrong data length code received by the frame RrWhlDistEdgeCnt_Prtctd_MSG_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 Basic enable conditions met	=TRUE =see sheet enable tables	10(s)	2 Trip
U1608	Dectects 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	Dectects 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	Dectects 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
	U1609	Dectects 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	Dectects 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	Dectects 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	Dectects 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	Dectects 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	Dectects when the frame "NodeStatus_CAN2_MSG01_TO" is not received from Gateway Module	Wrong data length code received by the frame NodeStatus_CAN2_MSG01_TO 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	Dectects when the frame "NodeStatus_CAN2_MSG02_TO" is not received from Gateway Module	Wrong data length code received by the frame NodeStatus_CAN2_MSG02_TO 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	Dectects when the frame "NodeStatus_CAN3_MSG01_TO" is not received from Gateway Module	Wrong data length code received by the frame NodeStatus_CAN3_MSG01_TO 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 Basic enable conditions met	=TRUE =see sheet enable tables	3(events)	1 Trip
U131D	Detects when wrong data length code received by the frame "FTZM_Information_1_S1_Chks" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_1_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_1_S1_DLC" 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	Dectects 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	Dectects when the frame "FTZM_Information_11_S1_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_11_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_12_S1_ARC" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_12_S1_ARC from ECM/PCM	=TRUE	3(events)	1 Trip
	U131D	Detects when wrong data length code received by the frame "FTZM_Information_12_S1_Chks" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_12_S1_Chks 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	Dectects 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_ARC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_13_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_13_S1_Chks" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_13_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_13_S1_MSG_DLC" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_13_S1_MSG_DLC from Fuel Tank Zone Module	=TRUE		10(s)	1 Trip
U18A2	Dectects when the frame "FTZM_Information_13_S1_MSG_TO" is not received from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_13_S1_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_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	Dectects 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_ARC" 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_Chks" from ECM/PCM	Wrong data length code received by the frame FTZM_Information_2_S1_Chks from ECM/PCM	=TRUE	3(events)	1 Trip
	U131D	Detects when wrong data length code received by the frame "FTZM_Information_2_S1_DLC" 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	Dectects 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_ARC" 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_Chks" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_5_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_5_S1_DLC" 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	Dectects 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_ARC" 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
	U131D	Detects when wrong data length code received by the frame "FTZM_Information_6_S1_Chks" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_6_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_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	Dectects 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_Chks" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_7_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_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	Dectects 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
	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_Chks" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_8_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_8_S1_DLC" 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	Dectects 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_Chks" from Fuel Tank Zone Module	Wrong data length code received by the frame FTZM_Information_9_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_9_S1_DLC" 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
	U18A2	Dectects 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 "IntkAirTThrVlvUsSnsrInit" from Intake Air Temperature Sensor	Wrong data length code received by the frame IntkAirTThrVlvUsSnsrInit from Intake Air Temperature Sensor	=TRUE	Ignition is ON Basic enable conditions met	=TRUE =see sheet enable tables	2 Trip
	U1370	Detects when wrong data length code received by the frame "IntkAirTThrVlvUsSnsrInt" from Intake Air Temperature Sensor	Wrong data length code received by the frame IntkAirTThrVlvUsSnsrInt from Intake Air Temperature Sensor	=TRUE			2 Trip
	U1372	Detects when wrong data length code received by the frame "IntkAirTThrVlvUsB2SnsrInit" from Intake Air Temperature Sensor Bank 2	Wrong data length code received by the frame IntkAirTThrVlvUsB2SnsrInit from Intake Air Temperature Sensor Bank 2	=TRUE			2 Trip
	U1372	Detects when wrong data length code received by the frame "IntkAirTThrVlvUsB2SnsrInt" from Intake Air Temperature Sensor Bank 2	Wrong data length code received by the frame IntkAirTThrVlvUsB2SnsrInt from Intake Air Temperature Sensor Bank 2	=TRUE			2 Trip
	U0611 and U0613	Dectects when the frame "IntkAirTThrVlvUsCom" is not received from Intake Air Temperature Sensor	Wrong data length code received by the frame IntkAirTThrVlvUsCom from Intake Air Temperature Sensor	=TRUE			2 Trip
	U0611 and U0613	Dectects when the frame "IntkAirTThrVlvUsLineHi" is not received from Intake Air Temperature Sensor	Wrong data length code received by the frame IntkAirTThrVlvUsLineHi from Intake Air Temperature Sensor	=TRUE			2 Trip

	U0611 and U0613	Dectects 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
	U0612	Dectects 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	Dectects 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	Dectects 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	Dectects 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		
67. CCM - ENGINE CONTROL MODULE LIN BUS OFF MONITORING	U1345	Detects Bus off error at LIN channel 1.	LIN channel 1 indicates bus off error	=TRUE	Ignition is on	=TRUE	10(counts)	2 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
	U1347	Detects Bus off error at LIN channel 3.	LIN channel 3 indicates bus off error	=TRUE	Ignition is on	=TRUE	10(counts)	2 Trip
					No pending or confirmed DTCs	=see sheet inhibit tables		

					Basic enable conditions met	=see sheet enable tables		
	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	=0		
					LIN diagnostics enabled	=TRUE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enabling conditions are met	=see sheet enable tables		
68. SIGNAL PROCESSING OF FRAMES	U1004	Register the faults reported by CGM in the ECM software from array 1 index 5	CGM reporting communication CAN bus 3 off	=TRUE	Battery Voltage	>9(V)	2(s)	2 Trip

FROM GATEWAY-ECU					Basic enable conditions met	=see sheet enable tables	
	U2419	Register the faults reported by CGM in the ECM software from array 2 index 6	CGM reporting loss of communication with Brake System Control Module (CAN Bus 2)	=TRUE			2 Trip
	U2418	Dectects when the frame "ComCGMDTCS2_5" is not received from Brake System Control Module	Wrong data length code received by the frame ComCGMDTCS2_5 from Brake System Control Module (CAN Bus 1)	=TRUE			2 Trip
	U197B	Central Gateway Module internal performance failure	CGM reports self learn did not execute	=TRUE			2 Trip
	B2B13	CGM Control Module Internal Performance Failure	CGM reports internal performance failure	=TRUE			2 Trip
	U197C	Central Gateway Module ECU Identification List Memory Fault	CGM reports ECU identification list memory failure	=TRUE			2 Trip
	U197D	Central Gateway Module Self-Learn Invalid Due To VIN Mismatch	CGM reports self-learning invalid due to VIN mismatch	=TRUE			2 Trip
	U137F	Central Gateway Module Invalid Data Received from Body Control Module	CGM reports invalid data received from Body Control Module	=TRUE			2 Trip
	U1982	Central Gateway Module Key Table Not Provisioned	CGM reports key table not provisioned	=TRUE			2 Trip

	U1983	Central Gateway Module Security Peripheral Performance - Performance or Incorrect Operation	CGM reports security peripheral performance failure	=TRUE	2 Trip
	U1984	Central Gateway Module Unable To Authenticate Serial Data Message	CGM reports unable to authenticate Serial Data Message	=TRUE	2 Trip
	B2B12	CGM Control Module Memory Failure	CGM reports memory failure	=TRUE	2 Trip
	U1002	Central Gateway Module Communication CAN Bus 1 Off	CGM reports loss of communication of CAN bus 1	=TRUE	2 Trip
	U2413	Central Gateway Module High Speed CAN Bus Off	CGM reports loss of high speed CAN bus	=TRUE	2 Trip
	U1006	Central Gateway Module Communication CAN Bus 5 Off	CGM eports loss of CAN bus 5	=TRUE	2 Trip
	U2203	Central Gateway Module Lost Communication with Body Control Module	CGM reports loss of communication with Body Control Module	=TRUE	2 Trip
	U241D	Central Gateway Module Lost Communication with Engine Control Module on CAN Bus 3	CGM reports loss of communication with Engine Control Module	=TRUE	2 Trip

	U2205	Central Gateway Module Lost Communication with Electronic Power Steering Module	CGM reports loss of communication with Electronic Power Steering Module	=TRUE				2 Trip
	U2209	Central Gateway Module Lost Communication with HVAC Display - Front	CGM reports loss of communication with HVAC disaplay	=TRUE				2 Trip
	U220D	Central Gateway Module Lost Communication with Shifter Interface Board Module	CGM reports loss of communication with Shifter Interface Board Module	=TRUE				2 Trip
	U220F	Central Gateway Module Lost Communication with Transmission Control Module	CGM reports loss of communication with Transmission Control Module	=TRUE				2 Trip
	U241C	Central Gateway Module Lost Communication with Engine Control Module on CAN Bus 2	CGM reports loss of communication with Engine Control Module on CAN Bus 2	=TRUE				2 Trip
69. SIGNAL PROCESSING OF AUTOSAR COMMUNICATIONS FOR OTHER MODULES	U0402	Frame $36 - Transmission Engine Speed Extended Range Intervention Type or Frame $02E - Transmission Actual Range, Immediate Directional Torque Intervention, Predicted Torque Intervention Type, Transmission Engine Speed Control Response, etc. or	Invalid data message reported	=TRUE	Battery Voltage Basic enable conditions met	>9(V) =see sheet enable tables	2(events)	1 Trip

		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						
	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

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 or 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	Invalid Data Received From Body Control Module	=TRUE	Battery Voltage Basic enable conditions met	>9(V) =see sheet enable tables	2(events)	1 Trip

	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 tables		
		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 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	=FALSE	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		
	U1978	VIN Of The Very First Vehicle Programming Status	VIN of the very first vehicle programmed	=FALSE	Ignition is ON	=TRUE	1(s)	1 Trip
					Battery Voltage	>9(V)		
					Basic enable conditions met	=see sheet enable tables		
72. CCM - 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 groud 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	>8(V)		
					Battery Voltage	<655.34(V)		
					Power stage off-diagnosis enable	<2(s)		
					)			
					Power stage output signal	=FALSE		
					Timeout after which the state	<1(s)		
					No pending or confirmed DTCs	=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	>8(V)		
					Battery Voltage	<655.34(V)		
					Power stage off-diagnosis enable	<2(s)		
					)			
					Power stage output signal	=TRUE		
					No pending or confirmed DTCs	=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	>8(V)		
					Battery Voltage	<655.34(V)		

					Power stage off-diagnosis enable timer) Power stage output signal Timeout after which the state machine leaves the off-diagnosis state No pending or confirmed DTCs Basic enable conditions met	<2(s) =FALSE <1(s) =see sheet inhibit tables =see sheet enable tables			
74. CCM - FUEL CONTROL ENABLE WIRE (FTZM) DIAGNOSIS	P0629	Digital output stage - Circuit Hig	Pre Supply Pump output voltage	>4.7(V)	(ECU is in POSTDRIVE state OR Airbag is activated) OR (Fuel pressure actual value OR Fuel System Priming Timer is active) Battery voltage No pending or confirmed DTCs Basic enable conditions met	 =TRUE =TRUE >600(kPa) =TRUE >9(V) =see sheet inhibit tables =see sheet enable tables		0.2(s)	2 Trip
	P0628	Digital output stage - Circuit Lov	Pre Supply Pump output voltage (see Look-Up-Table #90)	<1.95 to 4.5(V)	(Engine is in running state OR Validity bit of fuel low pressure value Fuel pressure actual value) Fuel pressure actual value Fuel System Priming Timer is not active Battery voltage	 =TRUE =TRUE <10(kPa) <10(kPa) =FALSE >9(V)		0.05(s)	2 Trip

					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
			Pre Supply Pump output voltage		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		
					)			
					Battery voltage	>9(V)		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=see sheet enable tables		
75. CCM - IGNITION COIL POWERSTAGE ELECTRICAL DIAGNOSIS	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 KΩ 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		
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 Ω 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		
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 Ω 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		
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 KΩ 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		
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 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		
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 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		
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 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		

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 O 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		
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 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		
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 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		
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 Ignition synchronized Engine speed	<655.34(V) >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 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		
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		
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 KO 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		
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 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		
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 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		
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 KΩ 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		
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 Ω 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		
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 Ω 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		
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 KΩ 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		
76. CCM - 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	<655.34(V)		
					Basic enable conditions met	=see sheet enable tables		
					No pending or confirmed DTCs	=see sheet inhibit tables		
	P029D	Detects mechanical failure open high pressure injection valve 1	Number of misfire counter for cylinder 1	>100	Diagnosis inhibited by statistical function	=FALSE	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	=FALSE		
					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)	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		

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 0 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	=FALSE	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	=FALSE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=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	<655.34(V)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=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)	Short to ground: <0.5 0 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 fi 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		
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	>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		
P02A5	Detects mechanical failure open high pressure injection valve 3	Number of misfire counter for cylinder 3	>100	Diagnosis inhibited by statistical function	=FALSE	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	=FALSE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				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	=FALSE	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	=FALSE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
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 O 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		
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)	Short to ground: <0.5 O 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		
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	<6553.5(V)		
				and			
				Basic enable conditions met	=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	=FALSE	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	=FALSE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
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	<6553.5(V)		
				Basic enable conditions met	=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)	Short to ground: < 0.5 O 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		
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	<6553.5(V)		
				Basic enable conditions met	=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	>100	Diagnosis inhibited by statistical function	=FALSE	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	=FALSE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=see sheet enable tables		
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 O impedance between ECU pin and load	Battery Voltage	>9(V)	2(events)	1 Trip
				Battery Voltage	<6553.5(V)		
				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)	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		
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	>9(V)	2(events)	1 Trip
				Battery Voltage	<6553.5(V)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P02B5	Detects mechanical failure open high pressure injection valve 7	Number of misfire counter for cylinder 7	>100	Diagnosis inhibited by statistical function	=FALSE	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	=FALSE		
				No pending or confirmed DTCs	=see sheet inhibit tables		

				Basic enable conditions met	=see sheet enable tables		
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	>9(V)	2(events)	1 Trip
				Battery Voltage	<6553.5(V)		
				Basic enable conditions met	=see sheet enable tables		
				No pending or confirmed DTCs	=see sheet inhibit tables		
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 O 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		
				No pending or confirmed DTCs	=see sheet inhibit tables		
P02B9	Detects mechanical failure open high pressure injection valve 8	Number of misfire counter for cylinder 8	>100	Diagnosis inhibited by statistical function	=FALSE	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	=FALSE		
				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 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		
	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
			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	<6553.5(V) =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 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	<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 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	<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 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	<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
			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	<6553.5(V) =see sheet enable tables		
					No pending or confirmed DTCs	=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)	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	<6553.5(V) =see sheet enable tables		
					No pending or confirmed DTCs	=see sheet inhibit tables		
	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)	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	<6553.5(V) =see sheet enable tables		

					No pending or confirmed DTCs	=see sheet inhibit tables		
	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 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 O 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
	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) 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
77. CCM - 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** 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 (	 =FALSE =FALSE <655.34(V) >7.734(%) <3072(%) =FALSE >7(s) =FALSE	10(s)	2 Trip

(	
(	
(	
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	=FALSE
)	
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	=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(counts)
(A) Number of injections for enabling high-pressure controller	
(B) Number of cylinders	=8
OR	

				Engine start is not in pre-injection mode Injection counter)) (Engine state of synchronisation for rail pressure control activation (Engine is in running state OR Crankshaft signal is detected) for time)) for time No pending or confirmed DTCs Basic enable conditions met	=FALSE >2(counts) >30 =TRUE =TRUE =0.04(s) =7(s) =see sheet inhibit table =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** Fuel tank is empty or reserve	 =TRUE	6(s)	2 Trip
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	 =FALSE =FALSE <655.34(V) >7.734(%) <3072(%) =FALSE >7(s) =FALSE	10(s)	2 Trip

(	
(	
(	
(	
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	=FALSE
)	
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 detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
High pressure pump not active	=FALSE
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	=FALSE		
				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		
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	=FALSE		
				Rail pressure sensor voltage is not plausible	=FALSE		
				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	>7(s)		
				Conditions for reset of high-pressure regulation	=FALSE		
				(			
				(			
				(			
				(			
				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	=FALSE
)	
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	=FALSE
End of start is reached	=TRUE
)	
(	
Start of injection enabled	=TRUE
(	
Engine start is in pre-injection mode	=TRUE
Injection counter (A+B) where in:	>(A+B)
	=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	=FALSE
Injection counter	>2(counts)
)	
)	
(	

				Engine state of synchronisation for rail pressure control activation (Engine is in running state OR Crankshaft signal is detected) for time)) for time No pending or confirmed DTCs Basic enable conditions met	>30 =TRUE =TRUE =0.04(s) =7(s) =see sheet inhibit table =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** Fuel tank is empty or reserve	 =TRUE	6(s)	2 Trip
P2C01	**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	 =FALSE =FALSE <655.34(V) >7.734(%) <3071.953(%) =FALSE >7(s) =FALSE <8(counts)	10(s)	2 Trip

Desired number of cylinders with injection cut-off	<8(counts)
)	
OR	
End of start is reached	=FALSE
)	
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 detected	=TRUE
)	
for time	=0.04(s)
)	
OR	
High pressure pump not active	=FALSE
End of start is reached	=TRUE
)	
(	
Start of injection is enabled	=TRUE
(	
Engine start is in pre-injection mode	=TRUE
Injection counter (A+B) where in:	>(A+B)
	=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	=FALSE
Injection counter	>2(counts)
)	
)	
(	

				Engine state of synchronisation for rail pressure control activation (Engine is in running state OR Crankshaft signal is detected) for time)) for time No pending or confirmed DTCs Basic enable conditions met	>30 =TRUE =TRUE =0.04(s) =7(s) =see sheet inhibit table =see sheet enable table		
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	=TRUE =FALSE =FALSE <6555. 34(V) >7.734(%) <3071.953(%) =FALSE >7(s) =FALSE <8(counts) <8(counts) =FALSE	7(s)	1 Trip

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	=FALSE
End of start is reached	=TRUE
)	
(	
Start of injection enabled	=TRUE
(	
(	
Engine start is in pre-injection mode	=TRUE
Injection counter (A+B) where in:	>(A+B)
	=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	=FALSE
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	=FALSE		
				(			
				Catalyst heating activated	=FALSE		
				OR			
				Catalyst heating request by cold engine	=FALSE		
				OR			
				Time counter at end of start	<2(s)		
				OR			
				Plausibility check fuel supply system active	=FALSE		
				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	<O(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:** 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	=FALSE
Rail pressure sensor voltage is not plausible	=FALSE
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	>7(s)
Conditions for reset of high-pressure regulation	=FALSE
(	
(	
(	
(	
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	=FALSE
)	
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	=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(counts)
(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(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	=FALSE
(	
Catalyst heating activated	=FALSE
OR	
Catalyst heating request by cold engine	=FALSE
OR	
Time counter at end of start	<2(s)
OR	
Plausibility check fuel supply system active	=FALSE
OR	
(	
Rail pressure setpoint	>36(MPa)

				OR Rail pressure setpoint OR Absolute of difference between rail pressure set point and its filtered value OR Engine speed Coolant temperature at engine output) OR High pressure regulation is reset) Fuel tank is empty or reserve No pending or confirmed DTCs Basic enable conditions met	 <6(MPa) >15(MPa) <O(rpm) <-3550(°C) =TRUE =FALSE =see sheet inhibit table =see sheet enable table		
	Path 2: 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	Filtered value of rail pressure control deviation	>3(MPa)	**Common conditions** Fuel tank is empty or reserve	 =TRUE	5(s)	
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 ((	=TRUE =FALSE =FALSE <655.34(V) >7.734(%) <3071.953(%) =FALSE >7(s) =FALSE	7(s)	1 Trip

(	
(	
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	=FALSE
)	
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	=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(counts)
(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(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	=FALSE
(	
Catalyst heating activated	=FALSE
OR	
Catalyst heating request by cold engine	=FALSE
OR	
Time counter at end of start	<2(s)
OR	
Plausibility check fuel supply system active	=FALSE
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	=FALSE		
				Rail pressure sensor voltage is not plausible	=FALSE		
				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	=FALSE		
				)			
				Time counter at end of start	>7(s)		
				Conditions for reset of high-pressure regulation	=FALSE		
				(			
				(			
				(			
				(			
				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	=FALSE		
				)			
				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	=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(counts)
(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(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	=FALSE
(	
Catalyst heating activated	=FALSE
OR	

				Catalyst heating request by cold engine OR Time counter at end of start OR Plausibility check fuel supply system active OR (Rail pressure setpoint OR Rail pressure setpoint OR Absolute of difference between rail pressure set point and its filtered value OR Engine speed Coolant temperature at engine output) OR High pressure regulation is reset) Fuel tank is empty or reserve No pending or confirmed DTCs Basic enable conditions met	=FALSE <2(s) =FALSE >36(MPa) <6(MPa) >15(MPa) <O(rpm) <-3550(°C) =TRUE =FALSE =see sheet inhibit table =see sheet enable table		
	Path 2: 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	Filtered value of rail pressure control deviation	>3(MPa)	**Common conditions** Fuel tank is empty or reserve	 =TRUE	5(s)	
P00C6	Fuel Rail Pressure Too Low - Engine Cranking Bank 1	High pressure start (Fuel rail pressure (see Look-Up-Table #28)	=FALSE <7 to 17(MPa)	Engine is in standby state Condition calucation of diagnosis high pressure start is stopped Engine temperature for diagnosis start with high fuel pressure	=TRUE =FALSE <142.96(°C)	0.1(s)	2 Trip

	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	
	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
			Start type from the start coordinator indicates preijections 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
Monitoring of preinjection with low pressure	Preinjection with low pressure is active	=FALSE	Engine is in standby state	=TRUE
	(		Condition calucation of diagnosis high pressure start is stopped	=FALSE
	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		
				)			
				(	=TRUE		
				High pressure start request			
				(			
				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	=FALSE	Engine is in standby state	=TRUE	0.1(s)	2 Trip
		(		Condition calucation of diagnosis high pressure start is stopped	=FALSE		

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 6(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
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 preijections 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
	Monitoring of preinjection with low pressure	Preinjection with low pressure is active	=FALSE	Engine is in standby state	=TRUE
		(		Condition calucation of diagnosis high pressure start is stopped	=FALSE
		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
		)	
		(	=TRUE
		High pressure start request	
		(	
		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 No pending or confirmed DTCs	=see sheet enable tables =see sheet inhibit tables		
	P00CA	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 No pending or confirmed DTCs	<655.34(V) >80(rpm) =see sheet enable tables =see sheet inhibit tables		
	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 No pending or confirmed DTCs	<655.34(V) >80(rpm) =see sheet enable tables =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 No pending or confirmed DTCs	<655.34(V) >80(rpm) =see sheet enable tables =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 O 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 No pending or confirmed DTCs	<655.34(V) >80(rpm) =see sheet enable tables =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 No pending or confirmed DTCs	<655.34(V) >80(rpm) =see sheet enable tables =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
		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 No pending or confirmed DTCs	=see sheet enable tables =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 No pending or confirmed DTCs	<655.34(V) >80(rpm) =see sheet enable tables =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 No pending or confirmed DTCs	<655.34(V) >80(rpm) =see sheet enable tables =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 0 impedance between ECU pin and load	Battery voltage	>10.9(V)	20(s)	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		
	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 0 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 No pending or confirmed DTCs	<655.34(V) >80(rpm) =see sheet enable tables =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. CCM - 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	=see sheet inhibit tables		
					Basic enable conditions met	=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	=see sheet inhibit tables		
					Basic enable conditions met	=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 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	>0.1(l/h)		

				Engine is running state	=TRUE		
				Pre-Supply pump is ON)	=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	>0.1(l/h)		
				Engine is running state	=TRUE		
				Pre-Supply pump is ON)	=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
				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
				No pending or confirmed DTCs	=see sheet inhibit tables		

					Basic enabling conditions are met	=see sheet enable tables		
80. CCM - FTZM INTERNAL PERFORMANCE	P1005	Monitoring of FTZM fuel pump driver contol module for too many unexpected resets	Fuel Pump driver contol 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
					Battery Voltage	>9(V)		
					Basic enable conditions are met	=see sheet enable tables		
81. CCM - CAMSHAFT POSITION ACTUATOR - INTAKE B1 ELECTRICAL DIAGNOSIS	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 Ω 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 O 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 KO 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		
82. CCM - 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 O 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		
	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 O 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		
	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	>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		
83. CCM - CAMSHAFT POSITION ACTUATOR - EXHAUST B1 ELECTRICAL DIAGNOSIS	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
					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 KO 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. CCM - 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 O 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		
	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 O 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 KΩ 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		
85. CCM - ENGINE OIL PRESSURE CONTROL ACTUATOR	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		
	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	=FALSE	1(s)	2 Trip
			for time constant filter	>2(s)	(Absolute value of transversal acceleration	≥5(g)		
					for time	>0(s)		
					for hold time after condition becomes false)	<0(s)		
					Oil temperature	>-50.04(°C)		
					Oil pump high side switch commanded on	=TRUE		
					Backup duty cycle for oil pressure is in use	=FALSE		
					In electric drive mode	=FALSE		
					No pending or confirmed DTCs	=see sheet inhibit tables		
					Basic enable conditions met	=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	=FALSE	1(s)	2 Trip
				(Absolute value of transversal acceleration	≥5(g)		
				for time	>0(s)		
				for hold time after condition becomes false)	<0(s)		
				Oil temperature	>-50.04(°C)		
				Oil pump high side switch commanded on	=TRUE		
				Backup duty cycle for oil pressure is in use	=FALSE		
				In electric drive mode	=FALSE		
				No pending or confirmed DTCs	=see sheet inhibit tables		
				Basic enable conditions met	=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	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		
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	=FALSE	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. CCM - EVAP PURGE VALVE - B1 DIAGNOSTIC S	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		
					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	<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		
	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	<17(V)		
					Power stage (driver) is switched off	=TRUE		

					Basic enable conditions met No pending or confirmed DTCs	=see sheet enable tables =see sheet inhibit tables		
87. CCM - EVAP PURGE VALVE - B2 DIAGNOSTICS	P04AD	Diagnoses the EVAP System Purge Control Valve low side driver circuit for circuit high faults.	Output (driver) current	>5.6(A)	Battery voltage Battery voltage Power stage (driver) is switched on Basic enable conditions met No pending or confirmed DTCs	>10(V) <17(V) =TRUE =see sheet enable tables =see sheet inhibit tables	1(s)	2 Trip
	P04AC	Diagnoses the EVAP System Purge Control Valve low side driver circuit for circuit low faults.	Output (driver) voltage	<2.74(V)	Battery voltage Battery voltage Power stage (driver) is switched off Basic enable conditions met No pending or confirmed DTCs	>10(V) <17(V) =TRUE =see sheet enable tables =see sheet inhibit tables	1(s)	2 Trip
	P04AB	Diagnoses the EVAP System Purge Control Valve low side driver circuit for open circuit faults.	Output (driver) voltage Output (driver) voltage	>3.26(V) <4.7(V)	Battery voltage Battery voltage Power stage (driver) is switched off Basic enable conditions met No pending or confirmed DTCs	>10(V) <17(V) =TRUE =see sheet enable tables =see sheet inhibit tables	1(s)	2 Trip
88. CCM - THROTTLE ACTUATOR – B1 DIAGNOSIS	P2176	Throttle actuator Bank1 first initialization - lower mechanical stop learning fail	(Initial learning of the closed throttle valve position has started Aborted due to one of the enable conditions no longer being fulfilled (see secondary parameters))	 =TRUE =TRUE	(Offset learning aborted OR Offset learning successful)	=FALSE =FALSE	0.01(s)	1 Trip

	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):		OR	
	(		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	
	)		Device type	>0
			)	
	for time	>1(s)	(	
	)		Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)
			(	
	)		(	
			(	
	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 cylce 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
	(		(	
	Calculated duty cycle ratio	<60(%)	The powerstage of the throttle actuator is commanded on	=TRUE
	)		Battery voltage	>7.5(V)

	for time	>1(s)	)	
			)	
			)	
	)		OR	
	OR		Power save is active	=TRUE
			)	
	(		Limp home driving mode requested	=FALSE
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)**:**		Safety fuel cut off 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:		Torque limitation requested)	=FALSE
	(		(Long term and short term adaptation chosen	=FALSE
	Lower mechanical stop voltage sensor 1	>0.58(V)	OR	
	OR		(Long term and short term adaptation chosen	=TRUE
	Lower mechanical stop voltage sensor 1	<.33(V)	Long term and short term is released	=TRUE
	OR		)	
	Lower mechanical stop voltage sensor 2	>4.67(V)	)	
	OR		OR	
	Lower mechanical stop voltage sensor 2	<4.42(V)	(	
	)		(	
	)		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

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		(Return spring check aborted	=TRUE		
				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:					
		(		Return spring check successful	=TRUE		
				)			
		Lower mechanical stop voltage sensor 1	>.58(V)	Return spring check fault is set	=FALSE		
				)			
		OR		OR			
		Lower mechanical stop voltage sensor 1	<.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		(			
				(			
		Lower mechanical stop voltage sensor 2	<4.42(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)		
				)			
				)			
				)			
				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)
)	
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))) OR	>7.5(V)		
				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)**:**		(Offset learning aborted	=FALSE	1(s)	1 Trip
		Actuator throttle position	>(Vmax - V) * Tgrad + Offset(%)	OR			
		Where:		Offset learning successful)	=FALSE		
		Vmax (Maximum voltage value allowed at mechanical stop, position sensor 1)	=.58(V)	Offset check at cold temperature conditions active	=FALSE		
		V (Actual learned sensor voltage of sensor 1 at the lower mechanical stop)	=sensed voltage(V)	((			
		Tgrad (Gradient of the throttle valve angle versus sensor 1 voltage)	=calculated value(% / V)	(Return spring check aborted	=TRUE		

	Offset (Offset to Desired position value to start ramping into mechanical stop)	=1.5(%)	OR	
			Return spring check successful)	=TRUE
Path 2: Range check of learned sensor voltage at lower mechanical stop for Throttle Position Sensor Bank 1 : Maximum learning limit exceeded	Low mechanical stop first learning has been performed	=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 Device type)	>0
	Actual learned sensor voltage of sensor 1 at the mechanical stop	>.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
			(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 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		
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		
		Actual learned sensor voltage of sensor 2 at the mechanical stop	<4.67(V)	((			
		(		(Return spring check aborted	=TRUE		
		Actual learned sensor voltage of sensor 1 at the mechanical stop	<.33(V)	OR			

OR		Return spring check successful)	=TRUE
Actual learned sensor voltage of sensor 2 at the mechanical stop)	<4.42(V)	Return spring check fault is set) OR	=FALSE
		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 OR (	=TRUE
		Offset learning active (	=FALSE
		The powerstage of the throttle actuator is commanded on	=TRUE
		Battery voltage))) OR	>7.5(V)
		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 OR	=FALSE
		(Long term and short term adaptation chosen	=TRUE
		Long term and short term is released)) OR ((	=TRUE
		First learning performed OR	=FALSE

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		
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 thottle 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 OR	>7.5(V)		
				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:		OR			
		A - Upper threshold for Throttle Actuator Control duty cycle Bank 1 diagnosis in case of low battery voltage	95(%)	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 thottle 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 OR	=TRUE		
				Engine speed)	>2000(rpm)		

				Limp home position not reached bank 1) Battery voltage for throttle valve operation sufficient for bank 1 No pending or confirmed DTCs Basic enable conditions met	=FALSE =TRUE =see sheet inhibit tables =see sheet enable tables		
P1551	**Path 2:** Range check of limp air position for Bank 1 - 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 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	>1.31(V) >1.31(V)	(Offset learning aborted OR Offset learning successful) Offset check at cold temperature conditions active (((Return spring check aborted OR Return spring check successful) Return spring check fault is set) OR Device type) (Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time (((Offset learning active OR (	=FALSE =FALSE =FALSE =TRUE =TRUE =FALSE >0 >29(s) =TRUE	0.01(s)	1 Trip

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 OR (Offset learning active (The powerstage of the throttle actuator is commanded on Battery voltage))) OR Power save is active) Limp home driving mode requested Safety fuel cut off requested Torque limitation requested) Vehicle speed Engine speed Battery voltage Battery voltage Intake air temperature before throttle valve Intake air temperature before throttle valve Engine coolant temperature Engine coolant temperature No pending or confirmed DTCs Basic enable conditions met	 =TRUE =FALSE =TRUE >7.5(V) =TRUE =FALSE =FALSE =FALSE <0.62(mph) <300(rpm) <16(V) >10(V) <143.26(°C) >5.26(°C) <100.46(°C) >5.26(°C) =see sheet inhibit tables =see sheet enable tables		
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 OR	<.87(V)	(Offset learning aborted OR	=FALSE	0.01(s)	1 Trip

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)	Offset learning successful)	=FALSE
		Offset check at cold temperature conditions active (((Return spring check aborted OR Return spring check successful) Return spring check fault is set) OR Device type) (Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time (((Offset learning active OR (Offset learning active (The powerstage of the throttle actuator is commanded on Battery voltage))) OR Power save is active) Limp home driving mode requested Safety fuel cut off requested Torque limitation requested) (Long term and short term adaptation chosen	=FALSE =TRUE =TRUE =FALSE >0 >29(s) =TRUE =FALSE =TRUE >7.5(V) =TRUE =FALSE =FALSE =FALSE =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
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		
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 Offset learning successful)	=FALSE		
		(|A - B|) Absolute value of the actual learned value minus last stored value Where:	>0.155(V)	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 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		(			

(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	=TRUE
	and	
	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)
)	
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		
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)	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		
				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)		
		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
Where:		Battery voltage	>7.5(V)
(A) Gradient of the throttle valve angle	=100% / ((V12 - V11) + (V21 - V22)) * 0.5(%/V)	)))	
(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 ((	
		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		
P2119	**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		
				(((	=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 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 (The powerstage of the throttle actuator is commanded on Battery voltage))) OR Power save is active) Limp home driving mode requested Safety fuel cut off requested Torque limitation requested) Vehicle speed Engine speed Battery voltage Battery voltage Intake air temperature before throttle valve Intake air temperature before throttle valve Engine coolant temperature Engine coolant temperature No pending or confirmed DTCs Basic enable conditions met	 =FALSE =TRUE >7.5(V) =TRUE =FALSE =FALSE =FALSE <0.62(mph) <300(rpm) <16(V) >10(V) <143.26(°C) >5.26(°C) <100.46(°C) >5.26(°C) =see sheet inhibit tables =see sheet enable tables		
P2119	**Path 3:** Throttle valve return spring failure check for Bank 1	((Limp air position is implausible OR First learning performed)	 =TRUE =FALSE	(Offset learning aborted OR Offset learning successful) Offset check at cold temperature conditions active ((	=FALSE =FALSE =FALSE	0.36(s)	1 Trip

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(%/V)	(	
(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		OR	
(V22) Actual learned sensor voltage of sensor 2 at the upper mechanical stop		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	
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) Limp home driving mode requested Safety fuel cut off requested Torque limitation requested) Vehicle speed Engine speed Battery voltage Battery voltage Intake air temperature before throttle valve Intake air temperature before throttle valve Engine coolant temperature Engine coolant temperature No pending or confirmed DTCs Basic enable conditions met	 =TRUE =FALSE =FALSE =FALSE <0.62(mph) <300(rpm) <16(V) >10(V) <143.26(°C) >5.26(°C) <100.46(°C) >5.26(°C) =see sheet inhibit tables =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 Where: (D1) Limp home position of the throttle valve (D2) Value by which return spring is spread starting from power off position (D3) Range for actual position (offset to desired value) to check whether return spring spread position is reached	<(D1 + D2) - D3(%) =Calculated parameter(%) =15(%) =2(%)	(Offset learning aborted OR Offset learning successful) Offset check at cold temperature conditions active (((Return spring check aborted OR Return spring check successful) Return spring check fault is set) OR	=FALSE =FALSE =FALSE =TRUE =TRUE =FALSE	0.2(s)	1 Trip

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	
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		
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:	=TRUE		
				(			
				State of the thottle 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			
				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 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 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 OR	>7.5(V)		
				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		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	ECU is in POSTDRIVE state)	=TRUE		
				The powerstage of the actuator is switched on, following conditions: (	=TRUE		
				State of the thottle 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 OR Engine speed) Limp home position not reached bank 1) No pending or confirmed DTCs Basic enable conditions met	>7.5(V) >2000(rpm) =FALSE =see sheet inhibit tables =see sheet enable tables			
89. CCM - THROTTLE ACTUATOR - B2 DIAGNOSIS	P218A	Throttle actuator Bank2 first initialization - lower mechanical stop learning fail	(Initial learning of the closed throttle valve position has started Aborted due to one of the enable conditions no longer being fulfilled (see secondary parameters)) OR	 =TRUE =TRUE	(Offset learning aborted OR Offset learning successful) Offset check at cold temperature conditions active	=FALSE =FALSE =FALSE	0.01(s)	1 Trip	
		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): ((Difference between actual throttle position sensor2 at) for time) OR	 >1.5(%) >1(s)	(((Return spring check aborted OR Return spring check successful) Return spring check fault for bank 2 is set) OR Device type) (	 =TRUE =TRUE =FALSE >0			

	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 will be enabled during ECU is in drive state when below conditions are satisfied for time	>29(s)
			(	
	(		(	
			(	
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)	(	
	OR		Offset learning active	=FALSE
Range check of learned sensor voltage at low mechanical stop	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)	Limp home driving mode requested for bank 2	=FALSE
	OR		Safety fuel cut off requested for bank 2	=FALSE
	Lower mechanical stop voltage sensor 2	<4.42(V)	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
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		
P218A	Throttle actuator Bank2 - 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		(	=TRUE		
				Return spring check aborted			
		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		(	
		(	
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	
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 Basic enable conditions met	=see sheet inhibit tables =see sheet enable tables		
P30E5	**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)**:**		(Offset learning aborted	=FALSE	1(s)	1 Trip
		Actuator throttle position	>(Vmax - V) * Tgrad + 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)	(Return spring check aborted	=TRUE		
		Offset (Offset to Desired position value to start ramping into mechanical stop)	=1.5(%)	OR			
				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 **Step 3** (If no fault in step 2 then check range of learned sensor voltages at lower mechanical stop)**:**		OR 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
(	
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)
)	
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		
P30E6	Range check of learned sensor voltage at lower mechanical stop for Throttle Position Sensor Bank 2: 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 mechanical stop**):**		OR Offset learning successful)	=FALSE		
		Actual learned sensor voltage of sensor 1 at the mechanical stop	<0.58(V)	Offset check at cold temperature conditions active	=FALSE		
		Actual learned sensor voltage of sensor 2 at the mechanical stop	<4.67(V)	((			
		(		(Return spring check aborted	=TRUE		
		Actual learned sensor voltage of sensor 1 at the mechanical stop	<0.33(V)	OR			
		OR		Return spring check successful)	=TRUE		
		Actual learned sensor voltage of sensor 2 at the mechanical stop)	<4.42(V)	Return spring check fault for bank 2 is set) OR	=FALSE		
				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	
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		
P210B	Rationality check of throttle actuator control Bank 2 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 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 Basic enable conditions met	 =see sheet inhibit tables =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 where A - Upper threshold for Throttle Actuator Control duty cycle Bank 2 diagnosis in case of low battery voltage B - Upper threshold for Throttle Actuator Control duty cycle bank 2 diagnosis C - Factor for battery voltage compensation bank 2	>Minimum(A, (B*C))(%) 95(%) 80(%) =13.5V / measured battery voltage [V]	(ECU is in DRIVE state OR ECU is in POSTDRIVE state) Absolute value of position controller of the throttle valve bank 2 of motor bench one / gradient of the filtered desired value The powerstage of the actuator is switched on, following conditions: (State of the thottle valve powerstage bank 2) Release of adaptation Actual position is valid Request safety fuel cut off SKA bank 2, following condition: (Request reversible safety fuel cut off SKA bank 2, which has following condition: (Battery voltage for throttle valve operation sufficient bank 2 OR Engine speed) Limp home position not reached bank 2) Battery voltage for throttle valve operation sufficient for bank 2 No pending or confirmed DTCs Basic enable conditions met	=TRUE =TRUE <78.1(%/s) =TRUE >0 =FALSE =TRUE =FALSE =FALSE =TRUE >2000(rpm) =FALSE =TRUE =see sheet inhibit tables =see sheet enable tables	0.6001(s)	1 Trip

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 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	>1.31(V) >1.31(V)	(Offset learning aborted OR Offset learning successful) Offset check at cold temperature conditions active (((Return spring check aborted OR Return spring check successful) Return spring check fault for bank 2 is set) OR Device type) (Offset learning will be enabled during ECU is in drive state when below conditions are satisfied for time (((Offset learning active OR (Offset learning active (The powerstage of the throttle actuator for bank 2 is commanded on Battery voltage))) OR	=FALSE =FALSE =FALSE =TRUE =TRUE =FALSE >0 >29(s) =TRUE =FALSE =TRUE >7.5(V)	0.01(s)	1 Trip

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)
)	
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		
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		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)	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
)	
(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
)	
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 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 Offset learning successful)	=FALSE		
		(|A - B|) Absolute value of the actual learned value minus last stored value	>0.155(V)	Offset check at cold temperature conditions active	=FALSE		
		Where:		((			
		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
(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	=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)
)	
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 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
)		(	
)			
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(%/V)	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		OR	
(V11) Actual learned sensor voltage of sensor 1 at the lower mechanical stop		Power save is active for bank 2	=TRUE
		)	
(V21) Actual learned sensor voltage of sensor 2 at the lower mechanical stop		Limp home driving mode requested for bank 2	=FALSE
(V22) Actual learned sensor voltage of sensor 2 at the upper mechanical stop		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)
)	
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 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) OR	=FALSE		
				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	
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 OR (Offset learning active (The powerstage of the throttle actuator for bank 2 is commanded on Battery voltage))) OR Power save is active for bank 2) Limp home driving mode requested for bank 2 Safety fuel cut off requested for bank 2 Torque limitation requested for bank 2) Vehicle speed Engine speed Battery voltage Battery voltage Intake air temperature before throttle valve Intake air temperature before throttle valve Engine coolant temperature Engine coolant temperature No pending or confirmed DTCs Basic enable conditions met	=TRUE =FALSE =TRUE >7.5(V) =TRUE =FALSE =FALSE =FALSE <0.62(mph) <300(rpm) <16(V) >10(V) <143.26(°C) >5.26(°C) <100.46(°C) >5.26(°C) =see sheet inhibit tables =see sheet enable tables		
P211D	**Path 3:** Throttle valve return spring failure check for Bank 2	((Limp air position is implausible OR	=TRUE	(Offset learning aborted OR Offset learning successful)	=FALSE =FALSE	0.36(s)	1 Trip

First learning performed	=FALSE	Offset check at cold temperature conditions active	=FALSE
)		(	
		(	
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 for bank 2 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(%/V)	(	
(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		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 OR	=FALSE	
	(Long term and short term adaptation chosen	=TRUE	
	Long term and short term is released)) OR ((	=TRUE	
	First learning performed OR	=FALSE	
	Limp air position is not plausible OR	=TRUE	
	External trigger to start offset learning)	=TRUE	
	(ECU is in drive state OR	=TRUE	
	ECU is in post drive state for time)) OR	>5(s)	
	ECU is in post drive state for time)	>5(s)	
	Offset learning will be enabled when below conditions are satisfied (((	=TRUE	
	Offset learning active OR (	=TRUE	
	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)
(	
(	
(	
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)
)	
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		
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 OR ECU is in POSTDRIVE state) The powerstage of the actuator is switched on, following conditions: (State of the thottle valve powerstage bank 2) Release of adaptation Actual position is valid Request safety fuel cut off SKA bank 2, following condition: (Request reversible safety fuel cut off SKA bank 2, which has following condition: (Battery voltage for throttle valve operation sufficient bank 2 OR Engine speed) Limp home position not reached bank 2) No pending or confirmed DTCs Basic enable conditions met	=TRUE =TRUE =TRUE >0 =FALSE =TRUE =FALSE =FALSE >7.5(V) >2000(rpm) =FALSE =see sheet inhibit tables =see sheet enable tables	0.01(s)	1 Trip
P210A	**Path 3 :** Diagnoses the Turbine bypass valve H bridge high side driver circuit at out 1 for circuit low fault Diagnoses the Turbine bypass valve H bridge low side driver circuit at out 2 for circuit high fault	Voltage low during driver ON 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 signal and controller ground Short to power: < 0.5 Q impedance between signal and controller power	(ECU is in DRIVE state OR ECU is in POSTDRIVE state) The powerstage of the actuator is switched on, following conditions: (	=TRUE =TRUE =TRUE	0.01(s)	1 Trip

					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		
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(%)		
					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	>9.5(V)		
					Basic enable conditions met	=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(%)		
					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	>9.5(V)		
					Basic enable conditions met	=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(%)		
				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	>9.5(V)		
				Basic enable conditions met	=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 (Time since fan commanded on OR (Fan speed Time since fan commanded on)) Commanded fan speed (Percent cooling fan commanded with hysteresis) Basic enable conditions met	>9.5(V) >5(s) <1000(rpm) >6(s) >7.65(%) <7.64(%) =see sheet enable tables	20(s)	2 Trip
	U1385	Fan4 communication via CAN	Fan4 communication error reported	=TRUE	Ignition is on Battery Voltage Basic enable conditions met	=TRUE >9.5(V) =see sheet enable tables	10(events)	2 Trip
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 No pending or confirmed DTCs Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	0.5(s)	1 Trip
	P0641	Sensor supply voltage circuit overvoltage	Voltage ratio between supply voltage output and reference voltage (+5V)	>1.06	Ignition is ON No pending or confirmed DTCs Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	0.5(s)	1 Trip
	P0641	Sensor supply voltage short circuit to ground	Supply voltage	<1(V)	Ignition is ON No pending or confirmed DTCs Basic enable conditions met	=TRUE =see sheet inhibit tables =see sheet enable tables	0.5(s)	1 Trip

	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		
	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		
	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	=FALSE	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)	=TRUE		
				Battery Voltage	>0(V)		
		FTZM reference 1 voltage (converted in ECM to percent	<87.75(%)	No pending or confirmed DTCs	=see sheet inhibit tables		
		OR		Basic enabling conditions are met	=see sheet enable tables		
		| (a) - (b) | where:	>1.1(%)				
		(a) is the filtered FTZM supply voltage 1	=calculated parameter				
		(b) is FTZM raw supply voltage 1	=measured parameter				
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	=FALSE	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		
				Battery Voltage	>0(V)		
		FTZM reference 2 voltage (converted in ECM to percent	<87.75(%)	No pending or confirmed DTCs	=see sheet inhibit tables		
		OR		Basic enabling conditions are met	=see sheet enable tables		
		| (a) - (b) | where:	>1.1(%)				
		(a) is the filtered FTZM supply voltage 2	=calculated parameter				
		(b) is FTZM raw supply voltage 2	=measured parameter				

92. CCM - 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	=see sheet enable tables		
					No pending or confirmed DTC's	=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	=TRUE		
					Basic enable conditions met	=see sheet enable tables		
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)		
					Upper limit of input duty cycle during terminal-L key-on test	>42(%)		
					Basic enable conditions met	=see sheet enable tables		
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		Catalyst heating is active	=FALSE		
		B: Precontrol of the drag torque		Limp-home operation is not active	=TRUE		
		C: Current idle speed governor torque		Safety fuel cut off is not active	=TRUE		
		)		Valid crankshaft signal is present	=TRUE		
		OR		Altitude correction factor	>0.688		
		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))	=TRUE		
				for time	>10(s)		
		Where: A: Maximum torque of idle speed control		Catalyst heating is active	=FALSE		
		B: Precontrol of the drag torque		Limp-home operation is not active	=TRUE		
		C: Current idle speed governor torque		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		
95. INTAKE MANIFOLD TUNING VALVE CONTROL DIAGNOSIS	P0660	Monitoring open load in the Intake Manifold Tuning Valve 1 module	Fault State will be actived 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		
			(		(			
			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)	>400(%)	(			
			)		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		
				Device Library - state of powerstage enabling conditions is enable	!=0		
				Status of the open-load diagnosis for H-bridge	=True		
P0661	Monitoring Short cuircuit 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 cuircuit 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 1.	A "Under Voltage error" is reported by the actuator power	=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		
	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		
			Jammmed preliminary error is reported.	=TRUE	The next condictions 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		
				)			
				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		

			Jammmed preliminary error is reported.	=TRUE	The next condictions needs to meet (			
			Governor Deviation Motinoring 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 or	=True		
					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
			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 Comunication 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		
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 actived 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		
		(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)	>399.9878(%)	or (			
		)		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)		
					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 cuircuit 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 cuircuit 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 powerstage in in the Intake Manifold Tuning Valve 2.	A "Under Voltage error" is reported by the actuator power .	=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		
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		
		Jammmed preliminary error is reported.	=TRUE	The next condictions needs to meet (			
		Governor Deviation Motinoring 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			
				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 Basic enable conditions met	>9(V) =see sheet enable tables			
		Negative governor deviation	=TRUE	Status of IMTV2_swtConf2_C after initialization is reporting a Disturbance pressure compensation	=TRUE			
		)		The next condictions 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		
				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 maximun 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 minimun 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

	Valve 2	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		
U1019	Monitoring Comunication of Intake Manifold Tuning Valve 2	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		
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
					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 sufficent 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 Perfomace 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		
		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 sufficent time has been allowed for this initialization.	<5(s)		

				VEV valve 1 actuator Perfomace 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		
				The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
				VEV valve 1 actuator Perfomace Diagnostic is Enable	=True		
P3174	Monitors diagnostic feedback from exhuaust 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 sufficent time has been allowed for this initialization.	<5(s)		
				VEV valve 1 actuator Perfomace 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 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	>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)		
				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	=see sheet enable tables		
				The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
				VEV valve 1 actuator Perfomace 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	=see sheet enable tables		
					The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
					VEV valve 1 actuator Perfomace Diagnostic is Enable	=True		
	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 sufficent time has been allowed for this initialization.	<5(s)		
					VEV valve 1 actuator Perfomace 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 sufficent time has been allowed for this initialization.	<5(s)		

				VEV valve 1 actuator Perfomace 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
		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 sufficent time has been allowed for this initialization.	<5(s)		
				VEV valve 1 actuator Perfomace 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
			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		
		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 sufficent time has been allowed for this initialization.	<5(s)		
			Fuel Tank Zone Module Pulse 2 Input Sensed Raw Value : Sensed Period Raw Value	<7.92(ms)	VEV valve 2 actuator Perfomace 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
					Basic enable conditions met	=see sheet enable tables		
					The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
					VEV valve 2 actuator Perfomace Diagnostic is Enable	=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	=see sheet enable tables		
					The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
					VEV valve 2 actuator Perfomace Diagnostic is Enable	=True		
	P3181	Monitors diagnostic feedback from exhuaust 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 sufficent time has been allowed for this initialization.	<5(s)		
					VEV valve 2 actuator Perfomace Diagnostic is Enable	=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		
				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 sufficent time has been allowed for this initialization.	<5(s)		
					VEV valve 2 actuator Perfomace Diagnostic is Enable	=True		
	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
					Basic enable conditions met	=see sheet enable tables		
					The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
					VEV valve 2 actuator Perfomace Diagnostic is Enable	=True		
	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
					Basic enable conditions met	=see sheet enable tables		
					The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
					VEV valve 1 actuator Perfomace 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		
	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

				Basic enable conditions met	=see sheet enable tables		
				The valve Init time value flag indicates that sufficent time has been allowed for this initialization.	<5(s)		
				VEV valve 2 actuator Perfomace 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 sufficent time has been allowed for this initialization.	<5(s)		
				VEV valve 2 actuator Perfomace 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)		
					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 sufficent time has been allowed for this initialization.	<5(s)		
					VEV valve 1 actuator Perfomace 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 condictions are met:(			
					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 sufficent time has been allowed for this initialization.	<5(s)		
				VEV valve 2 actuator Perfomace Diagnostic is Enable	=True		
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 condictions 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(%)		
				VEV Valve Feedback PWM PercentageDifference	>3(%)		
				)			
P2BF9	Monitors for ground short circuit faults in the exhuast valve PWM control circuit.	The exhuast 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(s)		
P2BF8	Monitors for open circuit faults in the exhuast valve PWM control circuit.	The exhuast 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 exhuast valve PWM control circuit.	The exhuast 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)		
98. CCM - ENGINE COMPARTMENT TEMPERATURE SENSOR DIAGNOSIS	P10B3	Resistance value of engine compartment temperature sensor lies below the	<53(Ohm)	Ignition is ON	=TRUE	0.5(s)	2 Trip
				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 eingine compartment temperature sensor	=2(s)	Sensor's power stage faults status:			
		B: debounce time error Loose Connection Check eingine 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)		
	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 transmition 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
			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
		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
		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
		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
		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
		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
			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	=see sheet enable tables		
					and (			
	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
			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
			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		
P17D8	Monitoring Fault information for Shifter B from SIB index 10	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	=10		
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
		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	

U18C7	Monitoring Fault information for Shifter B from SIB index 25	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	=25				
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
		Diagnostic Status Shifter Interface Board : B Diagnostic Trouble Code Index / Com signal for index values shifter B DTC from SIB	=28				
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				
U2201	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	=see sheet enable tables		
					and (			
	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
			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 Shifter C from SIB index 3	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	=3				
	U2215	Monitoring Fault information for Shifter C from SIB index 4	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	=4				

	U137C	Monitoring Fault information for Shifter C from SIB index 5	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	=5				
	U137D	Monitoring Fault information for Shifter C from SIB index 6	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	=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				
	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
101. ELECTRONIC TRANSMISSION 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	>9(V)		
					Basic enable conditions met	=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
	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
			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
P17F3	Park position switch Stuck Open Check	Park button stuck in open position.	=TRUE	Ignition is ON	=TRUE	60(s)	2 Trip
		for time	>1(s)	Battery Voltage	>9.00(V)		
				Basic enable conditions met	=see sheet enable tables		
				(ESDR Park 1 Position	=TRUE		
				ESDR Park 2 Position	=TRUE		
				for time)	>1.0(s)		

END OF SECTION

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 nmotfor 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 (dl) 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

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	0.051001	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	1.041992	1.062012	1.082031	1.092041	1.102051	1.112061
39.96	1	1	1	1	1.000977	1.020996	1.041016	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 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 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

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 02 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 02 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

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

Table no.

44 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

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

Table no.

58 Difference between max. tank differential pressure & min. tank differential pressure (A-B)

l/°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

Table no.

65 where A - delay time for lambda fuel adaption (rich condition)

s	1	5	15
s	3	4	5

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 M 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
de_ 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 M 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 W 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 M 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.

83 Abs (Physical value of driver demand torque extracted from LevelI 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	8.00	9.00
V	1.95	2.50	2.95	3.35	4.00	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	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	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

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
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	P060A	TCM Clock and Timing monitor	Watchdog fault detected at start up initialization	= True			>= 1 fail count	A

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
(TCM)			OR Clock or PLL related fault detected at start up initialization OR Task / program flow monitoring fault detected	= True = True				
Transmission Control Module (TCM)	P060B	ADC performance monitor	ADC related fault detected at start up initialization	= True	**Enable Conditions:** OTA Program State Flag	= INACTIVE	>= 1 fail count	A
Transmission Control Module (TCM)	P060B	ADC performance monitor	ADC converter related fault detected OR ADC multiplexer related fault detected	= True = True	**Enable Conditions:** Stabilization delay Ignition Voltage Ignition Voltage Power Mode OTA Program State Flag	>= 5 sec >= 8.75 Volt < 18 Volt = RUN = INACTIVE	>= 1 fail count	A
Transmission Control Module (TCM)	P060C	Supply voltage monitor	Supply related fault detected at start up initialization	= True	**Enable Conditions:** OTA Program State Flag	= INACTIVE	>= 1 fail count	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 partnumbers, 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 MCVM data	= True	**Enable Conditions:** OTA Program State Flag	= INACTIVE	>= 1 fail count	A
Transmission Control Module (TCM)	P1188	Calibration ID verification	Mismatch between Calibration ID and Application ID detected	= True	**Enable Conditions:** OTA Program State Flag	= INACTIVE	>= 1 fail count	A

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters		Enable Conditions	Time Required	MIL illum.
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 DTC is set.	Clutch 1 Pressure Sensor Voltage	> 4530 mV				Runs Continuously	A
			Hysteresis	= 30 mV	**Enable Conditions:**	Sensor supply voltage (VREF1)	> 5500 mV		
						Sensor supply voltage (VREF1)	< 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, P0642, P0643		
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 DTC is set.	Clutch 1 Pressure Sensor Voltage	< 220 mV	**Enable Conditions:**	Sensor supply voltage (VREF1)	> 5500 mV	Runs Continuously	A
			Hysteresis	= 30 mV		Sensor supply voltage (VREF1)	< 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, P0642, P0643		
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 DTC is set.	Clutch 2 Pressure Sensor Voltage	> 4530 mV	**Enable Conditions:**	Sensor supply voltage (VREF2)	> 5500 mV	Runs Continuously	A
			Hysteresis	= 30 mV		Sensor supply voltage (VREF2)	< 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		
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 DTC is set.	Clutch 2 Pressure Sensor Voltage	< 220 mV	**Enable Conditions:**	Sensor supply voltage (VREF2)	> 5500 mV	Runs Continuously	A
			Hysteresis	= 30 mV		Sensor supply voltage (VREF2)	< 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		
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 mV	**Enable Conditions:**	Sensor supply voltage (VREF2)	> 5500 mV	Runs Continuously	A
			Hysteresis	= 30 mV		Sensor supply voltage (VREF2)	< 4500 mV		
						Battery voltage	> 8750 mV		

					Battery voltage Engine Status Key Status **Debounce:** Fail confirmation time **Disable Conditions:**	< 18000 mV != Cranking != Stop >= 150 ms 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 Hysteresis	< 220 mV = 30 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 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 Hysteresis	> 4530 mV = 30 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	B
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 Hysteresis	< 220 mV = 30 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	B
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 Hysteresis	> 4745 mV = 5 mV	**Enable Conditions:** Battery voltage Battery voltage Engine Status Key Status **Debounce:** Fail confirmation time **Disable Conditions:**	> 8750 mV < 18000 mV != Cranking != Stop >= 500 ms P0882, P0883	Runs Continuously	B
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	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							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	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							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	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							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	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	75	ms		
							Disable Conditions:			P0882, P0883			
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	<	8000	mV	Enable Conditions:	Battery voltage	>	8750	mV	Runs Continuously	A
			hysteresis	=	250	mV		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	75	ms		
							Disable Conditions:			P0882, P0883			
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	>	10500	mV	Enable Conditions:	Battery voltage	>	8750	mV	Runs Continuously	A
			hysteresis	=	500	mV		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	75	ms		
							Disable Conditions:			P0882, P0883			

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	<	8000	mV	**Enable Conditions:**	Battery voltage	>	8750	mV	Runs Continuously	A
			Hysteresis	=	250	mV		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	75	ms		
							Disable Conditions:			P0882, P0883			
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	>	5500	mV	**Enable Conditions:**	Battery voltage	>	8750	mV	Runs Continuously	A
			Hysteresis	=	50	mV		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	40	ms		
							Disable Conditions:			P0882, P0883			
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	<	4500	mV	**Enable Conditions:**	Battery voltage	>	8750	mV	Runs Continuously	A
			Hysteresis	=	50	mV		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	40	ms		
							Disable Conditions:			P0882, P0883			
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	>	5500	mV	**Enable Conditions:**	Battery voltage	>	8750	mV	Runs Continuously	A
			Hysteresis	=	50	mV		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	40	ms		
							Disable Conditions:			P0882, P0883			
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	<	4500	mV	**Enable Conditions:**	Battery voltage	>	8750	mV	Runs Continuously	A
			Hysteresis	=	50	mV		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	40	ms		
							Disable Conditions:			P0882, P0883			
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	>	4774	mV	**Enable Conditions:**	Battery voltage	>	8750	mV	Runs Continuously	C
			Hysteresis	=	30	mV		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	150	ms		

					Disable Conditions:	P0882, P0883		
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 mV = 30 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 mV = 30 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	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 mV = 30 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 mV = 300 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 mV = 250 mV	**Enable Conditions:** Engine Status Key Status **Debounce:** Fail confirmation time **Disable Conditions:**	!= Cranking != Stop >= 500 ms	Runs Continuously	A

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			
								Key Status	!=	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)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			
								Key Status	!=	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)	<	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, 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)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			

								Key Status	!=	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)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883, P0642, P0643			
Rod 2 Position Sensor	P283A	This diagnosit 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)	<	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, 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)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	150	ms		
							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)	>	5500	mV	Runs Continuously	A
			Pin voltage	<	2000	mV		Sensor supply voltage (VREF2)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883, P0652, P0653			
Rod 3 Position Sensor	P283F	This diagnosit 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)	<	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			
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)		5500	mV	Runs Continuously	A
									>				
			Pin voltage	>	3500	mV		Sensor supply voltage (VREF2)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time		150	ms		
							Disable Conditions:			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)		5500	mV	Runs Continuously	A
									>				
			Pin voltage	<	2000	mV		Sensor supply voltage (VREF2)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time		150	ms		
							Disable Conditions:			P0882, P0883, P0652, P0653			

Rod 4 Position Sensor	P2844	This diagnosit 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)	<	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			
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)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			
								Key Status	!=	Stop			
							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)	<	4500	mV		
								Battery voltage	>	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	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883, P0652, P0653			
Rod 5 Position Sensor	P2867	This diagnosit 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)	<	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			

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria		Threshold Value		Secondary Parameters			Enable Conditions		Time Required	MIL illum.
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 SENT input 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 timstamp			Sensor supply voltage (VREF2)	<	4500	mV		
			Parklock position input pin voltage	>	3500	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			
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 SENT input 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 timstamp			Sensor supply voltage (VREF2)	<	4500	mV		
			Parklock position input pin voltage	<	2000	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			
Parklock position sensor	P191C	This diagnostic checks if a new values is received from the parklock postion SENT sensor. If no new value is received and the input pin is toggling a DTC is set after a confirmation timeout.	Receive timestamp	=	previous receive timstamp		Enable Conditions:	Sensor supply voltage (VREF2)	>	5500	mV	Runs Continuously	B
		This diagnostic checks if the SENT signal reveiced from the parklock position sensor is within the sensor value range. If not a DTC is 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 SENT signal is OK. If the CRC is wrong or the no End of frame was received successfully a DTC is se after a confirmation time.	Parklock position sencor CRC	=	wrong			Battery voltage	<	18000	mV		
			Parklock position sencor SENT end of frame	=	wrong			Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883, P0652, P0653			

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters		Enable Conditions	Time Required	MIL illum.
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		
						Battery voltage	> 8750 mV		
		This diagnositic 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 µs			18000		
						Battery voltage	< mV		
			OR			Engine Status	!= Cranking		
			Speed Sensor Pulse Width	> 63 µs		Key Status	!= Stop		
			Speed Sensor Pulse Width	< 67 µs					
			OR						
			Speed Sensor Pulse Width	> 115 µs					
			Speed Sensor Pulse Width	< 144 µs					
			OR						
			Speed Sensor Pulse Width	> 218 µs					
		This diagnositic 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 µs					
			Speed Sensor Pulse Width	> 218 µs					
		This diagnositic 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 µs					
					Debounce:	Fail confirmation time	>= 300 ms		
		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	**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
							mV		
			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		
		This diagnositic 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 µs			18000		
						Battery voltage	< mV		

			OR					Engine Status	!=	Cranking			
			Speed Sensor Pulse Width	>	63	µs		Key Status	!=	Stop			
			Speed Sensor Pulse Width	<	67	µs							
			OR										
			Speed Sensor Pulse Width	>	115	µs							
			Speed Sensor Pulse Width	<	144	µs							
			OR										
			Speed Sensor Pulse Width	>	218	µs							
		This diagnositic 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	µs							
			Speed Sensor Pulse Width	>	218	µs							
		This diagnositic 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	µs							
							Debounce:	Fail confirmation time	>=	300	ms		
		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	**Disable Conditions:**			P0882, P0883			
Odd Clutch Speed Sensor	P07C5	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
											mV		
			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			
Even Clutch Speed Sensor	P07C8	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 (VSS2)	>	8250	mV	Runs Continuously	A
			Hysteresis	=	30	mV		Sensor supply voltage (VSS2)	<	10000	mV		
								Battery voltage	>	8750	mV		
		This diagnositic 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	µs				18000			
								Battery voltage	<		mV		
			OR					Engine Status	!=	Cranking			
			Speed Sensor Pulse Width	>	63	µs		Key Status	!=	Stop			
			Speed Sensor Pulse Width	<	67	µs							
			OR										
			Speed Sensor Pulse Width	>	115	µs							
			Speed Sensor Pulse Width	<	144	µs							
			OR										
			Speed Sensor Pulse Width	>	218	µs							
		This diagnositic 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	µs							
			Speed Sensor Pulse Width	>	218	µs							

		This diagnositic 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	µs	**Debounce:**	Fail confirmation time	>=	300	ms		
		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	**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	mV	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			

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
HSO1	P0658	This diagnosis checks that the HSO is not shorted too 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	<	40	% off Vbatt	**Enable Conditions:**	Shutdownpath test OK	=	True		Runs Continuously	A
			OR					Battery voltage	>	8750	mV		
			HSO1 current feedback	>	10000	mA		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	60	ms		
							Disable Conditions:			P0882, P0883			
HSO2	P2670	This diagnosis checks that the HSO is not shorted too 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	<	40	% off Vbatt	**Enable Conditions:**	Shutdownpath test OK	=	True		Runs Continuously	A
			OR					Battery voltage	>	8750	mV		
			HSO2 current feedback	>	10000	mA		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	60	ms		
							Disable Conditions:			P0882, P0883			
HSO7	P2685	This diagnosis checks that the HSO is not shorted too 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	<	40	% off Vbatt	**Enable Conditions:**	Shutdownpath test OK	=	True		Runs Continuously	A
			OR					Battery voltage	>	8750	mV		
			HSO7 current feedback	>	5000	mA		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	60	ms		
							Disable Conditions:			P0882, P0883			
HSO8	P26E8	This diagnosis checks that the HSO is not shorted too 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	<	40	% off Vbatt	**Enable Conditions:**	Shutdownpath test OK	=	True		Runs Continuously	A
			OR					Battery voltage	>	8750	mV		
			HSO8 current feedback	>	5000	mA		Battery voltage	<	18000	mV		
								Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	60	ms		
							Disable Conditions:			P0882, P0883			

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	**Enable Conditions:**		Runs continuously	A
					System not in safe state	= True		
			LSO turned off	= True	Battery voltage	> 8750 mV		
			Tested timer	> 19.2 µs	Battery voltage	< 18000 mV		
			Vpos	< 3000 (+/-500) mV	Engine Status	!= Cranking		
			Vpos	> 1700 (+/-500) mV	Key Status	!= Stop		
			LSO turn off time	> 5 ms				
					Debounce: Fail confirmation time	>= 150 ms		
					Disable Conditions:	P0882, P0883		
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	**Enable Conditions:**		Runs continuously	A
					System not in safe state	= True		
			Tested timer	> 19.2 µs	Battery voltage	> 8750 mV		
			Vpos (battery voltage < 11500 mV)	> 700 (+/-100) mV	Battery voltage	< 18000 mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	> 900 (+/-100) mV	Engine Status	!= Cranking		
			Vpos (battery voltage > 15500 mV)	> 1100 (+/-100) mV	Key Status	!= Stop		
			LSO turned on	= True				
		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	> 200 mA				
			Time with small error	> 300 ms	**Disable Conditions:**	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	**Enable Conditions:**		Runs continuously	A
					System not in safe state	= True		
			LSO turned on	= True	Battery voltage	> 8750 mV		
			Tested timer	> 19.2 µs	Battery voltage	< 18000 mV		
			Vpos	< 1700 (+/-500) mV	Engine Status	!= Cranking		
			LSO turn off time	= 5 ms	Key Status	!= Stop		
			Tested timer	> 19.2 µs				
					Debounce: Fail confirmation time	>= 150 ms		
					Disable Conditions:	P0882, P0883		
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	**Enable Conditions:**		Runs continuously	A
					System not in safe state	= True		
			LSO turned off	= True	Battery voltage	> 8750 mV		
			Tested timer	> 19.2 µs	Battery voltage	< 18000 mV		
			Vpos	< 3000 (+/-500) mV	Engine Status	!= Cranking		
			Vpos	> 1700 (+/-500) mV	Key Status	!= Stop		
			LSO turn off time	> 5 ms				
					Debounce: Fail confirmation time	>= 150 ms		
					Disable Conditions:	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	= Short to Vbatt	**Enable Conditions:**		Runs continuously	A
					System not in safe state	= True		

			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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	>	200	mA							
			Time with small error	>	300	ms	**Disable Conditions:**			P0882, P0883			
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	=	Short to ground		**Enable Conditions:**					Runs continuously	A
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
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	=	Open load		**Enable Conditions:**					Runs continuously	A
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	100	ms		
							Disable Conditions:			P0882, P0883			
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.	TLE8242 component/driver diagnostic status	=	Short to Vbatt		**Enable Conditions:**					Runs continuously	A
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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	>=	100	ms		
			Error on current estimation versus target current	>	200	mA							
			Time with small error	>	300	ms	**Disable Conditions:**			P0882, P0883			
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.	TLE8242 component/driver diagnostic status	=	Short to ground		**Enable Conditions:**					Runs continuously	A
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			

			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	100	ms		
							Disable Conditions:			P0882, P0883			
		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:**						
Even Clutch Redundant Shutdown Valve	P2718							System not in safe state	=	True		Runs continuously	A
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	100	ms		
							Disable Conditions:			P0882, P0883			
		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:**						
Even Clutch Redundant Shutdown Valve	P2721							System not in safe state	=	True		Runs continuously	A
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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	>=	100	ms		
			Error on current estimation versus target current	>	200	mA							
			Time with small error	>	300	ms	**Disable Conditions:**			P0882, P0883			
		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:**						
Even Clutch Redundant Shutdown Valve	P2720							System not in safe state	=	True		Runs continuously	A
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	100	ms		
							Disable Conditions:			P0882, P0883			
		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:**						
System Pressure Pilot Valve	P2727							System not in safe state	=	True		Runs continuously	A
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							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:					Runs continuously	A
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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			
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							Runs continuously	A
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
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		Enable Conditions:					Runs continuously	A
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
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.	TLE8242 component/driver diagnostic status	=	Short to Vbatt		Enable Conditions:					Runs continuously	A
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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 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		**Enable Conditions:**					Runs continuously	A
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	150	ms		
							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
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							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
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							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
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			

			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			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
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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 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
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							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
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
Synchronizer Actuation Valve 4	P27D0	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
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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 4	P27CF	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
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
Synchronizer Actuation Valve 5	P27D5	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
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
Synchronizer Actuation Valve 5	P27D8	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
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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 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:**					Runs continuously	A
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							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:**					Runs continuously	A
								System not in safe state	=	True			

			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							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:**					Runs continuously	A
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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	>=	100	ms		
			Error on current estimation versus target current	>	400	mA							
			Time with small error	>	300	ms	**Disable Conditions:**			P0882, P0883			
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.	TLE8242 component/driver diagnostic status	=	Short to ground		**Enable Conditions:**					Runs continuously	A
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	100	ms		
							Disable Conditions:			P0882, P0883			
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.	TLE8242 component/driver diagnostic status	=	Open load		**Enable Conditions:**					Runs continuously	A
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
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.	TLE8242 component/driver diagnostic status	=	Short to Vbatt		**Enable Conditions:**					Runs continuously	A
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								

		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			
		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:						
Clutch Cooling Valve	P2738							System not in safe state	=	True		Runs continuously	A
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
		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:						
Limited Slip Differential Proportional Pressure Valve	P2812							System not in safe state	=	True		Runs continuously	B
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
		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:						
Limited Slip Differential Proportional Pressure Valve	P2815							System not in safe state	=	True		Runs continuously	B
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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	>	200	mA							
			Time with small error	>	300	ms	Disable Conditions:			P0882, P0883			
		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:						
Limited Slip Differential Proportional Pressure Valve	P2814							System not in safe state	=	True		Runs continuously	B
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			

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		**Enable Conditions:**					Runs continuously	B
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	150	ms		
							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	=	Short to Vbatt		**Enable Conditions:**					Runs continuously	B
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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	>	200	mA							
			Time with small error	>	300	ms	**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	=	Short to ground		**Enable Conditions:**					Runs continuously	B
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
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	=	Open load		**Enable Conditions:**					Runs continuously	B
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
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:**					Runs continuously	B
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		

			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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	>	200	mA							
			Time with small error	>	300	ms	Disable Conditions:			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:					Runs continuously	B
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
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:					Runs continuously	B
								System not in safe state	=	True			
			LSO turned off	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	3000 (+/-500)	mV		Engine Status	!=	Cranking			
			Vpos	>	1700 (+/-500)	mV		Key Status	!=	Stop			
			LSO turn off time	>	5	ms							
							Debounce:	Fail confirmation time	>=	150	ms		
							Disable Conditions:			P0882, P0883			
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:					Runs continuously	B
								System not in safe state	=	True			
			Tested timer	>	19.2	µs		Battery voltage	>	8750	mV		
			Vpos (battery voltage < 11500 mV)	>	700 (+/-100)	mV		Battery voltage	<	18000	mV		
			Vpos (12000 mV < battery voltage < 15000 mV)	>	900 (+/-100)	mV		Engine Status	!=	Cranking			
			Vpos (battery voltage > 15500 mV)	>	1100 (+/-100)	mV		Key Status	!=	Stop			
			LSO turned on	=	True								
		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	>	200	mA							
			Time with small error	>	300	ms	Disable Conditions:			P0882, P0883			
Parking Lock Hold Solenoid	P18A2	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	B
								System not in safe state	=	True			
			LSO turned on	=	True			Battery voltage	>	8750	mV		
			Tested timer	>	19.2	µs		Battery voltage	<	18000	mV		
			Vpos	<	1700 (+/-500)	mV		Engine Status	!=	Cranking			
			LSO turn off time	=	5	ms		Key Status	!=	Stop			
			Tested timer	>	19.2	µs							

					Debounce:	Fail confirmation time	>=	150	ms		
					Disable Conditions:			P0882, P0883			

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Speed sensor supply VSS1 enable	P06B1	If the speed sensor supply switch for VSS 1 reports overtemperature or over current a fault timer is increased. If the fault timer reaches the limit a DTC is set.	VSS 1 supply current	>	220	mA	**Enable Conditions:**	Battery voltage	>	8750	mV	Runs Continuously	A
			OR					Battery voltage	<	18000	mV		
			VSS1 switch temperature too high	=	True	mV		Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	60	ms		
							Disable Conditions:			P0882, P0883			
Speed sensor supply VSS2 enable	P06B4	If the speed sensor supply switch for VSS 2 reports overtemperature or over current a fault timer is increased. If the fault timer reaches the limit a DTC is set.	VSS2 supply current	>	220	mA	**Enable Conditions:**	Battery voltage	>	8750	mV	Runs Continuously	A
			OR					Battery voltage	<	18000	mV		
			VSS2 switch temperature too high	=	True	mV		Engine Status	!=	Cranking			
								Key Status	!=	Stop			
							Debounce:	Fail confirmation time	>=	60	ms		
							Disable Conditions:			P0882, P0883			

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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 resitor 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		shutdown		Runs at shutdown	A
								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			
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		shutdown		Runs at shutdown	B
								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			
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 resitor 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		shutdown		Runs at shutdown	A
								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			
HSO2	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		shutdown		Runs at shutdown	B
								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			
HSO7	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 resitor 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		shutdown		Runs at shutdown	A
								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			
HSO7	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		shutdown		Runs at shutdown	B
								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			
HSO8	P26E7	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 resitor 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.	HSO8 voltage level	>	40	% off Vbatt	Enable Conditions:	Shutdown path test busy		shutdown		Runs at shutdown	A
								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			
HSO8	P26E9	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.	HSO8 voltage level	>	70	% off Vbatt	Enable Conditions:	Shutdown path test busy		shutdown		Runs at shutdown	B

						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			

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	= Short to ground	**Enable Conditions:** System not in safe state	= True	Runs at shutdown	A
			LSO turned off	= True	Battery voltage	> 8750 mV		
			Other LSO on	= True	Battery voltage	< 18000 mV		
			AND		Engine Status	!= Cranking		
			TLE8242 component/driver diagnostic status for another LSO	= Short to ground	Key Status	!= Stop		
			The other LSO turned OFF	= True				
			This LSO is turned on	= True	**Debounce:** Fail confirmation time	>= 150 ms		
					Disable Conditions:	P0882, P0883		
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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	= Short to ground	**Enable Conditions:** System not in safe state	= True	Runs at shutdown	A
			LSO turned off	= True	Battery voltage	> 8750 mV		
			Other LSO on	= True	Battery voltage	< 18000 mV		
			AND		Engine Status	!= Cranking		
			TLE8242 component/driver diagnostic status for another LSO	= Short to ground	Key Status	!= Stop		
			The other LSO turned OFF	= True				
			This LSO is turned on	= True	**Debounce:** Fail confirmation time	>= 150 ms		
					Disable Conditions:	P0882, P0883		
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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	= Short to ground	**Enable Conditions:** System not in safe state	= True	Runs at shutdown	A
			LSO turned off	= True	Battery voltage	> 8750 mV		
			Other LSO on	= True	Battery voltage	< 18000 mV		
			AND		Engine Status	!= Cranking		
			TLE8242 component/driver diagnostic status for another LSO	= Short to ground	Key Status	!= Stop		
			The other LSO turned OFF	= True				
			This LSO is turned on	= True	**Debounce:** Fail confirmation time	>= 100 ms		
					Disable Conditions:	P0882, P0883		
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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	= Short to ground	**Enable Conditions:** System not in safe state	= True	Runs at shutdown	A
			LSO turned off	= True	Battery voltage	> 8750 mV		
			Other LSO on	= True	Battery voltage	< 18000 mV		
			AND		Engine Status	!= Cranking		
			TLE8242 component/driver diagnostic status for another LSO	= Short to ground	Key Status	!= Stop		
			The other LSO turned OFF	= True				
			This LSO is turned on	= True	**Debounce:** Fail confirmation time	>= 100 ms		
					Disable Conditions:	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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	A
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						Disable Conditions:			P0882, P0883			
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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	A
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						Disable Conditions:			P0882, P0883			
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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	A
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						Disable Conditions:			P0882, P0883			
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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	A
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						Disable Conditions:			P0882, P0883			

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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	A
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						Disable Conditions:			P0882, P0883			
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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	A
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						Disable Conditions:			P0882, P0883			
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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	A
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	A
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	B
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	B
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	B
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						Disable Conditions:			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 nvm at shutdown. At startup the nvm info will be read and the DTC will be set.	TLE8242 component/driver diagnostic status for this LSO	=	Short to ground	**Enable Conditions:**	System not in safe state	=	True		Runs at shutdown	B
			LSO turned off	=	True		Battery voltage	>	8750	mV		
			Other LSO on	=	True		Battery voltage	<	18000	mV		
			AND				Engine Status	!=	Cranking			
			TLE8242 component/driver diagnostic status for another LSO	=	Short to ground		Key Status	!=	Stop			
			The other LSO turned OFF	=	True							
			This LSO is turned on	=	True	**Debounce:**	Fail confirmation time	>=	150	ms		
						Disable Conditions:			P0882, P0883			

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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	=	True		Runs Continuously	C
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								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		
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	=	True		Runs Continuously	C
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								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		
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	=	True		Runs Continuously	C
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								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		
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	=	True		Runs Continuously	C
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								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		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Longitudinal acceleration sensor stuck at high value	C0552	This diagnostic detects a stuck at high value fault with the longitudinal acceleration sensor. 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. 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.	Absolute difference between Longitudinal acceleration value from CAN and longitudinal acceleration based on wheel/ouput speed data.	>=	0.5300149496868873	g	**Enable conditions**	Longitudinal acceleration data available on CAN	=	True		Runs Continuously	C
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
								Longitudinal acceleration out-of-range high electrical fault active	=	False			
								Longitudinal acceleration out-of-range low electrical fault active	=	False			
								Absolute Vehicle speed	>=	15	kph		
							Fault confirmation	Stability timer before increasing the fault timer	>=	10000	ms		
								Stability timer decrease rate when vehicle conditons are not met	=	20	ms		
								Fault confirmation timer	>=	75000	ms		
								Diagnostic sampling time window	=	120000	ms		
Lateral acceleration sensor stuck at high value	C0699	This diagnostic detects a stuck at high value fault with the lateral acceleration sensor. The data from the acceleration sensor is received over CAN and compared to a threshold under certain driving conditions. 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.	Absolute lateral acceleration value from CAN	>=	0.5300149496868873	g	**Enable conditions**	Lateral acceleration data available on CAN	=	True		Runs Continuously	C
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
								Lateral acceleration out-of-range high electrical fault active	=	False			
								Lateral acceleration out-of-range low electrical fault active	=	False			
								Transmission driving gear attained	=	True			
								Absolute clutch slip for driving gear	<=	100	rpm		
								Brake pedal	<=	1	%		
								Actual engine torque	>=	80	Nm		
								Absolute Vehicle speed	>=	15	kph		
								Absolute Vehicle speed	<=	200	kph		
								Longitudinal acceleration based on wheel/output speed	>=	-0.10004977919521446	g		
								Longitudinal acceleration based on wheel/output speed	<=	0.5300149496868873	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		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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	>=	2200	mV	**Enable Conditions:**	Electrical fault for paddle plus detected	=	False		Runs Continuously	C
			Paddle plus analogue input voltage	<=	3520	mV		Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
								Paddle min analogue input voltage is outside paddle min pressed voltage (3), see Summary table attachments C_SID_ASV_CMP_PADDLE	=	True			
							Fault confirmation time:			120000	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	=	True		**Enable Conditions:**	Electrical fault for paddle plus detected	=	False		Runs Continuously	C
			Paddle plus analogue input voltage is outside paddle plus released voltage (2), 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:			2000	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	>=	2200	mV	**Enable Conditions:**	Electrical fault for paddle min detected	=	False		Runs Continuously	C
			Paddle min analogue input voltage	<=	3520	mV		Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
								Paddle plus analogue input voltage is outside paddle plus pressed voltage (1), see Summary table attachments C_SID_ASV_CMP_PADDLE	=	True			
							Fault confirmation time:			120000	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
			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:			2000	ms		

Summary table attachments C_SID_ASV_CMP_PADDLE			
(1) Paddle plus analogue input voltage is outside paddle plus pressed voltage window = …			
Paddle plus analogue input voltage	<	2200	mV
OR			
Paddle plus analogue input voltage	>	3520	mV
(2) Paddle plus analogue input voltage is outside paddle plus released voltage window = …			
Paddle plus analogue input voltage	<	3826	mV
OR			
Paddle plus analogue input voltage	>	4744	mV
(3) Paddle min analogue input voltage is outside paddle min pressed voltage window = …			
Paddle min analogue input voltage	<	2200	mV
OR			
Paddle min analogue input voltage	>	3520	mV
(4) Paddle min analogue input voltage is outside paddle min released voltage window = …			
Paddle min analogue input voltage	<	3826	mV
OR			
Paddle min analogue input voltage	>	4744	mV

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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. 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. 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 hydrualically 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. If the current profile check for the selector pilot valve consistenly indicates a fail, the selector pilot valve is diagnosed hydraulically stuck on.	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		True		Runs continuously	A
			Current profile consistently indicates fail for selector pilot valve current profile check	=	True			Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL_SY	=	True			
								Cooler out temperature	>=	40	°C		
			Fault condition for synchronizer integrity test case selector mechanism stuck on detection:				Fault confirmation	Selector mechansim 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 off								
			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 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. 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. If the selector target postion 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 hydrualically faulted stuck off. 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.	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		True		Runs continuously	A
			Current profile consistently indicates fail for selector pilot valve current profile check	=	True			Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL_SY	=	True			
								Cooler out temperature	>=	40	°C		
			Fault condition for synchronizer integrity test case selector mechanism stuck off detection:										

		If the current profile check for the selector pilot valve consistenly indicates a fail, the selector pilot valve is diagnosed hydraulically stuck off.	Selector target position for the test case	=	Hydraulic on		**Fault confirmation**	Selector mechansim hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL_SY	>=	1	count		
			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 on	P1956	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. 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. 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 hydrualically 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. If the current profile check for the selector pilot valve consistenly indicates a pass the selector spool corresponding with the tested clutch shaft is diagnosed hydraulically stuck on.	Selector mechanism confirmed hydraulically stuck on 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
			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			
								Cooler out temperature	>=	40	°C		
			Fault condition for synchronizer integrity test case selector mechanism stuck on detection:										
			Selector target position for the test case	=	Hydraulic off		**Fault confirmation**	Selector mechansim hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL_SY	>=	1	count		
			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 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. 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.	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
			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 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 hydrualically faulted stuck on.						Cooler out temperature	>=	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:										
		If the current profile check for the selector pilot valve consistenly indicates a pass the selector spool corresponding with the tested clutch shaft is diagnosed hydraulically stuck off.	Selector target position for the test case	=	Hydraulic on		**Fault confirmation**	Selector mechansim hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL_SY	>=	1	count		
			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 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 even 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 positon 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			Even clutch shaft synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL_SY	=	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 hydrualically faulted stuck on.						Cooler out temperature	>=	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 on detection:										
		If the current profile check for the selector pilot valve consistenly indicates a pass the selector spool corresponding with the tested clutch shaft is diagnosed hydraulically stuck on.	Selector target position for the test case	=	Hydraulic off		**Fault confirmation**	Selector mechansim hydraulically stuck on detected by synchronizer integrity test cases (3) confirmation counter, see Summary table attachments C_SID_ASV_CMP_SEL_SY	>=	1	count		
			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 off	P1959	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. 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. 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 hydrualically 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. If the current profile check for the selector pilot valve consistenly indicates a pass the selector spool corresponding with the tested clutch shaft is diagnosed hydraulically stuck off.	Selector mechanism confirmed hydraulically stuck off 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
			Current profile consistently indicates pass for selector pilot valve current profile check	=	True			Even clutch shaft synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_SEL_SY	=	True			
								Cooler out temperature	>=	40	°C		
			Fault condition for synchronizer integrity test case selector mechanism stuck off detection:				Fault confirmation	Selector mechansim 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		

Summary table attachments C_SID_ASV_CMP_SEL_SY

(1) Trigger conditions for the synchronizer recovery routine per clutch shaft

The synchronizer integrity routine is triggered for a clutch shaft when

A performance DTC was set for a syncrhonizer shift related item corresponding the clutch shaft:

DTC set for Gear control failure for the clutch shaft	=	P073F, P072C, P1946, P074B, P072E, P1948, P074D, P073A, P194A, P074F, P073C, P194C	Odd clutch shaft synchronizer recovery routine trigger
		P074A, P072D, P1947, P074C, P072F, P1949, P074E, P073B, P194B, P07D8, P07D7, P194D, P073E, P072B, P194E	Even clutch shaft synchronizer recovery routine trigger
DTC set for Rod position sensor consistency fault for a rod corresponding to the clutch shaft	=	P2832, P2837	Odd clutch shaft synchronizer recovery routine trigger
		P283C, P2841, P2864	Even clutch shaft synchronizer recovery routine trigger
DTC set for Synchronizer pressure valve stuck off fault corresponding to the clutch shaft	=	P08C4, P27B9	Odd clutch shaft synchronizer recovery routine trigger
		P27C1, P27C9, P27D1	Even clutch shaft synchronizer recovery routine trigger
DTC set for Synchronizer pressure valve stuck on fault corresponding to the clutch shaft	=	P08C5, P27BA	Odd clutch shaft synchronizer recovery routine trigger

		P27C2, P27CA, P27D2	Even clutch shaft synchronizer recovery routine trigger
DTC set for Unintended rod movmenet fault for a rod corresponding to the clutch shaft	=	P284D, P284E	Odd clutch shaft synchronizer recovery routine trigger
		P284F, P2850, P286A	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector spool stuck off fault corresponding to the clutch shaft	=	P1957	Odd clutch shaft synchronizer recovery routine trigger
		P1959	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector spool stuck on fault corresponding to the clutch shaft	=	P1956	Odd clutch shaft synchronizer recovery routine trigger
		P1958	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector mechanism stuck off fault	=	P1950	Odd and even clutch shaft synchronizer recovery routine trigger
DTC set for Selector mechanism stuck on fault	=	P194F	Odd and even clutch shaft synchronizer recovery routine trigger
(2) Running conditions for the synchronizer integrity routine			
Hydraulic power available	=	True	
System pressure too low condition	=	False	
System pressure	<=	4.5	bar
System pressure too low confirmation time	>=	50	ms
Diagnostic reset event	=	False	
Time since last synchronizer shift completion	>	2000	ms
Rod drift correction active	=	False	
No adapation routine with exception of the syncrhonizer recovery routine is active	=	True	
In case the synchronizer recovery routine is triggered by the setting of a DTC following conditions are additionally checked:			
Request clutch equals to target clutch	=	True	
Target clutch equal to actual driving clutch	=	True	
Target gear equals the current gear for the clutch shaft	=	True	
Stable time for clutch and gear conditions	>=	5000	ms
Clutch shaft equal to actual clutch		False	
System pressure target overrule maximum overrule	>=	10	bar
System pressure target overrule minimum overrule	<=	20	bar
Time since last recovery routine run for a gear corresponding to the clutch shaft	>=	30000	ms
(3) Conditions for a synchronizer integrity test case			
Synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	
Opposite synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	

Synchronizer position sensor corresponding to the test electrical fault detected	=	False	
Selector cannot be controlled in the target position for the test case due to an electrical fault	=	False	
Selector pilot valve electrical fault no current	=	True	
Selector hydraulic target position for the test	=	S_OOSPOS_OFF	
OR			
Selector pilot valve electrical fault high current	=	True	
Selector hydraulic target position for the test	=	S_OOSPOS_ON	
Test inhibit by potential gear disengagement for intented rod movement (4)	=	False	
OR			
Absolute vehicle speed	<	10	kph
OR			
Gear that could be disengaged unintentionally is already faulted	=	True	
Test inhibit by potential gear disengagement for complement rod movement (5)	=	False	
OR			
Absolute vehicle speed	<	10	kph
OR			
Inverse selector hydraulic state for the test case	=	S_OOSPOS_ON	
Synchronizer recovery routine is active	=	True	
The selector was verified to be operational for the hydraulic S_OOSPOS_ON position during this instance of the synchronizer recovery routine run	=	True	
OR			
Inverse selector hydraulic state for the test case	=	S_OOSPOS_OFF	
Synchronizer recovery routine is active	=	True	
The selector was verified to be operational for the hydraulic S_OOSPOS_OFF position during this instance of the synchronizer recovery routine run	=	True	
(4) Test inhibit by potential gear disengagement for intended rod movement			
Currently engaged gear located at the A side	=	True	
Intended rod movement direction for current test case	=	A to B	
Intended move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
OR			
Currently engaged gear located at the B side	=	True	
Intended rod movement direction for current test case	=	B to A	
Intended move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
(5) Test inhibited by potential gear disengagement for complement rod movement			
Currently engaged gear located at the A side	=	True	
Complement rod movement direction for current test case	=	A to B	
Complement move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
OR			
Currently engaged gear located at the B side	=	True	
Complement rod movement direction for current test case	=	B to A	
Complement move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
(6) Synchronizer integrity test details			
Intended rod movement with PID control	=	500	µm

Test case finished when:			
Intended rod movement direction	=	A to B	
Difference between rod position measurement and rod position at start of test case	>	250	µm
OR			
Intended rod movement direction	=	B to A	
Difference between rod position at start of test case and rod position measurement	>	250	µm
OR			
Complement rod movement direction	=	A to B	
Difference between complement rod position measurement and complement rod position at start of test case	>	500	µm
OR			
Complement rod movement direction	=	B to A	
Difference between complement rod position at start of test case and complement rod position measurement	>	500	µm
OR			
Test case time	>	500	µm

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Park lock position sensor consistency	P18E7	This diagnostic detects a parking lock position sensor consistency fault during parking lock open error strategy. 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. 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.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	!=	Open		**Enable Conditions:**	Parking lock actuation strategy	=	Parking lock open error strategy		Runs continuously	B
			Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	!=	Hold			Parking lock engagement valve position target	=	Hydraulic On			
								Parking lock latching valve position target	=	Hydraulic On			
			Absolute vehicle speed	>	10	kph		Parking lock engagement valve logical position	=	Hydraulic On			
			OR					Parking lock latching valve logical position	=	Hydraulic On			
			Output speed	>	100	rpm		Electrical fault detected for the parking lock position sensor	=	False			
								Measured system pressure	>	15	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	>=	200	ms		
		This diagnostic detects a parking lock position senosr consistency fault during parking lock locked error strategy. 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. If the parking lock position sensor is reading something different from locked or hold, the parking lock position sensor is diagnosed faulted.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	!=	Locked			Parking lock actuation strategy	=	Parking lock locked error strategy		Runs continuously	
			Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	!=	Hold			Parking lock engagement valve position target	=	Hydraulic Off			
								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	>=	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	>=	100	ms		
		This diagnostic detects a parking lock position sensor consistency fault during parking lock standstill engagement strategy. 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 latchting 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 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.	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	
							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 standstill engage strategy			
							Parking lock engagment 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		
		This diagnostic detects a parking lock position sensor consistency fault during parking lock low speed engagement strategy. 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 latchting 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 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.	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	
							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 speed engage strategy			
							Parking lock engagment 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		
		This diagnostic detects a parking lock position sensor consistency fault during parking lock diagnostic disengage strategy at the initial disengagement.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	!=	Locked	**Enable Conditions:**	Diagnostic reset event	=	False			

		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. If after a timeout for the initial disengagement, the parking lock sensor is not reading open or locked, the parking lock position sensor is diagnosed faulted.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK	!=	Open		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			
							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 engagment valve logical position	=	Hydraulic On			
							Parking lock latching valve logical position	=	Hydraulic On			
							Absolute vehicle speed	<=	3	kph		
						Fault confirmation time	Parking lock initial disengagement time	>=	1250	ms		
		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. 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. 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. 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.	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			

		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. 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.				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 engagment valve logical position	=	Hydraulic On			
						Parking lock latching valve logical position	=	Hydraulic On			
					Fault confirmation time	Parking lock initial disengagement time	>=	1250	ms		

Summary table attachments C_SID_ASV_CMP_SNS_POS_PLK			
(1) Parking lock logical position = ...			
IF			
Electrical fault for the parking lock position sensor detected	=	True	
...	=	Unkown	
ELSE IF			
Absolute difference between parking lock position measured and learned locked position	<	500	µm
...	=	Locked	
ELSE IF			
Absolute difference between parking lock position measured and learned open position	<	Parking lock open tolerance (2)	µm
...	=	Open	
ELSE IF			
Absolute difference between parking lock position measured and learned hold position	<	Parking lock hold tolerance (3)	µm
ELSE IF			
Difference between learned open position and parking lock position measured	>	Parking lock open tolerance (2)	µm
Difference between parking lock position measured and learned hold position	>	Parking lock hold tolerance (3)	µm
... =		Between Open and Hold	
ELSE IF			
Difference between learned hold position and parking lock position measured	>	Parking lock hold tolerance (3)	µm
Difference between parking lock position measured and learned locked position	>	500	µm
...	=	Between Locked and Hold	
ELSE			
...	=	Invalid	
(2) Parking lock open tolerance = ...			
Unsatured open tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured open tolerance	>=	500	µm
...	=	500	µm
ELSE IF			
Unsatured open tolerance	<=	250	µm
...	=	250	µm
ELSE			
...	=	Unsatured open tolerance	
(3) Parking lock hold tolerance = ...			
Unsatured hold tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured hold tolerance	>=	500	µm
...	=	500	µm
ELSE IF			
Unsatured hold tolerance	<=	250	µm
...	=	250	µm
ELSE			
...	=	Unsatured hold tolerance	

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 enaged 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 positon sensor fault is set after a confirmation time.	Difference between rod 1 position sensor measured and learned engaged A position	>	1100	µm		Application state is equal to error state	=	False			
								Application state is equal to bypass state	=	False			
			OR					Rod 1 force target in gear engament direction	>	600	N		
								Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=	True			
			Gear to be engaged located on rod 1 at the B side	=	True			Rod 1 position sensor electrical fautl detected	=	False			
			Difference between learned engaged B position and rod 1 position sensor measured	>	1100	µm		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. If the speeds sensor indicate the gear is properly disengaged position sensor still indicates gear engagement, a rod positon sensor fault is set after a confirmation time.	Gear to be disengaged located on rod 1 at the A side	=	True			Hydraulic power available	=	True		Runs continuously	
			Difference between rod 1 position sensor measured and rod 1 position at start of the shift	<	1000	µm		Application state is equal to error state	=	False			
			Difference between rod 1 learned blocking ring A position and rod 1 position sensor measured	>	1500	µm		Application state is equal to bypass state	=	False			
								Rod 1 force target in gear engament direction	>	600	N		
			OR					Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=	False			
								Rod 1 position sensor electrical fautl detected	=	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 senosr at start of the shift and rod 1 position sensor measured	<	1000	µm		Time since last odd clutch speed sensor electrical fault detected	>=	100	ms		
			Difference between rod 1 position senosr measured and rod 1 learned blocking ring B position	>	1500	µm		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.	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	ms	Runs continuously	

		If the rod positon sensor is measuring a value outside these tolerance bands for a confirmation time the rod position sensor is considered suspicious. The sensor is confirmed to be faulted when at the time of the detected fault, the clutch speed and output speed can be indepently 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.	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		False			
								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		500	ms		
								Fault confirmation conditions to consider the rod position sensor faulted					
								Driving gear is an odd gear	=	True			
								Difference between odd 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 1	=	True			
								OR					
								Driving gear is located on rod 2	=	True			
								Difference between rod 1 learned blocking ring A position and rod 1 position sensor measurement	>	1000	µm		
								OR					
								Driving gear is located on rod 2	=	True			
								Difference between rod 1 position sensor measurement and rod 1 learned blocking ring B position	>	1000	µm		

		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_1 movement during C_ROD_1 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm	**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 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_2 movement during C_ROD_1 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		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_1 movement during C_ROD_1 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_2 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		C_ROD_1 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 S_OOSPOS_ON)	=	True			
			C_ROD_2 movement during C_ROD_1 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_2 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		C_ROD_1 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 S_OOSPOS_ON)	=	True			
			C_ROD_2 movement during C_ROD_2 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_2 actuation with selector position target hydraulically S_OOSPOS_OFF) OR	>	100	µm		C_ROD_2 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 S_OOSPOS_OFF) OR	=	True			
			C_ROD_2 movement during C_ROD_2 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_OFF)	>	100	µm		C_ROD_2 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 S_OOSPOS_OFF)	=	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			
								Application state is equal to bypass state	=	False			
			OR					Rod 2 force target in gear engament direction	>	600	N		

								Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=	True		
			Gear to be engaged located on rod 2 at the B side	=	True			Rod 2 position sensor electrical fautl detected	=	False		
			Difference between learned engaged B position and rod 2 position sensor measured	>	1100	µm		Rod 2 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. If the speeds sensor indicate the gear is properly disengaged position sensor still indicates gear engagement, a rod positon sensor fault is set after a confirmation time.	Gear to be disengaged located on rod 2 at the A side	=	True			Hydraulic power available	=	True		Runs continuously
			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	=	False		
								Rod 2 force target in gear engament direction	>	600	N	
			OR					Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=	False		
								Rod 2 position sensor electrical fautl 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 senosr at start of the shift and rod 2 position sensor measured	<	1000	µm		Time since last odd clutch speed sensor electrical fault detected	>=	100	ms	
			Difference between rod 2 position senosr measured and rod 2 learned blocking ring B position	>	1500	µm		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 positon sensor is measuring a value outside these tolerance bands for a confirmation time the rod position sensor is considered suspicious. The sensor is confirmed to be faulted when at the time of the detected fault, the clutch speed and output speed can be indepently 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 2 position measurement	>	Rod drift fault high limit (6), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	µm	**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 2 position measurement	<	Rod drift fault low limit (7), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	µm		Consistency fault rod 2 position sensor		False		
								Synchronizer shift busy on corresponding clutch shaft		False		
								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		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		500	ms		
								Fault confirmation conditions to consider the rod position sensor faulted					
								Driving gear is an odd gear	=	True			
								Difference between odd 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 2 OR	=	True			
								Driving gear is located on rod 1	=	True			
								Difference between rod 2 learned blocking ring A position and rod 2 position sensor measurement OR	>	1000	µm		
								Driving gear is located on rod 1	=	True			
								Difference between rod 2 position sensor measurement and rod 2 learned blocking ring B position	>	1000	µm		
		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_2 movement during C_ROD_2 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_2 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm	**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 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_1 movement during C_ROD_2 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_2 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm		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_2 movement during C_ROD_2 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm		C_ROD_2 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 S_OOSPOS_OFF)	=	True			
			C_ROD_1 movement during C_ROD_2 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm		C_ROD_2 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 S_OOSPOS_OFF)	=	True			
			C_ROD_1 movement during C_ROD_1 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_ON) OR	>	100	µm		C_ROD_1 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 S_OOSPOS_ON) OR	=	True			
			C_ROD_1 movement during C_ROD_1 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_2 actuation with selector position target hydraulically S_OOSPOS_ON)	>	100	µm		C_ROD_1 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 S_OOSPOS_ON)	=	True			
							Fault confirmation	Synchronizer integrity rod position sensor fault test suite confirmation runs	=	1			
Position sensor for rod 3 consistency	P283C	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 3 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 3 position sensor measured and learned engaged A position	>	1100	µm		Application state is equal to error state	=	False			
								Application state is equal to bypass state	=	False			
			OR					Rod 3 force target in gear engament direction	>	600	N		
								Speed sensors indicate gear is engaged (1)	=	True			
			Gear to be engaged located on rod 3 at the B side	=	True			Rod 3 position sensor electrical fautl detected	=	False			
			Difference between learned engaged B position and rod 3 position sensor measured	>	1100	µm		Rod 3 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 3 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 positon sensor fault is set after a confirmation time.	Difference between rod 3 position sensor measured and rod 3 position at start of the shift	<	1000	µm		Application state is equal to error state	=	False			
			Difference between rod 3 learned blocking ring A position and rod 3 position sensor measured	>	1500	µm		Application state is equal to bypass state	=	False			
								Rod 3 force target in gear engament direction	>	600	N		
			OR					Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=	False			
								Rod 3 position sensor electrical fautl detected	=	False			
			Gear to be disengaged located on rod 3 at the B side	=	True			Rod 3 gear disengagement active	=	True			
			Difference between rod 3 position senosr at start of the shift and rod 3 position sensor measured	<	1000	µm		Time since last even clutch speed sensor electrical fault detected	>=	100	ms		
			Difference between rod 3 position senosr measured and rod 3 learned blocking ring B position	>	1500	µm		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 positon sensor is measuring a value outside these tolerance bands for a confirmation time the rod position sensor is considered suspicious. The sensor is confirmed to be faulted when at the time of the detected fault, the clutch speed and output speed can be indepently 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 3 position measurement	>	Rod drift fault high limit (6), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	µm	**Enable Conditions:**	No rod 3 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 3 position sensor		False			
			Rod 3 position measurement	<	Rod drift fault low limit (7), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	µm		Consistency fault rod 3 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 3 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		
								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 3	=	True			
								OR					
								Driving gear is located on rod 4 or rod 5	=	True			
								Difference between rod 3 learned blocking ring A position and rod 3 position sensor measurement	>	1000	µm		
								OR					
								Driving gear is located on rod 4 or rod 5	=	True			
								Difference between rod 3 position sensor measurement and rod 3 learned blocking ring B position	>	1000	µm		
		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. 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_3 movement during C_ROD_3 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm	**Enable Conditions:**	Synchronizer integrity intrusive routine triggered (15), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD		True		Runs continuously	
			C_ROD_4 movement during C_ROD_3 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		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_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		C_ROD_3 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 S_OOSPOS_ON)	=	True			
			C_ROD_4 movement during C_ROD_3 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		C_ROD_3 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 S_OOSPOS_ON)	=	True			
			C_ROD_4 movement during C_ROD_4 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_OFF)	>	100	µm		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 S_OOSPOS_OFF)	=	True			

			OR					OR					
			C_ROD_4 movement during C_ROD_4 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_OFF)	>	100	µm		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 S_OOSPOS_OFF)	=	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 positon sensor fault is set after a confirmation time.	Gear to be enaged 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			
								Application state is equal to bypass state	=	False			
			OR					Rod 4 force target in gear engament direction	>	600	N		
								Speed sensors indicate gear is engaged (1)	=	True			
			Gear to be engaged located on rod 4 at the B side	=	True			Rod 4 position sensor electrical fautl detected	=	False			
			Difference between learned engaged B position and rod 4 position sensor measured	>	1100	µm		Rod 4 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. If the speeds sensor indicate the gear is properly disengaged position sensor still indicates gear engagement, a rod positon sensor fault is set after a confirmation time.	Gear to be disengaged located on rod 4 at the A side	=	True			Hydraulic power available	=	True		Runs continuously	
			Difference between rod 4 position sensor measured and rod 4 position at start of the shift	<	1000	µm		Application state is equal to error state	=	False			
			Difference between rod 4 learned blocking ring A position and rod 4 position sensor measured	>	1500	µm		Application state is equal to bypass state	=	False			
								Rod 4 force target in gear engament direction	>	600	N		
			OR					Speed sensors indicate gear is engaged (1), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	=	False			
								Rod 4 position sensor electrical fautl detected	=	False			
			Gear to be disengaged located on rod 4 at the B side	=	True			Rod 4 gear disengagement active	=	True			
			Difference between rod 4 position senosr at start of the shift and rod 4 position sensor measured	<	1000	µm		Time since last even clutch speed sensor electrical fault detected	>=	100	ms		
			Difference between rod 4 position senosr measured and rod 4 learned blocking ring B position	>	1500	µm		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 positon sensor is measuring a value outside these tolerance bands for a confirmation time the rod position sensor is considered suspicious. The sensor is confirmed to be faulted when at the time of the detected fault, the clutch speed and output speed can be indepently 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 high limit (6), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	µm	Enable Conditions:	No rod 4 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 4 position sensor		False			
			Rod 4 position measurement	<	Rod drift fault low limit (7), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD	µm		Consistency fault rod 4 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 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		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		
								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	=	True			
								OR					
								Driving gear is located on rod 3 or rod 5	=	True			
								Difference between rod 4 learned blocking ring A position and rod 3 position sensor measurement	>	1000	µm		

								OR Driving gear is located on rod 3 or rod 5 Difference between rod 4 position sensor measurement and rod 4 learned blocking ring B position	= >	True 1000	 µm		
		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_4 movement during C_ROD_4 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm	**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 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_3 movement during C_ROD_4 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm		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_4 movement during C_ROD_4 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm		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 S_OOSPOS_OFF)	=	True			
			C_ROD_3 movement during C_ROD_4 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm		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 S_OOSPOS_OFF)	=	True			
			C_ROD_3 movement during C_ROD_3 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_ON) OR	>	100	µm		C_ROD_3 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 S_OOSPOS_ON) OR	=	True			
			C_ROD_3 movement during C_ROD_3 move A to B test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_ON)	>	100	µm		C_ROD_3 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 S_OOSPOS_ON)	=	True			
							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 positon 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 engament 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 fautl 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. If the speeds sensor indicate the gear is properly disengaged position sensor still indicates gear engagement, a rod positon sensor fault is set after a confirmation time.	Gear to be disengaged located on rod 5 at the B side	=	True			Hydraulic power available	=	True		Runs continuously	
			Difference between rod 5 position senosr at start of the shift and rod 5 position sensor measured	<	1000	µm		Application state is equal to error state	=	False			
			Difference between rod 5 position senosr measured and rod 5 learned blocking ring B position	>	1500	µm		Application state is equal to bypass state	=	False			
								Rod 5 force target in gear engament 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 fautl 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		
							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 positon sensor is measuring a value outside these tolerance bands for a confirmation time the rod position sensor is considered suspicious. The sensor is confirmed to be faulted when at the time of the detected fault, the clutch speed and output speed can be indepently 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 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	ms	Runs continuously	
			OR					Electrical fault for rod 5 position sensor		False			
			Rod 5 position measurement	<	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			
								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		
								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	=	True			
								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	µm		
		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 C_ROD_5 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm	**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.	C_ROD_5 movement during C_ROD_5 move B to A test case (20), see Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD (Synchronizer pressure control valve C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm		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 syncrhonizer 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 (Synchronizer pressure control valve C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		C_ROD_5 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_5 actuation with selector position target hydraulically S_OOSPOS_ON)	=	True			

		If the current profile check for the synchronizer pressure control valve consistently indicates pass, the rod position sensor is diagnosted 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 (Synchronizer pressure control valve C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		C_ROD_5 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_5 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	True			
			Synchronizer pressure control valve 5 current profile check consistently indicates FAIL	=	True			Transmission oil temperature	>=	40	°C		
							Fault confirmation	Synchronizer pressure control valve 5 current profile check fail confirmation count	=	3	count		

Summary table attachments C_SID_ASV_CMP_SNS_POS_ROD					
(1) Gear engaged according to speed sensors					
If Engaged gear A-side detection (3)					
	...	=	Engaged gear at A side (transmission rear cover side)		
Else If Engaged gear B-side detection (4)					
	...	=	Engaged gear at B side (transmission clutch side)		
(2) Gear disengagement timeout = ...					
Scaled and min/max lmited difference between gear to neutral disengagement timer and time since start of shift					
Scaling factor		=	0.69921875		
Lower limit		=	200		
Upper limit		=	350		
(3) Engaged gear A-side detection condition					
Electrical clutch speed sensor fault		=	False		
Consistency clutch speed sensor fault			False		
Gear at A-side differential speed		<	SYin_GEAR_SPD_SNS_ZERO_DIFF_SPD_THS + Engaged gear differential speed offset (5)	rpm	
Gear at B-side differential speed		>	150	rpm	
Gear A-side engaged confirmation sample count *		>=	6	count	
* confirmation sample count frozen if					
Absolute difference between output speed and its previous value		>=	10	rpm	
(4) Engaged gear B-side detection condition					
Electrical clutch speed sensor fault		=	False		
Consistency clutch speed sensor fault			False		
Gear at B-side differential speed		<	30 + Engaged gear differential speed offset (5)	rpm	
Gear at A-side differential speed		>	150	rpm	
Gear B-side engaged confirmation sample count *		>=	6	count	
* confirmation sample count frozen if					
Absolute difference between output speed and its previous value		>=	10	rpm	
(5) Engaged gear differential speed offset ...					
If output speed control signal is substituted					
	...	=	20	rpm	
Else					
	...	=		rpm	
(6) Rod drift fault high limit = ...					
If Logical engaged gear equals Neutral and synchronizer B-side (transmission clutch side) has no gear					
If Synchronizer valve cleaning was active for clutch shaft		<	50	ms	
	...	=	Rod Neutral position + 4000	µm	
Else					
	...	=	Rod Neutral position + 4000	µm	
Else If Logical engaged gear equals Neutral					
	...	=	Rod Neutral position + 1600	µm	

Else If Logical engaged gear equals gear at synchronizer A-side (transmission rear cover side)				
	...	=	Rod A position + 1600	µm
Else If Logical engaged gear equals gear at synchronizer B-side (transmission clutch side)				
	...	=	Rod End B position + 1000	µm
(7) Rod drift fault low limit = ...				
If Logical engaged gear equals Neutral and synchronizer A-side (transmission rear cover side) has no gear				
If Synchronizer valve cleaning was active for clutch shaft		<	50	ms
	...	=	Rod Neutral position -4000	µm
Else				
	...	=	Rod Neutral position -4000	µm
Else If Logical engaged gear equals Neutral				
	...	=	Rod Neutral position - 1600	µm
Else If Logical engaged gear equals gear at synchronizer A-side (transmission rear cover side)				
	...	=	Rod End A position - 1000	µm
Else If Logical engaged gear equals gear at synchronizer B-side (transmission clutch side)				
	...	=	Rod B position - 1600	µm
(8) No rod force present condition				
Shorted switch fault for a synchronizer pressure control valve used to move the rod			False	
AND				
Absolute rod force target		<=	49	N
AND				
Absolute complement* rod force target		<=	49	N
OR				
Rod drift correction is active		=	True	
*complement rod = the rod corresponding to the inverted selector position				
(9) Rod speed gear = ...				
If Neutral detection at standstill condition (10) OR Neutral detection while driving condition (11)				
	...	=	Neutral	
Else If Engaged gear A-side detection (12)				
	...	=	Engaged gear at A side (transmission rear cover side)	
Else If Engaged gear B-side detection (13)				
	...	=	Engaged gear at B side (transmission clutch side)	
(10) Neutral detection at standstill condition				
Electrical or consistency clutch speed sensor fault		=	False	
Consistency clutch speed sensor fault			False	
Absolute output speed		<	5	rpm
Absolute clutch speed		>	550	rpm
Confirmation time		=	300	ms
(11) Neutral detection while driving condition				
Electrical or consistency clutch speed sensor fault		=	False	
Consistency clutch speed sensor fault			False	
Absolute output speed		>=	100	rpm

Absolute clutch speed	>=	400	rpm
Synchronizer gear(s) calculated differential speed	>	150	rpm
(12) Engaged gear A-side detection condition			
Electrical or consistency clutch speed sensor fault	=	False	
Consistency clutch speed sensor fault		False	
Absolute output speed	>=	100	rpm
Absolute clutch speed	>=	400	rpm
Gear at A-side differential speed	<	Engaged gear differential speed threshold (14)	
Gear at B-side differential speed	>	150	rpm
Gear A-side engaged confirmation sample count *	>=	6	count
* confirmation sample count frozen if			
Absolute difference between output speed and its previous value	>=	10	rpm
(13) Engaged gear B-side detection condition			
Electrical or consistency clutch speed sensor fault	=	False	
Consistency clutch speed sensor fault		False	
Absolute output speed	>=	100	rpm
Absolute clutch speed	>=	400	rpm
Gear at B-side differential speed	<	Engaged gear differential speed threshold (14)	
Gear at A-side differential speed	>	150	rpm
Gear B-side engaged confirmation sample count *	>=	6	count
* confirmation sample count frozen if			
Absolute difference between output speed and its previous value	>=	10	rpm
(14) Engaged gear differential speed threshold = …			
If output speed attained from output speed sensor (not subsituted)			
	=	30	rpm
Else			
	=	50	rpm
(15) Trigger conditions for the synchronizer integrity routine per clutch shaft			
The synchronizer integrity routine is triggered for a clutch shaft when			
Transmission engaged gear for the clutch shaft based on rod position sensor information or based on speed sensor information does not match with engaged gears stored in non-volatile memory	=	True	
OR			
A performance DTC was set for a syncrhonizer shift related item corresponding the clutch shaft:			

DTC set for Gear control failure for the clutch shaft	=	P073F, P072C, P1946, P074B, P072E, P1948, P074D, P073A, P194A, P074F, P073C, P194C	Odd clutch shaft synchronizer recovery routine trigger
		P074A, P072D, P1947, P074C, P072F, P1949, P074E, P073B, P194B, P07D8, P07D7, P194D, P073E, P072B, P194E	Even clutch shaft synchronizer recovery routine trigger
DTC set for Rod position sensor consistency fault for a rod corresponding to the clutch shaft	=	P2832, P2837	Odd clutch shaft synchronizer recovery routine trigger
		P283C, P2841, P2864	Even clutch shaft synchronizer recovery routine trigger
DTC set for Synchronizer pressure valve stuck off fault corresponding to the clutch shaft	=	P08C4, P27B9	Odd clutch shaft synchronizer recovery routine trigger
		P27C1, P27C9, P27D1	Even clutch shaft synchronizer recovery routine trigger
DTC set for Synchronizer pressure valve stuck on fault corresponding to the clutch shaft	=	P08C5, P27BA	Odd clutch shaft synchronizer recovery routine trigger
		P27C2, P27CA, P27D2	Even clutch shaft synchronizer recovery routine trigger
DTC set for Unintended rod movmenet fault for a rod corresponding to the clutch shaft	=	P284D, P284E	Odd clutch shaft synchronizer recovery routine trigger

		P284F, P2850, P286A	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector spool stuck off fault corresponding to the clutch shaft	=	P1957	Odd clutch shaft synchronizer recovery routine trigger
		P1959	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector spool stuck on fault corresponding to the clutch shaft	=	P1956	Odd clutch shaft synchronizer recovery routine trigger
		P1958	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector mechanism stuck off fault	=	P1950	Odd and even clutch shaft synchronizer recovery routine trigger
DTC set for Selector mechanism stuck on fault	=	P194F	Odd and even clutch shaft synchronizer recovery routine trigger
(16) Running conditions for the synchronizer integrity routine			
Hydraulic power available	=	True	
System pressure too low condition	=	False	
System pressure	<=	4.5	bar
System pressure too low confirmation time	>=	50	ms
Diagnostic reset event	=	False	
Time since last synchronizer shift completion	>	2000	ms
Rod drift correction active	=	False	
No adapation routine with exception of the syncrhonizer recovery routine is active	=	True	
In case the synchronizer recovery routine is triggered by the setting of a DTC following conditions are additionally checked:			
Request clutch equals to target clutch	=	True	
Target clutch equal to actual driving clutch	=	True	
Target gear equals the current gear for the clutch shaft	=	True	
Stable time for clutch and gear conditions	>=	5000	ms
Clutch shaft equal to actual clutch		False	
System pressure target overrule maximum overrule	>=	10	bar
System pressure target overrule minimum overrule	<=	20	bar
Time since last recovery routine run for a gear corresponding to the clutch shaft	>=	30000	ms
In case the synchronizer recovery routine is triggered by the power up check of the gears No extra conditions are checked			
(17) Conditions for a synchronizer integrity test case			
Synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	
Opposite synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	
Synchronizer position sensor corresponding to the test electrical fault detected	=	False	
Selector cannot be controlled in the target position for the test case due to an electrical fault	=	False	

Selector pilot valve electrical fault no current	=	True	
Selector hydraulic target position for the test	=	S_OOSPOS_OFF	
OR			
Selector pilot valve electrical fault high current	=	True	
Selector hydraulic target position for the test	=	S_OOSPOS_ON	
Test inhibit by potential gear disengagement for intented rod movement (4)	=	False	
OR			
Absolute vehicle speed	<	10	kph
OR			
Gear that could be disengaged unintentionally is already faulted	=	True	
Test inhibit by potential gear disengagement for complement rod movement (5)	=	False	
OR			
Absolute vehicle speed	<	10	kph
OR			
Inverse selector hydraulic state for the test case	=	S_OOSPOS_ON	
Synchronizer recovery routine is active	=	True	
The selector was verified to be operational for the hydraulic S_OOSPOS_ON position during this instance of the synchronizer recovery routine run	=	True	
OR			
Inverse selector hydraulic state for the test case	=	S_OOSPOS_OFF	
Synchronizer recovery routine is active	=	True	
The selector was verified to be operational for the hydraulic S_OOSPOS_OFF position during this instance of the synchronizer recovery routine run	=	True	
(18) Test inhibit by potential gear disengagement for intended rod movement			
Currently engaged gear located at the A side	=	True	
Intended rod movement direction for current test case	=	A to B	
Intended move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
OR			
Currently engaged gear located at the B side	=	True	
Intended rod movement direction for current test case	=	B to A	
Intended move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
(19) Test inhibited by potential gear disengagement for complement rod movement			
Currently engaged gear located at the A side	=	True	
Complement rod movement direction for current test case	=	A to B	
Complement move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
OR			
Currently engaged gear located at the B side	=	True	
Complement rod movement direction for current test case	=	B to A	
Complement move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
(20) Synchronizer integrity test details			
Intended rod movement with PID control	=	500	µm
Test case finished when:			
Intended rod movement direction	=	A to B	

Difference between rod position measurement and rod position at start of test case	>	250	µm
OR			
Intended rod movement direction	=	B to A	
Difference between rod position at start of test case and rod position measurement	>	250	µm
OR			
Complement rod movement direction	=	A to B	
Difference between complement rod position measurement and complement rod position at start of test case	>	500	µm
OR			
Complement rod movement direction	=	B to A	
Difference between complement rod position at start of test case and complement rod position measurement	>	500	µm
OR			
Test case time	>	500	µm

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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.	Absolute difference between odd clutch pressure measured and clutch pressure small step target	>	1	bar	Enable Conditions:	Diagnostic reset event	=	False		Runs Continuously	A
		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.	OR					Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_CMP_SNS_PRS_CLU_CONSIST	=	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.	Absolute difference between odd clutch pressure measured and clutch pressure big step target	>	1	bar		Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments	=	True			
		If one of the pressure steps cannot be attained, the clutch pressure sensor is diagnosed faulted.						Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False			
								Odd clutch redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine	=	False			
								Odd clutch redundant shutdown valve stuck off fault detected during this instance of the odd clutch recovery routine	=	False			
								Odd clutch proportional pressure valve stuck on fault detected during this instance of the odd clutch recovery routine	=	False			
								Odd 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		
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.	Absolute difference between even clutch pressure measured and clutch pressure small step target	>	1	bar	Enable Conditions:	Diagnostic reset event	=	False		Runs Continuously	A
		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.	OR					Even clutch pressure recovery routine is requested (1), see Summary table attachments	=	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.	Absolute difference between even clutch pressure measured and clutch pressure big step target	>	1	bar		Even clutch pressure recovery routine run conditions met (2), see Summary table attachments	=	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 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	=	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		

Summary table attachments C_SID_ASV_VA_CMP_SNS_PRS_CLU_CONSIST			
(1) Clutch pressure reovery routine request			
The clutch recovery rouitne is request for a clutch when a DTC is set for:			
Clutch pressure control system diagnostic		P2855, P2853	Odd clutch recovery trigger
		P2856, P2854	Even clutch recovery trigger
Clutch pressure sensor dirift out-of-window		P0844	Odd clutch recovery trigger
		P0849	Even clutch recovery trigger
Clutch pressure control valve mechanically stuck off		P0746	Odd clutch recovery trigger
		P0776	Even clutch recovery trigger
Clutch pressure control valve mechanically stuck on		P0747	Odd clutch recovery trigger
		P0777	Even clutch recovery trigger
Clutch redundant shutdown valve mechanically stuck off		P0796	Odd clutch recovery trigger
		P2714	Even clutch recovery trigger
Clutch redundant shutdown valve mechanically stuck on		P0797	Odd clutch recovery trigger
		P2715	Even clutch recovery trigger
(2) Clutch pressure reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Current engaged gear for the corresponding clutch shaft		Neutral	
Clutch cooling flow	<=	30	lpm
Transmission oil temperature	>=	50	°C
Clutch preload pressure learned at end-of-line	=	True	
Maximum clutch flow available	>=	3.5	lpm
Electrical fault acitve for the clutch pressure sensor	=	False	
Elecrical fault active for the clutch pressure control valve	=	False	
Electrical fault active for the clutch redundant shutdown valve	=	False	
Engine speed	>=	500	rpm
Maximum system pressure target overrule value	>=	13.5	bar
Minimum system pressure target overrule value	<=	20	bar

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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_DRIFT	> Pressure sensor drift out of window threshold (2), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_DRIFT bar = False	**Enable Conditions:** Clutch zero pressure condition (4), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_DRIFT 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_DRIFT	> Pressure sensor drift out of window threshold (2), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_DRIFT bar = False	**Enable Conditions:** Clutch zero pressure condition (4), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_DRIFT 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

Summary table attachments C_SID_ASV_CMP_SNS_PRS_CLU_DRIFT					
(1) Absolute raw measured clutch pressure sampling conditions					
Absolute raw clutch pressure		<	Pressure sensor drift out of window theshold (3)	bar	
Sample range		<=	0.259765625	bar	(sample range for clutch 1)
		<=	0.259765625	bar	(sample range for clutch 2)
Sampling time to consider samples valid for analysis		>	75	ms	(sampling confirmation time for clutch 1)
		>	75	ms	(sampling confrimation time for clutch 2)
Sampling timeout		<	600	ms	(sampling timeout for clutch 1)
		<	600	ms	(sampling timeout for clutch 2)
(2) Pressure sensor drift out of window thresholds= ...					
If Open loop temperature control active (3) OR		=	True		
Transmission oil temperature OR		>	90	°C	
Transmission oil temperature		<	0	°C	
	...	=	4.19921875	bar	(threshold for clutch 1)
	...	=	4.19921875	bar	(threshold for clutch 2)
Else					
	...	=	2.44921875	bar	(threshold for clutch 1)
	...	=	2.44921875	bar	(threshold for clutch 2)
(3) Open loop temperature control active = ...					
If (Transmission oil temperature sensor 1 electrical fault detected OR		=	True		
Transmission oil temperature sensor 1 consistency fault detected) AND			True		
(Transmission oil temperature sensor 2 electrical fault detected OR			True		
Transmission oil temperature sensor 2 consistency fault detected)			True		
	...	=	True		
Else					
	...	=	False		
(4) Clutch zero pressure condition ...					
Hydraulic powe r available from main pump		=	False		
Hydraulic powe r available from auxilary pump		=	False		
Confirmation time		=	No hydraulic power confirmation time (5)	ms	
OR					
Hydraulic powe r available from main pump		=	False		
Hydraulic powe r available from auxilary pump		=	False		
First pressure sensor offset check since controller startup		=	True		
Vehicle total time count*		>	Total time count at last engine stop*		
*Information saved in non-volatile-memory and based on CAN information					
OR					

Clutch redundant shutdown valve hydraulic actual position	=	Hydraulic Off	
Clutch proportional pressure valve current target	<	50	ms
Confirmation time	=	25	ms
(5) No hydraulic power confirmation time = …			
Linear interpolation based on transmission oil temperature			
AXIS:			
Transmission oil temperature	=	[-55 0 90 140]	°C
TABLE:			
No hydraulic power confirmation time	=	[10000 3000 1000 500]	ms

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
LSD pressure 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. 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. 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. If one of the pressure steps cannot be attained, the limited slip differential pressure sensor is diagnosed faulted.	Absolute difference between limited slip differential pressure measured and limited slip differential pressure small step target OR Absolute difference between limited slip differential pressure measured and limited slip differential pressure big step target	> >	1 1	bar bar	**Enable Conditions:** **Fault confirmation time**	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 during this instance of the odd clutch recovery routine Limited slip differential redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine Limited slip differential redundant shutdown valve stuck off fault detected during this instance of the odd clutch recovery routine Limited slip differential proportional pressure valve stuck on fault detected during this instance of the odd clutch recovery routine Limited slip differential 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 True True False False False False False 4 6 100	 bar bar ms	Runs Continuously	B

Summary table attachments C_SID_ASV_VA_CMP_SNS_PRS_LSD_CONSIST			
(1) Limited slip differential pressure reovery routine request			
The limited slip differential recovery rouitne is request when a DTC is set for:			
Limited slip differential pressure control system diagnostic		C2A18, C2A19	
Limited slip differential pressure sensor dirift out-of-window		P0879	
Limited slip differential pressure control valve mechanically stuck off		P2808	
Limited slip differential pressure control valve mechanically stuck on		P2809	
Limited slip differential redundant shutdown valve mechanically stuck off		P2817	
Limited slip differential redundant shutdown valve mechanically stuck on		P2818	
(2) Clutch pressure reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Transmission oil temperature	>=	50	°C
Electrical fault acitve for the limited slip differential pressure sensor	=	False	
Elecrical fault active for the limited slip differential pressure control valve	=	False	
Electrical fault active for the limited slip differential redundant shutdown valve	=	False	
Engine speed	>=	500	rpm
Absolute vehicle speed	<=	2	kph
Maximum system pressure target overrule value	>=	10	bar
Minimum system pressure target overrule value	<=	20	bar

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters	Enable Conditions		Time Required	MIL illum.
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	>	Pressure sensor drift out of window threshold (2), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_LSD_DRIFT	bar	**Enable Conditions:** Limited slip differential zero pressure condition (4), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_LSD_DRIFT	=	True	Runs Continuously	B
			Valid raw measured raw limited slip differential pressure samples found (1)	=	False						
							Controller awake time	>	20 ms		
							Electrical limited slip differential pressure sensor diagnostic indicates ok	=	True		
							Application state is unequal to error state	=	True		
							Application state is unequal to bypass state	=	True		
							Code clear event	=	False		
							Electrical limited slip differential pressure sensor fault	=	False		

Summary table attachments C_SID_ASV_CMP_SNS_PRS_LSD_DRIFT				
(1) Absolute raw measured limited slip differential pressure sampling conditions				
Absolute raw limited slip differential pressure		<	Pressure sensor drift out of window theshold (3)	bar
Sample range		<=	0.259765625	bar
Sampling time				
to consider samples valid for analysis		=	200	ms
Sampling timeout		=	1000	ms
(2) Pressure sensor drift out of window = ...				
If Open loop temperature control active (3) OR		=	True	
Transmission oil temperature OR		>	90	°C
Transmission oil temperature		<	0	°C
	...	=	4.19921875	bar
Else				
	...	=	2.44921875	bar
(3) Open loop temperature control active = ...				
If (Transmission oil temperature sensor 1 electrical fault detected OR		=	True	
Transmission oil temperature sensor 1 consistency fault detected) AND			True	
(Transmission oil temperature sensor 2 electrical fault detected OR			True	
Transmission oil temperature sensor 2 consistency fault detected)			True	
	...	=	True	
Else				
	...	=	False	
(4) Limited slip differential zero pressure condition ...				
Hydraulic powe r available from main pump		=	False	
Hydraulic powe r available from auxilary pump		=	False	
Confirmation time		=	No hydraulic power confirmation time (5)	ms
OR				
Hydraulic powe r available from main pump		=	False	rpm
Hydraulic powe r available from auxilary pump		=	False	
First pressure sensor offset check since controller startup		=	True	
Vehicle total time count*		>	Total time count at last engine stop*	
*Information saved in non-volatile-memory and based on CAN information				
OR				
Limited slip differential redundant shutdown valve hydraulic actual position		=	Hydraulic Off	
Clutch proportional pressure valve current target		<	50	ms
Confirmation time		=	25	ms
(5) No hydraulic power confirmation time = ...				
Linear interpolation based on transmission oil temperature				

AXIS:			
Transmission oil temperature	=	[-55 0 90 140]	°C
TABLE:			
No hydraulic power confirmation time	=	[10000 3000 1000 500]	ms

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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. 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 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	=	False		Runs Continuously	A
			OR					System pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_SYS_CONSIST	=	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		System pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_SYS_CONSIST	=	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.						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_SNS_PRS_SYS_CONSIST	=	True			
								System pressure sensor check against clutch pressure sensor conditions met (4), see Summary table attachments C_SID_ASV_CMP_SNS_PRS_SYS_CONSIST	=	True			
							Fault confirmation time		=	2000	ms		

Summary table attachments C_SID_ASV_CMP_SNS_PRS_SYS_CONSIST			
(1) System pressure reovery routine request			
The system pressure recovery rouitne is requested for a clutch when a DTC is set for:			
System pressure control too high system diagnostic		P0869	
System pressure control too low system diagnostic		P0868	
A temporary drop in system pressure timer	>=	15000	ms
System pressure pilot valve mechanically stuck off		P2723	
System pressure pilot valve mechanically stuck on		P2724	
System pressure relief valve mechanically stuck		P1955	
(2) System pressure reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Odd clutch pressure request	<=	8	bar
Even clutch pressure request	<=	8	bar
Limited slip differential pressure request	<=	8	
IF clutch is selected for the system pressure sensor consistency check			
Selected clutch for consistency check is equal to the actual clutch	=	False	
Selected clutch for consistency check is equal to the target clutch	=	False	
Selected clutch for consistency check is equal to the requested clutch	=	False	
Selected clutch for consisntecy check is unavailable due to diagnostic faults	=	False	
Transmission clutch state	!=	Launch	
Transmission clutch state	!=	Shift	
Maximum system pressure target overrule value	>=	10	bar
Minimum system pressure target overrule value	<=	20	bar
Electrical fault active for the system pressure sensor	=	False	
Electrical fautl active for the system pressure pilot valve	=	False	
(3) Target system pressure steps checks			
The first step of the system pressure recovery routine checks if the system pressure can be controlled against different pressure targets:			
System pressure step targets	=	[10 15 20 15 10]	bar
System pressure step target tollerances for measured pressure against target pressure	=	[2.5 2.5 2.5 2.5 2.5]	bar
System pressure step target reached confirmation time	=	500	ms
System pressure step target not reached timeout	=	2000	ms
(4) System pressure sensor consistency check against cluth pressure conditions			
The system pressure sensor is verified against a clutch pressure sensor during the system pressure recovery routine when:			
Odd or even clutch is available to perform the system pressure consistency check: clutch is not in use and is not faulted	=	True	

Neutral gear is engaged for the selected clutch shaft (this is requested by the system pressure recovery routine)	=	True

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions		Time Required	MIL illum.
System pressure sensor drift out of window	P0874	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. 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.	Absolute raw measured system pressure	>	Pressure sensor drift out of window threshold (2), see Summary table attachments C_SID_ASV_VA_CMP_SNS_PRS_SYS _DRIFT	bar	Enable Conditions:	System pressure zero condition (4), see Summary table attachments C_SID_ASV_VA_CMP_SNS_PRS_SYS _DRIFT	=	True	Runs Continuously	A
			Valid raw measured system pressure samples found (1)	=	False							
								Controller awake time	>	20 ms		
								Application state is unequal to error state	=	True		
								Application state is unequal to bypass state	=	True		
								Code clear event	=	False		
								Electrical system pressure sensor diagnostic indicates ok	=	True		

Summary table attachments C_SID_ASV_VA_CMP_SNS_PRS_SYS_DRIFT				
(1) Absolute raw measured system pressure sampling conditions				
Absolute raw system pressure		<	Pressure sensor drift out of window theshold (3)	bar
Sample range		<=	0.259765625	bar
Sampling time to consider samples valid for analysis		>	75	ms
Sampling timeout		=	600	ms
(2) Pressure sensor drift out of window = ...				
If Open loop temperature control active (4) OR		=	True	
Transmission oil temperature OR		>	90	°C
Transmission oil temperature		<	0	°C
	...	=	4.19921875	bar
Else				
	...	=	2.44921875	bar
(3) Open loop temperature control active = ...				
If (Transmission oil temperature sensor 1 electrical fault detected OR		=	True	
Transmission oil temperature sensor 1 consistency fault detected) AND			True	
(Transmission oil temperature sensor 2 electrical fault detected OR			True	
Transmission oil temperature sensor 2 consistency fault detected)			True	
	...	=	True	
Else				
	...	=	False	
(4) System pressure zero pressure condition ...				
Hydraulic powe r available from main pump		=	False	
Hydraulic powe r available from auxilary pump		=	False	
Confirmation time		=	No hydraulic power confirmation time (5)	ms
OR				
Hydraulic powe r available from main pump		=	False	rpm
Hydraulic powe r available from auxilary pump		=	False	
First pressure sensor offset check since controller startup		=	True	
Vehicle total time count*		>	Total time count at last engine stop*	
*Information saved in non-volatile-memory and based on CAN information				
(5) No hydraulic power confirmation time = ...				
Linear interpolation based on transmission oil temperature				
AXIS:				
Transmission oil temperature		=	[-55 0 90 140]	°C
TABLE:				
No hydraulic power confirmation time		=	[10000 3000 1000 500]	ms

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Clutch 1 speed sensor consistency	P0792	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. 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.	Absolute difference between measured clutch 1 speed and engine speed	>= 150 rpm	**Enable Conditions:** Engine speed available (3), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	= True	Runs Continuously	A
					Electrical clutch 1 speed sensor fault	= False		
					Clutch 1 state is closed	= True		
					Microslip active	= False		
					Odd clutch pressure pressure control ok condition (17), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	= True		
					Odd clutch pressure request - Odd clutch pressure target	<= 0.150390625 bar		
					Diagnostic reset event	= False		
					Application state is unequal to error state	= True		
					Application state is unequal to bypass state	= True		
					Fault confirmation time	= 1100 ms		
		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. 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.	Synchronizer differential speed for clutch 1 engaged gear	>= Synchronizer differential speed limit (1), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU rpm	**Enable Conditions:** Output speed consistency with wheel speeds from CAN (5), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	= True	Runs Continuously	
					Electrical clutch 1 speed sensor fault	= False		
					Synchronizer shift busy on clutch 1 shaft	= False		
					Absolute output speed	>= 150 rpm		
					Current logical gear on matches rod position sensor readings for clutch 1 shaft (6)	= True		
					Clutch 1 shaft has gear engaged	= True		
					Diagnostic reset event	= False		
					Application state is unequal to error state	= True		
					Application state is unequal to bypass state	= True		
					Fault confirmation time	= 200 ms		
		This diagnostic detects consistency fault for the clutch speed sensor by monitoring gear engagements. 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 syncrhonizer remains high, the clutch speed sensor is diagnosed faulted.	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	= False	**Enable Conditions:** Synchronizer shift busy on clutch 1 shaft	= True	Runs Continuously	
			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	= True	Output speed sensor is suspicious (9), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	= False		

			Rod position sensor movement during shift detected (13), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	=	True			Clutch 1 speed sensor is suspicious (10), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	=	False			
			Synchronizer differential speed for gear to engaged on clutch 1 shaft	>	200	rpm		Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
							Fault confirmation time		=	50	ms		
Clutch 2 speed sensor consistency	P2746	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. 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.	Absolute difference between measured clutch 2 speed and engine speed	>=	150	rpm	Enable Conditions:	Engine speed available (3), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	=	True		Runs Continuously	A
								Electrical clutch 2 speed sensor fault	=	False			
								Clutch 2 state is closed	=	True			
								Microslip active	=	False			
								Even clutch pressure pressure control ok condition (17), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	=	True			
								Even clutch pressure request - Even clutch pressure target	<=	0.150390625	bar		
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
							Fault confirmation time		=	1100	ms		
		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. 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.	Synchronizer differential speed for clutch 2 engaged gear	>=	Synchronizer differential speed limit (1)	rpm	Enable Conditions:	Output speed consistency with wheel speeds from CAN (5), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	=	True		Runs Continuously	
								Electrical clutch 2 speed sensor fault	=	False			
								Synchronizer shift busy on clutch 2 shaft	=	False			
								Absolute output speed	>=	150	rpm		
								Current logical gear on matches rod position sensor readings for clutch 2 shaft (6)	=	True			
								Clutch 1 shaft has gear engaged	=	True			
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
							Fault confirmation time		=	200	ms		
		This diagnostic detects consistency fault for the clutch speed sensor by monitoring gear engagements.	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	=	False		Enable Conditions:	Synchronizer shift busy on clutch 2 shaft	=	True		Runs Continuously	

		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 syncrhonizer remains high, the clutch speed sensor is diagnosed faulted.	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	= True	Output speed sensor is suspicious (9), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	= False		
			Rod position sensor movement during shift detected (13), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	= True	Clutch speed sensor is suspicious (10), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU	= False		
			Synchronizer differential speed for gear to engaged on clutch 2 shaft	> 200 rpm	Application state is unequal to error state	= True		
					Application state is unequal to bypass state	= True		
					Fault confirmation time	= 50 ms		

Summary table attachments C_SID_ASV_CMP_SNS_SPD_CLU			
(1) Synchronizer differential speed limit = …			
If clutch speed control signal is unsubstituted (2)			
…	=	70	rpm
Else			
…	=	100	rpm
(2) Clutch speed control signal substitution			
Clutch speed control signal not based on clutch speed sensor but rather on substitution if one of following conditions is met			
Electrical clutch speed sensor fault		True	
Clutch speed sensor consistency fault detected		True	
(3) Engine speed available			
Engine speed is available when:			
No electrical or consistency fault for engine speed sensor	=	True	
AND			
Engine speed from ECM valid (4)		True	
(4) Engine speed from ECM valid			
Engine speed from ECM is considered valid when:			
Engine speed CAN message timeout detected	=	False	
Engine speed CAN message MAC fault detected	=	False	
Engine speed CAN message ARC fault detected	=	False	
(5) Output speed consistency with wheel speeds from CAN			
Electrical output speed sensor fault	=	False	
Wheel speed CAN message timeout detected	=	False	
Wheel speed CAN message MAC fault detected	=	False	
Wheel speed CAN message ARC fault detected	=	False	
Diagnostic reset event	=	False	
Application state is unequal to error state	=	True	
Application state is unequal to bypass state	=	True	
Absolute difference between Measured output speed and Output speed from Wheel Speed on CAN	<	50	rpm
(6) Current logical gear matches rod position sensor readings			
Electrical fault for a rod position sensor on the clutch shaft	=	False	
Consistency fault for a rod position sensor on the clutch shaft	=	False	
Current logical gear rod position indicates current logical gear (7)	=	True	
Other rod position sensors for the clutch shaft indicate neutral (8)	=	True	
(7) Current logical gear rod position indicates current logical gear if:			
If current logical gear is located a A-side of the rod, conditions are:			
The difference between Measured rod position and Engaged A position for rod	<	1100	µm
Measured rod position (rod dependent)	>=	[1174 1116 1446 1741 1000]	µm
Measured rod position (rod dependent)	<=	[23802 23234 24564 24403 24033]	µm
If current logical gear is located at B-side of the rod, conditons are:			
The difference between Engaged B position for rod - Measured rod position	<	1100	µm
Measured rod position (rod dependent)	>=	[1174 1116 1446 1741 1000]	µm

Measured rod position (rod dependent)		<=	[23802 23234 24564 24403 24033]	µm
(8) Other rod position sensors for the clutch shaft indicate neutral if:				
Measured rod position (rod dependent)		>=	[1174 1116 1446 1741 1000]	µm
Measured rod position (rod dependent)		<=	[23802 23234 24564 24403 24033]	µm
The difference between Measured rod position - Blocking ring position at rod B side		<	1500	µm
The difference between Blocking ring position at rod A side - Measured rod position		<	1500	µm
Logical gear for the rod equals neutral		=	True	
OR				
Measured rod position - Rod neutral position		<	1450	µm
Rod neutral position - Measured rod position		<	1450	µm
(9) Output speed sensor is suspicious if:				
Output speed consistency with Output speed consistency with wheel speeds from CAN (5)		=	False	
Wheel speeds on CAN suspicious (19)		=	False	
(10) Clutch speed sensor is suspicious if:				
Clutch speed sensor is substituted (2)		=	True	
OR				
Clutch speed sensor consistency fault detected		=	True	
(11) Engaged gear based on speed sensor information = …				
If Engaged gear A-side detection (14)				
	…	=	Engaged gear at A side (transmission rear cover side)	
Else If Engaged gear B-side detection (15)				
	…	=	Engaged gear at B side (transmission clutch side)	
(12) Engaged gear based on rod position sensor = …				
If difference between Measured rod position and Engaged A position for rod		<=	1100	µm
	…	=	Engaged gear at A side (transmission rear cover side)	
Else If difference between Engaged B position for rod and Measured rod position		<=	1100	µm
	…	=	Engaged gear at B side (transmission clutch side)	
Else If				
difference between Measured rod position and Neutral position for rod		<=	1000	µm
difference between Neutral position for rod and Measured rod position		<=	1000	µm
	…	=	Neutral gear	
Else If difference between Measured rod position and Neutral position for rod		>	1000	µm
	…	=	Region B	
Else difference between Neutral position for rod and Measured rod position		>	1000	µm
	…	=	Region A	
(13) Rod position sensor movement detected during shift				
Rod movement detected if:				
In case intended move direction of rod is from A (transmission rear cover side) to B (transmission clutch side)				
Difference between Measured rod position and Rod position sample at start of shift		>	1000	µm
In case intended move direction of rod is from B (transmission clutch side) to A (transmission rear cover side)				
Difference between Rod position sample at start of shift and Measured rod position		>	1000	µm
(14) Engaged gear A-side detection condition				
Electrical clutch speed sensor fault		=	False	

Consistency clutch speed sensor fault		False	
Gear at A-side differential speed	<	30 + Engaged gear differential speed offset (16)	
Gear at B-side differential speed	>	150	rpm
Gear A-side engaged confirmation sample count *	>=	6	count
* confirmation sample count frozen if			
Absolute difference between output speed and its previous value	>=	10	rpm
(15) Engaged gear B-side detection condition			
Electrical clutch speed sensor fault	=	False	
Consistency clutch speed sensor fault		False	
Gear at B-side differential speed	<	30 + Engaged gear differential speed offset (16)	
Gear at A-side differential speed	>	150	rpm
Gear B-side engaged confirmation sample count *	>=	6	count
* confirmation sample count frozen if			
Absolute difference between output speed and its previous value	>=	10	rpm
(16) Engaged gear differential speed offset …			
If output speed control signal is substituted			
…	=	20	rpm
Else			
…	=		rpm
(17) Clutch pressure control condition			
Clutch pressure control condition is True if following conditions are met:			
		Absolute pressure difference fault threshold (18)	
		-	
Difference between clutch pressure sensor reading and modeled pressure	<=	0.5	bar
Electrical fault for clutch pressure sensor	=	False	
Electrical fault for clutch pressure control valve	=	False	
Electrical fault for clutch redundant shutdown valve	=	False	
Clutch redundant shutdown valve position	=	Hydraulic On	
Clutch recovery request	=	False	
Adaptive routine overrule for clutch pressure control valve current	=	False	
Adaptive routine overrule for clutch fast filling	=	False	
Adaptive routine overrule for clutch 1pressure control flow influence calculations	=	False	
Clutch superfill active	=	False	
Last superfill on clutch end	>	80	ms
Diagnostic clear event	=	False	
(18) Absolute pressure difference fault threshold = …			
Linear interpolation based on clutch target pressure			
AXIS:			
Clutch target pressure	=	[0 5 10 30]	bar
TABLE:			
Absolute pressure difference fault threshold	=	[2 2 2 2]	bar
(19) Wheel speeds on CAN suspicious			
Output speed consistency with Output speed consistency with wheel speeds from CAN (5)	=	False	
AND			

Measured output speed versus clutch 1 shaft speed consistency status (20)		=	OK	
Measured output speed versus clutch 2 shaft speed consistency status (20)			OK	
OR				
Measured output speed versus clutch 1 shaft speed consistency status (20)		=	OK	
Measured output speed versus clutch 2 shaft speed consistency status (20)		!=	NOT_OK	
OR				
Measured output speed versus clutch 1 shaft speed consistency status (20)		!=	NOT_OK	
Measured output speed versus clutch 2 shaft speed consistency status (20)			OK	
Confirmation time		=	100	ms
(20) Measured output speed versus clutch shaft speed consistency status = …				
If				
Electrical clutch speed sensor fault detected OR		=	True	
Consistency clutch speed sensor fault detected OR			True	
Clutch shaft has a gear engaged		=	False	
	…	=	NOT_AVAILABLE	
Elif				
Absolute difference between Measured output speed and				
Output speed from clutch speed		>=	50	
	…	=	NOT_OK	
Else				
	…	=	OK	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Engine speed sensor consistency	P0336	This diagnostic detects consistency faults engine speed sensor input towards the transmission controller. 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.	Absolute difference between measured engine speed and engine speed from ECM	> 350 rpm	**Enable Conditions:** Electrical engine speed sensor fault Engine speed from ECM valid (1), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_ENG Engine speed from ECM Diagnostic clear event Application state is unequal to error state Application state is unequal to bypass state High engine speed gradient expected condition (2), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_ENG **Fault confirmation time**	= False = True >= 400 rpm = False = True = True = False = 800 ms	Runs Continuously	A

Summary table attachments C_SID_ASV_CMP_SNS_SPD_ENG			
(1) Engine speed from ECM valid			
Engine speed from ECM is considered valid when:			
Engine speed CAN message timeout detected	=	False	
Engine speed CAN message MAC fault detected	=	False	
Engine speed CAN message ARC fault detected	=	False	
(2) High engine speed gradient expected condition			
Difference between odd clutch torque and actual engine torque	>=	600	Nm
OR			
Difference between even clutch torque and actual engine torque	>=	600	Nm
Latch time	=	50	ms

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Output speed sensor consistency	P0721	This diagnostic detects consistency faults for the transmission output speed sensor. The transmission output speed sensor reading is compared against the output speed calculated based on the driven wheel speeds. 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. 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. To verifiy the output speed sensor reading with the clutch speed, a gear has to be engaged on the corresponding clutch shaft and the ouput speed is calculated based on the clutch speed sensor reading and the engaged gear ratio.	Absolute difference between Measured output speed and Output speed from Wheel Speed on CAN	>= 150 rpm	**Enable Conditions:**		Runs Continuously	A
					Electrical output peed sensor fault	= False		
			Hysteresis low difference threshold	= 50 rpm	Wheel speed information from CAN valid (2), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_OUT	> True		
			AND		Output speed from clutch 1 available (3), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_OUT	= True		
			Absolute difference between Measured output speed and Output speed from clutch 1 too high (1), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_OUT	= True	Output speed from clutch 2 available (3), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_OUT	True		
			OR		Application state is unequal to error state	= True		
			Absolute difference between Measured output speed and Output speed from clutch 2 too high (1), see Summary table attachments C_SID_ASV_CMP_SNS_SPD_OUT	= True	Application state is unequal to bypass state	= True		
					Diagnostic clear event	= False		
					Fault confirmation time	= 300 ms		

Summary table attachments C_SID_ASV_CMP_SNS_SPD_OUT			
(1) Absolute difference between measured output speed and output speed from clutch too high			
Absolute difference between measured output speed and output speed calculated from clutch speed measurement	>=	50	rpm
Output speed from other clutch speed available (3)	=	False	
OR			
Absolute difference between measured output speed and output speed from other clutch speed measurement	>=	50	rpm
(2) Wheel speed information from CAN valid			
Wheel speed information on CAN is considered valid when:			
Wheel speed CAN message timeout detected	=	False	
Wheel speed CAN message MAC fault detected	=	False	
Wheel speed CAN message ARC fault detected	=	False	
(3) Ouput speed from clutch speed available			
Output speed from clutch speed is availabe when:			
Electrical clutch speed sensor fault	=	False	
Performance clutch speed sensor fault	=	False	
Clutch shaft has a gear engaged	=	True	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Sump temperature consistency	P0711	This diagnostic detects a consistency fault for the sump temperature sensor by monitoring high temperature gradient. 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.	Absolute filtered gradient of sump 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 sump temperature sensor active	=	False			
								Sump temperature gradient valid (enough samples taken)	=	True			
							Fault confirmation	Number of sump temperature measurement samples used for raw sump temperature gradient calculation	=	5	count		
								Number of raw sump temperature gradients used for filtered sump temperature gradient calculation	=	5	count		
								Sump temperature gradient fault confirmation timer	=	60	ms		
		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. 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. 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. 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.	Absolute average difference between sump temperature and engine water temperature during cold start check	>	15	°C	**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	
			Absolute difference between cooler out temperature and sump temperature measurement	>	10	°C		Electrical fault on sump temperature sensor active	=	False			
			Average absolute difference between cooler out and engine water temperature received from CAN	<	7	°C		Electrical fault on cooler out temperature sensor active	=	False			
								Propulsion system off time valid received from CAN	=	True			
								Propulsion system off time received from CAN	>=	28800	s		
								Engine is running	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
								Engine coolant water temperature valid received from CAN	=	True			
								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. 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. If the difference between the sump and cooler out temperature sensor readings is high, the difference between the cooler out and engine water temperature is high and the difference between the sump temperature and the engine engine water temperature is low, the cooler out temperature sensor is diagnosed faulted.	Absolute average difference between cooler temperature and engine water temperature during cold start check	>	15	°C	**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	
			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			
								Propulsion system off time valid received from CAN	=	True			
								Propulsion system off time received from CAN	>=	28800	s		
								Engine is running	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
								Engine coolant water temperature valid received from CAN	=	True			
								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		

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	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. 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. 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.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF	= Between Locked and Hold	Enable Conditions:		=	False		Runs Continuously	B
						Diagnostic reset event			kph		
						Application state is unequal to error state	=	True			
			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 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 diagnostic disengage strategy			
						Parking lock engagement valve position target	=	Hydraulic Off			
						Parking lock latching valve position target	=	Hydraulic On			
						Parking lock hold solenoid position target	=	Electrical On			
					Fault confirmation time	Parking lock hold solenoid stuck off fault confirmation timer	>=	25	ms		
		This diagnostic detects a mechanical stuck off hold solenoid during the parking lock latching 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. 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.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF	= Between Locked and Hold	Enable Conditions:	Absolute vehicle speed	<=	3	kph	Runs Continuously	
						Transmission oil temperature	<=	120	°C		
			OR								
			Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF	= Locked		Battery voltage	>=	10000	mV		
						Parking lock latching valve logical position	=	Hydraulic Off			

		After the parking lock engagement hydraulic stuck on test, the parking lock engagement valve is set to the hydraulic on position. When the parking lock position sensor reads open after the parking engagement valve test, the parking lock latching valve is tested by drianing the parking lock pisiton with the parking lock latching valve only. 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.					Parking lock actuation strategy	=	Parking lock diagnostic disengage 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			
							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			
						Fault confirmation time	Parking lock hold solenoid stuck off fault confirmation timer	>=	25	ms		
		This diagnostic detects a mechanical stuck off hold solenoid during the wait for vehicle speed 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. 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. After the parking lock engagement hydraulic stuck on test, the parking lock engagement valve is set to the hydraulic on position. When the parking lock position sensor reads open after the parking engagement valve test, the parking lock latching valve is tested by drianing the parking lock pisiton with the parking lock latching valve only.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF	=	Between Locked and Hold		Absolute vehicle speed	<=	3	kph	Runs Continuously	
							Transmission oil temperature	<=	120	°C		
			OR									
			Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF	=	Locked		Battery voltage	>=	10000	mV		
							Parking lock latching valve logical position	=	Hydraulic Off			
							Parking lock actuation strategy	=	Parking lock diagnostic disengage strategy			
							Parking lock engagement valve position target	=	Hydraulic On			

		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. 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.			Parking lock latching valve position target	= Hydraulic Off		
					Parking lock hold solenoid position target	= Electrical On		
					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		
					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 latching valve off state of the parking lock diagnostic disengage routine. 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 latchting 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.	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	Runs Continuously	
					Application state is unequal to error state	= True		
			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 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 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. 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 latchting 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.	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			
							Application state is unequal to error state	=	True			
			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 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 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		

Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_OFF			
(1) Parking lock logical position = …			
IF			
Electrical fault for the parking lock position sensor detected	=	True	
…	=	Unkown	
ELSE IF			
Absolute difference between parking lock position measured and learned locked position	<	500	µm
…	=	Locked	
ELSE IF			
Absolute difference between parking lock position measured and learned open position	<	Parking lock open tolerance (2)	µm
…	=	Open	
ELSE IF			
Absolute difference between parking lock position measured and learned hold position	<	Parking lock hold tolerance (3)	µm
ELSE IF			
Difference between learned open position and parking lock position measured	>	Parking lock open tolerance (2)	µm
Difference between parking lock position measured and learned hold position	>	Parking lock hold tolerance (3)	µm
… =		Between Open and Hold	
ELSE IF			
Difference between learned hold position and parking lock position measured	>	Parking lock hold tolerance (3)	µm
Difference between parking lock position measured and learned locked position	>	500	µm
…	=	Between Locked and Hold	
ELSE			
…	=	Invalid	
(2) Parking lock open tolerance = …			
Unsatured open tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured open tolerance	>=	500	µm
…	=	500	µm
ELSE IF			
Unsatured open tolerance	<=	250	µm
…	=	250	µm
ELSE			
…	=	Unsatured open tolerance	
(3) Parking lock hold tolerance = …			
Unsatured hold tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured hold tolerance	>=	500	µm
…	=	500	µm
ELSE IF			
Unsatured hold tolerance	<=	250	µm
…	=	250	µm
ELSE			
…	=	Unsatured hold tolerance	

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	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. 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 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.	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			
						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 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		
		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.	Parking lock logical position (1), see Summary tabel attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_ON	= Hold	**Enable Conditions:**		= False	Runs Continuously	
						Diagnostic reset event			

		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 latchting 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 hold the parking lock hold solenoid is diagnosed mechanical stuck on.				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 speed 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		

Summary table attachments C_SID_ASV_CMP_SOL_HLD_PLK_STUCK_ON

(1) Parking lock logical position = …			
IF			
Electrical fault for the parking lock position sensor detected	=	True	
…	=	Unkown	
ELSE IF			
Absolute difference between parking lock position measured and learned locked position	<	500	µm
…	=	Locked	
ELSE IF			
Absolute difference between parking lock position measured and learned open position	<	Parking lock open tolerance (2)	µm
…	=	Open	
ELSE IF			
Absolute difference between parking lock position measured and learned hold position	<	Parking lock hold tolerance (3)	µm
ELSE IF			
Difference between learned open position and parking lock position measured	>	Parking lock open tolerance (2)	µm
Difference between parking lock position measured and learned hold position	>	Parking lock hold tolerance (3)	µm
… =		Between Open and Hold	
ELSE IF			
Difference between learned hold position and parking lock position measured	>	Parking lock hold tolerance (3)	µm
Difference between parking lock position measured and learned locked position	>	500	µm
…	=	Between Locked and Hold	
ELSE			
…	=	Invalid	
(2) Parking lock open tolerance = …			
Unsatured open tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured open tolerance	>=	500	µm
…	=	500	µm
ELSE IF			
Unsatured open tolerance	<=	250	µm
…	=	250	µm
ELSE			
…	=	Unsatured open tolerance	
(3) Parking lock hold tolerance = …			
Unsatured hold tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured hold tolerance	>=	500	µm
…	=	500	µm
ELSE IF			
Unsatured hold tolerance	<=	250	µm
…	=	250	µm
ELSE			
…	=	Unsatured hold tolerance	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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. 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. 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. 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. If the current profile check for the system pressure pilot valve consistenly indicates pass, the system pressure relief valve is diagnostic stuck by process of elimination	Current profile check consistently indicated pass for the system pressure pilot valve	=	True	Enable Conditions:	Diagnostic reset event	=	False		Runs Continuously	A
			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			
							System pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_SPL_PRS_SYS	=	True			
							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			
							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_SPL_PRS_SYS	=	True			
							Transmission oil temperature	>=	60	°C		
							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			

Summary table attachments C_SID_ASV_CMP_SPL_PRS_SYS			
(1) System pressure reovery routine request			
The system pressure recovery rouitne is requested for a clutch when a DTC is set for:			
System pressure control too high system diagnostic		P0869	
System pressure control too low system diagnostic		P0868	
A temporary drop in system pressure timer	>=	15000	ms
System pressure pilot valve mechanically stuck off		P2723	
System pressure pilot valve mechanically stuck on		'P2724	
System pressure relief valve mechanically stuck		P1955	
(2) System pressure recovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Odd clutch pressure request	<=	8	bar
Even clutch pressure request	<=	8	bar
Limited slip differential pressure request	<=	8	
IF clutch is selected for the system pressure sensor consistency check			
Selected clutch for consistency check is equal to the actual clutch	=	False	
Selected clutch for consistency check is equal to the target clutch	=	False	
Selected clutch for consistency check is equal to the requested clutch	=	False	
Selected clutch for consisntecy check is unavailable due to diagnostic faults	=	False	
Transmission clutch state	!=	Launch	
Transmission clutch state	!=	Shift	
Maximum system pressure target overrule value	>=	10	
Minimum system pressure target overrule value	<=	20	
Electrical fault active for the system pressure sensor	=	False	
Electrical fautl active for the system pressure pilot valve	=	False	
(3) Target system pressure steps checks			
The first step of the system pressure recovery routine checks if the system pressure can be controlled against different pressure targets:			
System pressure step targets	=	[10 15 20 15 10]	bar
System pressure step target tollerances for measured pressure against target pressure	=	[2.5 2.5 2.5 2.5 2.5]	bar
System pressure step target reached confirmation time	=	500	ms
System pressure step target not reached timeout	=	2000	ms
(4) System pressure sensor consistency check against cluth pressure			
The system pressure sensor is verified against a clutch pressure sensor during the system pressure recovery routine			
Odd or even clutch is available to perform the system pressure consistency check: clutch is not in use and is not faulted	=	True	

Neutral gear is engaged for the selected clutch shaft (this is requested by the system pressure recovery routine)	=	True	
The system pressure sensor consistency check passes when:			
Open loop system pressure targets used during this check	=	[12 18]	bar
Pressure difference between the system pressure and the clutch pressure of the selected clutch	<	[2.5 2.5]	bar
System pressure match with clutch pressure confirmation time	=	300	ms

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	This diagnostic detects a hydraulic stuck off parking lock engagemenent valve. 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. 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 latchinng valve hydraulically stuck off, the current profile check is used for the parking lock engagement valve. If the current profile check for the parking lock engagement valve consistenly fails, the parking lock engagement valve is diagnosed hydraulically stuck off.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_VA_EN_PLK_STUCK_OFF	=	Locked	**Enable Conditions:**	Absolute vehicle speed	<=	10 kph	Runs Continuously	B
			Currently profile check for the parking lock engagement valve consistently indicate fails	=	True		Output speed	<=	100 rpm		
							Clutch torque	>	75		
							Brake bressed	=	False		
							Parking lock position sensor electrical fault detected	=	False		
							Parking lock latching valve electrical fault detected	=	False		
							Parking lock latching valve logical position	=	Hydraulic On		
							Transmission oil temperature	>=	40 °C		
							Diagnostic reset event	=	False		
							Application state is unequal to error state	=	True		
							Application state is unequal to bypass state	=	True		
						Fault confirmation	Drive away fail confirmation time	>=	3000 ms		
							Current profile check fail confirmation count	>=	3 count		

Summary table attachments C_SID_ASV_CMP_VA_EN_PLK_STUCK_OFF			
(1) Parking lock logical position = …			
IF			
Electrical fault for the parking lock position sensor detected	=	True	
…	=	Unkown	
ELSE IF			
Absolute difference between parking lock position measured and learned locked position	<	500	µm
…	=	Locked	
ELSE IF			
Absolute difference between parking lock position measured and learned open position	<	Parking lock open tolerance (2)	µm
…	=	Open	
ELSE IF			
Absolute difference between parking lock position measured and learned hold position	<	Parking lock hold tolerance (3)	µm
ELSE IF			
Difference between learned open position and parking lock position measured	>	Parking lock open tolerance (2)	µm
Difference between parking lock position measured and learned hold position	>	Parking lock hold tolerance (3)	µm
… =		Between Open and Hold	
ELSE IF			
Difference between learned hold position and parking lock position measured	>	Parking lock hold tolerance (3)	µm
Difference between parking lock position measured and learned locked position	>	500	µm
…	=	Between Locked and Hold	
ELSE			
…	=	Invalid	
(2) Parking lock open tolerance = …			
Unsatured open tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured open tolerance	>=	500	µm
…	=	500	µm
ELSE IF			
Unsatured open tolerance	<=	250	µm
…	=	250	µm
ELSE			
…	=	Unsatured open tolerance	
(3) Parking lock hold tolerance = …			
Unsatured hold tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured hold tolerance	>=	500	µm
…	=	500	µm
ELSE IF			
Unsatured hold tolerance	<=	250	µm
…	=	250	µm
ELSE			
…	=	Unsatured hold tolerance	

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	This diagnostic detects a hydraulic stuck on parking lock engagemenent 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. 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. 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. 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.	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_EN_PLK_STUCK_ON	= Open	**Enable Conditions:** Absolute vehicle speed	<= 3	Runs Continuously	B
					Transmission oil temperature	<= 120 °C		
					Battery voltage	>= 10000 mV		
					Parking lock engagment valve logical position	= Hydraulic Off		
					Parking lock actuation strategy	= Parking lock diagnostic disengage strategy		
					Parking lock engagement valve position target	= Hydraulic Off		
					Parking lock latching valve position target	= Hydraulic On		
					Parking lock hold solenoid position target	= Electrical On		
					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		
					Fault confirmation time Parking lock engagement valve off test state timer	> 200 ms		
		This diagnostic detects a hydraulic stuck on parking lock engagemenent 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.	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_EN_PLK_STUCK_ON	= Open	**Enable Conditions:** Diagnostic reset event	= False	Runs Continuously	
			Parking lock logical position (1) during forced low system pressure state, see Summary tabel attachments C_SID_ASV_CMP_VA_EN_PLK_STUCK_ON	= Locked	Application state is unequal to error state	= True		

		When the parking lock engagement by use of the parking lock latchting 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				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.	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_EN_PLK_STUCK_ON	=	Open		Electrical fault detected for the parking lock hold solenoid	=	False			
		If during the low system pressure phase, the parking lock position sensor reads locked, the parking lock engagement valve is diagnosed hydraulic stuck on.	Parking lock logical position (1) at the end of forced low system pressure state, see Summary tabel attachments C_SID_ASV_CMP_VA_EN_PLK_STUCK_ON	=	Between Hold and Locked		Electrical fault detected for the parking lock engagement valve	=	False			
		If after a timeout during the low system pressure phase the parking lock poiston reads between hold and locked, the parking lcok engagement is diagnosed hydraulic stuck on.					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			
							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		
		This diagnostic detects a hydraulic stuck on parking lock engagemenent 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.	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_EN_PLK_STUCK_ON	=	Open	**Enable Conditions:**		=	False			
							Diagnostic reset event				Runs Continuously	
		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.	Parking lock logical position (1) during forced low system pressure state, see Summary tabel attachments C_SID_ASV_CMP_VA_EN_PLK_STUCK_ON	=	Locked		Application state is unequal to error state	=	True			
		When the parking lock engagement by use of the parking lock latchting 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. If during the low system pressure phase, the parking lock position sensor reads locked, the parking lock engagement valve is diagnosed hydraulic stuck on.				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 engagment 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 engagement valve off state timer	>=	200	ms		
						Parking lock forced low system pressure timer	>=	600	ms		

Summary table attachments C_SID_ASV_CMP_VA_EN_PLK_STUCK_ON			
(1) Parking lock logical position = …			
IF			
Electrical fault for the parking lock position sensor detected	=	True	
…	=	Unkown	
ELSE IF			
Absolute difference between parking lock position measured and learned locked position	<	500	µm
…	=	Locked	
ELSE IF			
Absolute difference between parking lock position measured and learned open position	<	Parking lock open tolerance (2)	µm
…	=	Open	
ELSE IF			
Absolute difference between parking lock position measured and learned hold position	<	Parking lock hold tolerance (3)	µm
ELSE IF			
Difference between learned open position and parking lock position measured	>	Parking lock open tolerance (2)	µm
Difference between parking lock position measured and learned hold position	>	Parking lock hold tolerance (3)	µm
… =		Between Open and Hold	
ELSE IF			
Difference between learned hold position and parking lock position measured	>	Parking lock hold tolerance (3)	µm
Difference between parking lock position measured and learned locked position	>	500	µm
…	=	Between Locked and Hold	
ELSE			
…	=	Invalid	
(2) Parking lock open tolerance = …			
Unsatured open tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured open tolerance	>=	500	µm
…	=	500	µm
ELSE IF			
Unsatured open tolerance	<=	250	µm
…	=	250	µm
ELSE			
…	=	Unsatured open tolerance	
(3) Parking lock hold tolerance = …			
Unsatured hold tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured hold tolerance	>=	500	µm
…	=	500	µm
ELSE IF			
Unsatured hold tolerance	<=	250	µm
…	=	250	µm
ELSE			
…	=	Unsatured hold tolerance	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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	**Enable Conditions:**	Diagnostic reset event active	=	False		Runs continuously	C
							Transmission oil temperature	>=	60	°C		
							Electrical fault present for the clutch lube valve	=	False			
							Synchronizer shift busy	=	False			
							Clutch state is closed	=	True			
							Transmission clutch and gear actuation stable (1), see Summary table attachments	=	True			
							C_SID_ASV_CMP_VA_FLW_LUBE Adaptation routine active	=	False			
							Zero clutch cooling flow is allowed for odd clutch	=	True			
							Zero clutch cooling flow is allowed for even clutch	=	True			
							Clutch cooling flow target	<	3	lpm		
							Application state is unequal to error state	=	True			
							Application state is unequal to bypass state	=	True			
							Microslip feature active on odd clutch	=	False			
							Microslip feature active on even clutch	=	False			
						Fault confirmation	Lube current profile check fail confirmation counter	>=	5	count		
							Lube current profile check repeat time in case of confirmed status succes	=	900000	ms		
							Lube current profile check repeat in case of confirmed status succes enabled	=	1			
							Lube current profile check repeat time in case of confirmed status fail	=	30000	ms		
							Lube current profile check repeat time in case of undebounced status succes	=	3000	ms		
							Lube current profile check repeat time in case of undebounced status fail	=	3000	ms		

Summary table attachments C_SID_ASV_CMP_VA_FLW_LUBE			
(1) Transmission clutch and gear actuation stable			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaft equal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Park lock latching valve stuck off	P187E	This diagnostic detects a hydraulic stuck off parking lock latching valve. 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. 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 latchinng valve hydraulically stuck off, the current profile check is used for the parking lock engagement valve. If the current profile check for the parking lock engagement valve consistenly passes, the parking lock latching valve is diagnosed hydraulically stuck off.	Parking lock logical position (1) , see Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_OFF	= Locked	Enable Conditions:	Absolute vehicle speed	<=	10	kph	Runs Continuously	B
			Currently profile check for the parking lock engagement valve consistently indicate pass	= True		Output speed	<=	100	rpm		
						Clutch torque	>	75			
						Brake bressed	=	False			
						Parking lock position sensor electrical fault detected	=	False			
						Parking lock latching valve electrical fault detected	=	False			
						Parking lock latching valve logical position	=	Hydraulic On			
						Transmission oil temperature	>=	40	°C		
						Diagnostic reset event	=	False			
						Application state is unequal to error state	=	True			
						Application state is unequal to bypass state	=	True			
					Fault confirmation	Drive away fail confirmation time	>=	3000	ms		
						Current profile check pass confirmation count	>=	3	count		

Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_OFF			
(1) Parking lock logical position = ...			
IF			
Electrical fault for the parking lock position sensor detected	=	True	
...	=	Unkown	
ELSE IF			
Absolute difference between parking lock position measured and learned locked position	<	500	µm
...	=	Locked	
ELSE IF			
Absolute difference between parking lock position measured and learned open position	<	Parking lock open tolerance (2)	µm
...	=	Open	
ELSE IF			
Absolute difference between parking lock position measured and learned hold position	<	Parking lock hold tolerance (3)	µm
ELSE IF			
Difference between learned open position and parking lock position measured	>	Parking lock open tolerance (2)	µm
Difference between parking lock position measured and learned hold position	>	Parking lock hold tolerance (3)	µm
... =		Between Open and Hold	
ELSE IF			
Difference between learned hold position and parking lock position measured	>	Parking lock hold tolerance (3)	µm
Difference between parking lock position measured and learned locked position	>	500	µm
...	=	Between Locked and Hold	
ELSE			
...	=	Invalid	
(2) Parking lock open tolerance = ...			
Unsatured open tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured open tolerance	>=	500	µm
...	=	500	µm
ELSE IF			
Unsatured open tolerance	<=	250	µm
...	=	250	µm
ELSE			
...	=	Unsatured open tolerance	
(3) Parking lock hold tolerance = ...			
Unsatured hold tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured hold tolerance	>=	500	µm
...	=	500	µm
ELSE IF			
Unsatured hold tolerance	<=	250	µm
...	=	250	µm
ELSE			
...	=	Unsatured hold tolerance	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Park lock latching valve stuck on	P187D	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. 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. 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. After the parking lock engagement hydraulic stuck on test, the parking lock engagement valve is set to the hydraulic on position. When the parking lock position sensor reads open after the parking engagement valve test, the parking lock latching valve is tested by drianing the parking lock pisiton with the parking lock latching valve only. 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.	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	= Open	**Enable Conditions:** Absolute vehicle speed	<= 3	Runs Continuously	B
					Transmission oil temperature	<= 120 °C		
					Battery voltage	>= 10000 mV		
					Parking lock latching valve logical position	= Hydraulic Off		
					Parking lock actuation strategy	= Parking lock diagnostic disengage 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		
					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		
					Fault confirmation time Parking lock engagement valve off test state timer	> 500 ms		
		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.	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	= Open	**Enable Conditions:**	= False		
					Diagnostic reset event		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.	Parking lock logical position (1) during the parking lock engagement valve hydraulic off state, see Summary table attachements C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON	=	Locked		Application state is unequal to error state	=	True			
		When the parking lock engagement by use of the parking lock latchting 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 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.					Electrical fault detected for the parking lock hold solenoid	=	False			
		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.					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 at the end of the latching valve of state	=	Hydraulic Off			
						Fault confirmation time	Parking lock latching valve off state timer	>=	300	ms		
		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.	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	=	Open	**Enable Conditions:**		=	False			
							Diagnostic reset event					
		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.	Parking lock logical position (1) during forced low system pressure state, see Summary tabel attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON	=	Locked		Application state is unequal to error state	=	True			
		When the parking lock engagement by use of the parking lock latchting 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				Application state is unequal to bypass state	=	True			
		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.	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	=	Open		Electrical fault detected for the parking lock hold solenoid	=	False			
		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.	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	=	Between Hold and Locked		Electrical fault detected for the parking lock engagement valve	=	False			

		If during the low system pressure phase, the parking lock position sensor reads locked, the parking lock latch valve is diagnosed hydraulic stuck on.					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			
							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		
		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.	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	=	Open	**Enable Conditions:**		=	False			
							Diagnostic reset event					
		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.					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.	Parking lock logical position (1) during the parking lock engagement valve hydraulic off state, see Summary table attachements C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON	=	Hold		Application state is unequal to bypass state	=	True			
		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.	OR				Electrical fault detected for the parking lock hold solenoid	=	False			
		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.	Parking lock logical position (1) during the parking lock engagement valve hydraulic off state, see Summary table attachements C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON	=	Between Locked and Hold		Electrical fault detected for the parking lock engagement valve	=	False			
			OR				Electrical fault detected for the parking lock latching valve	=	False			
			Parking lock logical position (1) during the parking lock engagement valve hydraulic off state, see Summary table attachements C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON	=	Locked		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 engagment valve logical position	=	Hydraulic Off			
							Parking lock latching valve logical position at the end of the latching valve of state	=	Hydraulic Off			
						Fault confirmation time	Parking lock latching valve off state timer	>=	200	ms		
		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. 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 latchting 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 latch valve 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_CMP_VA_LTCH_PLK_STUCK_ON	=	Open	**Enable Conditions:**		=	False			
							Diagnostic reset event				Runs Continuously	
			Parking lock logical position (1) during forced low system pressure state, see Summary tabel attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON	=	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	=	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 engagment 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 engagement valve off state timer	>=	200	ms		
							Parking lock forced low system pressure timer	>=	600	ms		

Summary table attachments C_SID_ASV_CMP_VA_LTCH_PLK_STUCK_ON			
(1) Parking lock logical position = ...			
IF			
Electrical fault for the parking lock position sensor detected	=	True	
...	=	Unkown	
ELSE IF			
Absolute difference between parking lock position measured and learned locked position	<	500	µm
...	=	Locked	
ELSE IF			
Absolute difference between parking lock position measured and learned open position	<	Parking lock open tolerance (2)	µm
...	=	Open	
ELSE IF			
Absolute difference between parking lock position measured and learned hold position	<	Parking lock hold tolerance (3)	µm
ELSE IF			
Difference between learned open position and parking lock position measured	>	Parking lock open tolerance (2)	µm
Difference between parking lock position measured and learned hold position	>	Parking lock hold tolerance (3)	µm
... =		Between Open and Hold	
ELSE IF			
Difference between learned hold position and parking lock position measured	>	Parking lock hold tolerance (3)	µm
Difference between parking lock position measured and learned locked position	>	500	µm
...	=	Between Locked and Hold	
ELSE			
...	=	Invalid	
(2) Parking lock open tolerance = ...			
Unsatured open tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured open tolerance	>=	500	µm
...	=	500	µm
ELSE IF			
Unsatured open tolerance	<=	250	µm
...	=	250	µm
ELSE			
...	=	Unsatured open tolerance	
(3) Parking lock hold tolerance = ...			
Unsatured hold tolerance	=	(Learned open positon - Learned hold position - 100) /2	µm
IF			
Unsatured hold tolerance	>=	500	µm
...	=	500	µm
ELSE IF			
Unsatured hold tolerance	<=	250	µm
...	=	250	µm
ELSE			
...	=	Unsatured hold tolerance	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Clutch 1 proportional pressure valve stuck on	P0747	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.	Current profile checks consistencly failed for the odd clutch pressure control valve	=	True		**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	A
		The clutch pressure control valve is verified for functionallity 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. 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.	Odd clutch pressure measured during stuck check	>=	4	bar		Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRS_CLU	=	True			
								Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRS_CLU	=	True			
		If the pressure sensor measures a high pressure during this stage, the pressure control valve is diagnosed stuck on.						Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False			
								Odd clutch redundant shutdown valve stuck on fault detected druing this instance of the odd clutch recovery routine	=	False			
								Odd clutch redundant shutdown valve stuck off fault detected druing this instance of the odd clutch recovery routine	=	False			
								Time zero current is commanded for the odd clutch pressure control valve before triggering the current profile check	=	100	ms		
							Fault confirmation	Odd clutch current profile check consist fail confirmation count	=	3	count		
								Odd clutch pressure above stuck on detection level	>	500	ms		
Clutch 1 proportional pressure valve stuck off	P0746	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.	Current profile checks consistencly failed for the odd clutch pressure control valve	=	True		**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	A
		The clutch pressure control valve is verified for functionallity 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. 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.	Odd clutch pressure measured during stuck check	<	4	bar		Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRS_CLU	=	True			
								Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRS_CLU	=	True			
		If the pressure sensor measures a low pressure during this stage, the pressure control valve is diagnosed stuck off.						Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False			
								Odd clutch redundant shutdown valve stuck on fault detected druing this instance of the odd clutch recovery routine	=	False			
								Odd clutch redundant shutdown valve stuck off fault detected druing this instance of the odd clutch recovery routine	=	False			

								Time zero current is commanded for the odd clutch pressure control valve before triggering the current profile check	=	100	ms		
							Fault confirmation	Odd clutch current profile check consist fail confirmation count	=	3	count		
								Odd clutch pressure below stuck on detection level	>	500	ms		
Clutch 2 proportional pressure valve stuck on	P0777	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.	Current profile checks consistencly failed for the even clutch pressure control valve	=	True		**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	A
		The clutch pressure control valve is verified for functionallity 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. 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.	Even clutch pressure measured during stuck check	>=	4	bar		Even clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRS_CLU	=	True			
		If the pressure sensor measures a high pressure during this stage, the pressure control valve is diagnosed stuck on.						Even clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRS_CLU	=	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	=	False			
								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 above stuck on detection level	>	500	ms		
Clutch 2 proportional pressure valve stuck off	P0776	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.	Current profile checks consistencly failed for the even clutch pressure control valve	=	True		**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	A
		The clutch pressure control valve is verified for functionallity 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. 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.	Odd clutch pressure measured during stuck check	<	4	bar		Even clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRS_CLU	=	True			
		If the pressure sensor measures a low pressure during this stage, the pressure control valve is diagnosed stuck off.						Even clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRS_CLU	=	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		

Summary table attachments C_SID_ASV_VA_VA_PRS_CLU			
(1) Clutch pressure reovery routine request			
The clutch recovery rouitne is request for a clutch when a DTC is set for:			
Clutch pressure control system diagnostic		P2855, P2853	Odd clutch recovery trigger
		P2856, P2854	Even clutch recovery trigger
Clutch pressure sensor dirift out-of-window		P0844	Odd clutch recovery trigger
		P0849	Even clutch recovery trigger
Clutch pressure control valve mechanically stuck off		P0746	Odd clutch recovery trigger
		P0776	Even clutch recovery trigger
Clutch pressure control valve mechanically stuck on		P0747	Odd clutch recovery trigger
		P0777	Even clutch recovery trigger
Clutch redundant shutdown valve mechanically stuck off		P0796	Odd clutch recovery trigger
		P2714	Even clutch recovery trigger
Clutch redundant shutdown valve mechanically stuck on		P0797	Odd clutch recovery trigger
		P2715	Even clutch recovery trigger
(2) Clutch pressure reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	
Current engaged gear for the corresponding clutch shaft		Neutral	
Clutch cooling flow	<=	30	
Transmission oil temperature	>=	50	
Clutch preload pressure learned at end-of-line	=	True	
Maximum clutch flow available	>=	3.5	
Electrical fault acitve for the clutch pressure sensor	=	False	
Elecrical fault active for the clutch pressure control valve	=	False	
Electrical fault active for the clutch redundant shutdown valve	=	False	
Engine speed	>=	500	
Maximum system pressure target overrule value	>=	13.5	
Minimum system pressure target overrule value	<=	20	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
LSD proportional pressure valve stuck on	P2809	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. The limited slip differential pressure control valve is verified for functionallity 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. 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 of hydraulically stuck off. If the pressure sensor measures a high pressure during this stage, the pressure control valve is diagnosed stuck on.	Current profile checks consistencly failed for the limited slip differential pressure control valve	=	True		Enable Conditions:	Diagnostic reset event	=	False		Runs Continuously	B
			Limited slip differential pressure measured during stuck check	>=	4	bar		Limited slip differential recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRS_LSD	=	True			
								Limited slip differential recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRS_LSD	=	True			
								Limited slip differential pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False			
								Limited slip differential redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine	=	False			
								Limited slip differential redundant shutdown valve stuck off fault detected during this instance of the odd clutch recovery routine	=	False			
								Time zero current is commanded for the limited slip differential pressure control valve before triggering the current profile check	=	100	ms		
							Fault confirmation	Limited slip differential current profile check consist fail confirmation count	=	3	count		
								Limited slip differential pressure above stuck on detection level	>	500	ms		
LSD proportional pressure valve stuck off	P2808	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. The limited slip differential pressure control valve is verified for functionallity 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. 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 of hydraulically stuck off. If the pressure sensor measures a low pressure during this stage, the pressure control valve is diagnosed stuck on.	Current profile checks consistencly failed for the limited slip differential pressure control valve	=	True	bar	Enable Conditions:	Diagnostic reset event	=	False		Runs Continuously	B
			Limited slip differential pressure measured during stuck check	<	4	bar		Limited slip differential recovery routine is requested (1), see Summary table attachments C_SID_ASV_VA_VA_PRS_LSD	=	True			
								Limited slip differential recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_VA_VA_PRS_LSD	=	True			
								Limited slip differential pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False			

						Limited slip differential redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine	=	False			
						Limited slip differential redundant shutdown valve stuck off fault detected during this instance of the odd clutch recovery routine	=	False			
						Time zero current is commanded for the limited slip differential pressure control valve before triggering the current profile check	=	100	ms		
					Fault confirmation	Limited slip differential current profile check consist fail confirmation count	=	3	count		
						Limited slip differential pressure below stuck on detection level	>	500	ms		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions		Time Required	MIL illum.
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 (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm	**Enable Conditions:**	Synchronizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF		True	Runs continuously	A
		The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionallity.	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 (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF	=	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 syncrhonizer 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_STUCK_OFF (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm		C_ROD_1 move C_SY_DIR_B_TO_A test case executed (3), 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_ON)	=	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_STUCK_OFF (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	100	µm		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_STUCK_OFF (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	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_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 S_OOSPOS_ON) OR	>	100	µm		C_ROD_1 move C_SY_DIR_A_TO_B test case executed (3), 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_ON) OR	=	True		
			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	µm		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_STUCK_OFF (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	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.	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 S_OOSPOS_ON)	<=	100	µm	**Enable Conditions:**	Synchronizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF		True	Runs continuously	A
		The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionallity.	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 S_OOSPOS_ON)	<=	100	µm		Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF	=	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 syncrhonizer 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_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	µm		C_ROD_1 move C_SY_DIR_A_TO_B test case executed (3), 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_ON)	=	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_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	µm		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_STUCK_OFF (Synchronizer pressure control C_SPV_2 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	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_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 S_OOSPOS_ON) OR	>	100	µm		C_ROD_1 move C_SY_DIR_B_TO_A test case executed (3), 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_ON) OR	=	True		

			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)	>	100	µm		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_STUCK_OFF (Synchronizer pressure control C_SPV_1 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	True		
							Confirmation count	Synchronizer integrity synchronizer pressure control valve stuck off fault test suite confirmation runs	=	1		
Shift solenoid 3 is hydraulically stuck off	P27C1	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_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 S_OOSPOS_ON)	<=	100	µm	**Enable Conditions:**	Synchronizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF		True	Runs continuously	A
		The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionallity.	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_STUCK_OFF (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF	=	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 syncrhonizer 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_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 S_OOSPOS_OFF)	<=	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 (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_ON)	=	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_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 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 (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	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_B_TO_A test case (6), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF (Synchronizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_ON) OR	>	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 (Synchronizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_ON) OR	=	True		
			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 (Synchronizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_OFF)	>	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 (Synchronizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	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	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_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 (Synchronizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm	**Enable Conditions:**	Synchronizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF		True	Runs continuously	A
		The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionallity.	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_STUCK_OFF (Synchronizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF	=	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 syncrhonizer 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 (Synchronizer 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 (Synchronizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_ON)	=	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 (Synchronizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	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 (Synchronizer pressure control C_SPV_4 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	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 (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_ON) 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 (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_ON) 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 (Synchronizer 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 (Synchronizer pressure control C_SPV_3 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	True		
							Confirmation count	Synchronizer integrity synchronizer pressure control valve stuck off fault test suite confirmation runs	=	1		
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 (Synchronizer pressure control C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm	**Enable Conditions:**	Synchronizer integrity intrusive routine triggered (1), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF		True	Runs continuously	A
		The synchronizer recovery routine uses the synchronizer integrity routine as part of its functionallity.	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 (Synchronizer pressure control C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_ON)	<=	100	µm		Synchronizer integrity routine running conditions (2), see Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF	=	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 syncrhonizer 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_STUCK_OFF (Synchronizer pressure control C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	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_STUCK_OFF (Synchronizer pressure control C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_ON)	=	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_STUCK_OFF (Synchronizer pressure control C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_OFF)	<=	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_STUCK_OFF (Synchronizer pressure control C_SPV_5 actuation with selector position target hydraulically S_OOSPOS_OFF)	=	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 syncrhonizer interity 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		

Summary table attachments C_SID_ASV_CMP_VA_PRS_LSD			
(1) Limited slip differential pressure reovery routine request			
The limited slip differential recovery rouitne is request when a DTC is set for:			
Limited slip differential pressure control system diagnostic		C2A18, C2A19	
Limited slip differential pressure sensor dirift out-of-window		P0879	
Limited slip differential pressure control valve mechanically stuck off		P2808	
Limited slip differential pressure control valve mechanically stuck on		P2809	
Limited slip differential redundant shutdown valve mechanically stuck off		P2817	
Limited slip differential redundant shutdown valve mechanically stuck on		P2818	
(2) Limited slip differential reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Transmission oil temperature	>=	50	°C
Electrical fault acitve for the limited slip differential pressure sensor	=	False	
Elecrical fault active for the limited slip differential pressure control valve	=	False	
Electrical fault active for the limited slip differential redundant shutdown valve	=	False	
Engine speed	>=	500	rpm
Absolute vehicle speed	<=	2	kph
Maximum system pressure target overrule value	>=	10	bar
Minimum system pressure target overrule value	<=	20	bar

Summary table attachments C_SID_ASV_CMP_VA_PRS_SY_STUCK_OFF

(1) Trigger conditions for the synchronizer integrity routine per clutch shaft

The synchronizer integrity routine is triggered for a clutch shaft when

Transmission engaged gear for the clutch shaft based on rod position sensor information or based on speed sensor information does not match with engaged gears stored in non-volatile memory	=	True	
OR			
A performance DTC was set for a syncrhonizer shift related item corresponding the clutch shaft:			
DTC set for Gear control failure for the clutch shaft	=	P073F, P072C, P1946, P074B, P072E, P1948, P074D, P073A, P194A, P074F, P073C, P194C	Odd clutch shaft synchronizer recovery routine trigger
		P074A, P072D, P1947, P074C, P072F, P1949, P074E, P073B, P194B, P07D8, P07D7, P194D, P073E, P072B, P194E	Even clutch shaft synchronizer recovery routine trigger
DTC set for Rod position sensor consistency fault for a rod corresponding to the clutch shaft	=	P2832, P2837	Odd clutch shaft synchronizer recovery routine trigger
		P283C, P2841, P2864	Even clutch shaft synchronizer recovery routine trigger
DTC set for Synchronizer pressure valve stuck off fault corresponding to the clutch shaft	=	P08C4, P27B9	Odd clutch shaft synchronizer recovery routine trigger
		P27C1, P27C9, P27D1	Even clutch shaft synchronizer recovery routine trigger

DTC set for Synchronizer pressure valve stuck on fault corresponding to the clutch shaft	=	P08C5, P27BA	Odd clutch shaft synchronizer recovery routine trigger
		P27C2, P27CA, P27D2	Even clutch shaft synchronizer recovery routine trigger
DTC set for Unintended rod movmenet fault for a rod corresponding to the clutch shaft	=	P284D, P284E	Odd clutch shaft synchronizer recovery routine trigger
		P284F, P2850, P286A	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector spool stuck off fault corresponding to the clutch shaft	=	P1957	Odd clutch shaft synchronizer recovery routine trigger
		P1959	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector spool stuck on fault corresponding to the clutch shaft	=	P1956	Odd clutch shaft synchronizer recovery routine trigger
		P1958	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector mechanism stuck off fault	=	P1950	Odd and even clutch shaft synchronizer recovery routine trigger
DTC set for Selector mechanism stuck on fault	=	P194F	Odd and even clutch shaft synchronizer recovery routine trigger
(2) Running conditions for the synchronizer integrity routine			
Hydraulic power available	=	True	
System pressure too low condition	=	False	
System pressure	<=	4.5	bar
System pressure too low confirmation time	>=	50	ms
Diagnostic reset event	=	False	
Time since last synchronizer shift completion	>	2000	ms
Rod drift correction active	=	False	
No adapation routine with exception of the syncrhonizer recovery routine is active	=	True	
In case the synchronizer recovery routine is triggered by the setting of a DTC following conditions are additionally checked:			
Request clutch equals to target clutch	=	True	
Target clutch equal to actual driving clutch	=	True	
Target gear equals the current gear for the clutch shaft	=	True	
Stable time for clutch and gear conditions	>=	5000	ms
Clutch shaft equal to actual clutch		False	
System pressure target overrule maximum overrule	>=	10	bar
System pressure target overrule minimum overrule	<=	20	bar
Time since last recovery routine run for a gear corresponding to the clutch shaft	>=	30000	ms

In case the synchronizer recovery routine is triggered by the power up check of the gears			
No extra conditions are checked			
(3) Conditions for a synchronizer integrity test case			
Synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	
Opposite synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	
Synchronizer position sensor corresponding to the test electrical fault detected	=	False	
Selector cannot be controlled in the target position for the test case due to an electrical fault	=	False	
Selector pilot valve electrical fault no current	=	True	
Selector hydraulic target position for the test	=	S_OOSPOS_OFF	
OR			
Selector pilot valve electrical fault high current	=	True	
Selector hydraulic target position for the test	=	S_OOSPOS_ON	
Test inhibit by potential gear disengagement for intented rod movement (4)	=	False	
OR			
Absolute vehicle speed	<	10	kph
OR			
Gear that could be disengaged unintentionally is already faulted	=	True	
Test inhibit by potential gear disengagement for complement rod movement (5)	=	False	
OR			
Absolute vehicle speed	<	10	kph
OR			
Inverse selector hydraulic state for the test case	=	S_OOSPOS_ON	
Synchronizer recovery routine is active	=	True	
The selector was verified to be operational for the hydraulic S_OOSPOS_ON position during this instance of the synchronizer recovery routine run	=	True	
OR			
Inverse selector hydraulic state for the test case	=	S_OOSPOS_OFF	
Synchronizer recovery routine is active	=	True	
The selector was verified to be operational for the hydraulic S_OOSPOS_OFF position during this instance of the synchronizer recovery routine run	=	True	
(4) Test inhibit by potential gear disengagement for intended rod movement			
Currently engaged gear located at the A side	=	True	
Intended rod movement direction for current test case	=	A to B	
Intended move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
OR			
Currently engaged gear located at the B side	=	True	
Intended rod movement direction for current test case	=	B to A	
Intended move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
(5) Test inhibited by potential gear disengagement for complement rod movement			
Currently engaged gear located at the A side	=	True	
Complement rod movement direction for current test case	=	A to B	
Complement move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
OR			

Currently engaged gear located at the B side	=	True	
Complement rod movement direction for current test case	=	B to A	
Complement move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
(6) Synchronizer integrity test details			
Intended rod movement with PID control	=	500	µm
Test case finished when:			
Intended rod movement direction	=	A to B	
Difference between rod position measurement and rod position at start of test case	>	250	µm
OR			
Intended rod movement direction	=	B to A	
Difference between rod position at start of test case and rod position measurement	>	250	µm
OR			
Complement rod movement direction	=	A to B	
Difference between complement rod position measurement and complement rod position at start of test case	>	500	µm
OR			
Complement rod movement direction	=	B to A	
Difference between complement rod position at start of test case and complement rod position measurement	>	500	µm
OR			
Test case time	>	500	µm

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Shift solenoid 1 is hydraulically stuck on	P08C5	This diagnostic detects a syncrhonizer pressure control valve hydraulic stuck on fault. This is done by analyzing rod movement during and shortly after a selector position change. 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. If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding syncrhonizer pressure control valve is determined and considered suspicious hydraulically stuck on. 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 on		**Enable Conditions:**	Diagnostic reset event active	=	False		Runs continuously	A
			Difference between C_ROD_1 position at start of selector change and C_ROD_1 position measured (unintended rod movement detected)	>=	1000	µm		Time since start of selector pilot valve position target change	<	200	ms		
			Difference between C_ROD_2 position at start of selector change and C_ROD_2 position measured (rod relaxation detected)	>=	125	µm		Electrical fault for C_ROD_1 position sensor active	=	False			
								Electrical fault for C_ROD_2 position sensor active	=	False			
			OR					Electrical fault for synchronizer pressure valve C_SPV_1 active	=	False			
								Electrical fault for synchronizer pressure valve C_SPV_2 active	=	False			
			Selector target position	=	Hydraulic off			C_ROD_1 force target	=	0	N		
			Difference between C_ROD_2 position at start of selector change and C_ROD_2 position measured (unintended rod movement detected)	>=	1000	µm		C_ROD_2 force target	=	0	N		
			Difference between C_ROD_1 position at start of selector change and C_ROD_1 position measured (rod relaxation detected)	>=	125	µm		Application state is equal to error state	=	False			
								Application state is equal to bypass state	=	False			
Shift solenoid 2 is hydraulically stuck on	P27BA	This diagnostic detects a syncrhonizer pressure control valve hydraulic stuck on fault. This is done by analyzing rod movement during and shortly after a selector position change. 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. If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding syncrhonizer pressure control valve is determined and considered suspicious hydraulically stuck on. 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 on		**Enable Conditions:**	Diagnostic reset event active	=	False		Runs continuously	A
			Difference between C_ROD_1 position at start of selector change and C_ROD_1 position measured (unintended rod movement detected)	>=	1000	µm		Time since start of selector pilot valve position target change	<	200	ms		
			Difference between C_ROD_2 position at start of selector change and C_ROD_2 position measured (rod relaxation detected)	>=	125	µm		Electrical fault for C_ROD_1 position sensor active	=	False			
								Electrical fault for C_ROD_2 position sensor active	=	False			
			OR					Electrical fault for synchronizer pressure valve C_SPV_2 active	=	False			
								Electrical fault for synchronizer pressure valve C_SPV_1 active	=	False			
			Selector target position	=	Hydraulic off			C_ROD_1 force target	=	0	N		
			Difference between C_ROD_2 position at start of selector change and C_ROD_2 position measured (unintended rod movement detected)	>=	1000	µm		C_ROD_2 force target	=	0	N		
			Difference between C_ROD_1 position at start of selector change and C_ROD_1 position measured (rod relaxation detected)	>=	125	µm		Application state is equal to error state	=	False			

								Application state is equal to bypass state	=	False			
Shift solenoid 3 is hydraulically stuck on	P27C2	This diagnostic detects a syncrhonizer pressure control valve hydraulic stuck on fault.	Selector target position	=	Hydraulic on		Enable Conditions:	Diagnostic reset event active	=	False		Runs continuously	A
		This is done by analyzing rod movement during and shortly after a selector position change. 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. If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding syncrhonizer pressure control valve is determined and considered suspicious hydraulically stuck on. If the other rod movement corresponding to this synchronizer pressure control valve shows relaxation, the synchronizer pressure control valve is diangosed hydraulically stuck on.	Difference between C_ROD_3 position at start of selector change and C_ROD_3 position measured (unintended rod movement detected)	>=	1000	µm		Time since start of selector pilot valve position target change	<	200	ms		
			Difference between C_ROD_4 position at start of selector change and C_ROD_4 position measured (rod relaxation detected)	>=	125	µm		Electrical fault for C_ROD_3 position sensor active	=	False			
								Electrical fault for C_ROD_4 position sensor active	=	False			
			OR					Electrical fault for synchronizer pressure valve C_SPV_3 active	=	False			
								Electrical fault for synchronizer pressure valve C_SPV_4 active	=	False			
			Selector target position	=	Hydraulic off			C_ROD_3 force target	=	0	N		
			Difference between C_ROD_4 position at start of selector change and C_ROD_4 position measured (unintended rod movement detected)	>=	1000	µm		C_ROD_4 force target	=	0	N		
			Difference between C_ROD_3 position at start of selector change and C_ROD_3 position measured (rod relaxation detected)	>=	125	µm		Application state is equal to error state	=	False			
								Application state is equal to bypass state	=	False			
Shift solenoid 4 is hydraulically stuck on	P27CA	This diagnostic detects a syncrhonizer pressure control valve hydraulic stuck on fault.	Selector target position	=	Hydraulic on		Enable Conditions:	Diagnostic reset event active	=	False		Runs continuously	A
		This is done by analyzing rod movement during and shortly after a selector position change. 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. If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding syncrhonizer pressure control valve is determined and considered suspicious hydraulically stuck on. If the other rod movement corresponding to this synchronizer pressure control valve shows relaxation, the synchronizer pressure control valve is diangosed hydraulically stuck on.	Difference between C_ROD_3 position at start of selector change and C_ROD_3 position measured (unintended rod movement detected)	>=	1000	µm		Time since start of selector pilot valve position target change	<	200	ms		
			Difference between C_ROD_4 position at start of selector change and C_ROD_4 position measured (rod relaxation detected)	>=	125	µm		Electrical fault for C_ROD_3 position sensor active	=	False			
								Electrical fault for C_ROD_4 position sensor active	=	False			
			OR					Electrical fault for synchronizer pressure valve C_SPV_4 active	=	False			
								Electrical fault for synchronizer pressure valve C_SPV_3 active	=	False			
			Selector target position	=	Hydraulic off			C_ROD_3 force target	=	0	N		
			Difference between C_ROD_4 position at start of selector change and C_ROD_4 position measured (unintended rod movement detected)	>=	1000	µm		C_ROD_4 force target	=	0	N		
			Difference between C_ROD_3 position at start of selector change and C_ROD_3 position measured (rod relaxation detected)	>=	125	µm		Application state is equal to error state	=	False			

								Application state is equal to bypass state	=	False			
Shift solenoid 5 is hydraulically stuck on	P27D2	This diagnostic detects a syncrhonizer pressure control valve hydraulic stuck on fault.	Selector target position	=	Hydraulic on		**Enable Conditions:**	Diagnostic reset event active	=	False		Runs continuously	A
		This is done by analyzing rod movement during and shortly after a selector position change. 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. If the changing of the selector position is followed by a detected unintentional rod movement, the corresponding syncrhonizer pressure control valve is determined and considered suspicious hydraulically stuck on. If the other rod movement corresponding to this synchronizer pressure control valve shows relaxation, the synchronizer pressure control valve is diangosed hydraulically stuck on.	Difference between C_ROD_5 position at start of selector change and C_ROD_5 position measured (unintended rod movement detected)	>=	4000	µm		Time since start of selector pilot valve position target change	<	200	ms		
								Electrical fault for C_ROD_5 position sensor active	=	False			
			OR					Electrical fault for synchronizer pressure valve C_SPV_5 active	=	False			
								C_ROD_5 force target	=	0	N		
			Selector target position	=	Hydraulic off			Application state is equal to error state	=	False			
			Difference between C_ROD_5 position at start of selector change and C_ROD_5 position measured (unintended rod movement detected)	>=	4000	µm		Application state is equal to bypass state	=	False			

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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 routinte which is triggered by the setting of system pressure control system or component diangostic failure. 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.	Current profile check consistently indicated fail for the system pressure pilot valve	=	True		**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	B
			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 consistenly indicates fail, the system pressure pilot valve is diagnosed stuck.						Transmission oil temperature	>=	60	°C		
		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.						Engine speed during forced zero current on the system pressure pilot valve	<=	2000	rpm		
		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.						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		
System pressure pilot valve stuck off	P2723	This diagnostic detects a system pressure pilot valve stuck on fault. This is done by use of the system pressure recovery routinte which is triggered by the setting of system pressure control system or component diangostic failure. 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.	Current profile check consistently indicated fail for the system pressure pilot valve	=	True		**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	A
			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 consistenly indicates fail, the system pressure pilot valve is diagnosed stuck.				Transmission oil temperature	>=	60	°C		
		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.				Engine speed during forced zero current on the system pressure pilot valve	<=	2000	rpm		
		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.				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		

Summary table attachments C_SID_ASV_CMP_VA_PRS_SYS			
(1) System pressure reovery routine request			
The system pressure recovery rouitne is requested for a clutch when a DTC is set for:			
System pressure control too high system diagnostic		P0869	
System pressure control too low system diagnostic		P0868	
A temporary drop in system pressure timer	>=	15000	ms
System pressure pilot valve mechanically stuck off		P2723	
System pressure pilot valve mechanically stuck on		'P2724	
System pressure relief valve mechanically stuck		P1955	
(2) System pressure reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Odd clutch pressure request	<=	8	bar
Even clutch pressure request	<=	8	bar
Limited slip differential pressure request	<=	8	
IF clutch is selected for the system pressure sensor consistency check			
Selected clutch for consistency check is equal to the actual clutch	=	False	
Selected clutch for consistency check is equal to the target clutch	=	False	
Selected clutch for consistency check is equal to the requested clutch	=	False	
Selected clutch for consisntecy check is unavailable due to diagnostic faults	=	False	
Transmission clutch state	!=	Launch	
Transmission clutch state	!=	Shift	
Maximum system pressure target overrule value	>=	13.5	bar
Minimum system pressure target overrule value	<=	20	bar
Electrical fault active for the system pressure sensor	=	False	
Electrical fautl active for the system pressure pilot valve	=	False	
(3) Target system pressure steps checks			
The first step of the system pressure recovery routine checks if the system pressure can be controlled against different pressure targets:			
System pressure step targets	=	[10 15 20 15 10]	bar
System pressure step target tollerances for measured pressure against target pressure	=	[2.5 2.5 2.5 2.5 2.5]	bar
System pressure step target reached confirmation time	=	500	ms
System pressure step target not reached timeout	=	2000	ms
(4) System pressure sensor consistency check against cluth pressure			
The system pressure sensor is verified against a clutch pressure sensor during the system pressure recovery routine			
Odd or even clutch is available to perform the system pressure consistency check: clutch is not in use and is not faulted	=	True	

Neutral gear is engaged for the selected clutch shaft (this is requested by the system pressure recovery routine)	=	True	
The system pressure sensor consistency check passes when:			
Open loop system pressure targets used during this check	=	[12 18]	bar
Pressure difference between the system pressure and the clutch pressure of the selected clutch	<	[2.5 2.5]	bar
System pressure match with clutch pressure confirmation time	=	300	ms

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Clutch 1 Rsp stuck off	P0796	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. 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. 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.	Current profile check failed for the odd redundant shutdown valve (ORSV)	= True	**Enable Conditions:** Diagnostic reset event	= False	Runs Continuously	A
					Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_OFF	= True		
					Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_OFF	= True		
					Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	= False		
					Odd clutch redundant shutdown valve stuck on fault detected druing this instance of the odd clutch recovery routine	= False		
					Time zero current is commanded for the odd clutch redundant shutdown valve before triggering the current profile check	= 100 ms		
					Fault confirmation Odd clutch redundant shutdown valve current profile check consist fail confirmation count	= 3 count		
Clutch 2 Rsp stuck off	P2714	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. 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. 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.	Current profile check failed for the even redundant shutdown valve (ERSV)	= True	**Enable Conditions:** Diagnostic reset event	= False	Runs Continuously	A
					Even clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_OFF	= True		
					Even clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_OFF	= 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		

						Time zero current is commanded for the even clutch redundant shutdown valve before triggering the current profile check	=	100	ms		
					Fault confirmation	Even clutch redundant shutdown valve current profile check consist fail confirmation count	=	3	count		

Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_OFF			
(1) Clutch pressure reovery routine request			
The clutch recovery rouitne is request for a clutch when a DTC is set for:			
Clutch pressure control system diagnostic		P2855, P2853	Odd clutch recovery trigger
		P2856, P2854	Even clutch recovery trigger
Clutch pressure sensor dirift out-of-window		P0844	Odd clutch recovery trigger
		P0849	Even clutch recovery trigger
Clutch pressure control valve mechanically stuck off		P0746	Odd clutch recovery trigger
		P0776	Even clutch recovery trigger
Clutch pressure control valve mechanically stuck on		P0747	Odd clutch recovery trigger
		P0777	Even clutch recovery trigger
Clutch redundant shutdown valve mechanically stuck off		P0796	Odd clutch recovery trigger
		P2714	Even clutch recovery trigger
Clutch redundant shutdown valve mechanically stuck on		P0797	Odd clutch recovery trigger
		P2715	Even clutch recovery trigger
(2) Clutch pressure reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Current engaged gear for the corresponding clutch shaft		Neutral	
Clutch cooling flow	<=	30	lpm
Transmission oil temperature	>=	50	°C
Clutch preload pressure learned at end-of-line	=	True	
Maximum clutch flow available	>=	3.5	lpm
Electrical fault acitve for the clutch pressure sensor	=	False	
Elecrical fault active for the clutch pressure control valve	=	False	
Electrical fault active for the clutch redundant shutdown valve	=	False	
Engine speed	>=	500	rpm
Maximum system pressure target overrule value	>=	13.5	bar
Minimum system pressure target overrule value	<=	20	bar

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions		Time Required	MIL illum.
Clutch 1 Rsp stuck on	P0797	This diagnostic detects a clutch redundant shutdown valve hydraulically stuck onn fault. 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. 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.	Current odd clutch pressure	>	1	bar	**Enable Conditions:**	Diagnostic reset event	=	False	Runs Continuously	A
								Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_ON	=	True		
								Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_ON	=	True		
								Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False		
								OR				
								Time based clutch pressure valve cleaning request (3), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_ON	=	True		
								Time based clutch pressure valve run conditions met (4), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_ON	=	True		
Clutch 2 Rsp stuck on	P2715	This diagnostic detects a clutch redundant shutdown valve hydraulically stuck onn fault. 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. 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.	Current even clutch pressure	>	1	bar	**Enable Conditions:**	Diagnostic reset event	=	False	Runs Continuously	A
								Odd clutch pressure recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_ON	=	True		
								Odd clutch pressure recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_ON	=	True		
								Odd clutch pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False		
								OR				
								Time based clutch pressure valve cleaning request (3), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_ON	=	True		
								Time based clutch pressure valve run conditions met (4), see Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_ON	=	True		

Summary table attachments C_SID_ASV_CMP_VA_RSP_CLU_STUCK_ON			
(1) Clutch pressure reovery routine request			
The clutch recovery rouitne is request for a clutch when a DTC is set for:			
Clutch pressure control system diagnostic		P2855, P2853	Odd clutch recovery trigger
		P2856, P2854	Even clutch recovery trigger
Clutch pressure sensor dirift out-of-window		P0844	Odd clutch recovery trigger
		P0849	Even clutch recovery trigger
Clutch pressure control valve mechanically stuck off		P0746	Odd clutch recovery trigger
		P0776	Even clutch recovery trigger
Clutch pressure control valve mechanically stuck on		P0747	Odd clutch recovery trigger
		P0777	Even clutch recovery trigger
Clutch redundant shutdown valve mechanically stuck off		P0796	Odd clutch recovery trigger
		P2714	Even clutch recovery trigger
Clutch redundant shutdown valve mechanically stuck on		P0797	Odd clutch recovery trigger
		P2715	Even clutch recovery trigger
(2) Clutch pressure reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Current engaged gear for the corresponding clutch shaft		Neutral	
Clutch cooling flow	<=	30	lpm
Transmission oil temperature	>=	50	°C
Clutch preload pressure learned at end-of-line	=	True	
Maximum clutch flow available	>=	3.5	lpm
Electrical fault active for the clutch pressure sensor	=	False	
Elecrical fault active for the clutch pressure control valve	=	False	
Electrical fault active for the clutch redundant shutdown valve	=	False	
Engine speed	>=	500	rpm
Maximum system pressure target overrule value	>=	13.5	bar
Minimum system pressure target overrule value	<=	20	bar
(3) Time based clutch pressure valve cleaning request			
Clutch pressure valve cleaning first request time for the power cycle	=	180 (Odd clutch)	s
		180.6 (Even clutch)	s
Clutch pressure valve cleaning repeat request time for the reset of the power cycle	=	120 (Odd clutch)	s
		120 (Even clutch)	s
(4) Time based clutch pressure valve cleaning run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	

Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Transmission oil temperature	>=	30	°C
Clutch cooling flow	<=	60	lpm
Electrical fault active for the clutch pressure sensor	=	False	
Elecrical fault active for the clutch pressure control valve	=	False	
Clutch balancing room is being filled	=	False	
No recent synchronizer or clutch actuation			
Synchonizer shift busy	=	False	
Clutch shift busy	=	False	
Rod drift correction active	=	False	
Synchronizer integrity troutine active	=	False	
No recent synchronizer or clutch actuation timer	>=	1000	ms
Time since last clutch valve cleaning actuation	>=	100000	ms
Clutch control phase	=	Open	
Clutch preload pressure learned at end-of-line	=	True	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters		Enable Conditions			Time Required	MIL illum.
LSD Rsp stuck off	P2817	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. 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. The limited slip differential pressure redudant shutdown valve is further verified for functionallity 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.	Current profile check failed for the limited slip differential redundant shutdown valve (ERSV)	=	True	**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	B
							Limited slip differential recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_RSP_LSD_STUCK_OFF	=	True			
							Limited slip differential recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_RSP_LSD_STUCK_OFF	=	True			
							Limited slip differential pressure sensor out-of-window drift fault detected during this instance of the odd clutch recovery routine	=	False			
							Limited slip differential redundant shutdown valve stuck on fault detected during this instance of the odd clutch recovery routine	=	False			
						Fault confirmation time		=	3	count		

Summary table attachments C_SID_ASV_CMP_VA_RSP_LSD_STUCK_OFF			
(1) Limited slip differential pressure reovery routine request			
The limited slip differential recovery rouitne is request when a DTC is set for:			
Limited slip differential pressure control system diagnostic		C2A18, C2A19	
Limited slip differential pressure sensor dirift out-of-window		P0879	
Limited slip differential pressure control valve mechanically stuck off		P2808	
Limited slip differential pressure control valve mechanically stuck on		P2809	
Limited slip differential redundant shutdown valve mechanically stuck off		P2817	
Limited slip differential redundant shutdown valve mechanically stuck on		P2818	
(2) Limited slip differential reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Transmission oil temperature	>=	50	°C
Electrical fault acitve for the limited slip differential pressure sensor	=	False	
Elecrical fault active for the limited slip differential pressure control valve	=	False	
Electrical fault active for the limited slip differential redundant shutdown valve	=	False	
Engine speed	>=	500	rpm
Absolute vehicle speed	<=	2	kph
Maximum system pressure target overrule value	>=	10	bar
Minimum system pressure target overrule value	<=	20	bar

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions		Time Required	MIL illum.
LSD Rsp stuck on	P2818	This diagnostic detects a limited slip differential redundant shutdown valve hydraulically stuck on fault. 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. 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.	Current limited slip differential pressure	>	1	bar	**Enable Conditions:**	Diagnostic reset event	=	False	Runs Continuously	B
								Limited slip differential recovery routine is requested (1), see Summary table attachments C_SID_ASV_CMP_VA_RSP_LSD_STUCK_OFF	=	True		
								Limited slip differentail recovery routine run conditions met (2), see Summary table attachments C_SID_ASV_CMP_VA_RSP_LSD_STUCK_OFF	=	True		
								Limited slip differential sensor out-of-window drift fault detected during this instance of the limited slip differential recovery routine	=	False		
								OR				
								Time based limited slip differential pressure valve cleaning request (3), see Summary table attachments C_SID_ASV_CMP_VA_RSP_LSD_STUCK_OFF	=	True		
								Time based limited slip differential pressure valve run conditions met (4), see Summary table attachments C_SID_ASV_CMP_VA_RSP_LSD_STUCK_OFF	=	True		

Summary table attachments C_SID_ASV_CMP_VA_RSP_LSD_STUCK_OFF			
(1) Limited slip differential pressure reovery routine request			
The limited slip differential recovery rouitne is request when a DTC is set for:			
Limited slip differential pressure control system diagnostic		C2A18, C2A19	
Limited slip differential pressure sensor dirift out-of-window		P0879	
Limited slip differential pressure control valve mechanically stuck off		P2808	
Limited slip differential pressure control valve mechanically stuck on		P2809	
Limited slip differential redundant shutdown valve mechanically stuck off		P2817	
Limited slip differential redundant shutdown valve mechanically stuck on		P2818	
(2) Limited slip differential reovery routine run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Transmission oil temperature	>=	50	°C
Electrical fault acitve for the limited slip differential pressure sensor	=	False	
Elecrical fault active for the limited slip differential pressure control valve	=	False	
Electrical fault active for the limited slip differential redundant shutdown valve	=	False	
Engine speed	>=	500	rpm
Absolute vehicle speed	<=	2	kph
Maximum system pressure target overrule value	>=	10	bar
Minimum system pressure target overrule value	<=	20	bar
(3) Time based limited slip differential pressure valve cleaning request			
Limited slip differential pressure valve cleaning first request time for the power cycle	=	360	s
Limited slip differential pressure valve cleaning repeat request time for the reset of the power cycle	=	120	s
(4) Time based limited slip differential pressure valve cleaning run conditions			
Transmission clutch and gear actuation stable			
Requested clutch equal to target clutch	=	True	
Target clutch equal to actual clutch	=	True	
Requested gear for odd clutch shaftequal to target gear for odd clutch shaft	=	True	
Target gear for odd clutch shaft equal to current engaged gear for odd clutch shaft	=	True	
Requested gear for even clutch shaftequal to target gear for even clutch shaft	=	True	
Target gear even odd clutch shaft equal to current engaged gear for even clutch shaft	=	True	
Transmission clutch and gear actuation stable timer	>=	5000	ms
Transmission oil temperature	>=	0	°C
Clutch cooling flow	<=	30	lpm
Electrical fault active for the limited slip differential pressure control valve	=	False	
Elecrical fault active for the limite slip differential redundant shutdown valve	=	False	
Electrical fault active for the limited slip differential pressure sensor	=	False	

Consistency fault active for the limited slip differential pressure sensor	=	False	
Engine speed	>=	300	rpm
Engine speed	<=	1000	rpm
Wheel brake torque	>=	500	Nm
Throttle pedal	<=	0	%
Limited slip differential clutch slip	<=	5	rpm
Limited slip differential clutch torque target	<=	50	Nm
Time since last limited slip valve clleaning run	>=	30000	ms

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Incorrect adaptation data	P287C	At controller initilization, 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				
			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					
			Limited slip differential kisspoint pressure end-of-line data invalid	=	True					
			End-of-line data version loaded not compatable 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 rotuine 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 rotuine 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	
			Parking lock positions end-of-lie learn routine not finished successfully	= True	Parking lock positions end-of-lien learn routine triggered by operator/mechanic	= True	Runs continuously	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Odd clutch driving gear lost	P277E	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. When syncrhonizer differential speed for the current driving gear is detected while the clutch is not slipping, the gear is diagnosed unintentionally mechanically disengaged.	Engaged gear for the synchronizer corresponding to the driving gear based on speed sensor information indicates neutral (1), see Summary table attachments C_SID_ASV_SYS_GEAR_ACT_LOST Odd clutch slip	True < 50 rpm	**Enable Conditions:** Driving gear selected Synchronizer shift busy for an odd gear synchronizer Driving gear corresponds to odd gear shaft Driving gear equals logical engaged gear on odd clutch shaft **Fault confirmation time:**	= True False = True = True 1000 ms	Runs Continuously	A
Even clutch driving gear lost	P277F	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. When syncrhonizer differential speed for the current driving gear is detected while the clutch is not slipping, the gear is diagnosed unintentionally mechanically disengaged.	Engaged gear for the synchronizer corresponding to the driving gear based on speed sensor information indicates neutral (1), see Summary table attachments C_SID_ASV_SYS_GEAR_ACT_LOST Even clutch slip	True < 50 rpm	**Enable Conditions:** Driving gear selected Synchronizer shift busy for an even gear synchronizer Driving gear corresponds to even gear shaft Driving gear equals logical engaged gear on even clutch shaft **Fault confirmation time:**	= True False = True = True 1000 ms	Runs Continuously	A

Summary table attachments C_SID_ASV_SYS_GEAR_ACT_LOST			
(1) Engaged gear for the synchronizer corresponding to the driving gear based on speed sensor information indicates neutral if			
Neutral detection at standstill condition (2)			
OR			
Neutral detection while driving condition (3)			
(2) Neutral detection at standstill condition			
Electrical or consistency clutch speed sensor fault	=	False	
Consistency clutch speed sensor fault		False	
Absolute output speed	<	5	rpm
Absolute clutch speed	>	550	rpm
Confirmation time	=	300	ms
(3) Neutral detection while driving condition			
Electrical or consistency clutch speed sensor fault	=	False	
Consistency clutch speed sensor fault		False	
Absolute output speed	>=	100	rpm
Absolute clutch speed	>=	400	rpm
Synchronizer gear(s) calculated differential speed	>	150	rpm

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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	>=	600	µm	**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	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					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			
		If the rod positon 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_1 to neutral	>=	200	N		C_ROD_1 position sensor diagnosed ok by the syncrhonizer 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.						C_ROD_1 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 2 performance	P1947	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_4 positon and the learned rod neutral position	>=	600	µm	**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	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					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			
		If the rod positon 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_4 to neutral	>=	200	N		C_ROD_4 position sensor diagnosed ok by the syncrhonizer 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.						C_ROD_4 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 3 performance	P1948	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	>=	600	µm	**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	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					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			
		If the rod positon 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_1 to neutral	>=	200	N		C_ROD_1 position sensor diagnosed ok by the syncrhonizer 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.						C_ROD_1 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 4 performance	P1949	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 measuredC_ROD_3 positon and the learned rod neutral position	>=	600	µm	**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	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					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			
		If the rod positon 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 syncrhonizer 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.						C_ROD_3 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 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 positon and the learned rod neutral position	>=	600	µm	**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	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					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			

		If the rod positon 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 syncrhonizer 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.						C_ROD_2 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 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 positon and the learned rod neutral position	>=	600	µm	**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	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					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			
		If the rod positon 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 syncrhonizer 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.						C_ROD_3 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 positon and the learned rod neutral position	>=	600	µm	**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	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					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			
		If the rod positon 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 syncrhonizer 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.						C_ROD_2 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 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. 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.	Difference between measured C_ROD_5 positon and the learned rod neutral position	>=	600	µm	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	A
			OR					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			
		If the rod positon 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_5 to neutral	>=	200	N		C_ROD_5 position sensor diagnosed ok by the syncrhonizer 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.						C_ROD_5 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 R performance	P194E	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. 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.	Difference between measured C_ROD_4 positon and the learned rod neutral position	>=	600	µm	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	A
			OR					Synchronizer integrity routine running conditions (1), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED	=	True			
		If the rod positon 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_4 to neutral	>=	200	N		C_ROD_4 position sensor diagnosed ok by the syncrhonizer 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.						C_ROD_4 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		

Summary table attachments C_SID_ASV_SYS_GEAR_SY_BLOCKED			
(1) Running conditions for the synchronizer integrity routine			
Hydraulic power available	=	True	
System pressure too low condition	=	False	
System pressure	<=	4.5	bar
System pressure too low confirmation time	>=	50	ms
Diagnostic reset event	=	False	
Time since last synchronizer shift completion	>	2000	ms
Rod drift correction active	=	False	
No adapation routine with exception of the syncrhonizer recovery routine is active	=	True	
(2) Rod drift correction becomes and remains active if			
Electrical rod position sensor fault	=	False	
Consistency rod position sensor fault	=	False	
Electrical fault for a sycnrhonizer pressure valve used to move the rod	=	False	
Selector position fixed due to a fault AND			
Selector position needed to move the rod doesn't match target selector position needed for rod control	=	False	
Drifting rod contains the acutal driving gear		False	
(3) Conditions for a synchronizer integrity test case			
Synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	
Opposite synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	
Synchronizer position sensor corresponding to the test electrical fault detected	=	False	
Selector cannot be controlled in the target position for the test case due to an electrical fault	=	False	
Selector pilot valve electrical fault no current	=	True	
Selector target position for the test	=	Hydraulic on	
OR			
Selector pilot valve electrical fault high current	=	True	
Selector target position for the test	=	Hydraulic off	
(4) Synchronizer integrity test details			
Intended rod movement with PID control	=	500	µm
Test case finished when:			
Intended rod movement direction	=	A to B	
Difference between rod position measurement and rod position at start of test case	>	250	µm
OR			
Intended rod movement direction	=	B to A	
Difference between rod position at start of test case and rod position measurement	>	250	µm
OR			
Complement rod movement direction	=	A to B	
Difference between complement rod position measurement and complement rod position at start of test case	>	500	µm
OR			
Complement rod movement direction	=	B to A	

Difference between complement rod position at start of test case and complement rod position measurement	>	500	µm
OR			
Test case time	>	500	µm

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Stuck in Gear 1	P072C	This diagnotic 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	= True	**Enable Conditions:** Gear 1 disengagement requested	= True	Runs Continuously	A
			Shift fork position sensor 1 electrical or consistency fault detected during the shift.	= True	Gear 1 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		
			Gear disengagement actuation state timer	>= Gear disengagement actuation state timeout (2), see Summary table attachements	Application state is unequal to bypass state	= True		
					Fault confirmation Gear 1 disengagement attempts	>= 4 count		
Stuck in Gear 2	P072D	This diagnotic 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	= True	**Enable Conditions:** Gear 2 disengagement requested	= True	Runs Continuously	A
			Shift fork position sensor 4 electrical or consistency fault detected during the shift.	= True	Gear 2 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		
			Gear disengagement actuation state timer	>= Gear disengagement actuation state timeout (2), see Summary table attachements	Application state is unequal to bypass state	= True		
					Fault confirmation Gear 2 disengagement attempts	>= 4 count		
Stuck in Gear 3	P072E	This diagnotic 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	= True	**Enable Conditions:** Gear 3 disengagement requested	= True	Runs Continuously	A
			Shift fork position sensor 1 electrical or consistency fault detected during the shift.	= True	Gear 3 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		
			Gear disengagement actuation state timer	>= Gear disengagement actuation state timeout (2), see Summary table attachements	Application state is unequal to bypass state	= True		
					Fault confirmation Gear 3 disengagement attempts	>= 4 count		
Stuck in Gear 4	P072F	This diagnotic 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.	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		

		If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	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			
			Gear disengagement actuation state timer	>=	Gear disengagement actuation state timeout (2), see Summary table attachements		Application state is unequal to bypass state	=	True			
						Fault confirmation	Gear 4 disengagement attempts	>=	4	count		
Stuck in Gear 5	P073A	This diagnotic detects a stuck gear by monitoring gear disengagement attempts.	Synchronizer shift to neutral	=	True	**Enable Conditions:**	Gear 5 disengagement requested	=	True		Runs Continuously	A
		The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral.	Shift fork position sensor 2 electrical or consistency fault detected during the shift.	=	True		Gear 5 disengagement active	=	True			
		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.	OR				System pressure	>	4.5	bar		
		If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	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			
			Gear disengagement actuation state timer	>=	Gear disengagement actuation state timeout (2), see Summary table attachements		Application state is unequal to bypass state	=	True			
						Fault confirmation	Gear 5 disengagement attempts	>=	4	count		
Stuck in Gear 6	P073B	This diagnotic detects a stuck gear by monitoring gear disengagement attempts.	Synchronizer shift to neutral	=	True	**Enable Conditions:**	Gear 6 disengagement requested	=	True		Runs Continuously	A
		The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral.	Shift fork position sensor 3 electrical or consistency fault detected during the shift.	=	True		Gear 6 disengagement active	=	True			
		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.	OR				System pressure	>	4.5	bar		
		If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	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			
			Gear disengagement actuation state timer	>=	Gear disengagement actuation state timeout (2), see Summary table attachements		Application state is unequal to bypass state	=	True			
						Fault confirmation	Gear 6 disengagement attempts	>=	4	count		
Stuck in Gear 7	P073C	This diagnotic detects a stuck gear by monitoring gear disengagement attempts.	Synchronizer shift to neutral	=	True	**Enable Conditions:**	Gear 7 disengagement requested	=	True		Runs Continuously	A
		The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral.	Shift fork position sensor 2 electrical or consistency fault detected during the shift.	=	True		Gear 7 disengagement active	=	True			
		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.	OR				System pressure	>	4.5	bar		
		If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	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			
			Gear disengagement actuation state timer	>=	Gear disengagement actuation state timeout (2), see Summary table attachements		Application state is unequal to bypass state	=	True			
						Fault confirmation	Gear 7 disengagement attempts	>=	4	count		
Stuck in Gear 8	P07D7	This diagnotic detects a stuck gear by monitoring gear disengagement attempts.	Synchronizer shift to neutral	=	True	**Enable Conditions:**	Gear 8 disengagement requested	=	True		Runs Continuously	A

		The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral.	Shift fork position sensor 5 electrical or consistency fault detected during the shift.	=	True		Gear 8 disengagement active	=	True			
		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.	OR				System pressure	>	4.5	bar		
		If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	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			
			Gear disengagement actuation state timer	>=	Gear disengagement actuation state timeout (2), see Summary table attachements		Application state is unequal to bypass state	=	True			
						Fault confirmation	Gear 8 disengagement attempts	>=	4	count		
Stuck in Gear R	P072B	This diagnotic detects a stuck gear by monitoring gear disengagement attempts.	Synchronizer shift to neutral	=	True	**Enable Conditions:**	Gear R disengagement requested	=	True		Runs Continuously	A
		The gear disengagement can fail when a rod position sensor faults occurs during the actuation and the corresponding shift rod position target is neutral.	Shift fork position sensor 4 electrical or consistency fault detected during the shift.	=	True		Gear R disengagement active	=	True			
		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.	OR				System pressure	>	4.5	bar		
		If consecutive gear disengagement attempts fail, the gear is diagnosed stuck in gear.	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			
			Gear disengagement actuation state timer	>=	Gear disengagement actuation state timeout (2), see Summary table attachements		Application state is unequal to bypass state	=	True			
						Fault confirmation	Gear R disengagement attempts	>=	4	count		

Summary table attachments C_SID_ASV_SYS_GEAR_SY_DISEN			
(1) Gear disengagement actuation state transition conditions			
Gear disengament actuation state	=	Gear Neutral Init	
Transition conditons:			
Estimated Selector target position equal to selector target position	=	True	
Gear disengament actuation state	=	Gear Neutral Preload	
Transition conditions:			
Difference between normalized engaged position and normalized measured position	>	2000	µm
Clutch control phase	=	Open	
Gear disengament actuation state	=	Gear Neutral Disengage	
Transition conditions:			
Normalized measured position	<=	-1000	µm
Confirmation time	>=	0	ms
Gear disengament actuation state	=	Gear Neutral Engage	
Transition conditions:			
Absolute normalized measured position	<=	700	µm
Confirmation time	=	20	ms
(2) Gear disengagement actuation state state timeout			
Gear disengament actuation state	=	Gear Neutral Init	
State timeout = ...			
IF			
Estimated Selector target position equal to selector target position	=	True	
...	=	200	ms
ELSE IF			
Selector target positon	=	Hydraulic On	
...	=	450	ms
ELSE			
...	=	600	ms
Gear disengament actuation state	=	Gear Neutral Preload	
State timeout	=	1000	ms
Gear disengament actuation state	=	Gear Neutral Disengage	
State timeout is linear interpolation based on transmission oil temperature			
AXIS:			
Transmission oil temperature	=	[-40 0 40 80 120]	°C
TABLE:			
State timeout	=	[2000 1000 600 400 300]	ms
Gear disengament actuation state	=	Gear Neutral Engage	

State timeout	=	State timeout part 1 + State timeout part 2 (see below)	ms
State timeout part 1 = ...			
IF			
Estimated Selector target position equal to selector target position at start of gear disengagement actuation state Gear Neutral Engage	=	True	
...	=		ms
ELSE IF			
Selector target positon	=	Hydraulic Off	
...	=	400	ms
ELSE			
...	=	250	ms
State timeout part 2 is linear interpolation based on transmission oil temperature			
AXIS:			
Transmission oil temperature	=	[-40 0 40 80 120]	°C
TABLE:			
State part 2 timeout	=	[2000 1000 700 550 500]	ms

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Unable to Engage Gear 1	P073F	This diagnotic 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 attachements C_SID_ASV_SYS_GEAR_SY_EN Gear engagement actuation state timer OR Absolute synchronizer differential speed for the gear to engage	> Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYS_GEAR_SY_EN rpm = False >= Gear engagement actuation state timeout (3), see Summary table attachements > Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN	**Enable Conditions:** Gear 1 engagement requested Gear 1 engagement active System pressure Application state is unequal to error state Application state is unequal to bypass state **Fault confirmation** Gear 1 engagement attempts	= True = True > 4.5 bar = True = True >= 4 count	Runs Continuously	A
Unable to Engage Gear 2	P074A	This diagnotic 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 attachements C_SID_ASV_SYS_GEAR_SY_EN Gear engagement actuation state timer OR Absolute synchronizer differential speed for the gear to engage	> Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYS_GEAR_SY_EN rpm = False >= Gear engagement actuation state timeout (3), see Summary table attachements > Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN	**Enable Conditions:** Gear 2 engagement requested Gear 2 engagement active System pressure Application state is unequal to error state Application state is unequal to bypass state **Fault confirmation** Gear 2 engagement attempts	= True = True > 4.5 bar = True = True >= 4 count	Runs Continuously	A
Unable to Engage Gear 3	P074B	This diagnotic 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 attachements C_SID_ASV_SYS_GEAR_SY_EN Gear engagement actuation state timer OR Absolute synchronizer differential speed for the gear to engage	> Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYS_GEAR_SY_EN rpm = False >= Gear engagement actuation state timeout (3), see Summary table attachements > Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN	**Enable Conditions:** Gear 3 engagement requested Gear 3 engagement active System pressure Application state is unequal to error state Application state is unequal to bypass state **Fault confirmation** Gear 3 engagement attempts	= True = True > 4.5 bar = True = True >= 4 count	Runs Continuously	A

Unable to Engage Gear 4	P074C	This diagnotic 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 attachements C_SID_ASV_SYS_GEAR_SY_EN Gear engagement actuation state timer OR Absolute synchronizer differential speed for the gear to engage	> = >= >	Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYS_GEAR_SY_EN False Gear engagement actuation state timeout (3), see Summary table attachements Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN	rpm	**Enable Conditions:** **Fault confirmation**	Gear 4 engagement requested Gear 4 engagement active System pressure Application state is unequal to error state Application state is unequal to bypass state Gear 4 engagement attempts	= = > = = >=	True True 4.5 True True 4	 bar count	Runs Continuously	A
Unable to Engage Gear 5	P074D	This diagnotic 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 attachements C_SID_ASV_SYS_GEAR_SY_EN Gear engagement actuation state timer OR Absolute synchronizer differential speed for the gear to engage	> = >= >	Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYS_GEAR_SY_EN False Gear engagement actuation state timeout (3), see Summary table attachements Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN	rpm	**Enable Conditions:** **Fault confirmation**	Gear 5 engagement requested Gear 5 engagement active System pressure Application state is unequal to error state Application state is unequal to bypass state Gear 5 engagement attempts	= = > = = >=	True True 4.5 True True 4	 bar count	Runs Continuously	A
Unable to Engage Gear 6	P074E	This diagnotic 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 attachements C_SID_ASV_SYS_GEAR_SY_EN Gear engagement actuation state timer OR Absolute synchronizer differential speed for the gear to engage	> = >= >	Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYS_GEAR_SY_EN False Gear engagement actuation state timeout (3), see Summary table attachements Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN	rpm	**Enable Conditions:** **Fault confirmation**	Gear 6 engagement requested Gear 6 engagement active System pressure Application state is unequal to error state Application state is unequal to bypass state Gear 6 engagement attempts	= = > = = >=	True True 4.5 True True 4	 bar count	Runs Continuously	A

Unable to Engage Gear 7	P074F	This diagnotic 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	>	Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYS_GEAR_SY_EN	rpm	**Enable Conditions:**	Gear 7 engagement requested	=	True		Runs Continuously	A
			OR					Gear 7 engagement active	=	True			
			Gear engagement actuation state transition conditions met (2), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_EN	=	False			System pressure	>	4.5	bar		
			Gear engagement actuation state timer	>=	Gear engagement actuation state timeout (3), see Summary table attachements			Application state is unequal to error state	=	True			
			OR					Application state is unequal to bypass state	=	True			
			Absolute synchronizer differential speed for the gear to engage	>	Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN								
							Fault confirmation	Gear 7 engagement attempts	>=	4	count		
Unable to Engage Gear 8	P07D8	This diagnotic 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	>	Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYS_GEAR_SY_EN	rpm	**Enable Conditions:**	Gear 8 engagement requested	=	True		Runs Continuously	A
			OR					Gear 8 engagement active	=	True			
			Gear engagement actuation state transition conditions met (2), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_EN	=	False			System pressure	>	4.5	bar		
			Gear engagement actuation state timer	>=	Gear engagement actuation state timeout (3), see Summary table attachements			Application state is unequal to error state	=	True			
			OR					Application state is unequal to bypass state	=	True			
			Absolute synchronizer differential speed for the gear to engage	>	Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN								
							Fault confirmation	Gear 8 engagement attempts	>=	4	count		
Unable to Engage Gear R	P073E	This diagnotic 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	>	Maximum initial differential speed threshold for gear to engage (1) + 250, see Summary tabel attachments C_SID_ASV_SYS_GEAR_SY_EN	rpm	**Enable Conditions:**	Gear R engagement requested	=	True		Runs Continuously	A
			OR					Gear R engagement active	=	True			
			Gear engagement actuation state transition conditions met (2), see Summary table attachements C_SID_ASV_SYS_GEAR_SY_EN	=	False			System pressure	>	4.5	bar		
			Gear engagement actuation state timer	>=	Gear engagement actuation state timeout (3), see Summary table attachements			Application state is unequal to error state	=	True			
			OR					Application state is unequal to bypass state	=	True			
			Absolute synchronizer differential speed for the gear to engage	>	Maximum differential speed threshold for the gear engagement actuation state (4), see Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN								
							Fault confirmation	Gear R engagement attempts	>=	4	count		

Summary table attachments C_SID_ASV_SYS_GEAR_SY_EN					
(1) Maximum initial differential speed threshold for gear to engage (1),					
The maximum initial differential speed allowed for gear engagement is gear dependend = …					
IF Gear to engage		=		Gear 1	
	Ellipsis	=		4300	rpm
ELSE IF Gear to engage		=		Gear 2	
	Ellipsis			4300	rpm
ELSE IF Gear to engage		=		Gear 3	
	Ellipsis			4300	rpm
ELSE IF Gear to engage		=		Gear 4	
	Ellipsis			4300	rpm
ELSE IF Gear to engage		=		Gear 5	
	Ellipsis			4300	rpm
ELSE IF Gear to engage		=		Gear 6	
	Ellipsis			4300	rpm
ELSE IF Gear to engage		=		Gear 7	
	Ellipsis			4300	rpm
ELSE IF Gear to engage		=		Gear 8	
	Ellipsis			4300	rpm
ELSE IF Gear to engage		=		Gear R	
	Ellipsis			4300	rpm
(2) Gear engagement actuation state transition conditions					
Gear engagement actuation state		=		Neutral Gear Init	
Transition conditons:					
Estimated selector position equal to selector target position		=		True	
Gear engagement actuation state		=		Neutral Gear Sync	
Difference between normalized measured position and normalized fork flex compensated blockin ring position		>		750	
Absolute synchronizer differential speed for the gear to engage		<	…		
IF Gear to engage		=		Gear 1	
	Ellipsis	<		40	rpm
ELSE IF Gear to engage		=		Gear 2	
	Ellipsis	<		50	rpm
ELSE IF Gear to engage		=		Gear 3	
	Ellipsis	<		65	rpm
ELSE IF Gear to engage		=		Gear 4	
	Ellipsis	<		75	rpm
ELSE IF Gear to engage		=		Gear 5	
	Ellipsis	<		90	rpm
ELSE IF Gear to engage		=		Gear 6	
	Ellipsis	<		100	rpm
ELSE IF Gear to engage		=		Gear 7	

	Ellipsis	<		100	rpm
ELSE IF Gear to engage		=		Gear 8	
	Ellipsis	<		100	rpm
ELSE IF Gear to engage		=		Gear R	
	Ellipsis	<		40	rpm
Gear engagement actuation state		=		Neutral Gear Engage	
Transition conditons:					
Engaged position reached condition (see below *)		=		True	
Differential speed low condition (see below **)		=		True	
* Engaged position reached condition					
IF gear engament retry attempt count		=		3	count
Difference between normalized measured position and normalized engaged position		>=		-1100	µm
ELSE					
Difference between normalized measured position and normalized engaged position		>=		-100	µm
OR					
Positon sensor electrical or consistency fault detected during the shift		=		True	
Engaged positon reached confirmation timer = ...		>			
IF positon sensor electrical or consistency fault detected during the shift		=		True	
	...	=		355	ms
ELSE					
	...	=		5	ms
** Differential speed low condition					
Absolute synchronizer differential speed for the gear to engage		<=	...		
IF Synchronizer comfort level		=		Standstill	
	...	<=		35	rpm
ELSE IF Synchronizer comfort level		=		Coasting	
	...	<=		45	rpm
ELSE IF Synchronizer comfort level		=		Soft	
	...	<=		60	rpm
ELSE IF Synchronizer comfort level		=		Medium	
	...	<=		80	rpm
ELSE IF Synchronizer comfort level		=		Hard	
	...	<=		110	rpm
ELSE IF Synchronizer comfort level		=		Very Hard	
	...	<=		140	rpm
Differential speed low confirmation timer = ...		=	...		
IF positon sensor electrical or consistency fault detected during the shift		=		True	
	...	=		262.5	ms
ELSE					

...	=		ms
OR			
Speed sensor electrical or consitency fault detected during the shift	=	True	
(3) Gear engagement actuation state state timeout			
Gear engagement actuation state	=	Neutral Gear Init	
State timeout = ...			
IF			
Estimated Selector target position equal to selector target position	=	True	
...	=	200	ms
ELSE IF			
Selector target positon	=	Hydraulic Off	
...	=	600	ms
ELSE			
...	=	450	ms
Gear engagement actuation state	=	Neutral Gear Sync	
State timeout is linear interpolation based on transmission oil temperature			
AXIS:			
Transmission oil temperature	=	[-40 0 40 80 120]	°C
IF synchronization level	=	Level 3	
TABLE:			
State timeout	=	[500 275 50 50 50]	ms
ELSE			
TABLE:			
State timeout	=	[500 500 670 750 750]	ms
Gear engagement actuation state	=	Neutral Gear Engage	
State timeout is linear interpolation based on transmission oil temperature = ...			
AXIS:			
Transmission oil temperature	=	[-40 0 40 80 120]	°C
IF Gear to engage	=	Gear 1	
TABLE:			
State timeout	=	[1000 750 500 250 250]	rpm
ELSE IF Gear to engage	=	Gear 2	
TABLE:			
State timeout		[1000 750 500 250 250]	rpm
ELSE IF Gear to engage	=	Gear 3	
TABLE:			
State timeout		[1000 750 500 250 250]	rpm
ELSE IF Gear to engage	=	Gear 4	
TABLE:			
State timeout		[1000 750 500 250 250]	rpm
ELSE IF Gear to engage	=	Gear 5	

TABLE:				
State timeout			[1000 750 500 250 250]	rpm
ELSE IF Gear to engage		=	Gear 6	
TABLE:				
State timeout			[1000 750 500 250 250]	rpm
ELSE IF Gear to engage		=	Gear 7	
TABLE:				
State timeout			[1000 750 500 250 250]	rpm
ELSE IF Gear to engage		=	Gear 8	
TABLE:				
State timeout			[1000 750 500 250 250]	rpm
ELSE IF Gear to engage		=	Gear R	
TABLE:				
State timeout			[1000 750 500 250 250]	rpm
(4) Maximum differential speed threshold for the gear engagement actuation state				
Gear engagement actuation state		=	Neutral Gear Init	
Absolute synchronizer differential speed for the gear to engage		=	Maximum initial differential speed threshold for gear to engage (1)	rpm
Gear engagement actuation state		=	Neutral Gear Engage	
Absolute synchronizer differential speed for the gear to engage = ...				
IF Gear to engage		=	Gear 1	
	Ellipsis	=	160	rpm
ELSE IF Gear to engage		=	Gear 2	
	Ellipsis	=	200	rpm
ELSE IF Gear to engage		=	Gear 3	
	Ellipsis	=	200	rpm
ELSE IF Gear to engage		=	Gear 4	
	Ellipsis	=	200	rpm
ELSE IF Gear to engage		=	Gear 5	
	Ellipsis	=	200	rpm
ELSE IF Gear to engage		=	Gear 6	
	Ellipsis	=	200	rpm
ELSE IF Gear to engage		=	Gear 7	
	Ellipsis	=	200	rpm
ELSE IF Gear to engage		=	Gear 8	
	Ellipsis	=	200	rpm
ELSE IF Gear to engage		=	Gear R	
	Ellipsis	=	160	rpm
Differential speed too high confirmation timer		>	40	rpm

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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. 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 1 position measurement	> Rod drift fault high limit (1), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU µm	**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 µm	Consistency fault rod 1 position sensor	False		
					Synchronizer shift busy on corresponding clutch shaft	False		
					No electrical odd clutch speed sensor OR output speed sensor fault time	>= 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	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 time:	500 ms		
		This diagnostic detects rod drift by determining too many active occurences 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 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	
					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 occurence 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 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	
					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. 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 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	>= 100 ms	Runs Continuously	A
			OR		Electrical fault for rod 2 position sensor	False		

			Rod 2 position measurement	< Rod drift fault low limit (2), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU µm		Consistency fault rod 2 position sensor	False		
						Synchronizer shift busy on corresponding clutch shaft	False		
						No electrical odd clutch speed sensor OR output speed sensor fault time	>= 100 ms		
						Logically engaged gear matches rod 2 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		
						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 time:		500 ms		
		This diagnostic detects rod drift by determining too many active occurences 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 2 drift correction active counter	>= 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	= True	Runs Continuously	
						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		
		This diagnostic detects rod drift by determining too long active occurence 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 2 drift correction active timer	> 5000 ms	**Enable Conditions:**	Rod drift correction for rod 2 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU	= True	Runs Continuously	
						Rod drift correction for rod 2 active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active timer)	= True		
Rod 3 drift fault	P284F	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 3 position measurement	> Rod drift fault high limit (1), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU µm	**Enable Conditions:**	No rod 3 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 3 position sensor	False		
			Rod 3 position measurement	< Rod drift fault low limit (2), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU µm		Consistency fault rod 3 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 3 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		
		This diagnostic detects rod drift by determining too many active occurences 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 counter	>=	10	count	**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 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 occurence 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) Rod drift fault low limit (2)	µm 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
								Electrical fault for rod 4 position sensor		False			
								Consistency fault rod 4 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 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		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 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	= False = False = False = True = True		
					Fault confirmation time:	500 ms		
		This diagnostic detects rod drift by determining too many active occurences 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 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 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 = True	Runs Continuously	
		This diagnostic detects rod drift by determining too long active occurence 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 4 drift correction active timer	> 5000 ms	**Enable Conditions:** Rod drift correction for rod 4 has been triggered (10), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU Rod drift correction for rod 4 active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active timer)	= True = True	Runs Continuously	
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. 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 5 position measurement OR Rod 5 position measurement	> Rod drift fault high limit (1), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU µm < Rod drift fault low limit (2), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU µm	**Enable Conditions:** No rod 5 force present condition (3) confirmation time, see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU Electrical fault for rod 5 position sensor Consistency fault rod 5 position sensor Synchronizer shift busy on corresponding clutch shaft No electrical even clutch speed sensor OR output speed sensor fault time Logically engaged gear matches rod 5 speed gear (4), see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU Output speed available from sensor OR substituted by CAN info Even 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 False False False >= 100 ms True True True = False = False = False = False = False = True = True	Runs Continuously	A

					Fault confirmation time:		500 ms		
		This diagnostic detects rod drift by determining too many active occurences of the rod drift correction.	Rod 5 drift correction active counter	>= 10 count	**Enable Conditions:**	Rod drift correction for rod 5 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 5 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 occurence of the rod drift correction.	Rod 5 drift correction active timer	> 5000 ms	**Enable Conditions:**	Rod drift correction for rod 5 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 5 active (13) , see Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU (increments active timer)	= True		

Summary table attachments C_SID_ASV_SYS_MECH_ROD_CLU				
(1) Rod drift fault high limit = ...				
If Logical engaged gear equals Neutral and synchronizer B-side (transmission clutch side) has no gear				
If Synchronizer valve cleaning was active for clutch shaft		<	50	ms
	...	=	Rod Neutral position + 4000	µm
Else				
	...	=	Rod Neutral position + 4000	µm
Else If Logical engaged gear equals Neutral				
	...	=	Rod Neutral position + 1600	µm
Else If Logical engaged gear equals gear at synchronizer A-side (transmission rear cover side)				
	...	=	Rod A position + 1600	µm
Else If Logical engaged gear equals gear at synchronizer B-side (transmission clutch side)				
	...	=	Rod End B position + 1000	µm
(2) Rod drift fault low limit = ...				
If Logical engaged gear equals Neutral and synchronizer A-side (transmission rear cover side) has no gear				
If Synchronizer valve cleaning was active for clutch shaft		<	50	ms
	...	=	Rod Neutral position -4000	µm
Else				
	...	=	Rod Neutral position -4000	µm
Else If Logical engaged gear equals Neutral				
	...	=	Rod Neutral position - 1600	µm
Else If Logical engaged gear equals gear at synchronizer A-side (transmission rear cover side)				
	...	=	Rod End A position - 1000	µm
Else If Logical engaged gear equals gear at synchronizer B-side (transmission clutch side)				
	...	=	Rod B position - 1600	µm
(3) No rod force present condition				
Shorted switch fault for a synchronizer pressure control valve used to move the rod			False	
AND				
Absolute rod force target		<=	49	N
AND				
Absolute complement* rod force target		<=	49	N
OR				
Rod drift correction is active		=	True	
*complement rod = the rod corresponding to the inverted selector position				
(4) Rod speed gear = ...				
If Neutral detection at standstill condition (5) OR Neutral detection while driving condition (6)				
	...	=	Neutral	
Else If Engaged gear A-side detection (7)				
	...	=	Engaged gear at A side (transmission rear cover side)	
Else If Engaged gear B-side detection (8)				

...	=	Engaged gear at B side (transmission clutch side)	
(5) Neutral detection at standstill condition			
Electrical or consistency clutch speed sensor fault	=	False	
Consistency clutch speed sensor fault		False	
Absolute output speed	<	5	rpm
Absolute clutch speed	>	550	rpm
Confirmation time	=	300	ms
(6) Neutral detection while driving condition			
Electrical or consistency clutch speed sensor fault	=	False	
Consistency clutch speed sensor fault		False	
Absolute output speed	>=	100	rpm
Absolute clutch speed	>=	400	rpm
Synchronizer gear(s) calculated differential speed	>	150	rpm
(7) Engaged gear A-side detection condition			
Electrical or consistency clutch speed sensor fault	=	False	
Consistency clutch speed sensor fault		False	
Absolute output speed	>=	100	rpm
Absolute clutch speed	>=	400	rpm
Gear at A-side differential speed	<	Engaged gear differential speed threshold (9)	
Gear at B-side differential speed	>	150	rpm
Gear A-side engaged confirmation sample count *	>=	6	count
* confirmation sample count frozen if			
Absolute difference between output speed and its previous value	>=	10	rpm
(8) Engaged gear B-side detection condition			
Electrical or consistency clutch speed sensor fault	=	False	
Consistency clutch speed sensor fault		False	
Absolute output speed	>=	100	rpm
Absolute clutch speed	>=	400	rpm
Gear at B-side differential speed	<	Engaged gear differential speed threshold (9)	
Gear at A-side differential speed	>	150	rpm
Gear B-side engaged confirmation sample count *	>=	6	count
* confirmation sample count frozen if			
Absolute difference between output speed and its previous value	>=	10	rpm
(9) Engaged gear differential speed threshold = ...			
If output speed attained from output speed sensor (not subsituted)			
	=	30	rpm
Else			
	=	50	rpm
(10) Rod drift correction trigger condition			
No rod 1 force present condition (3) confirmation time	>=	100	ms
Electrical fault for rod 1 position sensor		False	
Consistency fault rod 1 position sensor		False	
Synchronizer shift busy on corresponding clutch shaft		False	
No electrical odd clutch speed sensor OR output speed sensor fault time	>=	100	ms

Logically engaged gear matches rod speed gear (4)			True	
Output speed available from sensor OR substituted by CAN info			True	
Corresponding clutch shaft 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	
(Rod position measurement		>	Rod drift correction high limit (11)	µm
OR				
Rod position measurement)		<	Rod drift correction low limit (12)	µm
Rod drift correction trigger confirmation time		>	25	ms
(11) Rod drif correction high limit = ...				
If Logical engaged gear equals Neutral and synchronizer B-side (transmission clutch side) has no gear				
If Synchronizer valve cleaning was active for clutch shaft		<	50	ms
	...	=	Rod Neutral position + 1000	µm
Else				
	...	=	Rod Neutral position + 4000	µm
Else If Logical engaged gear equals Neutral				
	...	=	Rod Neutral position + 1000	µm
Else If Logical engaged gear equals gear at synchronizer A-side (transmission rear cover side)				
	...	=	Rod A position + 1100	µm
Else If Logical engaged gear equals gear at synchronizer B-side (transmission clutch side)				
	...	=	Rod End B position + 1000	µm
(12) Rod drift fault low limit = ...				
If Logical engaged gear equals Neutral and synchronizer A-side (transmission rear cover side) has no gear				
If Synchronizer valve cleaning was active for clutch shaft		<	50	ms
	...	=	Rod Neutral position -1000	µm
Else				
	...	=	Rod Neutral position -4000	µm
Else If Logical engaged gear equals Neutral				
	...	=	Rod Neutral position - 1000	µm
Else If Logical engaged gear equals gear at synchronizer A-side (transmission rear cover side)				
	...	=	Rod End A position - 1000	µm
Else If Logical engaged gear equals gear at synchronizer B-side (transmission clutch side)				
	...	=	Rod B position - 1100	µm
(13) Rod drift correction becomes and remains active if				
Rod drift correction triggered (10)		=	True	
Electrical rod position sensor fault		=	False	
Consistency rod position sensor fault		=	False	
Electrical fault for a sycnrhonizer pressure valve used to move the rod		=	False	
Selector position fixed due to a fault AND				
Selector position needed to move the rod doesn't match target selector position needed for rod control		=	False	

Drifting rod contains the acutal driving gear	False

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Park lock disengage retry fault	P07E6	This diagnostic detects a failure to disengage the parking lock. 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. If the parking lock disengagement takes too long, a parking lock disengagement retry counter is incremented. When the parking lock disengagement retry counter reaches the maximum retry count, the parking lock is diagnosed stuck in park.	The difference between the adapted parklock hold position and the measured parklock position	>	1000	um	**Enable Conditions:**	Parklock engage park request	=	False		Runs Continuously	A
			The difference between the measured parklock position and the adapted parklock open position	>	1000	um		Parklock disengagement possible (1), Summary table attachments C_SID_ASV_SYS_PLK_DISEN	=	True			
								Parking lock state is Disengaging (4), Summary table attachments C_SID_ASV_SYS_PLK_DISEN	=	True			
								System pressure	>=	15	bar		
								Parking lock position sensor electrical or consistency fault detected	=	False			
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
							Fault confirmation	Disengage active timer		Disengage timeout (2), Summary table attachments C_SID_ASV_SYS_PLK_DISEN	ms		
								Parking lock disengaging retry counter	=	3	count		
		This diagnostic detects an unintended parking lock egangement. 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. When the parking lock open fault retry counter reaches the maximum fault count, the parking lock is diagnosed stuck in park.	The difference between the adapted parklock hold position and the measured parklock position	>	2000	um	**Enable Conditions:**	Parklock engage park request	=	False		Runs Continuously	
			The difference between the measured parklock position and the adapted parklock open position	>	2000	um		Parking lock state is Open (4), Summary table attachments C_SID_ASV_SYS_PLK_DISEN	=	True			
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
							Fault confirmation	Open fault timer	=	250	ms		
								Parking lock open fault retry counter	=	3	count		

Summary table attachments C_SID_ASV_SYS_PLK_DISEN			
(1) Parklock disengagement possible (enough system pressure available)			
IF			
Electrical or consistency fault detected for system pressure sensor	=	False	
Measured system pressure	>	5	bar
ELSE IF			
Electrical fault detected for system pressure sensor	=	True	
Hydraulic power is available	=	True	
System pressure target	>	5	bar
(2) Disengage timeout = …			
Linear interpolation as function of transmission oil temperature			
AXIS input: Transmission oil temperature	=	[-30 -20 -10 0 100]	°C
…	=	[2400 2000 1600 1000 1000]	ms
(3) Parklock is open based on speed			
IF			
Output speed sensor invalid	=	FALSE	
Absolute speed of the output shaft	>	100	rpm
ELSE IF			
Absolute vehicle speed	>	10	kph
AND			
Confirmation time	=	100	ms
(4) Parking lock state transistion from Disengage to Open when			
IF			
Parklock engage park request	=	False	
Parking lock piston sensor (PLPS) fault detected	=	False	
The difference between the adapted parklock hold position and the measured parklock position	<=	1000	um
The difference between the measured parklock position and the adapted parklock open position	<=	1000	um
ELSEIF			
Parklock engage park request	=	False	
Parklock is open based on speed (3)	=	True	

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	This diagnostic detecs a failure to engage the parking lock. If the parking lock engagement takes too long, the parking lock engage retry counter is incremented. If the parking lock retry counter reaches the maximum parking lock engagement retry count, the parking lock is diagnosed unable to engage.	Absolute difference between the parklock locked position and the measured parklock position	>	1000	um	Enable Conditions:	Parklock state transition to engaging allowed (1), see Summary table attachments C_SID_ASV_SYS_PLK_EN	=	True		Runs Continuously	B
								Vehicle speed acceptable for engaging parklock (2), see Summary table attachments C_SID_ASV_SYS_PLK_EN	=	True			
								Parklock engage park request	=	True			
								Parking lock state is Disengaging	=	True			
								Parking lock piston sensor (PLPS) fault detected	=	False			
								Diagnostic reset event	=	False			
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
							Fault confirmation	Parking lock engagement timer		Engage timeout (3), see Summary table attachments C_SID_ASV_SYS_PLK_EN	ms		
								Engaging retry counter	=	3	count		
		This diagnostic detects unintentional parking lock disengagement by measuring a parking lock position outside the parking lock locked position tolerances or a too higher vehcile or output speed. If the parking lock shows unintended parking lock disengagement, the parking lock locked fault counter is incremented. If the parking lock locked fault counter reaches the maximum parking lock locked fault count, the parking lock is diagnosed unable to engage.	Absolute difference between the parklock locked position and the measured parklock position	>	2000	um	Enable Conditions:	Parking lock state is Locked (4), see Summary table attachments C_SID_ASV_SYS_PLK_EN	=	True		Runs Continuously	
			OR					Parklock engage park request	=	True			
			Absolute vehicle speed	>	3	kph		Diagnostic reset event	=	False			
			OR					Application state is unequal to error state	=	True			
			Absolute speed of the output shaft	>	30	rpm		Application state is unequal to bypass state	=	True			
							Fault confirmation	Parking lock locked fault timer	=	50	ms		
								Locked retry counter	=	3	count		

Summary table attachments C_SID_ASV_SYS_PLK_EN			
(1) Parklock state transition to engaging allowed			
IF			
Absolute vehicle speed	<	10	kph
OR			
Absolute speed of the output speed sensor	<	300	rpm
(2) Vehicle speed acceptable for engaging parklock			
IF			
Absolute vehicle speed	<	0.8125	kph
AND			
Absolute speed of the output speed sensor	<	10	rpm
(3) Engage timeout = …			
Engage timeout is linear interoplation as function of oil temperature			
AXIS: Cooler out temperature	=	[-30 -20 -10 0 100]	°C
…	=	[3000 2500 2000 2000 2000]	ms
(4) Parking lock state transition from Engaging to Locked when			
Parklock engage park request	=	True	
Parklock engagement allowed (1)	=	True	
Vehicle speed acceptable for engaging parklock (2)	=	True	
Parking lock position electrical or performance sensor fault detected	=	False	
Absolute difference between the adapted parklock locked position and the measured parklock position	<=	1000	um

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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	> Pressure difference fault threshold (1), see Summary table attachments C_SID_ASV_SYS_PRS_CLU bar	**Enable Conditions:**		Runs Continuously	A
					Diagnostic clear event	= False		
			Hysteresis	= 2 bar	Electrical fault for clutch 1 pressure sensor	= False		
					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 overrule for clutch 1 clutch pressure control valve current	= False		
					Adaptive routine overrule for clutch 1 fast filling	= False		
					Adaptive routine overrule 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: Pressure too high fault timer	>= Pressure difference too high confirmation time (2), see Summary table attachments C_SID_ASV_SYS_PRS_CLU 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 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	> Absolute pressure difference fault threshold (3), see Summary table attachments C_SID_ASV_SYS_PRS_CLU bar	**Enable Conditions:**		Runs Continuously	
					Diagnostic clear event	= False		
			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 overrule for clutch 1 clutch pressure control valve current	= False		
					Adaptive routine overrule for clutch 1 fast filling	= False		
					Adaptive routine overrule 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:	Absolute pressure too high difference timer	>=	Absolute pressure difference confirmation time (4), see Summary table attachments C_SID_ASV_SYS_PRS_CLU	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 hol d 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	<	0.05078125	bar	Enable Conditions:	Diagnostic clear event	=	False		Runs Continuously	
			Difference between clutch 1 pressure sensor reading and modeled pressure	>	1.19921875	bar		Electrical fault for clutch 1 pressure sensor	=	False			
			Hysteresis	=	0.5	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 overrule for clutch 1 clutch pressure control valve current	=	False			
								Adaptive routine overrule for clutch 1 fast filling	=	False			
								Adaptive routine overrule 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:	Pressure above hold pressure fault timer	>=	300	ms		
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 diangosed with a pressure discharge fault.	Clutch 1 modeled pressure	>	1	bar	Enable Conditions:	Diagnostic clear event	=	False		Runs Continuously	A
			Clutch 1 pressure sensor reading	<	0.5	bar		Electrical fault for clutch 1 pressure sensor	=	False			
								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 overrule for clutch 1 clutch pressure control valve current	=	False			
								Adaptive routine overrule for clutch 1 fast filling	=	False			
								Adaptive routine overrule 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 overrule for clutch 1 clutch pressure control valve current	=	False			
								Adaptive routine overrule for clutch 1 fast filling	=	False			
								Adaptive routine overrule 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:	Absolute pressure too high difference timer	>=	Absolute pressure difference confirmation time (4), see Summary table attachments C_SID_ASV_SYS_PRS_CLU	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	>	Pressure difference fault threshold (1), see Summary table attachments C_SID_ASV_SYS_PRS_CLU	bar	**Enable Conditions:**	Diagnostic clear event	=	False		Runs Continuously	A
			Hysteresis	=	2	bar		Electrical fault for clutch 2 pressure sensor	=	False			
								Electrical fault for clutch 2 pressure control valve	=	False			
								Electrical fault for clutch 2 redundant shutdown valve	=	False			
								Clutch 2 redundant shutdown valve position	=	Hydraulic On			
								Clutch 2 recovery request	=	False			
								Adaptive routine overrule for clutch 2 clutch pressure control valve current	=	False			
								Adaptive routine overrule for clutch 2 fast filling	=	False			

					Adaptive routine overrule for clutch 2 pressure control flow influence calculations	= False		
					Clutch 2 superfill active	= False		
					Last superfill on clutch 2 end	> 80 ms		
					Application state is unequal to error state	= True		
					Application state is unequal to bypass state	= True		
				Fault confirmation time: Pressure too high fault timer	>= Pressure difference too high confirmation time (2), see Summary table attachments C_SID_ASV_SYS_PRS_CLU 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 higher than the modeled pressure, the clutch pressure control is diagnosed faulted with a pressure charge fault.	Absolute difference between clutch 2 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 2 pressure sensor	= False		
			Difference between clutch 2 pressure sensor reading and modeled pressure	> bar	Electrical fault for clutch 2 pressure control valve	= False		
					Electrical fault for clutch 2 redundant shutdown valve	= False		
					Clutch 2 redundant shutdown valve position	= Hydraulic On		
					Clutch 2 recovery request	= False		
					Adaptive routine overrule for clutch 2 clutch pressure control valve current	= False		
					Adaptive routine overrule for clutch 2 fast filling	= False		
					Adaptive routine overrule for clutch 2 pressure control flow influence calculations	= False		
					Clutch 2 superfill active	= False		
					Last superfill on clutch 2 end	> 80 ms		
					Application state is unequal to error state	= True		
					Application state is unequal to bypass state	= True		
				Fault confirmation time: Absolute pressure too high difference timer	>= Absolute pressure difference confirmation time (4), see Summary table attachments C_SID_ASV_SYS_PRS_CLU ms		
		This diagnostic detecs 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.	Absolute difference between clutch 2 target pressure and hold pressure	< 0.05078125 bar	**Enable Conditions:** Diagnostic clear event	= False	Runs Continuously	
			Difference between clutch 2 pressure sensor reading and modeled pressure	> 1.19921875 bar	Electrical fault for clutch 2 pressure sensor	= False		

		If the clutch is being controlled around hol d 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.	Hysteresis	=	0.5	bar		Electrical fault for clutch 2 pressure control valve	=	False			
								Electrical fault for clutch 2 redundant shutdown valve	=	False			
								Clutch 2 redundant shutdown valve position	=	Hydraulic On			
								Clutch 2 recovery request	=	False			
								Adaptive routine overrule for clutch 2 clutch pressure control valve current	=	False			
								Adaptive routine overrule for clutch 2 fast filling	=	False			
								Adaptive routine overrule for clutch 2 pressure control flow influence calculations	=	False			
								Clutch 2 superfill active	=	False			
								Last superfill on clutch 2 end	>	80	ms		
								Application state is unequal to error state	=	True			
								Application state is unequal to bypass state	=	True			
							Fault confirmation time:	Pressure above hold pressure fault timer	>=	300	ms		
Transmission Clutch 2 Pressure Control Too Low	P2854	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 diangosed with a pressure discharge fault.	Clutch 2 modeled pressure	>	1	bar	**Enable Conditions:**	Diagnostic clear event	=	False		Runs Continuously	A
			Clutch 2 pressure sensor reading	<	0.5	bar		Electrical fault for clutch 2 pressure sensor	=	False			
								Electrical fault for clutch 2 pressure control valve	=	False			
								Electrical fault for clutch 2 redundant shutdown valve	=	False			
								Clutch 2 redundant shutdown valve position	=	Hydraulic On			
								Clutch 2 recovery request	=	False			
								Adaptive routine overrule for clutch 2 clutch pressure control valve current	=	False			
								Adaptive routine overrule for clutch 2 fast filling	=	False			
								Adaptive routine overrule for clutch 2 pressure control flow influence calculations	=	False			
								Clutch 2 superfill active	=	False			
								Last superfill on clutch 2 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 2 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 2 pressure sensor	=	False			

			Difference between clutch 2 pressure sensor reading and modeled pressure	< bar		Electrical fault for clutch 2 pressure control valve	=	False			
						Electrical fault for clutch 2 redundant shutdown valve	=	False			
						Clutch 2 redundant shutdown valve position	=	Hydraulic On			
						Clutch 2 recovery request	=	False			
						Adaptive routine overrule for clutch 2 clutch pressure control valve current	=	False			
						Adaptive routine overrule for clutch 2 fast filling	=	False			
						Adaptive routine overrule for clutch 2 pressure control flow influence calculations	=	False			
						Clutch 2 superfill active	=	False			
						Last superfill on clutch 2 end	>	80	ms		
						Application state is unequal to error state	=	True			
						Application state is unequal to bypass state	=	True			
					Fault confirmation time:	Absolute pressure too high difference timer	>=	Absolute pressure difference confirmation time (4), see Summary table attachments C_SID_ASV_SYS_PRS_CLU	ms		

Summary table attachments C_SID_ASV_SYS_PRS_CLU				
(1) Pressure difference fault threshold = …				
If Clutch pressure control is filling the clutch				
	…	=	7	bar
Else				
	…	=	5	bar
(2) Pressure difference too high confirmation time = …				
If Temperature low condition (4) OR Clutch is closed				
	…	=	60	ms
Else				
	…	=	40	ms
(3) Absolute pressure difference fault threshold = …				
Linear interpolation based on clutch target pressure				
AXIS:				
Clutch target pressure		=	[0 5 10 30]	bar
TABLE:				
Absolute pressure difference fault threshold		=	[2 2 2 2]	bar
(4) Absolute pressure difference confirmation time = …				
If Temperature low condition (5)				
	…	=	400	ms
Else If Clutch is closed				
	…	=	225	ms
Else				
	…	=	150	ms
(5) Temperature low condition = ….				
If controller initialization				
	…	=	False	
Else If Cooler out temperature		<	20	°C
	…	=	True	
Else if Cooler out temperature		>	25	°C
	…	=	False	
Else				
	…	=	Previous Value	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions		Time Required	MIL illum.
Limited Slip Differential Clutch Pressure Control Too High	C2A18	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 limited slip differential pressure control is diagnosed faulted with a too high pressure fault.	Absolute difference between limited slip differential pressure sensor reading and target pressure	>	2	bar	Enable Conditions:	Electrical fault for limited slip differential pressure sensor	=	False	Runs Continuously	B
			Hysteresis	=	0.5	bar		Electrical fault for limited slip differential pressure control valve	=	False		
			Difference between limited slip differential pressure sensor reading and target pressure	>	0	bar		Electrical fault for limited slip differential redundant shutdown valve	=	False		
								Limited slip differential redundant shutdown valve position	=	Hydraulic On		
								Limited slip differential recovery request	=	False		
								Adaptive routine overrule for limited slip differential pressure control valve current		False		
								Application state is unequal to error state	=	True		
								Application state is unequal to bypass state	=	True		
							Fault confirmation time:			300 ms		
Limited Slip Differential Clutch Pressure Control Too Low	C2A19	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 limited slip differential pressure control is diagnosed faulted with a too low pressure fault.	Absolute difference between limited slip differential pressure sensor reading and target pressure	>	2	bar	Enable Conditions:	Electrical fault for limited slip differential pressure sensor	=	False	Runs Continuously	B
			Hysteresis	=	0.5	bar		Electrical fault for limited slip differential pressure control valve	=	False		
			Difference between limited slip differential pressure sensor reading and target pressure	<	0	bar		Electrical fault for limited slip differential redundant shutdown valve	=	False		
								Limited slip differential redundant shutdown valve position	=	Hydraulic On		
								Limited slip differential recovery request	=	False		
								Adaptive routine overrule for limited slip differential pressure control valve current		False		
								Application state is unequal to error state	=	True		
								Application state is unequal to bypass state	=	True		
							Fault confirmation time:			300 ms		

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
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 auxilary 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_PRS_SYS 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 = 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 auxilary 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_PRS_SYS 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 = True = True 1500 ms	Runs Continuously	A
No System Pressure Fault	P0867	This diagnostic detetcs a fault where there is no system pressure buildup as it is expected. 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.	Measured system pressure	< 4 bar	**Enable Conditions:** System pressure recovery request System pressure recovery after system pressure drop check active (2), see Summary table attachments C_SID_ASV_SYS_PRS_SYS Electrical fault for system pressure sensor Hydraulic power available from main pump or from auxilary pump	= False = False = False = True	Runs Continuously	A

					Fault confirmation time:	2000 ms		

Summary table attachments C_SID_ASV_SYS_PRS_SYS			
(1) System pressure fault low limit = …			
Linear interpolation based on system pressure target			
AXIS:			
System pressure target	=	[10 30]	bar
TABLE:			
System pressure fault threshold	=	[2 6]	bar
(2) System pressure recovery check after system pressure drop check active			
When a system pressure too low fault has been detected, this may be temporary drop which is considered recoverable under following conditions:			
Time since too low fault was detected	<	15000	ms
Difference between current system pressure target and system pressure target when system pressure too low fault was detected	>	5	bar
Difference between current system pressure target and measured system pressure	<	2	bar

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Complement rod move caused by selector routing hydraulically off	P194F	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 The difference between the complement rod start position and the complement rod sensor measurement	<= 1100 um > 1100 um	**Enable Conditions:** Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASV_SYS_SEL_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 **Fault confirmation time**	= False = True = True > 3.23046875 lpm = True = True = False = Hydraulic On > 0 N = B to A = 40 ms	Runs Continuously	A
		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 The difference between the complement rod sensor measurement and the complement rod start position	<= 1100 um > 1100 um	**Enable Conditions:** Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASV_SYS_SEL_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 **Fault confirmation time**	= False = False = True > 3.23046875 lpm = True = True = False = Hydraulic On <= 0 N = A to B = 40 ms	Runs Continuously	
		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.	The difference between the actual rod sensor measurement and the actual rod start position The difference between the complement rod sensor measurement and the complement rod start position	<= 1100 um > 1100 um	**Enable Conditions:** Diagnostic reset event Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASV_SYS_SEL_SY	= False = False	Runs Continuously	

		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.						Synchronizer shift started	=	True			
								Flow of main pump	>	3.23046875	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 On			
								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 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	um	**Enable Conditions:**	Diagnostic reset event	=	False		Runs Continuously	
			The difference between the complement rod start position and the complement rod sensor measurement	>	1100	um		Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASV_SYS_SEL_SY	=	False			
								Synchronizer shift started	=	True			
								Flow of main pump	>	3.23046875	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 On			
								Actual rod force target	<=	0	N		
								Complement rod movement direction for shift solenoid in use	=	B to A			
							Fault confirmation time		=	40	ms		
		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. 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.	Rod movement in intended move direction during a synchronizer integrity test case (7), see Summary table attachments C_SID_ASV_SYS_SEL_SY	<=	100	µm	**Enable Conditions:**	Synchronizer integrity intrusive routine triggered (2), see Summary table attachments C_SID_ASV_SYS_SEL_SY		True		Runs Continuously	
			Complement rod movement for actuated shift solenoid during a syncrhonizer integrity test case (7), see Summary table attachments C_SID_ASV_SYS_SEL_SY	>	100	µm		Synchronizer integrity routine running conditions (3), see Summary table attachments C_SID_ASV_SYS_SEL_SY	=	True			

		If the selector stuck off confirmation counter reaches the selector hydraulically stuck off fault confirmation count, the selector mechansim is diagnosed hydraulically stuck off.						Expected position of synchronizer actuation selector pilot valve	=	Hydraulic On			
								Synchronizer test case conditions met (4), see Summary table attachments C_SID_ASV_SYS_SEL_SY		True			
							Fault confirmation count	Selector stuck off fault detection during synchronizer test suite confirmation count	=	1			
								Synchronizer integrity selector stuck off fault test suite confirmation runs	=	1			
Complement rod move caused by selector routing hydraulically on	P1950	This diagnostic detects a selectory hydraulic stuck on 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 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	=	False		Runs Continuously	A
			The difference between the complement rod start position and the complement rod sensor measurement	>	1100	um		Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASV_SYS_SEL_SY	=	False			
								Synchronizer shift started	=	True			
								Flow of main pump	>	3.23046875	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	=	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 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 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	=	False		Runs Continuously	
			The difference between the complement rod sensor measurement and the complement rod start position	>	1100	um		Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASV_SYS_SEL_SY	=	False			
								Synchronizer shift started	=	True			
								Flow of main pump	>	3.23046875	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 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 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	=	False		Runs Continuously	
			The difference between the complement rod sensor measurement and the complement rod start position	>	1100	um		Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASV_SYS_SEL_SY	=	False			
								Synchronizer shift started	=	True			
								Flow of main pump	>	3.23046875	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 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 off, the selector mechanism is diagnosed hydraulically stuck on.	The difference between the actual rod start position and the actual rod sensor measurement	<=	1100		Enable Conditions:	Diagnostic reset event	=	False		Runs Continuously	
			The difference between the complement rod start position and the complement rod sensor measurement	>	1100			Speed sensors have no electrical fault (1), see Summary table attachments C_SID_ASV_SYS_SEL_SY	=	False			
								Synchronizer shift started	=	True			
								Flow of main pump	>	3.23046875	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	=	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.	Rod movement in intended move direction during a synchronizer integrity test case (7), see Summary table attachments C_SID_ASV_SYS_SEL_SY	<=	100	µm	Enable Conditions:	Synchronizer integrity intrusive routine triggered (2), see Summary table attachments C_SID_ASV_SYS_SEL_SY		True		Runs Continuously	

		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 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 mechansim is diagnosed hydraulically stuck on.	Complement rod movement for actuated shift solenoid during a test case (7), see Summary table attachments C_SID_ASV_SYS_SEL_SY	>	100	µm		Synchronizer integrity routine running conditions (3), see Summary table attachments C_SID_ASV_SYS_SEL_SY	=	True		
								Expected position of synchronizer actuation selector pilot valve	=	Hydraulic Off		
								Synchronizer test case conditions met (4), see Summary table attachments C_SID_ASV_SYS_SEL_SY		True		
							Fault confirmation count	Selector stuck on fault detection during synchronizer test suite confirmation count	=	1		
								Synchronizer integrity selector fault stuck on test suite confirmation runs	=	1		

Summary table attachments C_SID_ASV_SYS_SEL_SY			
(1) Speed sensors have no electrical fault			
IF			
No electrical fault on both odd and even clutch speed from corresponding sensor	=	True	
No electrical fault on output speed from sensor	=	True	
Confirmation time	=	100	ms
(2) Trigger conditions for the synchronizer integrity routine per clutch shaft			
The synchronizer integrity routine is triggered for a clutch shaft when			
A performance DTC was set for a syncrhonizer shift related item corresponding the clutch shaft:			
DTC set for Gear control failure for the clutch shaft	=	P073F, P072C, P1946, P074B, P072E, P1948, P074D, P073A, P194A, P074F, P073C, P194C	Odd clutch shaft synchronizer recovery routine trigger
		P074A, P072D, P1947, P074C, P072F, P1949, P074E, P073B, P194B, P07D8, P07D7, P194D, P073E, P072B, P194E	Even clutch shaft synchronizer recovery routine trigger
DTC set for Rod position sensor consistency fault for a rod corresponding to the clutch shaft	=	P2832, P2837	Odd clutch shaft synchronizer recovery routine trigger
		P283C, P2841, P2864	Even clutch shaft synchronizer recovery routine trigger
DTC set for Synchronizer pressure valve stuck off fault corresponding to the clutch shaft	=	P08C4, P27B9	Odd clutch shaft synchronizer recovery routine trigger

		P27C1, P27C9, P27D1	Even clutch shaft synchronizer recovery routine trigger
DTC set for Synchronizer pressure valve stuck on fault corresponding to the clutch shaft	=	P08C5, P27BA	Odd clutch shaft synchronizer recovery routine trigger
		P27C2, P27CA, P27D2	Even clutch shaft synchronizer recovery routine trigger
DTC set for Unintended rod movmenet fault for a rod corresponding to the clutch shaft	=	P284D, P284E	Odd clutch shaft synchronizer recovery routine trigger
		P284F, P2850, P286A	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector spool stuck off fault corresponding to the clutch shaft	=	P1957	Odd clutch shaft synchronizer recovery routine trigger
		P1959	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector spool stuck on fault corresponding to the clutch shaft	=	P1956	Odd clutch shaft synchronizer recovery routine trigger
		P1958	Even clutch shaft synchronizer recovery routine trigger
DTC set for Selector mechanism stuck off fault	=	P1950	Odd and even clutch shaft synchronizer recovery routine trigger
DTC set for Selector mechanism stuck on fault	=	P194F	Odd and even clutch shaft synchronizer recovery routine trigger
(3) Running conditions for the synchronizer integrity routine			
Hydraulic power available	=	True	
System pressure too low condition	=	False	
System pressure	<=	4.5	bar
System pressure too low confirmation time	>=	50	ms
Diagnostic reset event	=	False	
Time since last synchronizer shift completion	>	2000	ms
Rod drift correction active	=	False	
No adapation routine with exception of the syncrhonizer recovery routine is active	=	True	
In case the synchronizer recovery routine is triggered by the setting of a DTC following conditions are additionally checked:			
Request clutch equals to target clutch	=	True	
Target clutch equal to actual driving clutch	=	True	
Target gear equals the current gear for the clutch shaft	=	True	
Stable time for clutch and gear conditions	>=	5000	ms
Clutch shaft equal to actual clutch		False	
System pressure target overrule maximum overrule	>=	10	bar
System pressure target overrule minimum overrule	<=	20	bar

Time since last recovery routine run for a gear corresponding to the clutch shaft	>=	30000	ms
In case the synchronizer recovery routine is triggered by the power up check of the gears			
No extra conditions are checked			
(4) Conditions for a synchronizer integrity test case			
Synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	
Opposite synchronizer pressure control valve corresponding to the test case electrical fault detected	=	False	
Synchronizer position sensor corresponding to the test electrical fault detected	=	False	
Selector cannot be controlled in the target position for the test case due to an electrical fault	=	False	
Selector pilot valve electrical fault no current	=	True	
Selector hydraulic target position for the test	=	S_OOSPOS_OFF	
OR			
Selector pilot valve electrical fault high current	=	True	
Selector hydraulic target position for the test	=	S_OOSPOS_ON	
Test inhibit by potential gear disengagement for intented rod movement (4)	=	False	
OR			
Absolute vehicle speed	<	10	kph
OR			
Gear that could be disengaged unintentionally is already faulted	=	True	
Test inhibit by potential gear disengagement for complement rod movement (5)	=	False	
OR			
Absolute vehicle speed	<	10	kph
OR			
Inverse selector hydraulic state for the test case	=	S_OOSPOS_ON	
Synchronizer recovery routine is active	=	True	
The selector was verified to be operational for the hydraulic S_OOSPOS_ON position during this instance of the synchronizer recovery routine run	=	True	
OR			
Inverse selector hydraulic state for the test case	=	S_OOSPOS_OFF	
Synchronizer recovery routine is active	=	True	
The selector was verified to be operational for the hydraulic S_OOSPOS_OFF position during this instance of the synchronizer recovery routine run	=	True	
(5) Test inhibit by potential gear disengagement for intended rod movement			
Currently engaged gear located at the A side	=	True	
Intended rod movement direction for current test case	=	A to B	
Intended move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
OR			
Currently engaged gear located at the B side	=	True	
Intended rod movement direction for current test case	=	B to A	
Intended move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
(6) Test inhibited by potential gear disengagement for complement rod movement			
Currently engaged gear located at the A side	=	True	
Complement rod movement direction for current test case	=	A to B	

Complement move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
OR			
Currently engaged gear located at the B side	=	True	
Complement rod movement direction for current test case	=	B to A	
Complement move rod corresponds with rod for currently engaged gear on the clutch shaft	=	True	
(7) Synchronizer integrity test details			
Intended rod movement with PID control	=	500	µm
Test case finished when:			
Intended rod movement direction	=	A to B	
Difference between rod position measurement and rod position at start of test case	>	250	µm
OR			
Intended rod movement direction	=	B to A	
Difference between rod position at start of test case and rod position measurement	>	250	µm
OR			
Complement rod movement direction	=	A to B	
Difference between complement rod position measurement and complement rod position at start of test case	>	500	µm
OR			
Complement rod movement direction	=	B to A	
Difference between complement rod position at start of test case and complement rod position measurement	>	500	µm
OR			
Test case time	>	500	µm

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Serial Data Message Safety Performance 1	P1967	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 actual range as invalid	=	False		Runs continuously	B
		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.	Transmission actual range reported by application software	!=	Park Position or Reverse Position or Neutral Position or First Drive Position							
		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.	Situations which are deemed acceptable by safety software A side									
			Transmission actual range reported by application software	=	Transmission actual range determined by safety software A partition							
			Transmission actual range determined by safety software A partition	=	Park							
			Transmission actual range reported by application software	=	Drive or Reverse							
			Transmission actual range determined by safety software A partition	=	Neutral	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 shift lever position as invalid	=	False		Runs continuously	
		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.	Shift lever position reported by application software	<	Park Range							
		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.	Shift lever position reported by application software	>	Forward Range B							
		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.	Situations which are deemed acceptable by safety software A side									
			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							
			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. 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.	Engaged power flow reported by application software	>	Reverse Engaged								
			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. On the one hand, the safety software A side considers certain values for the transmsission output speed signal determined by application software which are always unacceptable. 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. 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.	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	
			Transmission output speed reported by application software	>	16383.75	rpm							
			Situations which are deemed acceptable by safety software A side										
			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. On the one hand, the safety software A side considers certain values for the transmsission active gear signal determined by application software which are always unacceptable. 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. 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.	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	
			Transmission active gear reported by application software	>	Park Gear								
			Transmission active gear reported by application software	<	First Gear								
			Transmission active gear reported by application software	>	Eight Gear								
			Transmission active gear reported by application software	<	Neutral Gear								
			Values determined by application software which are always deemed unacceptable by safety software A side										
			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. On the one hand, the safety software A side considers certain values for the transmsission active gear ratio signal determined by application software which are always unacceptable. 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. 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.	<u>Values determined by application software which are always deemed unacceptable by safety software A side</u>				**Enable conditions:**	Application software reports transmission active gear ratio as invalid	=	False		Runs continuously	
			Transmission active gear reported by application software	>	7.99609375								
			<u>Values determined by application software which are always deemed unacceptable by safety software A side</u>										
			Absolute difference between transmission gear ratio reported by application software and transmission gear ratio determined by safety software A partition	<=	Transmission active gear ratio tolerance (2), see summarty table attachments C_SID_SSWA_CAN								
			Transmission active gear reported by application software	>=	Transmission gear ratio determined by safety software A partition - Transmission active gear ratio tolerance (2), see summarty table attachments C_SID_SSWA_CAN								
			Situation allowed enable	=	C_SE_TRUE								
			Time since last clutch shift was busy	<	0	ms							
			Transmission active gear reported by application software	<=	Maximum of transmission active gear ratio calculated from odd and even clutch shaft engaged gears + Transmission ctive gear ratio tolerance (2), see Summary table attachments C_SID_SSW_CAN								
			Transmission active gear reported by application software	>=	Minimum of transmission active gear ratio calculated from odd and even clutch shaft engaged gears - Transmission ctive gear ratio tolerance (2), see Summary table attachments C_SID_SSW_CAN								
			Situation allowed enable	=	C_SE_TRUE								
			Time since last clutch shift was busy	<	0	ms							

			Transmission active gear reported by application software	>=	Minimum of transmission active gear ratio calculated from odd and even clutch shaft engaged gears - Transmission ctive gear ratio tolerance (2), see Summary table attachments C_SID_SSW_CAN							
			Situation allowed enable 1	=	C_SE_TRUE							
			Situation allowed enable 2	=	C_SE_TRUE	**Fault confirmation time**	Fault confirmation time before safety software intervention	>=	450	ms		

Summary table attachments C_SID_SSWA_CAN			
(1) Transmission output speed tolerance tolerance			
Transmission output speed tolerance is linear interpolation as function of absolute transmission output speed determined by safety software partition A			
AXIS:			
Absolute transmission output speed determined by safety software partition A	=	[80 100 500 2000 10000]	rpm
TABLE:			
Transmission output speed tolerance	=	[300 300 300 300 300]	rpm
(2) Transmission active gear ratio tolerance = …			
…	=	0.080078125 * Transmission gear ratio determined by safety software A partition	

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	The safety software partition A prevents unintended acceleration. 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. 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.	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		
		The safety software partition A prevents unintended acceleration. 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. 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.	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		
		The safety software partition A prevents unintended change in driving direction. 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. 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.	Absolute vehicle speed	<= 18 kph	Range request	= Reverse	Runs Continuously	
			Absolute vehicle speed hysteresis	> 19 kph	Vehicle speed	>= 0 kph		
			Total transmission output torque	>= 394 Nm	Odd clutch shaft has forward gear engaged	= True		

		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	>	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 unintendend 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. 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		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			
			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. If both clutch shafts have a gear engaged and both clutches show torque at the same time, a clutch tie up condition is detected. 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 cltuch shaft or has a forward gera engaged.	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		
			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				
			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. 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 chosed. In case only a single clutch is showing high negative slip, this clutch shaft is targeted.	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				
			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				
			Even clutch torque	>=	Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWA_SG_CLU	Nm		Absolute 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			
			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								
		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 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 torque hysteris	<	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			
			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/10ms		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 hysteris	<	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. 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		
Even Gear Clutch Safety Performance 1	P1961	The safety software partition A 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 A 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 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 even gear clutch safety performance 1 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_SSWA_SG_CLU	Nm		Range request	=	Drive or Reverse		Runs Continuously	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	>=	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 acceleration. 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. 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 even gear clutch safety performance 1 DTC is set.	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	
			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 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 torque high acceleration limit depending on gear (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		
		The safety software partition A prevents unintended change in driving direction, If the unintendend 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. 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.	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			

		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.	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		
							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 unintendend 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.	Total transmission output torque	<	-394	Nm		Range request	=	Park or Neutral		Runs Continuously	
			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 cltuch shaft or has a forward gera 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 chosed.	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		
			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 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 even 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							
			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 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 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 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 torque hysteris	<	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/10ms		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.	Even clutch torque	>=	Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachements C_SID_SSWA_SG_CLU	Nm		Even 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 hysteris	<	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		
		The safety software partition A prevents unintended deceleration caused by clutch apply in reverse direction while moving in the forward direction.	Even clutch torque	>=	Clutch actuation with too low gear engaged clutch torque limit (5), see Summary table attachements C_SID_SSWA_SG_CLU	Nm		Even clutch shaft has a reverse gear engaged	=	True			
		If too much clutch torque is applied with a reverse gear enaged while vehicle is moving in foward direction, the safety software partition A can detect a safety goal violation.	Clutch torque hysteris	<	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 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		

Summary table attachements C_SID_SSWA_SG_CLU				
(1) Clutch acceleration torque limit = ...				
	Gear 1	:	93	Nm
	Gear 2	:	153	Nm
	Gear 3	:	221	Nm
	Gear 4	:	307	Nm
	Gear 5	:	412	Nm
	Gear 6	:	530	Nm
	Gear 7	:	677	Nm
	Gear 8	:	818	Nm
	Gear R	:	102	Nm
(2) Clutch tie up torque limit = ...				
	Gear 1	:	194	Nm
	Gear 2	:	320	Nm
	Gear 3	:	461	Nm
	Gear 4	:	641	Nm
	Gear 5	:	861	Nm
	Gear 6	:	1106	Nm
	Gear 7	:	1415	Nm
	Gear 8	:	1709	Nm
	Gear R	:	214	Nm
(3) Clutch tie up torque recovery limit = ...				
	Gear 1	:	180	Nm
	Gear 2	:	300	Nm
	Gear 3	:	440	Nm
	Gear 4	:	620	Nm
	Gear 5	:	840	Nm
	Gear 6	:	1080	Nm
	Gear 7	:	1400	Nm
	Gear 8	:	1690	Nm
	Gear R	:	200	Nm
(4) Clutch tie up slip threshold = ...				
	Gear 1	:	-1000	rpm
	Gear 2	:	-600	rpm
	Gear 3	:	-400	rpm
	Gear 4	:	-300	rpm
	Gear 5	:	-250	rpm
	Gear 6	:	-250	rpm
	Gear 7	:	-250	rpm
	Gear 8	:	-250	rpm
	Gear R	:	-900	rpm
(5) Clutch actuation with too low gear engaged clutch torque limit = ...				
	Gear 1	:	194	Nm
	Gear 2	:	320	Nm
	Gear 3	:	461	Nm

	Gear 4	:	641	Nm
	Gear 5	:	861	Nm
	Gear 6	:	1106	Nm
	Gear 7	:	1415	Nm
	Gear 8	:	1709	Nm
	Gear R	:	214	Nm
(6) Clutch actuation with too low gear engaged clutch torque recovery limit = …				
	Gear 1	:	180	Nm
	Gear 2	:	300	Nm
	Gear 3	:	440	Nm
	Gear 4	:	620	Nm
	Gear 5	:	840	Nm
	Gear 6	:	1080	Nm
	Gear 7	:	1400	Nm
	Gear 8	:	1690	Nm
	Gear R	:	200	Nm
(7) Clutch actuation with too low gear engaged clutch slip limit = …				
	Gear 1	:	-1000	rpm
	Gear 2	:	-600	rpm
	Gear 3	:	-400	rpm
	Gear 4	:	-300	rpm
	Gear 5	:	-250	rpm
	Gear 6	:	-250	rpm
	Gear 7	:	-250	rpm
	Gear 8	:	-250	rpm
	Gear R	:	-900	rpm

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
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	µm	**Enable Conditions:**	Parking lock was previously confirmed engaged (1), see Summary table attachements C_SID_SSWA_SG_PLK	=	True		Runs Continuously	B
								Range request	=	Park			
							Fault confirmation time	Fault confirmation time before safety software intervention	>=	450	ms		
		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	µm	**Enable Conditions:**	Driver range request	=	Park		Runs Continuously	
								Absolute Vehicle speed	<	0.25	kph		
								Parking lock was previously confirmed engaged during park request (2), see Summary table attachements C_SID_SSWB_SG_PLK	=	False			
							Fault confirmation time	Fault confirmation time before safety software intervention	>=	450	ms		

Summary table attachements C_SID_SSWA_SG_PLK			
(1) Parking lock confirmed engaged conditions			
Absolute Vehicle speed	<	0.25	kph
Absolute difference between parking lock position measured and learned parking lock engaged position	<=	500	µm
Parking lock engaged confirmation timer	>=	100	ms
(2) Parking lock confirmed engaged during park request conditions			
Range request	=	Park	
Parking lock confirmed engaged (1)	=	True	

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Serial Data Message Safety Performance 1	P1968	The safety software partition B detects incorrect values for safety relevant CAN signals. 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. 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. 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.	<u>Values determined by application software which are always deemed unacceptable by safety software B side</u>		**Enable conditions:** Application software reports transmission actual range as invalid	= False	Runs continuously	B
			Transmission actual range reported by application software	!= Park Position or Reverse Position or Neutral Position or First Drive Position				
			<u>Situations which are deemed acceptable by safety software B side</u>					
			Transmission actual range determined by safety software B partition	= Park				
			Absolute transmission output speed	> 50 rpm				
			Transmission actual range reported by application software	= Transmission actual range determined by safety software B partition				
			Absolute transmission output speed	> 50 rpm				
			Transmission actual range reported by application software	= Drive or Reverse				
			Transmission actual range determined by safety software B partition	= Neutral				
			Absolute transmission output speed	<= 50 rpm				
			Transmission actual range reported by application software	!= Park				
			Transmission actual range determined by safety software B partition	= Neutral or Drive or Reverse	**Fault confirmation time** Fault confirmation time before safety software intervention	>= 450 ms		
		The safety software partition B detects incorrect values for safety relevant CAN signals. 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. 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. 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.	<u>Values determined by application software which are always deemed unacceptable by safety software B side</u>		**Enable conditions:** Application software reports shift lever position as invalid	= False	Runs continuously	
			Shift lever position reported by application software	< Park Range				
			Shift lever position reported by application software	> Forward Range B				
			<u>Situations which are deemed acceptable by safety software B side</u>					
			Transmission actual range determined by safety software B partition	= Park				
			Absolute transmission output speed	> 50 rpm				
			Transmission actual range determined by safety software B partition	= Neutral				
			Shift lever position reported by application software	!= Park Range				
			Absolute transmission output speed	> 50 rpm				
			Transmission actual range determined by safety software B partition	= Drive				
			Shift lever position reported by application software	= Forward Range A or Forward Range B				

			Absolute transmission output speed	>	50	rpm							
			Transmission actual range determined by safety software B partition	=	Reverse								
			Shift lever position reported by application software	=	Reverse Range								
			Absolute transmission output speed	<=	50	rpm							
			Transmission actual range determined by safety software B partition	=	Neutral or Drive or Reverse								
			Shift lever position reported by application software	!=	Park Range		**Fault confirmation time**	Fault confirmation time before safety software intervention	>=	450	ms		
		The safety software partition B detects incorrect values for safety relevant CAN signals. 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. 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. 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.	Values determined by application software which are always deemed unacceptable by safety software B side				**Enable conditions:**	Application software reports engaged power flow as invalid	=	False		Runs continuously	
			Engaged power flow reported by application software	<	No Powerflow								
			Engaged power flow reported by application software	>	Reverse Engaged								
			Situations which are deemed acceptable by safety software B side										
			Absolute transmission output speed	<=	50	rpm							
			Absolute transmission output speed	>	50	rpm							
			Transmission actual range determined by safety software B partition	=	Park or Neutral								
			Absolute transmission output speed	>	50	rpm							
			Engaged power flow reported by application software	=	Drive Engaged								
			Transmission actual range determined by safety software B partition	=	Drive								
			Absolute transmission output speed	>	50	rpm							
			Engaged power flow reported by application software	=	Reverse Engaged								
			Transmission actual range determined by safety software B partition	=	Reverse		**Fault confirmation time**	Fault confirmation time before safety software intervention	>=	450	ms		
		The safety software partition B detects incorrect values for safety relevant CAN signals. On the one hand, the safety software B side considers certain values for the transmsission output speed signal determined by application software which are always unacceptable. 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. 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.	Values determined by application software which are always deemed unacceptable by safety software B side				**Enable conditions:**	Application software reports engaged transmission output speed as invalid	=	True		Runs continuously	
			Transmission output speed reported by application software	>	16383.75	rpm							
			Situations which are deemed acceptable by safety software B side										
			Absolute difference between transmission output speed reported by application software and absolute transmission output speed determined by safety software B partition	<=	Transmission output speed tolerance (1), see summary table attachments C_SID_SSWB_CAN	rpm	**Fault confirmation time**	Fault confirmation time before safety software intervention	>=	450	ms		
		The safety software partition B detects incorrect values for safety relevant CAN signals. On the one hand, the safety software B side considers certain values for the transmsission active gear ratio signal determined by application software which are always unacceptable.	Values determined by application software which are always deemed unacceptable by safety software B side				**Enable conditions:**	Application software reports transmission active gear ratio as invalid	=	False		Runs continuously	
			Transmission active gear reported by application software	>	7.99609375								

		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. 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.	Values determined by application software which are always deemed unacceptable by safety software B side										
			Absolute transmission output speed	<=	50	rpm							
			Absolute difference between transmission gear ratio reported by application software and transmission gear ratio determined by safety software B partition	<=	Transmission active gear ratio tolerance (2), see summarty table attachments C_SID_SSWB_CAN								
			Transmission active gear reported by application software	>=	Transmission gear ratio determined by safety software B partition - Transmission active gear ratio tolerance (2), see summarty table attachments C_SID_SSWB_CAN								
			Situation allowed enable	=	C_SE_TRUE								
			Time since last clutch shift was busy	<	2000	ms							
			Transmission active gear reported by application software	<=	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_SSW_CAN								
			Transmission active gear reported by application software	>=	Minimum 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_SSW_CAN								
			Situation allowed enable	=	C_SE_TRUE								
			Time since last clutch shift was busy	<	2000	ms							
			Transmission active gear reported by application software	>=	Minimum 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								
			Situation allowed enable 1	=	C_SE_TRUE								
			Situation allowed enable 2	=	C_SE_TRUE		**Fault confirmation time**	Fault confirmation time before safety software intervention	>=	450	ms		

Summary table attachments C_SID_SSWB_CAN			
(1) Transmission output speed tolerance tolerance			
Transmission output speed tolerance is linear interpolation as function of absolute transmission output speed determined by safety software partition A			
AXIS:			
Absolute transmission output speed determined by safety software partition A	=	[80 100 500 2000 1e+004]	rpm
TABLE:			
Transmission output speed tolerance	=	[300 300 300 300 300]	rpm
(2) Transmission active gear ratio tolerance = …			
…	=	0.079999998211861 * Transmission gear ratio determined by safety software B partition	

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	The safety software partition B prevents unintended acceleration. 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. 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.	Difference between actual torque on odd clutch and driver demanded engine torque	>=	Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWB_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	>=	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. 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. 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.	Difference between actual torque on odd clutch and driver demanded engine torque	>=	Clutch acceleration torque limit (1), see Summary tabel attachements C_SID_SSWB_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_SSWB_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_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		
		The safety software partition B prevents unintended change in driving direction. 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. 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.	Absolute vehicle speed	<=	18	kph		Range request	=	Reverse		Runs Continuously	
			Absolute vehicle speed hysteresis	>	19	kph		Vehicle speed	>=	0	kph		
			Total transmission output torque	>=	394	Nm		Odd clutch shaft has forward gear engaged	=	True			

		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	>	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 unintendend 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. 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		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		
			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. If both clutch shafts have a gear engaged and both clutches show torque at the same time, a clutch tie up condition is detected. 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 cltuch shaft or has a forward gera engaged.	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	
			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			
			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. 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 chosed. In case only a single clutch is showing high negative slip, this clutch shaft is targeted.	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			
			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			
			Even clutch torque	>=	Clutch tie up torque limit (2), see Summary table attachements C_SID_SSWB_SG_CLU	Nm		Absolute 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		
			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				
			<u>Determination of odd clutch targeted for reaction</u>					
			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				
		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 attachements 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 hysteris	< Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachements C_SID_SSWB_SG_CLU Nm	Odd clutch shaft has gear engaged	= True		
			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/10ms	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.	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		
		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.	Clutch torque hysteris	< 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 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		
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. 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. 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 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			
			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 tabel 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 tabel 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		
		The safety software partition B prevents unintended change in driving direction, If the unintendend 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. 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.	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			

		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.	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	>	394	Nm							
			or										
			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		
							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 unintendend 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. 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.	Total transmission output torque	<	-394	Nm		Range request	=	Park or Neutral			
			Transmission output torque contribution from even clutch shaft	<	-394	Nm		Even clutch shaft has forward gear engaged	=	True			
			or										
			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	>=	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. If both clutch shafts have a gear engaged and both clutches show torque at the same time, a clutch tie up condition is detected. 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 cltuch shaft or has a forward gera engaged.	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			
			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			
			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 chosed.	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			
			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			
			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 attachements 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 hysteris	<	Clutch actuation with too low gear engaged clutch torque recovery limit (6), see Summary table attachements 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 attachements C_SID_SSW_SG_CLU	rpm		Absolute vehicle speed	>=	18	kph			
			Engine speed gradient	>=	1	rpm/10ms		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.	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				

		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.	Clutch torque hysteris	<	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.	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			
		If too much clutch torque is applied with a reverse gear enaged while vehicle is moving in foward direction, the safety software partition B can detect a safety goal violation.	Clutch torque hysteris	<	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.					**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		

Summary table attachements C_SID_SSWB_SG_CLU

(1) Clutch acceleration torque limit = …				
	Gear 1	:	93	Nm
	Gear 2	:	153	Nm
	Gear 3	:	221	Nm
	Gear 4	:	307	Nm
	Gear 5	:	412	Nm
	Gear 6	:	530	Nm
	Gear 7	:	677	Nm
	Gear 8	:	818	Nm
	Gear R	:	102	Nm
(2) Clutch tie up torque limit = …				
	Gear 1	:	194	Nm
	Gear 2	:	320	Nm
	Gear 3	:	461	Nm
	Gear 4	:	641	Nm
	Gear 5	:	861	Nm
	Gear 6	:	1106	Nm
	Gear 7	:	1415	Nm
	Gear 8	:	1709	Nm
	Gear R	:	214	Nm
(3) Clutch tie up torque recovery limit = …				
	Gear 1	:	180	Nm
	Gear 2	:	300	Nm
	Gear 3	:	440	Nm
	Gear 4	:	620	Nm
	Gear 5	:	840	Nm
	Gear 6	:	1080	Nm
	Gear 7	:	1400	Nm
	Gear 8	:	1690	Nm
	Gear R	:	200	Nm
(4) Clutch tie up slip threshold = …				
	Gear 1	:	-1000	rpm
	Gear 2	:	-600	rpm
	Gear 3	:	-400	rpm
	Gear 4	:	-300	rpm
	Gear 5	:	-250	rpm
	Gear 6	:	-250	rpm
	Gear 7	:	-250	rpm
	Gear 8	:	-250	rpm
	Gear R	:	-900	rpm
(5) Clutch actuation with too low gear engaged clutch torque limit = …				
	Gear 1	:	194	Nm
	Gear 2	:	320	Nm
	Gear 3	:	461	Nm

	Gear 4	:	641	Nm
	Gear 5	:	861	Nm
	Gear 6	:	1106	Nm
	Gear 7	:	1415	Nm
	Gear 8	:	1709	Nm
	Gear R	:	214	Nm
(6) Clutch actuation with too low gear engaged clutch torque recovery limit = ...				
	Gear 1	:	180	Nm
	Gear 2	:	300	Nm
	Gear 3	:	440	Nm
	Gear 4	:	620	Nm
	Gear 5	:	840	Nm
	Gear 6	:	1080	Nm
	Gear 7	:	1400	Nm
	Gear 8	:	1690	Nm
	Gear R	:	200	Nm
(7) Clutch actuation with too low gear engaged clutch slip limit = ...				
	Gear 1	:	-1000	rpm
	Gear 2	:	-600	rpm
	Gear 3	:	-400	rpm
	Gear 4	:	-300	rpm
	Gear 5	:	-250	rpm
	Gear 6	:	-250	rpm
	Gear 7	:	-250	rpm
	Gear 8	:	-250	rpm
	Gear R	:	-900	rpm

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value			Secondary Parameters		Enable Conditions			Time Required	MIL illum.
Electronic Limited Slip Differential Safety Performance	P1966	The safety software partition B detects unintended unintended lateral vehicle movement by wrong eLSD torque application. If this safety goal violation is detected for too long, the application software will attempt intervention by eLSD disable. 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		
								eLSD drain 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		

Summary table attachements C_SID_SSWB_SG_LSD			
(1) Limited slip differential torque threshold			
Linear interpolation based on limited slip differential torque request			
AXIS: Limited slip differential torque request	=	[0 100 101 300 400 500 510 520]	Nm
TABLE: Limited slip differential torque threshold	=	[130 130 5000 5000 5000 5000 5000 5000]	Nm

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.	Estimated parking lock stepper motor position	>=	1000	µm	**Enable Conditions:**	Parking lock was previously engaged (1), see Summary table attachements C_SID_SSWB_SG_PLK	=	True		Runs Continuously	B
		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.	Parking lock stepper motor speed	>=	0	mm/s		Range request	=	Park			
			Parking lock engagement valve current	<=	200	mA							
			System pressure	>	12	bar							
			Engine speed	>	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.	Estimated parking lock stepper motor position	>=	1000	µm	**Enable Conditions:**	Range request	=	Park		Runs Continuously	
		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.	Parking lock stepper motor speed	>=	0	mm/s		Absolute vehicle speed	<	0.300000011920929	kph		
			Parking lock engagement valve current	<=	200	mA		Parking lock was previously engaged during park request (2), see Summary table attachments C_SID_SSWB_SG_PLK	=	False			
			System pressure	>	12	bar		OR					
			Engine speed	>	70	rpm		Range request	=	Park			
								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		

Summary table attachements C_SID_SSWB_SG_PLK			
(1) Parking lock considered engaged conditions			
Estimated parking lock stepper motor position	<=	3000	µm
Parking lock stepper motor speed	<=	1	mm/s
OR			
Parking lock engagement valve current	>	800	mA
OR			
System pressure	<=	12	bar
Engine speed	<=	70	rpm
Absolute vehicle speed	<	0.300000011920929	kph
Parking lock was engaged confirmation timer	>=	300	ms
(2) Parking lock engaged during park request			
Parking lock considered engaged (1), see summary table attachments C_SID_SSWB_SG_PLK	=	True	
Range request	=	Park	
(3) Vehicle speed low during park request			
Range request	=	Park	
Absolute vehicle speed	<	0.300000011920929	kph
Vehicle speed low during park request confirmation timer	>=	300	ms

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL illum.
Transmission Control Module (TCM)	U0073	Controller Area Network bus Communication Error	CAN Hardware Circuitry Detects a bus-off condition	= True			>= 5 occurences in 5 sec	A
					Enable Conditions: Stabilization delay	>= 5 sec		
					Ignition Voltage	>= 8.75 Volt		
					Ignition Voltage	< 18 Volt		
					Partial network	= ACTIVE for at least 2sec		
					OTA Program State Flag	= INACTIVE		
Transmission Control Module (TCM)	U1960	Key Provisioning	Empty Key Slot found at power up initialization	= True			>= 1 fail count	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		
Transmission Control Module (TCM)	U1960	Key Provisioning	Authoritative counter overflow	= True			>= 1 fail count	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		
Transmission Control Module (TCM)	U196192	Security Peripheral Monitor	Security periperal related fault during MAC generation or Security periperal related fault during MAC verification	= True			>= 1 fail count	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		
Transmission Control Module (TCM)	U1962	Message authentication Monitor	Message Authentication failed	= True			>= 250 fail counts per key slot	A
					Enable Conditions: Stabilization delay	>= 5 sec		
					Ignition Voltage	>= 8.75 Volt		
					Ignition Voltage	< 18 Volt		
					Partial network	= ACTIVE for at least 2sec		
					OTA Program State Flag	= INACTIVE		
					Disable Conditions: MIL Illuminated for	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
					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		
					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	A
											out of	80	
						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	C
											out of	80	
						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	B
											out of	80	
						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	B
											out of	80	
						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)	U0447	Invalid data received from CGM	CAN message from CGM signal integrity fault detected	=	True						>=	40	A
											out of	80	
						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)	U0418	Invalid data received from EBCM	CAN message from EBCM signal integrity fault detected	= True			>= 40 out of 80	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		
					Disable Conditions: MIL Illuminated for	DTC U0073		
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
					Enable Conditions: Power Mode	= not 'OFF' at least 5 sec sec		
					Disable Conditions: MIL Illuminated for	DTC U0073		