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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Crankshaft Position (CKP)-Camshaft Position (CMP) Correlation Bank 1 Sensor A	P0016	This DTC checks the CAM/CRANK signal correlation	Cam pulse occurred outside the 2nd and 7th medium resolution window	LNJ, LX9 • If medium resolution signal is matched, and Cam pulse occurred, and RPM < 1500, and no Cam or Crank fault exist. L26, L32, L36, L67, LG8 • If PCM State is run or crank and medium resolution and low resolution signals are correct and no Cam or Crank faults exist.	LNJ, LX9 Medium resolution interrupt L26, L32, L36, L67, LG8 Medium resolution interrupt	DTC Type B
O2S Heater Control Circuit Bank 1 Sensor 1	P0030	This DTC checks the Heater Output Driver circuit for electrical integrity	Output state shorted or open	• Ignition switch is in crank or run • 11 volts < Ignition Voltage < 18 volts	15 failures out of 20 samples Frequency: 100ms loop Continuous	DTC Type B
O2S Heater Control Circuit Bank 1 Sensor 2	P0036	This DTC checks the Heater Output Driver circuit for electrical integrity	Output state shorted or open	• Ignition switch is in crank or run • 11 volts < Ignition Voltage < 18 volts	15 failures out of 20 samples Frequency: 100ms loop Continuous	DTC Type B
O2S Heater Control Circuit Bank 2 Sensor 1	P0050 (Malibu only)	This DTC checks the Heater Output Driver circuit for electrical integrity	Output state shorted or open	• Ignition switch is in crank or run • 11 volts < Ignition Voltage < 18 volts	15 failures out of 20 samples Frequency: 100ms loop Continuous	DTC Type B
HO2S Heater Resistance Bank 1 Sensor 1	P0053 (This applies to RPO's L26, L32, LX9, LNJ)	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Calculated Heater resistance > 9.3 Ω or < 3.13 Ω	• Coolant – IAT < 8ºC • Engine Soak Time > 10 Hours • -30ºC < Coolant Temp < 45ºC	Once per valid cold start.	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
HO2S Heater Resistance Bank 1 Sensor 2	**P0054 (This applies to RPO's L26, L32, LX9, LNJ)**	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Calculated Heater resistance > 22.17 Ω or < 8.82 Ω	• Coolant – IAT < 8ºC • Engine Soak Time > 10 Hours • -30ºC < Coolant Temp < 45ºC	Once per valid cold start.	DTC Type B
O2S Heater Control Circuit Bank 2 Sensor 2	**P0056 (Malibu only)**	This DTC checks the Heater Output Driver circuit for electrical integrity	Output state shorted or open	• Ignition switch is in crank or run • 11 volts < Ignition Voltage < 18 volts •	15 failures out of 20 samples Frequency: 100ms loop Continuous	DTC Type B
HO2S Heater Resistance Bank 2 Sensor 1	**P0059 (Malibu only)**	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Calculated Heater resistance > 9.3 Ω or < 3.13 Ω	• Coolant – IAT < 8ºC • Engine Soak Time > 10 Hours • -30ºC < Coolant Temp < 45ºC •	Once per valid cold start.	DTC Type B
HO2S Heater Resistance Bank 2 Sensor2	**P0060 (Malibu only)**	Detects an oxygen sensor heater having an incorrect or out of range resistance value.	Calculated Heater resistance > 22.17 Ω or < 8.82 Ω	• Coolant – IAT < 8ºC • Engine Soak Time > 10 Hours • -30ºC < Coolant Temp < 45ºC •	Once per valid cold start.	DTC Type B
MAP/MAF – Throttle Position Correlation	**P0068 (This applies to RPO's L26, L32, LX9, LNJ)**	Indicates that measured engine airflow does not match estimated engine airflow as established by the TP Sensor.	MAP based airflow – TP Sensor estimated airflow > 165 mg/cyl AND MAF based airflow – TP Sensor estimated airflow > 165 mg/cyl AND [(MAF failure or MAP failure) OR (NO Throttle DTC AND NO PCM-TACM serial data DTC)]	• Engine running = true. • Ignition on > 2 seconds • RPM > 600 • No Throttle Actuation DTC's. • No PCM-TACM Serial Data DTC. • Both TPS Circuit DTC's are not set. • No PCM Processor DTC's • No TACM Processor DTC	Both fail counters are incremented by 2 for every error and decrement by 1 for every pass; both thresholds are 32; both fail counters must exceed threshold to set DTC. Frequency: 18.75 ms loop Continuous	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Manifold Absolute Pressure – Barometric Pressure Correlation	**P0069 (GrandPri x L32 only)**	This DTC compares the Predicted Barometric Pressure to the Barometric Pressure Sensor value.	When Predicted BARO is MAP, Difference between Predicted BARO and Barometer Pressure Sensor > 5.195313 kPa When Predicted BARO is calculated, Difference Between Predicted BARO and Barometer Pressure Sensor > 60 kPa	• No Map Sensor DTC's active • No TP Sensor DTC's active • No ECT Sensor DTC's active • No MAF Sensor DTC's active • No IAT Sensor DTC's active • No VSS DTC's active • No BARO Sensor Shorted/Open DTC's active • Predicted BARO must have been updated within the last 1 mile of this trip; Predicted BARO is set equal to powerup MAP at start of trip	10 failures out of 100 samples Frequency: 100ms loop Continuous	DTC Type B
Mass Airflow (MAF) Sensor Performance	**P0101**	This DTC determines if the MAF sensor is not within the normal operating range.	(Calculated Flow - Measured Flow) > cal table lookup as a function of calculated flow	• No MAF circuit DTC's failing • No MAP DTC's failing • No TP Sensor DTC's failing • No EVAP DTC's failing • No EGR DTC's failing • No TAC System DTC faults • No ECT DTC's failing • No IAT DTC's failing • PCM State = RUN • Traction Control = Not Active • EGR Flow Diag. – Not Active • EGR $\leq$ 100% • EGR DC $\leq$ 100% • EVAP Canister Purge Valve Duty Cycle $\leq$ 100% • Delta MAP $\leq$ 5.195313 kPa • Delta TP Sensor $\leq$ 15 % • Engine Vacuum $\leq$ 80 kPa • TP Sensor $\leq$ 100% • 9 volts $\leq$ Ignition Voltage $\leq$ 18 volts • If ignition voltage $\leq$ 11.5 volts then undefaulted MAF must be $\leq$ 40 gps • Enable Criteria Stable Time $\geq$ 2 seconds	320 test failures in a 400 test sample Frequency: 100 ms loop Continuous	DTC Type B

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Mass Air Flow (MAF) Sensor Circuit Low	**P0102**	This DTC detects a continuous short to low or open in either the signal circuit or the MAF sensor.	MAF sensor signal $\leq$ 1200 Hz	• Engine Run Time $\geq$ 0 seconds • RPM $\geq$ 50 • System Voltage $\geq$ 8 volts • Ignition is in crank or run • Indicated Throttle Position $\geq$3.496094 percent rotation (Vehicles with Electronic Throttle Control) (OR IAC steps $\geq$ 5 for vehicles without Electronic Throttle Control) • Enable Criteria Stable Time $\geq$ 0.5 seconds	395 test failures in a 400 test sample 1 sample on every reference pulse	DTC Type B
Mass Air Flow (MAF) Sensor Circuit High	**P0103**	This DTC detects a continuous short to high in either the signal circuit or the MAF sensor.	MAF sensor signal $\geq$ 11500 Hz	• Engine Run Time $\geq$ 0 seconds • RPM $\geq$ 50 • System Voltage $\geq$ 8 volts • Ignition is in crank or run • Indicated Throttle Position $\geq$3.496094 percent rotation (Vehicles with Electronic Throttle Control) (OR IAC steps $\geq$ 5 for vehicles without Electronic Throttle Control) • Enable Criteria Stable Time $\geq$ 0.5 seconds	395 test failures in a 400 test sample 1 sample on every reference pulse	DTC Type B
Manifold Absolute Pressure (MAP) Sensor Circuit Low	**P0107**	This DTC detects a continuous short to low or open in either the signal circuit or the MAP sensor.	MAP sensor signal < 1.95%	• No TP Sensor DTC's failing • No TAC system DTC's failing • [(TP Sensor $\geq$ 0 & Engine Speed $\leq$1000) or (TP Sensor $\geq$ 10% & Engine Speed > 1000)]	175 test failures in a 200 test sample Continuous: 12.5 ms loop if engine is not running every reference pulse below 3200 rpm when engine is running every other reference pulse above 3200 rpm when engine is running	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Manifold Absolute Pressure (MAP) Sensor Circuit High	P0108	This DTC detects a continuous short to high in either the signal circuit or the MAP sensor.	MAP sensor signal > 86.21%	• No TP Sensor DTC's failing • No TAC system DTC's failing • Controller State = RUN • Engine Run Time based on power up coolant temperature: > 1 sec at ≥ 30°C >30 sec at 15°C > 45 sec at 0°C >90 sec at −15°C > 120 sec at -30° C; time is interpolated between temperature points • [(TP Sensor < 2% & Engine Speed ≤ 3000) or (TP Sensor < 30% & Engine Speed > 3000)]	175 test failures in a 200 test sample Continuous: 12.5 ms loop if engine is not running every reference pulse below 3200 rpm when engine is running every other reference pulse above 3200 rpm when engine is running	DTC Type B
Intake Air Temperature (IAT) Sensor Circuit Low	P0112	This DTC determines if the IAT sensor is shorted low by checking for an IAT sensor output voltage below a threshold	IAT sensor signal < 0.703%	• No VSS DTC's failing • No ECT DTC's failing • Vehicle speed ≥ 25.00 mph • Engine run time > 10.00 seconds • ECT < 121.02°C • Engine Run Time > 10 seconds	175 test failures within 1200 test sample s Frequency: 100 ms loop Continuous	DTC Type B
Intake Air Temperature (IAT) Sensor Circuit High	P0113	This DTC determines if the IAT sensor is shorted high or open by checking for an IAT sensor output voltage above a threshold	IAT sensor signal > 99%	• No ECT DTC's failing • No VSS DTC's failing • No MAF DTC's failing • Vehicle speed < 15.00 mph • Airflow < 10.00 g /s • ECT ≥ 60.00 °C • Engine run time> 180.00 seconds	1100 test failures within a 1200.00 test sample Frequency: 100 ms loop Continuous	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Engine Coolant Temperature (ECT) Sensor Performance	P0116	This DTC detects if the engine coolant sensor is biased high while in range.	A failure will be reported if any of the following occur: ECT at powerup > IAT at powerup by 100°C after a minimum 8 hour soak (fast fail). ECT at powerup > IAT at powerup by 15°C after a minimum 8 hour soak and a block heater has not been detected. ECT at powerup > IAT at powerup by 15°C after a minimum 8 hour soak and the time spent cranking the engine without starting is greater than 5 seconds with the fuel level being above a minimum level of 10%.	• No VSS DTC's • No IAT DTC's • No ECT sensor shorted DTC's • ECM/PCM Internal Engine Off Timer Performance DTC not active • Non-volatile memory failure has not been detected on power-up. • Engine off time > 480 minutes (8 hours) • Test run this trip = false • Test aborted this trip = false Block heater detection: - ECT at powerup > IAT at powerup by 15°C - Powerup IAT > 15°C - Vehicle driven a minumu of 300 seconds above 25 mph and IAT drops more than 5° C from powerup IAT.	Frequency: Once per ignition cycle 100 ms loop	DTC Type B
Engine Coolant Temperature (ECT) Sensor Circuit Low	P0117	Thermistor Analog Voltage This DTC detects if the engine coolant sensor's analog voltage falls below a minimum expected value	ECT sensor signal < 0.5078%	• Engine run time > 3.00 seconds OR min IAT ≤ 90°C	240 test failures within a 250.00 test sample Frequency: 100 ms loop Continuous	DTC Type B
Engine Coolant Temperature (ECT) Sensor Circuit High	P0118	Thermistor Analog Voltage This DTC detects if the engine coolant sensor's analog voltage exceeds a maximum expected value	ECT sensor signal > 96.797%	• Engine run time > 30.00 seconds OR min IAT ≥ 0°C	240 test failures within a 250.00 test sample Frequency: 100 ms loop Continuous	DTC Type B

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Throttle Position (TP) Sensor 1 Circuit	**P0120**	1) TACM indicates a continuous or intermittent short or open in either the signal circuit or the TP sensor #1. OR 2) TACM indicates an invalid minimum mechanical position for the TP sensor #1. OR 3) TACM indicates reference voltage out of range.	1) Raw TP sensor signal < 0.376 V or > 4.506 V. OR 2) TP sensor minimum mechanical stop voltage < 0.376 V or > 0.714 V. OR 3) Reference Voltage < 4.54 V or > 5.21 V.	• Ignition in Run or Crank. • Ignition voltage > 5.23 V. • Valid TACM - PCM serial data. • No TACM processor DTC.	1) Counter increments by 4 for every error, decrements by 1 for every pass; threshold is 133. Check runs every 3 ms. 2) One occurrence. Check runs at power-up. 3a). Continuous. Counter increments by 1 for every error, decrements by 1 for every pass. Threshold is 10ms. For reference voltage direct short to ground. 3b) Second continuous counter increments by 1 for every error and decrements by 1 for every pass, threshold is 1000 msec. Verify A/D input on reference voltage to be 5volts +/- tolerance.	DTC Type A
Throttle Position (TP) Sensor 1 Performance	**P0121** **(LG8, L36 and L67 only)**	This DTC determines if the TP Sensor is stuck within the normal operating range.	Stuck High MAP < 50 KPa & TP Sensor > predicted TP Sensor (lookup table as a function of RPM) or Stuck Low MAP > 70 KPa & TP Sensor < predicted TP Sensor (lookup table as a function of RPM)	• No TP Sensor circuit DTC's • No IAC DTC's • No MAP DTC's failing • Engine runtime ≥120 seconds • ECT ≥ 75°C • MAP delta ≤ 5 kPa for MAP Stable Time ≥ 5 seconds • 0 ≤ IAC position ≤ 130 •	95 test failures in a 100 test sample Frequency: 100 ms loop Continuous	DTC Type B

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Throttle Position (TP) Sensor 1 Circuit Low	**P0122 (LG8, L36 and L67 only)**	This DTC detects a continuous short to low or open in either the signal circuit or the TP sensor.	TP sensor signal < 0.0975 volts	• PCM State = Crank or Run	95.00 consecutive test failures within a 100 test sample Frequency: 12.5 ms Continuous	DTC Type B
Throttle Position (TP) Sensor 1 Circuit High	**P0123 (LG8, L36 and L67 only)**	This DTC detects a continuous short to high in either the signal circuit or the TP sensor.	TP sensor signal > 4.9 volts	• PCM State = Crank or Run	95.00 consecutive test failures within a 100 test sample Frequency: 12.5 ms Continuous	DTC Type B
Engine Coolant Temperature (ECT) Insufficient for Closed Loop Fuel Control	**P0125 (This logic applies to LX9, L32, L67. W-car L36 and LNJ)**	This DTC detects if the engine coolant temperature rises too slowly due to an ECT sensor or cooling system fault	If actual accumulated airflow is > predicted accumulated airflow before engine coolant reaches 15 °C	• No MAF DTC's • No IAT sensor DTC's • NO ECT sensor shorts DTC's • No VSS DTC's • ECT Sensor shorts tests not failing • Start up ECT < 10 °C • Minimum Average Airflow > 1.0 gps • Vehicle speed > 5 MPH for 0.50 miles • 30.00 sec < Engine Run Time < 1800.00 sec • IAT $\geq$ -7.03 °C • ECT > -40 °C • Maximum airflow added to actual accumulated airflow limited to 30 gps Note: the min IAT used above is clamped to a maximum value of 54.5°C	30 failures to set DTC Frequency: Once per ignition cycle 1 second loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION

Engine Coolant Temperature (ECT) Insufficient for Closed Loop Fuel Control (Does not fail on EPA 3)	**P0125 (this logic used on LG8)**	Under driving conditions, closed loop temperature should be achieved based on amount of cumulative airflow ingested and based on startup coolant temperature	If closed-loop timer is exceeded: 120 sec @ 44 °F 300.00 sec @ 24 °F to 44°F 439.0 sec @ region 3 and ECT < 15 ° C (59°F) Coolant temperature < 32.5°C when actual cumulative airflow $\geq$ predicted cumulative airflow (based on start-up coolant temperature, minimum IAT, engine run time) for 30 seconds Cumulative airflow is accumulated when 15 GPS < airflow < 75 GPS	• ECT sensor shorts test not failing
				• IAT sensor DTCs not active
				• Engine runtime > 0
				• Start up ECT $\leq$ 10.00 °C
				• IAT $\geq$ -6.99 °C
				• ECT $\geq$ -40.00 °C
				
				• Max Idle Time $\leq$:
				  95.00 sec @ 44 °F
				  210.00 sec @ 24°F to 44 °F
				  329.00 sec @ Reg 3
				
				• Min Total Engine Air $\geq$:
				  1252.00 grams @ 44 °F
				  1908.00 grams @ 24 °F to 44°F
				  4669.0 grams @ Reg 3
				
				•
					Frequency: Once per ignition cycle 100 ms loop
					
					Time to fail based on flow
						DTC Type B

Engine Coolant Temperature (ECT) Below Thermostat Regulating Temperature	**P0128**	This DTC detects if the engine coolant temperature rises too slowly due to an ECT or cooling system fault	If actual accumulated airflow is > predicted accumulated airflow before engine coolant reaches 80.00 °C	• No MAF DTC's • No IAT sensor DTC's • NO ECT sensor shorts DTC's • No VSS DTC's • ECT Sensor shorts tests not failing • Start up ECT < 75 °C • Minimum Average Airflow > 1 gps • Vehicle speed > 5 MPH for 0.50 miles • 30.00 sec < Engine Run Time < 1800.00 sec • IAT $\geq$ -7.03 °C • ECT > -40 °C • Maximum airflow added to actual accumulated airflow limited to 30 gps Note: the min IAT used above is clamped to a maximum value of 54.5°C	30 failures to set DTC Frequency: Once per ignition cycle 1 second loop	DTC Type B

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O2S Circuit Low Voltage Bank 1 Sensor 1	**P0131**	This DTC determines if the O2 sensor circuit is shorted to low by checking for a lean condition during steady throttle and PE.	O2 sensor voltage < 78.125 millivolts
			or
			O2 sensor voltage < 600.00 millivolts in PE mode
				<u>Common Enable Criteria</u>
				• No TP Sensor DTC's
				• No MAP DTC's
				• No ECT DTC's
				• No MAF DTC's
				• No IAT DTC's
				• No Evap DTC's
				• No Fuel Injector DTC's
				• EGR flow diagnostic intrusive test = Not Active
				• Catalyst monitor diagnostic intrusive test = Not Active
				• Post Oxygen Sensor Diagnostic intrusive test= Not Active
				• 9 volts < system voltage < 18.00 volts
				• Device control = Not Active
				
				 <u>Specific Enable Criteria</u>
				• $0.88 \leq$ Equivalence ratio ≤ 1.088
				• $4 \% \leq$ throttle position $\leq 40.00 \%$
				• Fuel state = closed loop
				• All fuel injectors = ON
				• Traction Control = not active
				• ECT < 131°C
				
				  All of the above met for at least 3 seconds
				
				<u>For PE Test</u>
				• All injectors = on
				• Indication that closed loop fueling is ready
				• Equivalence Ratio ≥ 1.088
				• Engine Run Time ≥ 300 seconds
				  All of the above met for at least 2 seconds
					155 test failures in a 170.00 test sample for 3.00 sets of samples
					
					60.00 failures in a 75.00 test sample for PE mode
					
					<u>Frequency:</u>
					Continuous
					100 ms loop
						DTC Type B

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O2S Circuit High Voltage Bank 1 Sensor 1	**P0132**	This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle.	O2 sensor voltage > 889.76 millivolts	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test= Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • $0.88 \leq$ Equivalence Ratio ≤ 1.088 • $3.00 \% \leq$ throttle position $\leq 40.00 \%$ • Fuel_State = Closed loop All of the above met for at least 3 seconds	100.00 test failures in a 125 test sample for 6.00 sets of samples Frequency: Continuous 100 ms loop	DTC Type B

SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2S Slow Response Bank 1 Sensor 1	**P0133**	This DTC determines if the O2 sensor response time is degraded	O2 Sensor Average Transition Time: LRA > 170.00 ms or RLA > 155.00 ms	<u>Common Enable Criteria</u> • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test = Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active <u>Specific Enable Criteria</u> • O2 Heater on for $\geq$ 0 seconds • Bank 1 Sensor1 circuit and heater and heater driver DTCs = Not Active • Bank 2 Sensor 1 circuit and heater and heater driver DTCs = Not Active • In one of the following four fueling cells: Purge off, normal; purge off, high flow; purge on, normal; purge oon, high flow • Misfire DTC = Not Active • ECT > 65.00 °C • Engine run time > 60.00 seconds • EVAP Canister purge duty cycle $\geq$ 0.00 % • 15.00 gps $\leq$ MAF $\leq$ 30.00 gps • 1200.00 $\leq$ RPM $\leq$ 2200.00 • Throttle position $\geq$ 2.00 % • Fuel state = closed loop • Transmission (automatic) not in Park, Reverse or Neutral All of the above met for at least 1 second.	90000.00 ms <u>Frequency:</u> Once per trip	DTC Type B

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O2S Circuit Insufficient Activity Bank 1 Sensor 1	**P0134**	This DTC determines if the O2 sensor is open.	381.94 millivolts < O2 sensor < 525.17 millivolts	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test = Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific_Enable_Criteria • Engine run time > 120.00 seconds • Predicted O2 temperature > 0°C	250 test failures in a 300 test sample Frequency: Continuous for pre catalyst sensors 100 ms loop rate	DTC Type B

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O2S Heater Performance Bank 1 Sensor 1	**P0135**	Current Monitor: This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Current Monitor:The heater full on current is < 0.3125 amps or > 1.426 amps	Current Monitor: Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test = Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • Engine Run Time $\geq$ 100 seconds • ECT $\geq$ 65° C • 600 $\leq$ Engine Rpm $\leq$ 3000 • 4 gps $\leq$ Mass Airflow $\leq$ 30 gps • O2 heater not in Device control • O2 heater driver DTC not active All of the above met for at least 2 seconds	Current Monitor: 17 test failures in 20 test samples Frequency: 5 tests per trip 30 second delay between tests 1 second execution rate	DTC Type B

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O2S Circuit Low Voltage Bank 1 Sensor 2	**P0137**	This DTC determines if the O2 sensor circuit is shorted to low by checking for a lean condition during steady throttle.	O2 sensor voltage < 78.125 millivolts	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test = Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • $0.88 \leq$ Equivalence ratio ≤ 1.088 • $4\% \leq$ throttle position $\leq 40.00\%$ • Fuel state = closed loop • All fuel injectors = ON • Traction Control = not active • ECT < 131°C All of the above met for at least 3 seconds	360 test failures in a 400 test sample for 3.00 sets of samples Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2S Circuit High Voltage Bank 1 Sensor 2	**P0138**	This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle.	O2 sensor voltage > 924.48 millivolts	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic = Not Active • Catalyst monitor diagnostic = Not Active • Post Oxygen Sensor Diagnostic = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • $0.88 \leq$ Equivalence Ratio ≤ 1.088 • $3.00\ \% \leq$ throttle position $\leq 40.00\ \%$ • Fuel_State = Closed loop All of the above met for at least 3 seconds	540 test failures in a 600 test sample for 2 sets of samples Frequency: Continuous 100 ms loop	DTC Type B

2005   3.1L (LG8)   3.4L (LA1, LNJ)   3.5L (LX9)   3.8L (L32, L36, L67)   3.8L (L26) *without* A.I.R.

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION

O2S Circuit Insufficient Activity Bank 1 Sensor 2	**P0140**	This DTC determines if the O2 sensor is open.	390.63 millivolts < O2 sensor < 520.83 millivolts for regular open test
			
			381.94 millivolts < O2 sensor < 525.17 millivolts to fail the fast pass open test (must fail the regular open test in order to fail the DTC; regular open test is run if fast pass is not run or if fast pass fails)
				Common Enable Criteria
				• No TP Sensor DTC's
				• No MAP DTC's
				• No ECT DTC's
				• No MAF DTC's
				• No IAT DTC's
				• No Evap DTC's
				• No Fuel Injector DTC's
				• EGR flow diagnostic = Not Active
				• Catalyst monitor diagnostic = Not Active
				• Post Oxygen Sensor Diagnostic = Not Active
				• 9 volts < system voltage < 18.00 volts
				• Device control = Not Active
				
				Specific Enable Criteria
				• O2S Heater Performance Bank 1 Sensor 2 not active
				• O2S Heater Control Circuit Bank 1 Sensor 2 not active
				• PCM State = run
				
				Fast Pass:
				• (Engine run time $\leq$ 90 seconds) OR (current start <> cold start)
				
				Cold start determination:
				  Powerup ECT < 35° C
				  Powerup IAT < 35° C
				  Powerup ECT – Powerup IAT < 6° C
				
				(Fast pass cannot report a fail; if Fastpass fails, the regular open test is run)
				
				Regular Open Test
				• Engine run time > 120 seconds
				• Predicted O2 temperature > 0° C
				• Fuel state = closed loop
				• Minimum of 3 occurrences of a delta TP sensor $\geq$ 8.0 % during diagnostic test
					1080 test failures in a 1200 test sample for regular open test
					
					(sample counts – failure counts) < 180 within 90 seconds of engine run time to fail the fast pass test (regular open test is run when fast pass fails; to fail DTC the regular open test must fail)
					
					Frequency:
					
					Once/trip for post catalyst sensors
					100 ms loop
						DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
O2S Heater Performance Bank 1 Sensor 2	**P0141 (This logic aplies to L26, L32, LX9 and LNJ)**	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	The heater full on current is < 0.2148438 amps or > 0.957031 amps	Current Monitor: Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic Intrusive Test = Not Active • Catalyst monitor diagnostic Intrusive Test = Not Active • Post Oxygen Sensor Diagnostic Intrusive Test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • Engine Run Time $\geq$ 100 seconds • ECT $\geq$ 65° C • 600 $\leq$ Engine Rpm $\leq$ 3000 • 4 gps $\leq$ Mass Airflow $\leq$ 30 gps • O2 heater not in Device control O2 heater driver DTC not active All of the above met for at least 2 seconds	Current Monitor: 17 test failures in 20 test samples Frequency: 5 tests per trip 30 second delay between tests 1 second execution rate	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION

O2S Heater Performance Bank 1 Sensor 2	**P0141**
	
	This logic applies to L36, L67, and LG8
		This DTC determines if the O2 sensor heater is degraded.	The elapsed time to obtain ± 74.0 millivolts from the mean O2 bias voltage.
			
			*Time based on table: Time vs Start Up ECT
				• No O2 sensor DTC's for Bank 1 Sensor 2 set (P0137, P0138, P0140)
				• Device control = Not Active
				• Current start = cold start
				• 399.31 mV< start-up bias voltage < 499.13 mV
				• 9 volts < system voltage < 18.00 volts
				
				Cold start determination:
				  Powerup ECT < 35° C
				  Powerup IAT < 35° C
				  Powerup ECT – Powerup IAT < 6° C
				
				Note: Cannont report a pass if average airflow ≥ 20 grams per second
					One test/trip	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
O2S Circuit Low Voltage Bank 2 Sensor 1	**P0151 (Malibu only)**	This DTC determines if the O2 sensor circuit is shorted to low by checking for a lean condition during steady throttle and PE.	O2 sensor voltage < 78.125 millivolts or O2 sensor voltage < 600.00 millivolts in PE mode	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test = Not Active • Post Oxygen Sensor Diagnostic intrusive test= Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • $0.88 \leq$ Equivalence ratio ≤ 1.088 • $4 \% \leq$ throttle position $\leq 40.00 \%$ • Fuel state = closed loop • All fuel injectors = ON • Traction Control = not active • ECT < 131°C All of the above met for at least 3 seconds For PE Test • All injectors = on • Indication that closed loop fueling is ready • Equivalence Ratio ≥ 1.088 • Engine Run Time ≥ 300 seconds All of the above met for at least 2 seconds	155 test failures in a 170.00 test sample for 3.00 sets of samples 60.00 failures in a 75.00 test sample for PE mode Frequency: Continuous 100 ms loop	DTC Type B

2005   3.1L (LG8)   3.4L (LA1, LNJ)   3.5L (LX9)   3.8L (L32, L36, L67)   3.8L (L26) *without* A.I.R.

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
O2S Circuit High Voltage Bank 2 Sensor 1	**P0152 (Malibu only)**	This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle.	O2 sensor voltage > 889.76 millivolts	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test= Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • $0.88 \leq$ Equivalence Ratio ≤ 1.088 • $3.00 \% \leq$ throttle position $\leq 40.00 \%$ • Fuel_State = Closed loop All of the above met for at least 3 seconds •	100.00 test failures in a 125 test sample for 6.00 sets of samples Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2S Slow Response Bank 2 Sensor 1	**P0153** **(Malibu only)**	This DTC determines if the O2 sensor response time is degraded	O2 Sensor Average Transition Time: LRA > 200 ms or RLA > 200 ms	<u>Common Enable Criteria</u> • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test = Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active <u>Specific Enable Criteria</u> • O2 Heater on for $\geq$ 0 seconds • Bank 1 Sensor1 circuit and heater and heater driver DTCs = Not Active • Bank 2 Sensor 1 circuit and heater and heater driver DTCs = Not Active • In one of the following four fueling cells: Purge off, normal; purge off, high flow; purge on, normal; purge oon, high flow • Misfire DTC = Not Active • ECT > 65.00 °C • Engine run time > 60.00 seconds • EVAP Canister purge duty cycle $\geq$ 0.00 % • 15.00 gps $\leq$ MAF $\leq$ 30.00 gps • 1200.00 $\leq$ RPM $\leq$ 2200.00 • Throttle position $\geq$ 2.00 % • Fuel state = closed loop • Transmission (automatic) not in Park, Reverse or Neutral All of the above met for at least 1 second. •	90000.00 ms <u>Frequency:</u> Once per trip	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
O2S Circuit Insufficient Activity Bank 2 Sensor 1	**P0154 (Malibu only)**	This DTC determines if the O2 sensor is open.	381.94 millivolts < O2 sensor < 525.17 millivolts	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test = Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific_Enable_Criteria • Engine run time > 120.00 seconds • Predicted O2 temperature > 0°C •	250 test failures in a 300 test sample Frequency: Continuous for pre catalyst sensors 100 ms loop rate	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
O2S Heater Performance Bank 2 Sensor 1	**P0155 (Malibu only)**	Current Monitor: This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	Current Monitor:The heater full on current is < 0.3125 amps or > 1.426 amps	Current Monitor: Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test = Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • Engine Run Time $\geq$ 100 seconds • ECT $\geq$ 65° C • 600 $\leq$ Engine Rpm $\leq$ 3000 • 4 gps $\leq$ Mass Airflow $\leq$ 30 gps • O2 heater not in Device control • O2 heater driver DTC not active All of the above met for at least 2 seconds •	Current Monitor: 17 test failures in 20 test samples Frequency: 5 tests per trip 30 second delay between tests 1 second execution rate	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2S Circuit Low Voltage Bank 2 Sensor 2	**P0157 (Malibu only)**	This DTC determines if the O2 sensor circuit is shorted to low by checking for a lean condition during steady throttle.	O2 sensor voltage < 78.125 millivolts	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic intrusive test = Not Active • Catalyst monitor diagnostic intrusive test = Not Active • Post Oxygen Sensor Diagnostic intrusive test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • $0.88 \leq$ Equivalence ratio ≤ 1.088 • $4\ \% \leq$ throttle position $\leq 40.00\ \%$ • Fuel state = closed loop • All fuel injectors = ON • Traction Control = not active • ECT < 131°C All of the above met for at least 3 seconds	360 test failures in a 400 test sample for 3.00 sets of samples Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2S Circuit High Voltage Bank 2 Sensor 2	**P0158 (Malibu only)**	This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle.	O2 sensor voltage > 924.48 millivolts	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic = Not Active • Catalyst monitor diagnostic = Not Active • Post Oxygen Sensor Diagnostic = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • $0.88 \leq$ Equivalence Ratio ≤ 1.088 • $3.00 \% \leq$ throttle position $\leq 40.00 \%$ • Fuel_State = Closed loop All of the above met for at least 3 seconds •	540 test failures in a 600 test sample for 2 sets of samples Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION

O2S Circuit Insufficient Activity Bank 2 Sensor 2	**P0160 (Malibu only)**	This DTC determines if the O2 sensor is open.	390.63 millivolts < O2 sensor < 520.83 millivolts for regular open test
			
			381.94 millivolts < O2 sensor < 525.17 millivolts to fail the fast pass open test (must fail the regular open test in order to fail the DTC; regular open test is run if fast pass is not run or if fast pass fails)
				Common Enable Criteria
				• No TP Sensor DTC's
				• No MAP DTC's
				• No ECT DTC's
				• No MAF DTC's
				• No IAT DTC's
				• No Evap DTC's
				• No Fuel Injector DTC's
				• EGR flow diagnostic = Not Active
				• Catalyst monitor diagnostic = Not Active
				• Post Oxygen Sensor Diagnostic = Not Active
				• 9 volts < system voltage < 18.00 volts
				• Device control = Not Active
				
				Specific Enable Criteria
				• O2S Heater Performance Bank 1 Sensor 2 not active
				• O2S Heater Control Circuit Bank 1 Sensor 2 not active
				• PCM State = run
				
				Fast Pass:
				• (Engine run time $\leq$ 90 seconds) OR (current start <> cold start)
				
				Cold start determination:
				  Powerup ECT < 35° C
				  Powerup IAT < 35° C
				  Powerup ECT – Powerup IAT < 6° C
				
				(Fast pass cannot report a fail; if Fastpass fails, the regular open test is run)
				
				Regular Open Test
				• Engine run time > 120 seconds
				• Predicted O2 temperature > 0° C
				• Fuel state = closed loop
				• Minimum of 3 occurrences of a delta TP sensor $\geq$ 8.0 % during diagnostic test
				•
					1080 test failures in a 1200 test sample for regular open test
					
					(sample counts – failure counts) < 180 within 90 seconds of engine run time to fail the fast pass test (regular open test is run when fast pass fails; to fail DTC the regular open test must fail)
					
					Frequency:
					
					Once/trip for post catalyst sensors
					100 ms loop
						DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
O2S Heater Performance Bank 2 Sensor 2	**P0161 (Malibu only)**	This DTC determines if the O2 sensor heater is functioning properly by monitoring the current through the heater circuit.	The heater full on current is < 0.2148438 amps or > 0.957031 amps	Current Monitor: Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic Intrusive Test = Not Active • Catalyst monitor diagnostic Intrusive Test = Not Active • Post Oxygen Sensor Diagnostic Intrusive Test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • Engine Run Time $\geq$ 100 seconds • ECT $\geq$ 65° C • 600 $\leq$ Engine Rpm $\leq$ 3000 • 4 gps $\leq$ Mass Airflow $\leq$ 30 gps • O2 heater not in Device control • O2 heater driver DTC not active All of the above met for at least 2 seconds	Current Monitor: 17 test failures in 20 test samples Frequency: 5 tests per trip 30 second delay between tests 1 second execution rate	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Fuel Trim System Lean Bank 1	**P0171** **(This logic applies to RPO's LNJ, LX9, L26, L32)**	Determines if the system is in a lean condition.	The average of long term fuel trim samples (LTM average) $\geq$ 1.1875 Note: The LTM average is weighted 15% idle cell purge on or purge off (last idle cell driven in), and 70% normal cell purge on, and 15% high flow cell purge on.	• No TP Sensor DTC's • No TAC System DTC's • No Misfire DTC's • No IAC DTC's • No Fuel Injector DTC's • No MAF DTC's • No O2 sensor DTC's • No MAP DTC's • No EGR DTC's • No EVAP DTC's • No AIR DTC's • Engine speed > 525 rpm but < 5600 rpm • BARO > 70.00 kPa • ECT > --38.51^{o}C but < 121.01°C • MAP > 15.0 kPa but < 199.00 kPa • IAT > -38.51 °C but < 139.88°C • Airflow > 1.0 g/s but < 511.00 g/s • Vehicle speed < 82.00 mph • Closed Loop Fueling • Long Term Fuel Trim Learning enabled • Not in Device Control • EGR Flow Diagnostic Intrusive Test = Not Active • Catalyst Monitor Diagnostic Intrusive Test = Not Active • Post O2 Diagnostic Intrusive Test = Not Active • Evap diagnostic is at any stage except the "tank pull down" portion of the test. • At least 60 seconds have been spent in the last idle cell and 60 seconds have been spent in the purge on normal cell and 50 seconds have been spent in the purge on high flow cell. • Fuel Level > 10 % (must be < 10% for 10 seconds to disable; default is to enable if fuel sender is broken)	70.00 test failures Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Fuel Trim System Lean Bank 1	**P0171** **This logic applies to the following engine rpo's: L36, L67, LG8**	Determines if the system is in a lean condition.	The average of long term fuel trim samples (LTM average) $\geq$ 1.2031 Note: The LTM average is weighted 37.5% idle cell purge on or purge off (last idle cell driven in), and 12.5% purge-off idle cell, and 12.5% purge-off normal cell, and 37.5% purge-on normal cell.	• No TP Sensor , Misfire, IAC, Fuel Injector, MAF, O2 Sensor, MAP, EGR, or EVAP DTC's • Engine speed > 450 rpm but < 5600 rpm • BARO > 70.00 kPa (8500 ft) • ECT > 20 ^{o}C but < 123.9844 $^\circ$C • MAP > 18 kPa but < 200 kPa • IAT > -18.01 $^\circ$C but < 140.00 $^\circ$C • Airflow > 2.797 gps but < 511.99 gps • Vehicle speed < 82 mph • Closed Loop Fueling • Long Term Fuel Trim Learning enabled • Not in Device Control • EGR Flow Diagnostic Intrusive Test = Not Active • Catalyst Monitor Diagnostic Intrusive Test = Not Active • Evap Diagnostic = Done • Post O2 Diagnostic Intrusive Test – Not Active • Fuel Level > 10 % (must be < 10% for 10 seconds to disable; default is to enable if fuel sender is broken)	5.00 test failures Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Fuel Trim System Rich Bank 1	**P0172** **(This logic applies to RPO's LNJ, LX9, L26, L32)**	Determines if the system is in a rich condition.	The average of long term fuel trim (LTM) samples ≤ 0.80469 Once the above occurs, the purge is ramped off to determine if excess purge is present or if the system is truly failing. Therefore, in addition to the above, one of the following must also occur: The snapshot value of the long term fuel trim of the idle purge off cell < 0..8001 Or The snapshot value of the long term fuel trim of the normal purge off cell < 0.8001 Or The snapshot value of the long term fuel trim of the high flow purge off cell < 0.8001 Snapshots of the long term modifier values of the learned cells in the idle, normal, or high flow cells (all purge off), are separated by a 10-second purge off time interval; a minimum of 60 seconds total accumulated time must be spent in any one cell before a snapshot can occur in that cell. Note: 1. If the intrusive portion of the test does not fail, the intrusive portion of the diagnostic will be delayed for 300 seconds. During this delay, fuel trim will pass if the EVAP canister vapors are cleaned out and the long term modifier average increases above 0.80469 2. The LTM average is weighted 15% idle cell purge on or purge off (last idle cell driven in), and 70% normal cell purge on, and 15% high flow cell purge on.	• No TP Sensor DTC's • No TAC System DTC's • No Misfire DTC's • No IAC DTC's • No Fuel Injector DTC's • No MAF DTC's • No O2 sensor DTC's • No MAP DTC's • No EGR DTC's • No EVAP DTC's • No AIR DTC's • Engine speed > 525 rpm but < 5600 rpm • BARO > 70.00 kPa • ECT > --38.51°C but < 121.01°C • MAP > 15.0 kPa but < 199.00 kPa • IAT > -38.51 °C but < 139.88°C • Airflow > 1.0 g/s but < 511.00 g/s • Vehicle speed < 82.00 mph • Closed Loop Fueling • Long Term Fuel Trim Learning enabled • Not in Device Control • EGR Flow Diagnostic Intrusive Test = Not Active • Catalyst Monitor Diagnostic Intrusive Test = Not Active • Post O2 Diagnostic Intrusive Test = Not Active • Evap diagnostic is at any stage except the "tank pull down" portion of the test. Intrusive Enable Criteria • At least 60 seconds have been spent in the last idle cell and 60 seconds have been spent in the purge on normal cell and 50 seconds have been spent in the purge on high flow cell. • Average of long term fuel trim samples ≤ 0.80469 for 10 seconds • RPM > 0 • 1 gps < Mass Airflow < 511 gps • Must be in the last idle cell entered, normal purge on cell, or the high flow purge on cell, for at least 2 consecutive seconds. • VSS > 8 mph Temporary Intrusive Test Disable criteria • If during intrusive test, leave Excess Purge Test cell (idle, normal, or high flow purge	If rich fail counter is ≥5.00 Before rich non-fail counter ≥ 2, diagnostic fails. <u>Frequency:</u> Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Fuel Trim System Rich Bank 1	**P0172** **This logic applies to the following engine rpo's: L36, L67, LG8,**	Determines if the system is in a rich condition.	The average of long term fuel trim samples (LTM average) ≤ 0.80469 Note: The LTM average is weighted 37.5% idle cell purge on or purge off (last idle cell driven in), and 12.5% purge-off idle cell, and 12.5% purge-off normal cell, and 37.5% purge-on normal cell. The change in (ltm + stm + plm) < 0.109375 in 3.5 seconds (purge is ramped from a higher to a lower value and the change in fueling is evaluated to decide if excess purge is present or if the system is failing rich (normal purge is present)) Note: 1. If the intrusive portion of the test indicates the presence of excess purge, the diagnostic will be delayed for 10 seconds to allow the EVAP canister time to clean itself. 2. After either 10 indications of normal purge present or 5 indications of excess purge present (both indication limits are application dependent), the intrusive portion of the test will be delayed for 300 seconds. During this delay, fuel trim will pass if the EVAP canister vapors are cleaned out and the long-term modifier average increases above 0.80469.	• No TP Sensor DTC's • No Misfire DTC's • No IAC DTC's • No Fuel Injector DTC's • No MAF DTC's • No O2 sensor DTC's • No MAP DTC's • No EGR DTC's • No EVAP DTC's • Engine speed > 450 rpm but < 5600 rpm • BARO > 70.00 kPa (8500 ft) • ECT > 20.00 ^{o}C but < 123.9844 °C • MAP > 18.01 kPa but < 200.00 kPa • IAT > -18.01 °C but < 140.00 °C • Airflow > 2.797 gps but < 511.99 gps • Vehicle speed < 82 mph • Closed Loop Fueling • Long Term Fuel Trim Learning enabled • Not in Device Control • EGR Flow Diagnostic Intrusive Test = Not Active • Catalyst Monitor Diagnostic Intrusive Test = Not Active • Evap Diagnostic = Done • Post O2 Diagnostic Intrusive Test = Not Active Intrusive Enable Criteria • Average of long term fuel trim samples ≤ 0.80469 • RPM > 900 • 2.89 gps < Mass Airflow < 150 gps • EVAP Canister Purge Valve Duty Cycle must be > 20 % for 8 seconds • Must be in the normal, purge on cell; must have spent a minimum of 45 seconds in the purge on normal cell with learning enabled during the life of the vehicle to enable in that cell,	4.00 test failures Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Fuel Trim System Lean Bank 2	**P0174 (Malibu only)**	Determines if the system is in a lean condition.	The average of long term fuel trim samples (LTM average) $\geq$ 1.1875 Note: The LTM average is weighted 15% idle cell purge on or purge off (last idle cell driven in), and 70% normal cell purge on, and 15% high flow cell purge on.	• No TP Sensor DTC's • No TAC System DTC's • No Misfire DTC's • No IAC DTC's • No Fuel Injector DTC's • No MAF DTC's • No O2 sensor DTC's • No MAP DTC's • No EGR DTC's • No EVAP DTC's • No AIR DTC's • Engine speed > 525 rpm but < 5600 rpm • BARO > 70.00 kPa • ECT > --38.51^{o}C but < 121.01°C • MAP > 15.0 kPa but < 199.00 kPa • IAT > -38.51 °C but < 139.88°C • Airflow > 1.0 g/s but < 511.00 g/s • Vehicle speed < 82.00 mph • Closed Loop Fueling • Long Term Fuel Trim Learning enabled • Not in Device Control • EGR Flow Diagnostic Intrusive Test = Not Active • Catalyst Monitor Diagnostic Intrusive Test = Not Active • Post O2 Diagnostic Intrusive Test = Not Active • Evap diagnostic is at any stage except the "tank pull down" portion of the test. • At least 60 seconds have been spent in the last idle cell and 60 seconds have been spent in the purge on normal cell and 50 seconds have been spent in the purge on high flow cell. • Fuel Level > 10 % (must be < 10% for 10 seconds to disable; default is to enable if fuel sender is broken)	70.00 test failures Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Fuel Trim System Rich Bank 2	**P0175 (Malibu only)**	Determines if the system is in a rich condition.	The average of long term fuel trim (LTM) samples ≤ 0.80469 Once the above occurs, the purge is ramped off to determine if excess purge is present or if the system is truly failing. Therefore, in addition to the above, one of the following must also occur: The snapshot value of the long term fuel trim of the idle purge off cell < 0..8001 Or The snapshot value of the long term fuel trim of the normal purge off cell < 0.8001 Or The snapshot value of the long term fuel trim of the high flow purge off cell < 0.8001 Snapshots of the long term modifier values of the learned cells in the idle, normal, or high flow cells (all purge off), are separated by a 10-second purge off time interval; a minimum of 60 seconds total accumulated time must be spent in any one cell before a snapshot can occur in that cell. Note: 3. If the intrusive portion of the test does not fail, the intrusive portion of the diagnostic will be delayed for 300 seconds. During this delay, fuel trim will pass if the EVAP canister vapors are cleaned out and the long term modifier average increases above 0.80469 The LTM average is weighted 15% idle cell purge on or purge off (last idle cell driven in), and 70% normal cell purge on, and 15% high flow cell purge on.	• No TP Sensor DTC's • No TAC System DTC's • No Misfire DTC's • No IAC DTC's • No Fuel Injector DTC's • No MAF DTC's • No O2 sensor DTC's • No MAP DTC's • No EGR DTC's • No EVAP DTC's • No AIR DTC's • Engine speed > 525 rpm but < 5600 rpm • BARO > 70.00 kPa • ECT > --38.51^{o}C but < 121.01°C • MAP > 15.0 kPa but < 199.00 kPa • IAT > -38.51 °C but < 139.88°C • Airflow > 1.0 g/s but < 511.00 g/s • Vehicle speed < 82.00 mph • Closed Loop Fueling • Long Term Fuel Trim Learning enabled • Not in Device Control • EGR Flow Diagnostic Intrusive Test = Not Active • Catalyst Monitor Diagnostic Intrusive Test = Not Active • Post O2 Diagnostic Intrusive Test = Not Active • Evap diagnostic is at any stage except the "tank pull down" portion of the test. Intrusive Enable Criteria • At least 60 seconds have been spent in the last idle cell and 60 seconds have been spent in the purge on normal cell and 50 seconds have been spent in the purge on high flow cell. • Average of long term fuel trim samples ≤ 0.80469 for 10 seconds • RPM > 0 • 1 gps < Mass Airflow < 511 gps • Must be in the last idle cell entered, normal purge on cell, or the high flow purge on cell, for at least 2 consecutive seconds. • VSS > 8 mph Temporary Intrusive Test Disable criteria • If during intrusive test, leave Excess Purge Test cell (idle, normal, or high flow purge	If rich fail counter is ≥5.00 Before rich non-fail counter ≥ 2, diagnostic fails. Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Injector 1 Control Circuit	**P0201**	This DTC checks the Fuel Injectors for electrical integrity	Output state is shorted or open	• Ignition switch is in crank or run • 9 < Ignition Voltage < 18 • Injector commanded on > 0.5 seconds	15 failures out of 20 samples Frequency: Continuous 100 ms loop	DTC Type B
Injector 2 Control Circuit	**P0202**	This DTC checks the Fuel Injectors for electrical integrity	Output state is shorted or open	• Ignition switch is in crank or run • 9 < Ignition Voltage < 18 • Injector commanded on > 0.5 seconds	15 failures out of 20 samples Frequency: Continuous 100 ms loop	DTC Type B
Injector 3 Control Circuit	**P0203**	This DTC checks the Fuel Injectors for electrical integrity	Output state is shorted or open	• Ignition switch is in crank or run • 9 < Ignition Voltage < 18 • Injector commanded on > 0.5 seconds	15 failures out of 20 samples Frequency: Continuous 100 ms loop	DTC Type B
Injector 4 Control Circuit	**P0204**	This DTC checks the Fuel Injectors for electrical integrity	Output state is shorted or open	• Ignition switch is in crank or run • 9 < Ignition Voltage < 18 • Injector commanded on > 0.5 seconds	15 failures out of 20 samples Frequency: Continuous 100 ms loop	DTC Type B
Injector 5 Control Circuit	**P0205**	This DTC checks the Fuel Injectors for electrical integrity	Output state is shorted or open	• Ignition switch is in crank or run • 9 < Ignition Voltage < 18 • Injector commanded on > 0.5 seconds	15 failures out of 20 samples Frequency: Continuous 100 ms loop	DTC Type B
Injector 6 Control Circuit	**P0206**	This DTC checks the Fuel Injectors for electrical integrity	Output state is shorted or open	• Ignition switch is in crank or run • 9 < Ignition Voltage < 18 • Injector commanded on > 0.5 seconds	15 failures out of 20 samples Frequency: Continuous 100 ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Throttle Position (TP) Sensor 2 Circuit	**P0220 (This applies to RPO's L26, L32, LX9 and LNJ)**	1) TACM indicates a continuous or intermittent short or open in either the signal circuit or the TP sensor #2. OR 2) TACM indicates an invalid minimum mechanical position for the TP sensor #2. OR 3) TACM indicates reference voltage out of range.	1) Raw TP sensor signal < 0.282 V or > 4.60 V. OR 2) TP sensor minimum mechanical stop voltage < 0.282 V or > 0.813V OR 3) 4.54 V < Reference voltage < 5.21 V	• Ignition in Run or Crank. • Ignition voltage > 5.23 V. • Valid TACM - PCM serial data. • No TACM processor DTC.	1) Counter increments by 4 for every error, decrements by 1 for every pass; threshold is 133. Check runs every 3 ms. 2) One occurrence. Check runs at power-up. 3) Continuous. Counter increments by 1 for every error, decrements by 1 for every pass. Threshold is 10ms. For Reference voltage direct short to ground.	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Turbocharger Wastegate / Supercharger Boost Solenoid A Control Circuit	**P0243** **Applies to the following engine rpos:** **L32, L67**	This DTC checks the Supercharcger Solenoid Control Circuit for electrical integrity	Output state invalid	• Ignition switch is in crank or run • 9 < Ignition Voltage < 18	15 failure out of 20 samples OR chip protection logic indicates a short failure 1 time Frequency: Continuous 100 ms loop Chip protection logic: 5 failures out of 10 samples indicate a short Frequency of this logic is 12.5 ms loop Continuous Once the chip protection logic detects 5 failures out of 10 samples, the driver is turned off for the rest of the trip.	DTC Type B (L67 is Type C)

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Engine Misfire Detected	P0300	These DTC 's will determine if a random misfire or a cylinder specific misfire is occurring by monitoring crankshaft velocity.	Deceleration index vs Engine Speed vs Load and Camshaft Position Emission Failure Threshold = 1.0% Catalyst Damage Threshold = 5% Misfire depending on engine speed and engine load	• DTCs not active for VSS, CKP, CMP, TP, MAP, ECT, MAF, TAC system sensors. • P0315 (Crankshaft Position System Variation Not Learned) not active or engine speed < 1200. • Any Fuel cutoff not active. • Power management is not active. • Brake torque management not active. • Fuel level > 10% (disablement ends 500 engine cycles, after a low fuel level condition ceases, and fuel disable does not occur with a fuel sensor DTC). • -6.99 °C < ECT < 123.9844 ° C. • If ECT at startup < -6.99 °C, then disable until ECT > 21.09 °C. • 525.00 RPM < Engine speed < 5700.00 RPM. • 9.00 volts < System voltage < 18 volts. • + Throttle position delta < 100 % per 50 ms. • - Throttle position delta < 100 % per 50 ms. • Abnormal engine speed is not present. • ABS rough road not detected. • Excessive drive wheel slip is not detected (enablement occurs if {Non Drive Wheel Speed > 255 MPH} or {Drive Wheel Speed - Non Drive Wheel Speed > 255 MPH} and {wheel speed data is valid}) • ABS is not active, TCS is not active. • Positive and zero torque (except the CARB approved 3000 rpm to redline triangle). Positive and zero torque is detected when both is true: 1) engine load > zero torque cal (cal a function of engine speed), and 2) TP Sensor > 1.4% or VSS < 20 MPH. • Detectable engine speed and engine load region. • EGR Intrusive test not active. • CMP sensor is in sync with CKP sensor. • Automatic transmission is not shifting or automatic transmission is shifting and TPS ≤ 95% • PRNDL indication did not change (not used). • Misfire Diagnostic is not requesting to disable TCC when transmission is in hot mode.	Emission Exceedence = (5) failed 200 revolution blocks of 16. Failure reported with (1) Exceedence in 1st (16) 200 revolution block, or (4) Exceedences thereafter. 1st Catalyst Exceedence = Number of 200 revolution blocks as data supports for catalyst damage (this number is 1 in this application). 2nd and subsequent Catalyst Exceedences = (1) 200 revolution block with catalyst damage. Failure reported with (3) Exceedences in FTP, or (1) Exceedence outside FTP. <u>Frequency:</u> Continuous	DTC Type B (MIL Flashes with Catalyst Damaging Misfire)
Cylinder 1 Misfire Detected	P0301					
Cylinder 2 Misfire Detected	P0302					
Cylinder 3 Misfire Detected	P0303					
Cylinder 4 Misfire Detected	P0304					
Cylinder 5 Misfire Detected	P0305					
Cylinder 6 Misfire Detected	P0306					

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Crankshaft Position System Variation Not Learned (CASE)	**P0315**	Determines if the Crankshaft Position System Variation has not been learned.	Sum of Compensation Factors are ≤ 2.997 or ≥ 3.0043	• Manufacturers Enable Counter must be zero.	0.50 seconds Frequency: Continuous 100 ms loop	DTC Type A
Knock Sensor (KS) Circuit Bank 1	**P0325**	This diagnostic will detect a failed internal PCM component associated with knock control	Output voltage is high and stays relatively constant	Enable Conditions • No VSS DTC's • No TP Sensor DTC's • No TAC System DTC's • No ECT DTC's • NO Crank Sensor DTC's • No CMP Sensor DTC's • No MAF DTC's • Engine running longer than 30 seconds • Ignition voltage ≥ 9 volts • Throttle position ≥ 10.00 % • ECT ≥ 60.00 °C • Engine speed between 1000 & 5000 RPM • Cylinder air mass ≥ 45.00 % • Ignition Control Spark retard ≤ 15.01 degrees Determine Fault Region • (Instantaneous voltage – average voltage is too small; delta from average $\leq .03125$ OR Average voltage – instantaneous voltage is too small; delta from average ≤ 0.03125) AND the average voltage ≥ 4.8 volts	Frequency: Every combustion event Continuous 480 test failures out of 500 samples	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Knock Sensor (KS) Circuit Low Frequency Bank 1	**P0327**	This diagnostic will detect a wiring fault with knock sensor 1	Output voltage amplitude is low and stays relatively constant	Enable Conditions • No VSS DTC's • No TP Sensor DTC's • No TAC System DTC's • No ECT DTC's • NO Crank Sensor DTC's • No CMP Sensor DTC's • No MAF DTC's • Engine running longer than 30 seconds • Ignition voltage ≥ 9 volts • Throttle position ≥ 10.00 % • ECT ≥ 60.00 °C • Engine speed between 1000 & 5000 RPM • Cylinder air mass ≥ 45.00 % • Ignition Control Spark retard ≤ 15.01 degrees Determine Fault Region • (Instantaneous voltage – average voltage is too small; delta from average $\leq .03125$ OR Average voltage – instantaneous voltage is too small; delta from average ≤ 0.03125) AND the average voltage < 4.8 volts	Every combustion event Continuous 480 test failures out of 500 samples	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION

Knock Sensor (KS) Circuit Low Frequency Bank 2	**P0332 (This applies to RPO's LNJ, LX9, L26, L32, L36, L67)**	This diagnostic will detect a wiring fault with knock sensor 2	Output voltage amplitude is low an stays relatively constant	Enable Conditions
				• No VSS DTC's
				• No TP Sensor DTC's
				• No TAC System DTC's
				• No ECT DTC's
				• NO Crank Sensor DTC's
				• No CMP Sensor DTC's
				• No MAF DTC's
				• Engine running longer than 30 seconds
				• Ignition voltage ≥ 9 volts
				• Throttle position ≥ 10.00 %
				• ECT ≥ 60.00 °C
				• Engine speed between 1000 & 5000 RPM
				• Cylinder air mass ≥ 45.00 %
				• Ignition Control Spark retard ≤ 15.01 degrees
				
				Determine Fault Region
				• (Instantaneous voltage – average voltage is too small; delta from average $\leq .03125$ OR
				  Average voltage – instantaneous voltage is too small; delta from average ≤ 0.03125)
				  AND the average voltage < 4.8 volts
					Every combustion event
					
					Continuous
					
					480 test failures out of 500 samples
						DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION

Crankshaft Position (CKP) Sensor A Circuit	**P0335**	This diagnostic determines whether a fault exists with crank position sensor circuit signal	LNJ, LX9
			If Camshaft Position (CMP) Sensor Circuit is Active this Key, then if match has been lost longer than 2 seconds and there were no medium resolution pulses between cam pulses.
			
			If Camshaft Position (CMP) Sensor Circuit is not Active this Key then the number of medium resolution pulses seen per cam pulse is 0.
			
			L26, L32, L36, L67, LG8:
			If 6 low res pulses have been seen and 0 med res pulses have been seen AND 1 cam has been seen and 0 med res pulses have been seen.
				LNJ, LX9
				• If Camshaft Position sensor circuit or Camshaft Position sensor Performance fault = ATK, then
				  –Ignition Switch not in Crank:
				    20 < RPM from medium resolution < 5850
				    PCM State = Run
				    MAF > 2 gps
				  – Ignition Switch is in Crank:
				    Starter Relay is commanded on
				    20 < RPM from medium resolution < 400
				
				• If at least one CAM has occurred since last time through the diagnostic and if Camshaft Position sensor circuit or Camshaft Position sensor Performance fault = ATK, then
				  – Ignition Switch not in Crank:
				    20 < RPM from CAM < 5950
				    PCM State = Run
				    MAF > 2 gps
				  – Ignition Switch is in Crank:
				    Starter Relay is commanded on
				    20 < RPM from CAM < 400
				
				L26, L32, L36, L67, LG8:
				• Engine run time > 3 seconds
				• For the LG8, the engine run time criteria is not required if PCM State is crank.
					LNJ, LX9
					Camshaft Position (CMP) Sensor Circuit is active this key or Camshaft Position sensor Performance fault = ATK
					Match lost while in Crank > 2 sec.
					Match lost while in Run > 2 sec.
					12.5 ms continuous
					
					Camshaft Position (CMP) Sensor Circuit is not active this key or Camshaft Position sensor Performance fault = ATK
					In Crank > 2 fail count
					In Run > 2 fail count
					
					12.5 ms Continuous
					
					L26, L32, L36, L67, LG8:
					Low res interrupt - for low res check
					
					100 ms - for cam check
					
					L36, L67, LG8: 80 failures out of 100 samples
					L26, L32: 40 failures out of 50 samples
						DTC Type A (For LNJ only)
						
						DTC Type B for all others

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Crankshaft Position (CKP) Sensor A Performance	**P0336**	This diagnostic determines whether a performance fault exists with crank position sensor signal	LNJ, LX9
			If Camshaft Position (CMP) Sensor Circuit is Active this Key, then if match has been lost longer than 2 seconds.
			
			If Camshaft Position (CMP) Sensor Circuit is not Active this Key then the number of medium resolution pulses seen per cam pulse is ≤ 47 or ≥ 49.
			
			Match lost 20 times within 2 sec.
			
			L26, L32, L36, L67:
			If 6 low res pulses have been seen and a number of med res pulses other than 0 or 36 have been seen AND 1 cam has been seen and a number of med res pulses other than 0 or 36 have been seen.
			
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			LG8:
			If 6 low res pulses have been
				LNJ, LX9
				• If Camshaft Position sensor circuit or Camshaft Position sensor Performance fault = ATK, then
				  –Ignition Switch not in Crank:
				    20 < RPM from medium resolution < 5850
				    PCM State = Run
				    MAF > 2 gps
				  – Ignition Switch is in Crank:
				    Starter Relay is commanded on
				    20 < RPM from medium resolution < 400
				• If at least one CAM has occurred since last time through the diagnostic and if Camshaft Position sensor circuit or Camshaft Position sensor Performance fault = ATK, then
				  – Ignition Switch not in Crank:
				    20 < RPM from CAM < 5950
				    PCM State = Run
				    MAF > 2 gps
				•
				    – Ignition Switch is in Crank:
				      Starter Relay is commanded on
				      20 < RPM from CAM < 400If PCM state = Run, then If engine speed >20 and above conditions are not met, then Match lost 20 times within 2 sec.
				
				• If PCM state = crank, then If engine speed >20 and < 400, and above conditions are not met, then Match lost 20 times within 2 sec
				
				L26, L32, L36, L67:
				• Engine run time > 3 seconds
				
				 LG8:
				Engine run time > 3 seconds
					LNJ, LX9
					Camshaft Position (CMP) Sensor Circuit is active this key or Camshaft Position sensor Performance fault = ATK
					Match lost while in Crank > 2 sec.
					Match lost while in Run > 2 sec.
					12.5 ms continuous
					
					Camshaft Position (CMP) Sensor Circuit is not active this key or Camshaft Position sensor Performance fault = ATK
					In Crank > 2 fail count
					In Run > 2 fail count
					
					12.5 ms Continuous
					
					100 ms Continuous
					
					L26, L32, L36, L67:
					Low res interrupt - for low res check
					100 ms - for cam check
					L36, L67: 80 failures out of 100 samples
					L26, L32: 40 failures out of 50 samples
					
					LG8:
					Low res interrupt - for low
						DTC Type B

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Camshaft Position (CMP) Sensor Circuit Bank 1 Sensor A	**P0340**	1X Signal This diagnostic will detect if a fault exists on the camshaft position sensor signal.	LNJ, LX9 A. Engine is cranking and the engine speed from CMP Sensor =0 for more than 10 seconds OR B. Reference pulse logic saw more than 7 reference pulses between CMP Sensor pulses L26, L32, L36, L67: If 36 med res pulses have been seen and 0 cam pulses have been seen AND 6 low res pulses have been seen and 0 cam pulses have been seen. LG8: If 48 med res pulses have been seen and 0 cam pulses have been seen AND 6 low res pulses have been seen and 0 cam pulses have been seen.	LNJ, LX9 A. Ignition Switch is in crank Starter relay is commanded on B. Ignition switch is in run or crank L26, L32, L36, L67: • Engine run time > 3 seconds • Engine Speed > 100 • Cam pulse seen OR 6 low res pulses seen • The engine run time criteria is not required if PCM State is crank. LG8: • Engine run time > 3 seconds • Engine Speed > 100 Cam pulse seen OR 6 low res pulses seen	LNJ, LX9 A. 10 seconds without CMP Sensor signal detected. 12.5 ms continuous B. continuous every reference pulse L26, L32, L36, L67: Med res interrupt - for med res check Low res interrupt - for low res check 40 failures out of 50 samples LG8: Med res interrupt - for med res check Low res interrupt - for low res check 40 failures out of 50 samples	DTC Type B

2005   3.1L (LG8)   3.4L (LA1, LNJ)   3.5L (LX9)   3.8L (L32, L36, L67)   3.8L (L26) *without* A.I.R.

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Camshaft Position (CMP) Sensor Performance Bank 1 Sensor A	P0341	1X Signal This diagnostic will detect if the CMP Sensor signal. Performance is correct	LNJ, LX9 Ref pulse logic saw less then 6 reference pulses between CMP sensor pulses L26, L32, L36, L67: If 36 med res pulses have been seen and 2 or more cam pulses have been seen AND 6 low res pulses have been seen and 2 or more cam pulses have been seen. LG8: If 48 med res pulses have been seen and 2 or more cam pulses have been seen AND 6 low res pulses have been seen and 2 or more cam pulses have been seen.	LNJ, LX9 Ignition switch is in run or crank L26, L32, L36, L67: • Engine run time > 3 seconds • Engine Speed > 100 • Cam pulse seen OR 6 low res pulses seen LG8: • Engine run time > 3 seconds • Engine Speed > 100 Cam pulse seen OR 6 low res pulses seen	LNJ, LX9 Continuous every reference pulse L26, L32, L36, L67: Med res interrupt - for med res check Low res interrupt - for low res check 40 failures out of 50 samples LG8: Med res interrupt - for med res check Low res interrupt - for low res check 40 failures out of 50 samples	DTC Type B
Ignition Coil Circuit	**P0350 (This applies to RPO's L26, L32, LG8, L36 and L67)**	This diagnostic detects an open or short on the Electronic Spark Timing (EST) output circuits.	Fault is detected	• Engine is running or cranking	90 failure out of 100 samples <u>Frequency:</u> Continuous 100 ms loop Once the fault logic detects a failures, the diagnostic is turned off for the rest of the trip.	DTC Type B
Ignition Coil 1 Control Circuit	**P0351 (This applies to RPO's LX9, LNJ)**	This DTC checks the EST circuit for electrical integrity	Voltage state invalid	• PCM state = crank or run	90 failures <u>Frequency:</u> Every engine cycle Continuous	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Ignition Coil 2 Control Circuit	**P0352 (This applies to RPO's LX9, LNJ)**	This DTC checks the EST circuit for electrical integrity	Voltage state invalid	• PCM state = crank or run	90 failures <u>Frequency:</u> Every engine cycle Continuous	DTC Type B
Ignition Coil 3 Control Circuit	**P0353 (This applies to RPO's LX9, LNJ)**	This DTC checks the EST circuit for electrical integrity	Voltage state invalid	• PCM state = crank or run	90 failures <u>Frequency:</u> Every engine cycle Continuous	DTC Type B
Crankshaft Position (CKP) Sensor B Circuit	**P0385 (This applies to RPO's L26, L32, LG8, L36 and L67)**	This diagnostic determines whether a circuit fault exists with the low res sensor signal	L26, L32, L36, L67: If 36 med res pulses have been seen and 0 low res pulses have been seen AND 1 cam pulse has been seen and 0 low res pulses have been seen. LG8: If 48 med res pulses have been seen and 0 low res pulses have been seen AND 1 cam pulse has been seen and 0 low res pulses have been seen.	L26, L32, L36, L67: • Engine run time > 3 seconds Engine Speed > 100 Cam pulse seen OR 6 low res pulses seen LG8: Engine run time > 3 seconds Engine Speed > 100 Cam pulse seen OR 6 low res pulses seen	L26, L32, L36, L67: Med res interrupt - for med res check 100 ms - for cam check L36, L67: 80 failures out of 100 samples L26, L32: 40 failures out of 50 samples LG8: Med res interrupt - for med res check 100 ms - for cam check 80 failures out of 100 samples	DTC Type B

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Crankshaft Position (CKP) Sensor B Performance	**P0386 (This applies to RPO's L26, L32, LG8, L36 and L67)**	This diagnostic determines whether a performance fault exists with the low res sensor signal	L26, L32, L36, L67: If 36 med res pulses have been seen and a number of low res pulses other than 0 or 6 have been seen AND 1 cam pulse has been seen and a number of low res pulses other than 0 or 6 have been seen. LG8: If 48 med res pulses have been seen and a number of low res pulses other than 0 or 6 have been seen AND 1 cam pulse has been seen and a number of low res pulses other than 0 or 6 have been seen.	L26, L32, L36, L67: • Engine run time > 3 seconds • Engine Speed > 100 • Cam pulse seen OR 6 low res pulses seen LG8: • Engine run time > 3 seconds • Engine Speed > 100 Cam pulse seen OR 6 low res pulses seen	L26, L32, L36, L67: Med res interrupt - for med res check 100 ms - for cam check L36, L67: 80 failures out of 100 samples L26, L32: 40 failures out of 50 samples LG8: Med res interrupt - for med res check 100 ms - for cam check 80 failures out of 100 samples	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Exhaust Gas Recirculation (EGR) Flow Insufficient (Quick Test)	**P0401 (This applies to RPO's L36, L26, L32, LX9, LNJ, and Malibu Classic)**	During a closed throttle decel condition, the EGR valve is normally closed. This diagnostic opens the valve to a pre-determined position, and the change in MAP is computed. This change in MAP correlates to the flow rate of the EGR system.	With EGR valve open, the peak + MAP Δ is monitored over a period of time. This value is compared with a threshold from Engine Speed vs BARO table and the difference computed. The result is statistically filtered (EWMA) and compared to a decision limit. DTC is set when the filtered result exceeds the decision limit of 0.8594 kPa.	Test Enables No fuel injector DTCs set, No CKP DTCs set, No TP sensor DTC's set, No MAP DTC's set, No VSS DTC's set, No ETC DTC's set, No 5 volt reference DTC's set, No IAT sensor DTC's set No ECT sensor DTC's set, No IAC DTC's set, No EGR Pintle Position DTC set, No Misfire DTC's set No MAF DTC's set, No CPP (Clutch) DTC's set, Not in device control, EGR valve icing not occurring, EGR Engine run time expired, Not in Power Enrichment, ECT > 75° C ECT < 151.9531^o C BARO > 70 kPa (10,000 Ft) BARO data is valid IAT < 100° C IAT > 5° C Ignition Voltage < 18 volts Ignition Voltage > 11 volts Transmission is in 3rd, 4th or 5th gear Decel Fuel Cutoff is either inactive (mode 0) or at a commanded spark value of 0 (mode 2) for at least 6.25 ms. Vehicle speed < 70 MPH Vehicle Speed > 28 MPH Throttle Position is < 0.9% A/C clutch status is unchanged for 1 second. Transmission status is unchanged for 1.5 seconds. Throttle Area Delta < 100 % Stability Mode Enables EGR Position < 1% 1000 RPM < Engine Speed < 1800 RPM MAP Δ < 1.294 kpa 17 kpa < Compensated MAP < 43 kpa Throttle Area Delta < 100% Difference between desired & actual airflow < 1.2 Grams/sec. Intrusive Mode Enables Vehicle Speed Δ < 3 MPH + RPM Δ < 100 RPM - RPM Δ < 200 RPM Max EGR Position > 75 % Max EGR Position < 95 % EGR Duty Cycle On Time < 25	Test Time 800 ms Frequency 6.26 ms loop Once per trip (typically) Rapid Step Response feature will initiate multiple tests: IF the difference between the current EWMA and the current map difference is > 2.866 kPa AND current map difference is > 0.791 kPa THEN 5 tests may be run per trip until 30 tests have been completed Fast Initial Response feature will initiate multiple tests upon code clear or a non-volatile memory failure: Several tests per trip will run until 12 tests have been completed.	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Exhaust Gas Recirculation (EGR) Flow Insufficient (Classic Flow test)	P0401 (Runs on the follwing engine rpo's: LG8, L67 and (except Malibu Classic)	During a closed throttle decel condition, the EGR valve is normally closed. This diagnostic opens the valve to a pre-determined position, and the change in MAP is computed. This change in MAP correlates to the flow rate of the EGR system.	With EGR valve open, the peak + MAP Δ is monitored over a period of time. This value is compared with a threshold from Engine Speed vs BARO table and the difference computed. The result is statistically filtered (EWMA) and compared to a decision limit. DTC is set when the filtered result exceeds the decision limit of 1.992188 kPa.	Test Enables • No VSS, TP Sensor, Misfire, IAT, MAP, IAC DTC's • No Fuel Injector DTC's • No EGR Sensor DTC's • No ECT DTC's • No Crank Sensor DTC's • No MAF DTC's • Engine Run Time > cal table based on startup coolant temperature • ECT > 75.00 ° C • BARO > 74.00 kPa (8500 ft) • 0°C $\leq$ IAT $\leq$ 100°C • 11 $\leq$ Ignition voltage $\leq$ 18 • IAC Δ < 5.00 counts • Throttle Position < 1% • AC clutch status is unchanged • Transmission status is unchanged • Transmission is not in Park or Neutral • Not in Power Enrichment • Not in Catalyst Protection Mode • Traction contol is not active • Vehicle Speed $\geq$ 30 mph • RPM $\geq$ 775 • ECT < 131° C • EGR Icing is not possible • EGR is not in device control • AC Clutch status is not changed • Clutch is not depressed (manual trans only) • Not in Decel Fuel Cut off (LG8 only) • DFCO status is unchanged Stability Mode Enables • EGR Position < 1% • Engine Speed > 1000.00 rpm but < 1400.00 rpm • MAP Δ < 2.998 kPa • MAP > 15.00 kPa but < 70.00 kPa All of the above met for 0.5 seconds Intrusive Mode Enables • Vehicle Speed Δ < 5 MPH • + RPM Δ < 250 RPM • - RPM Δ < 350 RPM • Max EGR position > 90% •	Test Time: 3.9 seconds Frequency: 100 ms loop Once per trip (typically) Rapid Step Response feature will initiate multiple tests: IF the difference between the current EWMA and the current map diff is > 7.001953 kpa AND current map diff is > 2.001953 kpa THEN 4 tests may be run per trip until 24 tests have been completed Fast Initial Response feature will initiate multiple tests upon code clear: Several tests per trip will run until 12 tests have been completed.	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Exhaust Gas Recirculation (EGR) Solenoid Control Circuit	**P0403**	This DTC checks the Linear EGR circuit for electrical integrity	Output state invalid	• Ignition switch is in crank or run • 9 volts < Ignition Voltage < 18 volts	20.00 seconds OR chip protection logic indicates a short failure 1 time Frequency: Continuous 100 ms loop Chip protection logic: 5 failures out of 10 samples indicate a short Frequency of this logic is 12.5 ms loop Continuous Once the chip protection logic detects 5 failures out of 10 samples, the driver is turned off for the rest of the trip.	DTC Type B
Exhaust Gas Recirculation (EGR) Open Position Performance	**P0404**	This diagnostic detects if the pintle position error is too large	Pintle position error [absolute value of (desired position - actual position)] > 10.00 %	5 Volt reference DTC's not active Engine is running Off-board device not active Pintle cleaning not active P0401 not intrusive Ignition voltage $\geq$ 11 volts EGR valve icing or over temperature not occurring EGR is enabled Desired EGR position > 0% Δ Desired EGR position < 30.00 % for 1 sec.	Frequency: 850 fail counts out of 1000 sample counts 100ms loop Continuous	DTC Type B

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Exhaust Gas Recirculation (EGR) Position Sensor A Circuit Low Voltage	P0405	This diagnostic detects if the pintle position feedback circuit is open or shorted to ground	EGR feedback sensor signal < 4.0% of 5 volt reference voltage	5 Volt reference DTC's not active Engine is running Off-board device not active Pintle cleaning not active P0401 not intrusive Ignition voltage $\geq$ 11 volts EGR valve icing or over temperature not occurring.	Frequency: 50 fail counts out of 55 sample counts 100ms loop Continuous	DTC Type B
Exhaust Gas Recirculation (EGR) Position Sensor A Circuit High Voltage	P0406	This diagnostic detects if the pintle position feedback circuit is shorted to high voltage or the 5V return is open.	EGR feedback sensor signal > 94.7% of 5 volt reference voltage	5 Volt reference DTC's not active Engine is running Off-board device not active Pintle cleaning not active P0401 not intrusive Ignition voltage $\geq$ 11 volts EGR valve icing or over temperature not occurring.	3600 fail counts out of 4000 sample counts 100ms loop Continuous	DTC Type B

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Catalyst System Low Efficiency Bank 1	**P0420** **This logic applies for RPO's LNJ, LX9, L26 and L32**	Oxygen Storage	OSC time difference $\geq$ 0.1601 (EWMA filtered) OSC time difference = OSC worst pass threshold - OSC compensation factor * (post cat O2 resp time - pre cat O2 resp time) OSC worst pass thresh = 2.0625 seconds	<u>General Enable</u> • No EVAP, TAC system, MAF, CAM, ECT, CKP, EGR, BARO, AIR, EST, Fuel Injector, Fuel Trim, Idle Air, MAP, IAT, Misfire, O2 Sensor, TP Sensor, VSS or Engine Overtemp Protection Mode DTC's • IAT > -20° C • Green Converter Delay = not active <u>Valid Idle Period Criteria</u> • Engine speed $\geq$ 1100 RPM for a minimum of 29 seconds since end of last idle period. • Engine Speed < 1100 RPM • Engine run time $\geq$ 600 seconds. • Vehicle Speed $\leq$ 2 mph • Fuel Trim Intrusive Test and/ or POS Diagnostic Intrusive Test and/or AIR Diagnostic Intrusive Test not Active • Tests attempted this trip $\leq$ 6.00 <u>Idle conditions Met Criteria</u> General Enable met; Valid Idle Period met • $0 \leq$ short term fuel trim ≤ 2 • Δ short term fuel trim since valid idle conditions met ≤ 2 • 485°C $\leq$ predicted catalyst temperature $\leq$ 723°C for at least 60 seconds with a closed throttle time $\leq$ 60 seconds consecutively (closed throttle $\Rightarrow$ TPS < 1.503906%) • Closed loop fueling • Long term fuel trim learning enabled • Barometric pressure > 70 kPa • 75°C $\leq$ ECT $\leq$ 121.0156°C • System voltage > 10.7 volts • 0 < Idle period $\leq$ 60 seconds $\Rightarrow$ Idle time is incremented if: Vehicle Speed $\leq$ 2 mph and Throttle Position $\leq$ 1.503906% • IAT < 100°C • PRNDL is in Drive Range <u>Test Enable Conditions; must hold true from 5 seconds after idle conditions are met to end of test</u> • Delta IAC $\leq$ 8.4 steps Delta RPM $\leq$ 32 • 3 gps $\leq$ MAF $\leq$ 10 gps CCP DC Multiplier $\leq$ 1	1 test attempted per valid idle period Minimum of 1 test per trip Maximum of 6 tests per trip <u>Frequency:</u> • 12.5 ms Continuous Rapid Step Response feature will initiate multiple tests: If the difference between current EWMA value and the current OSC time difference $\geq$ 0.54 seconds and OSC time difference $\geq$ 0.00 seconds Maximum of 6 tests per trip. Maximum of 11 tests to detect failure when rapid step response is enabled. <u>Green Converter Delay Criteria</u> • The diagnostic will not be enabled until the next ignition cycle after the following has been met:Predicted catalyst temperature $\geq$ 535° C for 3600 seconds non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle) • Note: this feature is only enabled when the vehicle is new and cannot be enabled in service	DTC Type A

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Catalyst System Low Efficiency Bank 1	**P0420** **This logic applies for RPO's LG8, L36 and L67**	Oxygen Storage	OSC time difference $\geq$ 0.2617 (EWMA filtered) OSC time difference = OSC worst pass threshold - OSC compensation factor * (post cat O2 resp time - pre cat O2 resp time) OSC worst pass thresh = 2.10seconds	<u>General Enable</u> • No EVAP, MAF, CAM, ECT, CKP, EGR, EST, Fuel Injector, Fuel Trim, Idle Air, MAP, IAT, Misfire, O2 Sensor, TP Sensor or VSS DTC's • IAT > -20° C • Green Converter Delay = not active <u>Valid Idle Period Criteria</u> • Engine speed $\geq$ 1100 RPM for a minimum of 26.5 seconds since end of last idle period. • Engine Speed < 1100 RPM • Engine run time $\geq$ 600 seconds. • Vehicle Speed $\leq$ 2 mph • Fuel Trim Intrusive Test and/ or POS Diagnostic Intrusive Test Active • Tests attempted this trip $\leq$ 6.00 <u>Idle conditions Met Criteria</u> General Enable met; Valid Idle Period met • 455°C $\leq$ predicted catalyst temperature $\leq$ 650°C for at least 60 seconds with a closed throttle time $\leq$ 60 seconds consecutively (closed throttle $\Rightarrow$ TPS < 1.503906%) • Closed loop fueling • Long term fuel trim learning enabled • Barometric pressure > 70 kPa • 75°C $\leq$ ECT $\leq$ 123.98°C • System voltage > 10.7 volts • 0 < Idle period $\leq$ 60 seconds $\Rightarrow$ Idle time is incremented if: Vehicle Speed $\leq$ 2 mph and Throttle Position $\leq$ 1.503906% • IAT < 100°C • PRNDL is in Drive Range <u>Test Enable Conditions; must hold true from 5 seconds after idle conditions are met to end of test</u> • Delta IAC $\leq$ 19.4 steps Delta RPM $\leq$ 300 • 3 gps $\leq$ MAF $\leq$ 10 gps • RPM – Desired RPM $\leq$ 300 Desired RPM – RPM $\leq$ 300 • Test aborted this idle period < 1 • Load change: If during enabled test conditions the cooling fan of A/C	1 test attempted per valid idle period Minimum of 1 test per trip Maximum of 6 tests per trip <u>Frequency:</u> • 12.5 ms Continuous Rapid Step Response feature will initiate multiple tests: If the difference between current EWMA value and the current OSC time difference $\geq$ 0.8544 seconds and OSC time difference $\geq$ 0.00 seconds Maximum of 6 tests per trip. Maximum of 11 tests to detect failure when rapid step response is enabled. <u>Green Converter Delay Criteria</u> • The diagnostic will not be enabled until the next ignition cycle after the following has been met:Predicted catalyst temperature $\geq$ 455° C for 3600 seconds non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle) • Note: this feature is only enabled when the vehicle is new and cannot be enabled in service	DTC Type A

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Catalyst System Low Efficiency Bank 2	**P0430 (Malibu only)**	Oxygen Storage	OSC time difference $\geq$ 0.1601 (EWMA filtered) OSC time difference = OSC worst pass threshold - OSC compensation factor * (post cat O2 resp time - pre cat O2 resp time) OSC worst pass thresh = 2.0625 seconds	General Enable • No EVAP, TAC system, MAF, CAM, ECT, CKP, EGR, BARO, AIR, EST, Fuel Injector, Fuel Trim, Idle Air, MAP, IAT, Misfire, O2 Sensor, TP Sensor, VSS or Engine Overtemp Protection Mode DTC's • IAT > -20° C • Green Converter Delay = not active Valid Idle Period Criteria • Engine speed $\geq$ 1100 RPM for a minimum of 29 seconds since end of last idle period. • Engine Speed < 1100 RPM • Engine run time $\geq$ 600 seconds. • Vehicle Speed $\leq$ 2 mph • Fuel Trim Intrusive Test and/ or POS Diagnostic Intrusive Test and/or AIR Diagnostic Intrusive Test not Active • Tests attempted this trip $\leq$ 6.00 Idle conditions Met Criteria General Enable met; Valid Idle Period met • 0 $\leq$ short term fuel trim $\leq$ 2 • Δ short term fuel trim since valid idle conditions met $\leq$ 2 • 485°C $\leq$ predicted catalyst temperature $\leq$ 723°C for at least 60 seconds with a closed throttle time $\leq$ 60 seconds consecutively (closed throttle $\Rightarrow$ TPS < 1.503906%) • Closed loop fueling • Long term fuel trim learning enabled • Barometric pressure > 70 kPa • 75°C $\leq$ ECT $\leq$ 121.0156°C • System voltage > 10.7 volts • 0 < Idle period $\leq$ 60 seconds $\Rightarrow$ Idle time is incremented if: Vehicle Speed $\leq$ 2 mph and Throttle Position $\leq$ 1.503906% • IAT < 100°C • PRNDL is in Drive Range Test Enable Conditions; must hold true from 5 seconds after idle conditions are met to end of test • Delta IAC $\leq$ 8.4 steps Delta RPM $\leq$ 34 • 3 gps $\leq$ MAF $\leq$ 10 gps CCP DC Multiplier $\leq$ 1	1 test attempted per valid idle period Minimum of 1 test per trip Maximum of 6 tests per trip Frequency: • 12.5 ms Continuous Rapid Step Response feature will initiate multiple tests: If the difference between current EWMA value and the current OSC time difference $\geq$ 0.54 seconds and OSC time difference $\geq$ 0.00 seconds Maximum of 6 tests per trip. Maximum of 11 tests to detect failure when rapid step response is enabled. Green Converter Delay Criteria • The diagnostic will not be enabled until the next ignition cycle after the following has been met:Predicted catalyst temperature $\geq$ 535° C for 3600 seconds non-continuously. (Note that all other enable criteria must be met on the next ignition cycle for the test to run on that ignition cycle) • Note: this feature is only enabled when the vehicle is new and cannot be enabled in service	DTC Type A

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Evaporative Emission (EVAP) System Small Leak Detected (EONV)	**P0442 (This applies to RPO's LX9, LNJ, L32 and L26)**	This DTC will detect a small leak (>= 0.020") in the EVAP system between the fuel fill cap and the purge solenoid.	SMALL LEAK TEST FAIL: Engine Off Natural Vacuum (EONV) The total pressure change achieved during the test is normalized against a target value that is based upon fuel level and ambient temperature. (values range from 1.85" water to 2.75" water). The normalized value is entered into EWMA (with 0= perfect pass and 1=perfect fail). Once EWMA exceeds the fail threshold, the DTC light is illuminated. The DTC light can be turned off if the EWMA falls below the re-pass threshold for 3 consecutive trips. Fail threshold = 0.600 Re-Pass threshold = 0.400	TEST ENABLE : VS Sensor DTC's not active No Fuel Tank Pressure Sensor DTC's No EVAP Canister Purge Solenoid DTC's No EVAP Canister Vent Solenoid DTC's Coolant Sensor DTC's not active IAT Sensor DTC's not active EVAP Vacuum Sensor Performance DTC not active. EVAP CCP stuck open DTC not active. EVAP large leak DTC not active. Ignition off timer DTC not active. Fuel Level >15.0% but < 85.0% No thermostat rationality DTC's No Fuel level DTC's (for LX9, L26 or L32) Valid Cold Start Startup ECT > 4°C but < 30° C Startup IAT > 4°C but < 30° C Startup Δ°C(ECT-IAT) < 8°C if ECT > IAT Estimated ambient temperature at end of drive > 2°C but < 32°C. Drive time >= 600 seconds. Drive length >= 5.2 miles. Coolant >= 70°C. No fuel filling (fuel level increment >= 10%) During EONV test. BARO > 74.0kPa	Once per cold start, during hot soak (up to 2500 sec.). Time since last complete test >= 17 hours if EWMA is passing, or >= 10 hours if EWMA is failing. No more than 2 attempts per day.	DTC Type A EWMA Average run length: 7

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Evaporative Emission (EVAP) System Small Leak Detected (EVPD)	**P0442** **(This logic applies to LAI, LG8, L36 and L67)**	This DTC will detect a small leak in the evap system between the fuel fill cap and up to the purge solenoid	0.04" EWMA Value > 0.0289917 in. dia. OR 0.02" EWMA Value > 0.01123291 in. dia.	General Test Enable
				• No MAP DTC's
				• No TP Sensor DTC's
				• No VSS DTC's
				• No IAT DTC's
				• No ECT DTC's
				• No Fuel Tank Pressure Sensor DTC's
				• No Evap Canister Purge solenoid DTC's
				• No EVAP Canister Vent Solenoid DTC's
				• No Thermostat Rationality DTC's
				• 15 % < Fuel Level < 85. %
				• 10.00 V < System Voltage < 18.00 V
				• 4 °C < IAT < 30°C
				• ECT < 30 °C
				• BARO > 74.00 kPa (8000 ft)
				• VSS < 80.00 mph (0.02" leak only)
				• 39 % < Fuel level < 85 % (0.02" leak only)
				• Δ Vacuum Slosh < 0.44 – 0.95 "H2O based on fuel level
				  OR
				  Δ Fuel Slosh < 3.1 – 7.1 % based on fuel level
				  (if occurs, test will try to run, again)
				• Δ Vacuum Slosh < 0.22 – 0.47 "H2O based on fuel level
				  OR
				  Δ Fuel Slosh < 2.2 – 4.9 % based on fuel level
				  (If these occur, the 0.020" EWMA will not be updated)
				
				      Cold Start Test
				• IAT < 30°C
				• Cold temperature Δ(ECT-IAT):
				  < 150 °C if IAT>ECT
				  < 8 °C if ECT > IAT
				• Cold Test Timer < 675 seconds
					Once per cold start
					
					Time is dependent on driving conditions
					
					Max. before test abort is 675 seconds
						DTC Type A

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Evaporative Emission (EVAP) Purge Solenoid Control Circuit	**P0443**	This DTC checks the Purge Solenoid Control Circuit for electrical integrity	Output state is invalid	• Ignition switch is in crank or run • 11< Ignition Voltage < 18	15 failure out of 20 samples OR Chip protection logic indicates a short failure 1 time Frequency: Continuous 100 ms loop Chip protection logic: 5 failures out of 10 samples indicate a short Frequency of this logic is 12.5 ms loop Continuous Once the chip protection logic detects 5 failures out of 10 samples, the driver is turned off for the rest of the trip.	DTC Type B
Evaporative Emission (EVAP) Vent System Performance	**P0446**	This DTC will determine if a restriction is present in the vent solenoid, vent filler, vent hose or EVAP canister	Tank Vacuum > 10.00 "H2O for 5 seconds BEFORE Purge Volume > 6 liters OR Vented Vacuum < -2.5 in. H20 or Vented Vacuum > 5 in. H20 for 15 seconds 2 liters of fuel must be consumed after setting the DTC active the first time to set the DTC active the second time.	General Test Enable • No MAP DTC's • No TP Sensor DTC's • No VSS DTC's • No IAT DTC's • No ECT DTC's • No Fuel Tank Pressure Sensor DTC's • No Evap Canister Purge solenoid DTC's • No EVAP Canister Vent Solenoid DTC's • No Thermostat Rationality DTC's • 15 % < Fuel Level < 85. % • 10.00 V < System Voltage < 18.00 V • 4 °C < IAT < 30°C • ECT < 30 °C • BARO > 74.00 kPa (8000 ft)	Once per trip Time is dependent on driving conditions Max. before test abort is 675 seconds	DTC Type B

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Evaporative Emission (EVAP) Vent Solenoid Control Circuit	**P0449**	This DTC checks the output driver for electrical integrity	Output state is invalid	• Ignition switch is in crank or run • 11< Ignition Voltage < 18	15 failures out of 20 samples Frequency: Continuous 100 ms loop	DTC Type B
Fuel Tank Pressure (FTP) Sensor Circuit Performance	**P0451 (This logic applies to RPO's LX9, L26, L32 and LNJ)**	The DTC will be set if the fuel tank vacuum sensor is out of range when it tries to re-zero prior to the phase-1 or phase-2 portions of the engine-off natural vacuum small leak test..	The tank vacuum sensor voltage is compared to a window about the nominal sensor voltage offset (~1.5 volts) upper voltage threshold (voltage addition above the nominal voltage): 0.2 volts lower voltage threshold (voltage subtraction below the nominal voltage): 0.2 volts The difference between tank vacuum sensor voltage and the nominal offset voltage is then normalized against the appropriate threshold listed above to produce a ratio between 0.0 and 1.0. This normalized re-zero ratio is then filtered with a EWMA (with 0= perfect pass and 1=perfect fail). Once EWMA exceeds the fail threshold, the DTC light is illuminated. The DTC light can be turned off if the EWMA falls below the re-pass threshold for 3 consecutive trips. Fail threshold = 0.75 Re-Pass threshold = 0.36	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes	This test is executed during an engine-off natural vacuum small leak test. The number of times that it executes can range from zero to two per engine-off period. The length of the test is determined by the refueling rationality test which can take up to 600 seconds to complete.	DTC Type B (GMT191) A (all others) average run length: 6

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Fuel Tank Pressure (FTP) Sensor Circuit Low Voltage	**P0452**	This DTC will detect a fuel tank pressure sensor signal that is too low out of range.	Fuel tank pressure sensor signal < 0.1 volts produces a failing sample. Otherwise, the sample is considered passing. If 80 samples fail out of 100 samples total, then a fail will be reported to the DTC.	• 0.10 second delay after sensor power up for sensor warm-up • PCM State <> crank	Frequency: Continuous 100ms loop	DTC Type B
Fuel Tank Pressure (FTP) Sensor Circuit High Voltage	**P0453**	This DTC will detect a fuel tank pressure sensor signal that is too high out of range.	Fuel tank pressure sensor signal > 4.90 volts produces a failing sample. Otherwise, the sample is considered passing. If 80 samples fail out of 100 samples total, then a fail will be reported to the DTC.	• 0.10 second delay after sensor power up for sensor warm-up • PCM state <> crank	Frequency: Continuous 100ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Fuel Tank Pressure (FTP) Sensor Circuit Intermittent	**P0454 (This logic applies to LX9, L26, L32 and LNJ)**	This DTC will detect intermittent tank vacuum sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event.	If an abrupt change in tank vacuum is detected the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that a refueling event occurred. If a refueling is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem. The abrupt change is defined as a change of 1.0 "H2O vacuum in the span of 1.0 seconds. A refueling event is confirmed if the fuel level has a persistent change of 10.0 % for 30 seconds. The test will report a failure if 2 out of 3 samples are failures (for LX9, L26, and L32). The test will report a failure if 3 out of 10 samples are failures (for LNJ).	This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes	This test is executed during an engine-off natural vacuum small leak test. The test can only execute once per engine-off period. The length of the test is determined by the refueling rationality test which can take up to 600 seconds to complete.	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Evaporative Emission (EVAP) System Large Leak Detected	**P0455**	This DTC will detect a weak vacuum condition (large leak or purge blockage) in the Evap system.	Purge volume > 6.00 liters BEFORE Tank vacuum < 7 inH_2O 2 liters of fuel must be consumed after setting the DTC active the first time to the DTC active the second time. Weak Vacuum Followup Test Weak Vacuum Test failed previous trip and this trip. Passes if tank vacuum > 7 in. H2O. Note: Weak vacuum Followup Test can only report a pass.	General Test Enable • No MAP DTC's • No TP Sensor DTC's • No VSS DTC's • No IAT DTC's • No ECT DTC's • No Fuel Tank Pressure Sensor DTC's • No Evap Canister Purge solenoid DTC's • No EVAP Canister Vent Solenoid DTC's • No Thermostat Rationality DTC's • 15 % < Fuel Level < 85. % • 10.00 V < System Voltage < 18.00 V • 4 °C < IAT < 30°C • ECT < 30 °C • BARO > 74.00 kPa (8000 ft) Cold Start Test • IAT < 30°C • Cold temperature Δ(ECT-IAT): < 150 °C if IAT>ECT < 8 °C if ECT > IAT • Cold Test Timer < 675 seconds	Once per cold start Time is dependent on driving conditions Max. before test abort is 675 seconds	DTC Type B
Fuel Level Sensor Circuit Low	**P0462**	This DTC will detect a fuel sender stuck out of range low.	Fuel level A/D counts less than 28 A/D counts for 10 seconds	• runs continuously		DTC Type B (This applies to LX9, L26, L32) (This is Type C Supplemental for LNJ, LG8, L36 and L67)

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Fuel Level Sensor Circuit High	**P0463**	This DTC will detect a fuel sender stuck out of range high.	Fuel level A/D counts more than 133 A/D counts for 30 seconds	• runs continuously		DTC Type B (This applies to LX9, L26, L32) (This is Type C Supplemental for LNJ, LG8, L36 and L67)
Fuel Level Sensor 1 Circuit Intermittent	**P0464 (This logic applies to LX9, LNJ, L26 and L32)**	This DTC will detect intermittent fuel level sensor signals that would have caused the engine-off natural vacuum small leak test to abort due to an apparent re-fueling event.	If a change in fuel level is detected the engine-off natural vacuum test is aborted due to an apparent refueling event. Subsequent to the abort, a refueling rationality test is executed to confirm that a refueling event occurred. If a refueling is confirmed, then the test sample is considered passing. Otherwise, the sample is considered failing indicating an intermittent signal problem. The refuel event is defined as a change of 10.0 % fuel level during the engine-off test. A refueling event is confirmed if the fuel level has a persistent change of 10.0 % for 30 seconds. The test will report a failure if 3 out of 10 samples are failures (for LNJ). The test will report a failure if 2 out of 3 samples are failures (for LX9, L26 and L32).	• This test will execute whenever the engine-off natural vacuum small leak test (P0442) executes	This test is executed during an engine-off natural vacuum small leak test. The test can only execute once per engine-off period. The length of the test is determined by the refueling rationality test which can take up to 600 seconds to complete.	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Cooling Fan 1 Control Circuit	**P0480**	This DTC checks the output driver for electrical integrity	Output state is invalid	• Ignition switch is in crank or run • 9 < Ignition Voltage < 18 • Fan must be commanded on >0.5 seconds	15 failure out of 20 samples OR chip protection logic indicates a short failure 1 time Frequency: Continuous 100 ms loop Chip protection logic: 5 failures out of 10 samples indicate a short Frequency of this logic is 12.5 ms loop Continuous Once the chip protection logic detects 5 failures out of 10 samples, the driver is turned off for the rest of the trip.	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Cooling Fan 2 Control Circuit	**P0481**	This DTC checks the output driver for electrical integrity	Output state is invalid	• Ignition switch is in crank or run • 9 < Ignition Voltage < 18 • Fan must be commanded on >0.5 seconds	15 failure out of 20 samples OR chip protection logic indicates a short failure 1 time Frequency: Continuous 100 ms loop Chip protection logic: 5 failures out of 10 samples indicate a short Frequency of this logic is 12.5 ms loop Continuous Once the chip protection logic detects 5 failures out of 10 samples, the driver is turned off for the rest of the trip.	DTC Type B

2005   3.1L (LG8)   3.4L (LA1, LNJ)   3.5L (LX9)   3.8L (L32, L36, L67)   3.8L (L26) *without* *A.I.R.*

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Evaporative Emission (EVAP) System Flow During Non-Purge	**P0496**	This DTC will determine if the purge solenoid is leaking to engine manifold vacuum.	Tank Vacuum > 10 "H2O for 5.00 sec BEFORE Test time > 60 seconds (cold start)	General Test Enable • No MAP DTC's • No TP Sensor DTC's • No VSS DTC's • No IAT DTC's • No ECT DTC's • No Fuel Tank Pressure Sensor DTC's • No EVAP canister purge valve solenoid DTC's • No EVAP Canister Vent Solenoid DTC's • No Thermostat Rationality DTC's • 15 % < Fuel Level < 85. % • 10.00 V < System Voltage < 18.00 V • 4 °C < IAT < 30°C • ECT < 30 °C • BARO > 74.00 kPa (8000 ft) Cold Start Test • IAT < 30°C • Cold temperature ∆(ECT-IAT): < 150 °C if IAT>ECT < 8 °C if ECT > IAT • Cold Test Timer < 675 seconds	Once per cold start. Cold start: max time is 675 seconds	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Idle Air Control (IAC) System - RPM Too Low	**P0506**	This DTC will determine if a low idle exists.	RPM < (Desired RPM – a value from a look up table based on ECT) ECT value -40 300 -28 300 -16 300 -4 300 8 300 20 300 32 100 44 100 56 100 68 100 80 100 92 100 104 100 116 100 128 100 140 100 152 100	Test Enable: • No EVAP Canister Purge Valve Stuck Open DTC • No EVAP Canister Purge Solenoid Control Circuit DTC • No ECT DTC's • No Fuel Injector DTC's • No EGR Flow or Sensor DTC's • No TAC system DTC's • No IAT DTC's • No Fuel Trim DTC's • No MAF DTC's • No TP Sensor DTC's • No Misfire DTC's • No VSS DTC's • No MAP DTC's • ECT $\geq$ -40.00 °C • System Voltage $\geq$ 9.00 V but $\leq$ 18.00 V • IAT $\geq$ -40.00 °C • Engine run time $\geq$ 1.00 seconds • BARO $\geq$ 60.00 kPa • TP Sensor $\leq$ 0.80% • VSS $\leq$ 3.00 MPH • Catalyst Diagnostic Intrusive Test = not active • EGR Flow Diagnostic Intrusive Test = not active • Post O2 Diagnostic Intrusive Test = not active • Transmission state hasn't changed in last 0.1 seconds • Above met for a time $\geq$ 5 seconds to enable diagnostic.	8.00 seconds per test 4 tests to fail; must leave enable criteria between each test Frequency: Continuous after enable 100ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Idle Air Control (IAC) System - RPM Too High	**P0507**	This DTC will determine if a high idle exists. Results in Limited Authority Mode if vehicle has Electronic Throttle Control	RPM > (Desired RPM + value from look up table based on ECT) ECT value -40 300 -28 300 -16 300 -4 300 8 300 20 300 32 200 44 200 56 200 68 175 80 175 92 175 104 175 116 175 128 175 140 175 152 175	Test Enable: • No EVAP Purge Valve Stuck Open DTC • No EVAP Canister Purge Solenoid Control Circuit DTC • No ECT DTC's • No Fuel Injector DTC's • No EGR Flow or Sensor DTC's • No TAC system DTC's • No IAT DTC's • No Fuel Trim DTC's • No MAF DTC's • No TP Sensor DTC's • No Misfire DTC's • No VSS DTC's • No MAP DTC's • ECT $\geq$ -40.00 °C • System Voltage $\geq$ 9.00 V but $\leq$ 18.00 V • IAT $\geq$ -40.00 °C • Engine run time $\geq$ 1.00 seconds • BARO $\geq$ 60.00 kPa • TP Sensor $\leq$ 0.80% • VSS $\leq$ 3.00 MPH • Catalyst Diagnostic Intrusive Test = not active • EGR Flow Diagnostic Intrusive Test = not active • Post O2 Diagnostic Intrusive Test = not active • Transmission state hasn't changed in last 0.1 seconds • Above met for a time $\geq$ 5 seconds to enable diagnostic.	8.00 seconds per test 4 tests to fail; must leave enable criteria between each test Frequency: Continuous after enable 100ms loop	DTC Type A
Control Module Read Only Memory (ROM)	**P0601**	This DTC will be stored if the calibration check sum is incorrect	Output state invalid	• PCM state = crank or run • Ignition voltage $\geq$ 5 volts • Engine speed < 5000	1 failure Frequency: 50 ms loop Continuous	DTC Type A

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Control Module Not Programmed	**P0602**	This DTC will be stored if the PCM is a service PCM that has not been programmed.	Output state invalid	• PCM state = crank or run • PCM is identified through calibration as a Service PCM	Test is run at Powerup Test also runs: <u>Frequency:</u> 100ms loop Continuous	DTC Type A
Control Module Random Access Memory (RAM)	**P0604 (This logic applies to LX9, LNJ, L26 and L32)**	Indicates that PCM is unable to correctly write and read data to and from RAM	Data read does not match data written	Ignition in Run or Crank	1) One failure at key-up initialization. This check is on all GMPX RAM. OR 2) Fault counter increments by 10 for every error, decrements by 1 for every pass; fail threshold = 20. This check is on the Desired Throttle Position RAM location and runs 12.5 ms continuous OR 3) Fault counter increments by 10 for every error, decrements by 1 for every pass; fail threshold = 20. This check is on all GMPX RAM and runs 100 ms continuous	DTC Type A
ECM/PCM Processor	**P0606 (This logic applies to LX9, LNJ, L26 and L32)**	Indicates that the PCM has detected a TACM internal processor integrity fault	TACM has process sequencing error, dual path consistency error, clock error, or computer is not operating properly	Ignition in Run/Crank or during key-off	Fault sets within 200 msec Runs every 18.75 msec	DTC Type A

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5 Volt Reference 1 Circuit	**P0641**	This DTC detects if the 5 Volt supply is too high or too low	Voltage state invalid (Voltage > 4.7 volts or voltage < 4.39 volts)	• PCM state = run	Failed for 10.00 sec Frequency: 100ms loop Continuous	DTC Type B
Malfunction Indicator Lamp (MIL) Control Circuit	**P0650**	This DTC checks the output driver for electrical integrity	Output state is shorted, open or over temperature	• Ignition switch is in crank or run • 9< Ignition Voltage < 18	15 failure out of 20 samples for open or over temperature chip protection logic indicates a short failure 1 time Frequency: Continuous 100 ms loop Chip protection logic: 5 failures out of 10 samples indicate a short Frequency of this logic is 12.5 ms loop Continuous Once the chip protection logic detects 5 failures out of 10 samples, the driver is turned off for the rest of the trip.	DTC Type B No MIL
5 Volt Reference 2 Circuit	**P0651**	This DTC detects if the 5 Volt supply is too high or too low	Voltage state invalid (Voltage > 4.7 volts or voltage < 4.4 volts)	• PCM state = run	Failed for 10.00 sec Frequency: 100ms loop Continuous	DTC Type B
Transmission Control Module (TCM) Requested MIL Illumination	**P0700 (GMT191 only)**	ECM determines when CAN signals from TCM should be processed	Trans_Emis_Related_Malf_Active = TRUE and DGDM_TCM_DTC_Fault_Detected <> 0 signals are received	• No sooner than 3.0 seconds after engine start	Once per ignition cycle	DTC Type A

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Accelerator Pedal Position (APP) System	**P1125 (This logic applies to LX9, LNJ, L26 and L32)**	PCM determines a limp home mode of operation due to multiple accelerator pedal sensor faults.	This DTC is set when: 1) 1 or more APP sensors are out of range, OR 2) Both APP sensors disagree	• Ignition in Run or Crank. • Ignition voltage > 5.23 V. • Valid TACM - PCM serial data. • No TACM processor DTC.	One occurrence. Check runs every 18.75 ms.	DTC Type B

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O2S Insufficient Switching Bank 1 Sensor 1	**P1133**	This DTC determines if the O2 sensor is no longer sufficiently switching.	Half cycle L/R switches < 70.00 OR Half cycle R/L switches <70.00 OR Slope Time L/R switches < 3.00 OR Slope Time R/L switches < 3.00	<u>Common Enable Criteria</u> • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic Intrusive Test= Not Active • Catalyst monitor diagnostic Intrusive Test= Not Active • Post Oxygen Sensor Diagnostic Intrusive Test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active <u>Specific Enable Criteria</u> • O2 Heater on for $\geq$ 0 seconds • Bank 1 Sensor1 circuit and heater and heater drive DTCs = Not Active • Bank 2 Sensor1 circuit and heater and heater driver DTCs = Not Active • In one of the following four fueling cells: Purge off, normal; purge off, high flow; purge on, normal; purge on, high flow • Misfire DTC = Not Active • ECT > 65.00 °C • Engine run time > 60.00 seconds • EVAP canister purge duty cycle $\geq$ 0.00 % • 15.00 gps $\leq$ MAF $\leq$ 30.00 gps • 1200.00 $\leq$ RPM $\leq$ 2200.00 • Throttle position $\geq$ 2.00 % • Fuel state = closed loop • Transmission (automatic) not in Park, Reverse or Neutral All of the above met for at least 1 second.	90000.00 ms <u>Frequency:</u> Once per trip	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2S Transition Time Ratio Bank 1 Sensor 1	**P1134**	This DTC determines if the O2 sensor transition time between rich to lean and lean to rich is degraded	Transition time difference < -90 OR Transition time difference > 82	<u>Common Enable Criteria</u> • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic Intrusive Test = Not Active • Catalyst monitor diagnostic Intrusive Test = Not Active • Post Oxygen Sensor Diagnostic Intrusive Test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active <u>Specific Enable Criteria</u> • O2 Heater on for $\geq$ 0 seconds • Bank 1 Sensor1 circuit and heater and heater drive DTCs = Not Active • Bank 2 Sensor1 circuit and heater and heater driver DTCs = Not Active • In one of the following four fueling cells: Purge off, normal; purge off, high flow; purge on, normal; purge on, high flow • Misfire DTC = Not Active • ECT > 65.00 °C • Engine run time > 60.00 seconds • EVAP canister purge duty cycle $\geq$ 0.00 % • 15.00 gps $\leq$ MAF $\leq$ 30.00 gps • 1200.00 $\leq$ RPM $\leq$ 2200.00 • Throttle position $\geq$ 2.00 % • Fuel state = closed loop • Transmission (automatic) not in Park, Reverse or Neutral All of the above met for at least 1 second.	90000.00 ms <u>Frequency:</u> Once per trip	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2S Insufficient Switching Bank 2 Sensor 1	**P1153** **(Malibu only)**	This DTC determines if the O2 sensor is no longer sufficiently switching.	Half cycle L/R switches < 55.00 OR Half cycle R/L switches < 55.00 OR Slope Time L/R switches < 4.00 OR Slope Time R/L switches < 4.00	Common Enable Criteria • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic Intrusive Test= Not Active • Catalyst monitor diagnostic Intrusive Test= Not Active • Post Oxygen Sensor Diagnostic Intrusive Test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active Specific Enable Criteria • O2 Heater on for $\geq$ 0 seconds • Bank 1 Sensor1 circuit and heater and heater drive DTCs = Not Active • Bank 2 Sensor1 circuit and heater and heater driver DTCs = Not Active • In one of the following four fueling cells: Purge off, normal; purge off, high flow; purge on, normal; purge on, high flow • Misfire DTC = Not Active • ECT > 65.00 °C • Engine run time > 60.00 seconds • EVAP canister purge duty cycle $\geq$ 0.00 % • 15.00 gps $\leq$ MAF $\leq$ 30.00 gps • 1200.00 $\leq$ RPM $\leq$ 2200.00 • Throttle position $\geq$ 2.00 % • Fuel state = closed loop • Transmission (automatic) not in Park, Reverse or Neutral All of the above met for at least 1 second. •	90000.00 ms Frequency: Once per trip	DTC Type B

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O2S Transition Time Ratio Bank 2 Sensor 1	**P1154** **(Malibu only)**	This DTC determines if the O2 sensor transition time between rich to lean and lean to rich is degraded	Transition time difference < -60 OR Transition time difference > 70	<u>Common Enable Criteria</u> • No TP Sensor DTC's • No MAP DTC's • No ECT DTC's • No MAF DTC's • No IAT DTC's • No Evap DTC's • No Fuel Injector DTC's • EGR flow diagnostic Intrusive Test = Not Active • Catalyst monitor diagnostic Intrusive Test = Not Active • Post Oxygen Sensor Diagnostic Intrusive Test = Not Active • 9 volts < system voltage < 18.00 volts • Device control = Not Active <u>Specific Enable Criteria</u> • O2 Heater on for $\geq$ 0 seconds • Bank 1 Sensor1 circuit and heater and heater drive DTCs = Not Active • Bank 2 Sensor1 circuit and heater and heater driver DTCs = Not Active • In one of the following four fueling cells: Purge off, normal; purge off, high flow; purge on, normal; purge on, high flow • Misfire DTC = Not Active • ECT > 65.00 °C • Engine run time > 60.00 seconds • EVAP canister purge duty cycle $\geq$ 0.00 % • 15.00 gps $\leq$ MAF $\leq$ 30.00 gps • 1200.00 $\leq$ RPM $\leq$ 2200.00 • Throttle position $\geq$ 2.00 % • Fuel state = closed loop • Transmission (automatic) not in Park, Reverse or Neutral All of the above met for at least 1 second. •	90000.00 ms <u>Frequency:</u> Once per trip	DTC Type B

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Engine Coolant Over Temperature - Protection Mode Active	**P1258 (This logic applies to LX9, LNJ, L26 and L32)**	This DTC indicates that the engine is or has been in camel mode, where the coolant has gotten so hot that the engine is being run first on one bank of injectors, and then on the other bank, in an effort to save the engine.	Injectors are turned off due to ECT > 131°C	• ECT shorts tests not failing • Engine is running • Engine run time > 5 seconds	Frequency: 1 second Continuous	DTC Type A
Bypass Line Monitor	P1350 (This applies to RPO's L26, L32, LG8, L36 and L67)	This diagnostic detects an open or short on the Electronic Spark Timing (EST) output circuits.	Fault is detected	Engine is running or cranking	90 failure out of 100 samples Frequency: Continuous 100 ms loop Once the fault logic detects a failures, the diagnostic is turned off for the rest of the trip.	DTC Type B
Exhaust Gas Recirculation (EGR) Closed Position Performance	P1404	This diagnostic detects if the valve is stuck open when commanded closed.	Actual pintle position >= 5.5% of 5 volt reference voltage from learned closed position	5 Volt reference DTC's not active Engine is running Off-board device not active Pintle cleaning not active P0401 not intrusive Ignition voltage ≥ 11 volts EGR valve icing or over temperature not occurring. EGR is enabled Desired EGR position = 0%, for 1 sec.	4 failure detections of: 360 fail counts out of 400 sample counts (with pintle movement between failure detections of 40% for at least 1 second open time) Frequency: 100ms loop Continuous	DTC Type B

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Throttle Actuator Control (TAC) Module Throttle Actuator Position Performance	**P1516 (This applies to RPO's LX9, LNJ, L26 and L32)**	1) Indicates that the TAC Module has detected a throttle positioning error OR 2) Either Processor cannot determine throttle positioning OR 3) Both TP Sensors are invalid	1) Absolute value of the throttle error: a) ≥2 degrees for >200 ms with no change in Commanded Throttle Position. OR b) ≥2 degrees for >500 ms for throttle command changes ≥ 2 degrees. OR c) ≥ 5 degrees for >200 ms for throttle command changes ≥ 5 degrees. OR d) ≥ 5 degrees for > 300 ms as commanded throttle changes continuously (no step change) [Throttle error = Measured throttle position - commanded throttle position] OR 2a) PCM processor DTC's. OR 2b) TACM processor DTC. OR 3a) both TP Sensor Circuit DTC's are set. OR 3b) PCM-TACM Serial Data DTC with any APP Sensor DTC or TP Sensor DTC. [Throttle error = Measured throttle position - commanded throttle position]	• Ignition in Run or Crank. • Ignition voltage > 5.23 V. • Valid TACM - PCM serial data. • Not in battery saver mode.	One occurrence. Check runs every 3 ms.	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINAT ION
Control Module Throttle Actuator Position Performance	**P2101 (This applies to LX9, LNJ, L26 and L32)**	Indicates that the PCM has detected a throttle positioning error	Absolute value of the throttle error > 6%. [Throttle error = Measured throttle position - modeled throttle position]	• Ignition in Run or Crank • TACM determines PCM Desired Throttle Position is valid. • Not in battery saver mode. • No Airflow Actuation DTC. • (Engine Running = true) OR (Ignition Voltage > 8.5 volts). • No Throttle Actuation DTC. • No PCM-TACM Serial Data DTC. • Both TP Sensor Circuit DTC's are not set. • No PCM Processor DTC's. • No TACM Processor DTC.	High counter increments by 2 for every throttle error > 6%; decrements by 1 if 0% < throttle error <5%; decrements by 5 if -6% < throttle error <0%; clears if throttle error < -6%. Check runs every 18.75 ms with TACM - PCM valid message received. Low counter increments by 2 for every throttle error < -6%; decrements by 1 if -6%<throttle error <0%; decrements by 5 if 0%<throttle error <6%; clears if throttle error > 6%. Check runs every 18.75 ms with TACM - PCM valid message received.	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Throttle Actuator Control (TAC) Module Performance	**P2108 (This applies to LX9, LNJ, L26 and L32)**	Indicates that TAC Module is unable to correctly read data from the flash memory. Indicates that TAC Module is unable to correctly write and read data to and from RAM. Indicates that the TAC Module has detected an internal processor integrity fault.	1) Power-up test fails to read/write data OR 2) Maximum allowed Running Resets exceeded OR 3) ROM checksum does not match expected checksum OR 4) RAM data read does not match data written OR 5) Failure of Interrupt process flag to match expected value. OR 6) Program is not executed in the proper order OR 7) Primary and Redundant RAM variables disagree OR 8) Primary and Redundant Indicated Pedal Position calculation difference > 0.0%. OR 9) Math/Logic test fails to equate to a predetermined value. OR 10) Internal Register data read does not match data written. OR 11) Internal Timer fails to increment OR 12) Watchdog Timer fails to increment OR 13) Failure of Processor Stack pointer to zero at Main Loop.	• Ignition in Run or Crank. • Ignition voltage > 5.23 V. • Valid TACM - PCM serial data.	1) One occurrence Check runs at Reset initialization 2) 10 occurrences during ignition cycle Check runs at Reset initialization 3) One occurrence. Check runs at power up and every 60 seconds thereafter. 4) One occurrence. Check runs at power up and every 800 milliseconds thereafter 5) - 13) One occurrence. Check runs every 3 milliseconds. Second Watchdog timer runs in 10 millisecond loop.	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Accelerator Pedal Position (APP) Sensor 1 Circuit	**P2120 (This applies to LX9, LNJ, L26 and L32)**	1) TACM indicates a continuous or intermittent short or open in either the signal circuit or the APP sensor #1. OR 2) TACM indicates an invalid minimum mechanical position for the APP sensor #1. OR 3) TACM indicates reference voltage out of range.	1) Raw APP sensor signal < 0.235 V or > 4.487 V. OR 2) APP sensor minimum mechanical stop voltage < 0.235 V. OR 3) Reference Voltage < 4.54 V or > 5.21 V.	• Ignition in Run or Crank. • Ignition voltage > 5.23 V. • Valid TACM - PCM serial data. • No TACM processor DTC.	1) & 2) Counter increments by 4 for every error, decrements by 1 for every pass; threshold is 133. Check runs every 3 ms.	DTC Type A
Accelerator Pedal Position (APP) Sensor 2 Circuit	**P2125 (This applies to LX9, LNJ, L26 and L32)**	1) TACM indicates a continuous or intermittent short or open in either the signal circuit or the APP sensor #2. OR 2) TACM indicates an invalid minimum mechanical position for the APP sensor #2. OR 3) TACM indicates reference voltage out of range.	1) Raw APP sensor signal < 0.235 V or > 4.487 V. OR 2) APP sensor minimum mechanical stop voltage > 0.235 V. OR 3) Reference voltage < 4.54 V or > 5.21 V.	• Ignition in Run or Crank. • Ignition voltage > 5.23 V. • Valid TACM - PCM serial data. • No TACM processor DTC.	1) & 2) Counter increments by 4 for every error, decrements by 1 for every pass; threshold is 180. Check runs every 3 ms.	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Throttle Position (TP) Sensor 1-2 Correlation	**P2135 (This applies to LX9, LNJ, L26 and L32)**	1) TACM indicates a continuous or intermittent correlation fault between TP sensors #1 and #2. OR 2) TACM indicates an invalid minimum mechanical position correlation between TP sensor #1 and #2. OR 3) TP Sensor 1 signal short to TP Sensor 2 signal, Any reference, or ground.	1) Absolute value of (TP Sensor 1 raw – TP Sensor 2 raw) < 6.0%. OR 2) TP Sensor 1 signal to TP Sensor 2 signal > 0.05V when TP Sensor 2 reference = 0.0 V.	• Ignition in Run or Crank. • Ignition voltage > 5.23 V. • Valid TACM - PCM serial data. • No TACM processor DTC.	1) Counter increments by 4 for every error, decrements by 1 for every pass; threshold is 180. Check runs every 3 ms. 2) One occurrence. Check runs at power-up 3) Counter increments by 4 for every error, decrements by 1 for every pass: threshold is 133 Check runs every 3ms..	DTC Type A
Accelerator Pedal Position (APP) Sensor 1-2 Correlation	**P2138 (This applies to LX9, LNJ, L26 and L32)**	1) TACM indicates a continuous or intermittent correlation fault between APP sensors #1 and #2 OR 2) TACM indicates an invalid minimum mechanical position correlation between APP sensor #1 and #2. OR 3) APP sensor 1 signal short to APP sensor 2 signal, any reference, or ground.	1)Absolute value of (raw APP sensor #2 voltage - raw APP sensor #1 voltage) > 0.269 V. OR 2) APP sensor 1 to APP sensor 2 > 0.05V when APP sensor 2 reference is 0.0 V.	• Ignition in Run or Crank. • Ignition voltage > 5.23 V. • Valid TACM - PCM serial data. • No TACM processor DTC.	1) Counter increments by 4 for every error, decrements by 1 for every pass; threshold is 180 Check runs every 3 ms. 2) Counter increments by 4 for every error, decrements by 1 for every pass: threshold is 1333 Check runs every 3ms..	DTC Type A

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
Barometric Pressure (BARO) Sensor Performance	**P2227 (GrandPrix L32 engine only)**	This DTC detects a BARO Sensor reading that is rapidly changing (unstable).	BARO Sensor has changed more than 10 kPa since the last time read.	• No Map Sensor DTC's active • No TP Sensor DTC's active • No ECT Sensor DTC's active • No MAF Sensor DTC's active • No IAT Sensor DTC's active • No VSS DTC's active • No BARO Sensor Shorted/Open DTC's active • Engine run time > 10 seconds • Vehicle Speed < 255.9844	80 failures out of 100 samples Frequency: 100 ms loop continuous	DTC Type B
Barometric Pressure (BARO) Sensor Circuit Low Voltage	**P2228 (GrandPrix L32 engine only)**	This DTC detects a continuous short to low or open in either the signal circuit or the BARO sensor.	BARO Sensor Voltage < 0.25 volts		80 failures out of 100 samples Frequency: 100 ms loop Continuous	DTC Type B
Barometric Pressure (BARO) Sensor Circuit High Voltage	**P2229 (GrandPrix L32 engine only)**	This DTC detects a continuous short to high in either the signal circuit or the BARO sensor.	BARO Sensor Voltage > 4.33 volts		80 failures out of 100 samples Frequency: 100 ms loop Continuous	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
ECM/PCM Internal Engine Off Timer Performance	**P2610**	This DTC determines if the ignition off timer has failed.	A failure will be reported if any of the following occur: Ignition Off Time < 0 seconds Ignition Off Time > 8 seconds Sample Counter > 25 Ignition Off Time < Old Ignition Off Time On positive timer transition Sample Counter < 7 or Sample Counter > 13 Or (Ignition Off Time - Old Ignition Off Time) ≠ 1 second note: Sample Counter is incremented if Ignition Off Time = Old Ignition Off Time	Test Run This Trip = FALSE Ignition Off Timer Enabled = TRUE (PCM State = Poweroff; Time in poweroff ≥ 1.6 seconds)	Frequency: 100 ms loop Continuous	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2 Sensor Circuit Range/Performance Bank 1 Sensor 1	**P2A00**	This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling.	Closed loop fuel control O2 sensor Ready flag set to "Not Ready." O2 sensor voltage must be > 600 millivolts or < 300 millivolts to set closed loop fuel O2 Ready flag. Once set to "Ready," the O2 sensor voltage cannot be > 300 millivolts and < 600 millivolts for > 10 seconds or the O2 Ready flag will be reset to "Not Ready."	• No TP Sensor DTC's • No MAF DTC's • No MAP DTC's • No ECT DTC's • No Bank 1 Sensor 1 or Bank 2 Sensor 1 O2 DTC's • Engine Run Time $\geq$ 180 seconds • ECT $\geq$ 65° C • Traction Control = Not Active • Not in Catalyst Protection Mode • 9 volts $\leq$ Ignition Voltage $\leq$ 18 volts • 602 $\leq$ Engine Speed $\leq$ 3000 • 5gps $\leq$ Mass Airflow $\leq$ 38gps • 3% $\leq$ TP Sensor $\leq$ 35% • Not in Decel Fuel Cutoff Mode • Not in Power Enrichment • Predicted O2 temp $\geq$ 0°C All of the above met for 3 seconds	300 test failures in a 360 test sample Frequency: Continuous 100ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2 Sensor Circuit Range/Performance Bank 1 Sensor 2 (Intrusive test runs on unified cycle)	**P2A01**	This DTC determines if the post catalyst O2 sensor is stuck in a normal voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic includes a passive (stage 1) test and an intrusive (stage 2) test. The stage 2 increases or reduces delivered fuel to achieve the required rich or lean threshold.	Post catalyst O2 sensor cannot achieve voltage $\geq$ 685.76 millivolts and voltage $\leq$ 290.8 millivolts	Common Enable Criteria • No O2 circuit, heater, response or heater driver DTC's active • No TP Sensor DTC's • No MAF DTC's • No ECT DTC's • No MAP DTC's • No IAT DTC's • No EVAP DTC's • No Fuel Injector DTC's • 9 volts $\leq$ system voltage $\leq$ 18 volts • Engine Runtime $\geq$ 6 seconds Stage 2 Specific Enable Criteria: • Stage 1 portion of test not passed • Must be in one of the following fuel cells: Purge, normal; Purge, high flow • 1000 rpm $\leq$ Engine Speed $\leq$ 3000 rpm • 15 gps $\leq$ Airflow $\leq$ 40 gps • 20 mph $\leq$ Vehicle Speed $\leq$ 80 mph • EGR Flow diagnostic intrusive test not active • 96.5 $\leq$ Short term fuel trim $\leq$ 103.5 All of the above met for at least 2.5 seconds, and then: • Fuel state = closed loop EVAP diagnostic not in control of purge	Stage 1: Up to 380 seconds Stage 2: Up to 11.6 seconds for each threshold Frequency: One test per trip	DTC Type B

ENGINE DIAGNOSTIC PARAMETERS

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2 Sensor Circuit Range/Performance Bank 2 Sensor 1	**P2A03 (Malibu only)**	This DTC determines if the O2 sensor voltage is not meeting the voltage criteria to enable closed loop fueling.	Closed loop fuel control O2 sensor Ready flag set to "Not Ready." O2 sensor voltage must be > 600 millivolts or < 300 millivolts to set closed loop fuel O2 Ready flag. Once set to "Ready," the O2 sensor voltage cannot be > 300 millivolts and < 600 millivolts for > 10 seconds or the O2 Ready flag will be reset to "Not Ready."	• No TP Sensor DTC's • No MAF DTC's • No MAP DTC's • No ECT DTC's • No Bank 1 Sensor 1 or Bank 2 Sensor 1 O2 DTC's • Engine Run Time $\geq$ 180 seconds • ECT $\geq$ 65° C • Traction Control = Not Active • Not in Catalyst Protection Mode • 9 volts $\leq$ Ignition Voltage $\leq$ 18 volts • 602 $\leq$ Engine Speed $\leq$ 3000 • 5gps $\leq$ Mass Airflow $\leq$ 38gps • 3% $\leq$ TP Sensor $\leq$ 35% • Not in Decel Fuel Cutoff Mode • Not in Power Enrichment Predicted O2 temp $\geq$ 0°C All of the above met for 3 seconds	300 test failures in a 360 test sample <u>Frequency:</u> Continuous 100ms loop	DTC Type B

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SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION
O2 Sensor Circuit Range/Performance Bank 2 Sensor 2 (Intrusive test runs on unified cycle)	**P2A04 (Malibu only)**	This DTC determines if the post catalyst O2 sensor is stuck in a normal voltage range and thereby can no longer be used for post oxygen sensor fuel control or for catalyst monitoring. The diagnostic includes a passive (stage 1) test and an intrusive (stage 2) test. The stage 2 increases or reduces delivered fuel to achieve the required rich or lean threshold.	Post catalyst O2 sensor cannot achieve voltage $\geq$ 685.76 millivolts and voltage $\leq$ 290.8 millivolts	Common Enable Criteria • No O2 circuit, heater, response or heater driver DTC's active • No TP Sensor DTC's • No MAF DTC's • No ECT DTC's • No MAP DTC's • No IAT DTC's • No EVAP DTC's • No Fuel Injector DTC's • 9 volts $\leq$ system voltage $\leq$ 18 volts • Engine Runtime $\geq$ 6 seconds Stage 2 Specific Enable Criteria: • Stage 1 portion of test not passed • Must be in one of the following fuel cells: Purge, normal; Purge, high flow • 1000 rpm $\leq$ Engine Speed $\leq$ 3000 rpm • 15 gps $\leq$ Airflow $\leq$ 40 gps • 20 mph $\leq$ Vehicle Speed $\leq$ 80 mph • EGR Flow diagnostic intrusive test not active • 96.5 $\leq$ Short term fuel trim $\leq$ 103.5 All of the above met for at least 2.5 seconds, and then: • Fuel state = closed loop • EVAP diagnostic not in control of purge	Stage 1: Up to 380 seconds Stage 2: Up to 11.6 seconds for each threshold Frequency: One test per trip	DTC Type B

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LOOK UP TABLES

P0101: (Calculated Flow – Measured Flow) Lookup Table: 3.4L (LNJ) GMT191

Calculated Airflow	Airflow Delta
Grams_Air_0	10
Grams_Air_40	15
Grams_Air_80	20
Grams_Air_120	400
Grams_Air_160	400
Grams_Air_200	400
Grams_Air_240	400
Grams_Air_280	400
Grams_Air_320	400
Grams_Air_360	400
Grams_Air_400	400

LOOK UP TABLES

P0141: Lookup Tables for Fail Times: Typical data from 3.1L LG8 MS2000 (LNJ, LX9, L26 and L32 use current monitor on both sensors)
P0141 – Bank 1, Sensor 2

Additional Fail Time (Add this amount at this Startup Coolant Temperature)	
	Bank 1, Sensor 2
-40 Degrees_C	30
-28 Degrees_C	19
-16 Degrees_C	12
-4 Degrees_C	6
8 Degrees_C	4
20 Degrees_C	2
32 Degrees_C	0
44 Degrees_C	0
56 Degrees_C	0
68 Degrees_C	0
80 Degrees_C	0
92 Degrees_C	0
104 Degrees_C	0
116 Degrees_C	0
128 Degrees_C	0
140 Degrees_C	0
152 Degrees_C	0
Unadjusted Fail Time	
	Bank 1, Sensor 2
0 Grams_Per_Second	460
5 Grams_Per_Second	240

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LOOK UP TABLES

10 Grams_Per_Second	180
15 Grams_Per_Second	120
20 Grams_Per_Second	120
25 Grams_Per_Second	200
30 Grams_Per_Second	200
35 Grams_Per_Second	200
40 Grams_Per_Second	200
45 Grams_Per_Second	200
50 Grams_Per_Second	200
55 Grams_Per_Second	200
60 Grams_Per_Second	200
65 Grams_Per_Second	200
70 Grams_Per_Second	200
75 Grams_Per_Second	200
80 Grams_Per_Second	200
85 Grams_Per_Second	200
90 Grams_Per_Second	200
95 Grams_Per_Second	200
100 Grams_Per_Second	200

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LOOK UP TABLES

P0300: Catalyst Damaging Misfire Percentages as a Function of Engine Speed and Load Table: LNJ GMT191

Eng. Load ↓ / Eng. RPM →	0 RPM	1000 RPM	2000 RPM	3000 RPM	4000 RPM	5000 RPM	6000 RPM	7000 RPM
0 Load_In_Percent	31.875%	31.875%	31.875%	31.875%	31.875%	31.875%	31.875%	31.875%
10 Load_In_Percent	31.875%	31.875%	31.875%	31.875%	31.875%	31.875%	31.875%	31.875%
20 Load_In_Percent	31.875%	31.875%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
30 Load_In_Percent	31.875%	31.875%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
40 Load_In_Percent	31.875%	31.875%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
50 Load_In_Percent	31.875%	31.875%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
60 Load_In_Percent	31.875%	31.875%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
70 Load_In_Percent	31.875%	31.875%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
80 Load_In_Percent	31.875%	31.875%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
90 Load_In_Percent	31.875%	31.875%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
100 Load_In_Percent	31.875%	31.875%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%

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LOOK UP TABLES

P0401: Engine Run Time as a Function of Coolant Temperature Table: 3.4L (LNJ) GMT191

Coolant Temperature at Startrun	Engine Run Time (seconds)
Deg_C_m40	360
Deg_C_m30	300
Deg_C_m20	240
Deg_C_m10	180
Deg_C___0	90
Deg_C__10	50
Deg_C__20	45
Deg_C__30	40
Deg_C__40	37
Deg_C__50	34
Deg_C__60	31
Deg_C__70	28
Deg_C__80	25
Deg_C__90	20
Deg_C_100	20
Deg_C_110	20
Deg_C_120	20
Deg_C_130	20
Deg_C_140	20

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LOOK UP TABLES

P0420: Average Base Pulse Width Maximum Allowed Value as a Function of Airflow Table: 3.4L (LNJ) GMT191

Airflow in gps	Average BPW in milliseconds
0	100.0029
1	100.0029
2	100.0029
3	100.0029
4	100.0029
5	100.0029
6	100.0029
7	100.0029
8	100.0029
9	100.0029
10	100.0029
11	100.0029
12	100.0029
13	100.0029
14	100.0029
15	100.0029
16	100.0029

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LOOK UP TABLES

P0420: Average Base Pulse Width Minimum Allowed Value as a Function of Airflow Table: 3.4L (LNJ) GMT191

Airflow in gps	Average BPW in milliseconds
0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0

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LOOK UP TABLES

P0430: Average Base Pulse Width Maximum Allowed Value as a Function of Airflow Table: 3.5L (LX9) Malibu / 381 only uses this additional table

Airflow in gps	Average BPW in milliseconds
0	100.0029
1	100.0029
2	100.0029
3	100.0029
4	100.0029
5	100.0029
6	100.0029
7	100.0029
8	100.0029
9	100.0029
10	100.0029
11	100.0029
12	100.0029
13	100.0029
14	100.0029
15	100.0029
16	100.0029

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LOOK UP TABLES

P0430: Average Base Pulse Width Minimum Allowed Value as a Function of Airflow Table: 3.5L (LX9) Malibu / 381 only uses this additional table

Airflow in gps	Average BPW in milliseconds
0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0