3.8L (L67) Supercharged C-car, G-car, H-car - 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 REQUIRED AND FREQUENCY	MIL ILLUMINATION TYPE
MAF Sensor Range/Perf	P0101	0 to 231gps 1500HZ to 10500HZ	Delta > 15-40 gps between the actual airflow and calculated airflow	Delta TPS < 1.5% EGR < 50% 9V < ign voltage < 16V Engine stable = 2 sec	395 test failures out of 400 tests 100ms/test Continuous	DTC Type A
MAF Sensor Circuit Low Input	P0102	0 to 231gps 1500HZ to 10500HZ	Frequency value < 1200HZ	RPM > 50 Ign voltage > 8V Conditions stable > 0.5 sec TPS < 50%	395test failures out of 400 tests Every reference pulse	DTC Type A
MAF Sensor Circuit High Input	P0103	0 to 231gps 1500HZ to 10500HZ	Frequency value>11500HZ	RPM > 50 Ign voltage > 8V Conditions stable > 0.5 sec TPS < 50%	395 test failures out of 400 tests Every reference pulse	DTC Type A
MAP Sensor Circuit - Low Input	P0107	This DTC detects a continuous short to low or open in either the signal circuit or the MAP sensor.	Raw MAP < 5 counts (12 kPa)	No TP sensor DTC's set Engine Running Throttle Position ≥ 0% when Engine speed is ≤ 1000 RPM **or** Throttle Position is ≥ 6% when Engine speed is > 1000 RPM	175 test failures within a 200 test sample. Every 3rd reference pulse	DTC Type B
MAP Sensor Circuit -High Input	P0108	This DTC detects a continuous short to high in either the signal circuit or the MAP sensor.	Raw MAP > 215 counts (90 kPa)	No TP sensor DTC's set Engine Running Throttle Position ≤ 2% when Engine speed is ≤ 900 RPM	175 test failures within a 200 test sample. Every 3rd reference pulse	DTC Type B
Intake Air Temp. Sensor Circuit - Low Input	P0112	The DTC detects a continuous short to ground in the IAT signal circuit or the IAT sensor	**Low Resistance Pullup** Raw IAT < 7 counts (-34.75□C) **High Resistance Pullup** Raw IAT < 7 counts (-34.75□C)	No VS sensor DTC's set. Vehicle speed ≥ 25mph Engine run time > 10 seconds No ECT sensor DTC's set	175 test failures within a 200 test sample 100ms/test Continuous	DTC Type B
Intake Air Temp. Sensor Circuit - High Input	P0113	The DTC detects a continuous open or short to high in the IAT signal circuit or the IAT sensor	**Low Resistance pullup** Raw IAT > 247 counts(134.75□C) **High Resistance pullup** Raw IAT > 247 counts(134.75□C)	No ECT sensor DTC's set No VS sensor DTC's set Vehicle speed < 35mph Air flow < 12 g /second Coolant > 60°C Engine run time> 180 seconds	175 test failures within a 200 test sample 100ms/test Continuous	DTC Type B
Engine Coolant Temp. Sensor Circuit-Low Input	P0117	The DTC detects a continuous short to ground in the ECTsignal circuit or the ECT sensor	**Low Resistance Pullup** Raw ECT < 37 counts(-12.25□C) **High Resistance Pullup** Raw ECT < 37 counts(-12.25□C)	Engine run time > 15 seconds	95 test failures within a 100 test sample 100ms/test Continuous	DTC Type B

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Engine Coolant Temp. Sensor Circuit-High Input	P0118	The DTC detects a continuous short to high or open in the ECT signal circuit or the ECT sensor	**Low Resistance pullup** Raw ECT > 247 counts(134.75□C) **High Resistance pullup** Raw ECT > 247 counts(134.75□C)	Engine run time > 3 seconds	95 test failures within a 100 test sample 100ms/test Continuous	DTC Type B
Throttle Position Sensor Circuit Range/Rationality	P0121	The DTC detects a stuck TP sensor	The last throttle position value > or < predicted throttle position. Lookup table for stuck high or low based on engine RPM.	No TP sensor DTC's set or failures flagged No MAP sensor DTC's set Engine Running MAP < 50 kPa for stuck high fail MAP > 70 kPa for stuck low fail TP sensor Δ < 2% IAC between 0 to 130 counts	95 test failures within a 100 test sample 100ms/test Continuous	DTC Type A
Throttle Position Sensor Circuit-Low Input	P0122	This DTC detects a continuous short to low or open in either the signal circuit or the TP sensor.	Raw TP sensor signal < 5 counts (1.95%)	Engine running	95 test failures within a 100 test sample 12.5ms/test Continuous	DTC Type A
Throttle Position Sensor Circuit-High Input	P0123	This DTC detects a continuous short to high in either the signal circuit or the TP sensor.	Raw TP sensor signal > 250 counts (97.66%)	Engine running	95 test failures within a 100 test sample 12.5ms/test Continuous	DTC Type A
Min. Cool.Temp. to Allow C.L. Op. Not Achieved Without Excess. Time	P0125	The DTC detects if a stabilized minimum closed-loop is reached and maintained after engine start-up.	Minimum stabilized ECT < 21°C	No ECT sensor tests failing or DTC's set No IAT sensor DTC's set Vehicle speed > 5 mph IAT > 10°C ECT > 0°C Start-up ECT < 30°C Closed loop timer ≥120 seconds	20 consecutive test failures 100ms/test Continuous	DTC Type B

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O2S Circuit-Low Voltage(Bank 1, Sensor 1)	P0131	This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady throttle and PE.	O2 sensor voltage < 0.175 volts or O2 sensor voltage < 0.600 volts in PE mode	No misfire DTC's No transmission DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No Fuel trim DTC's No EGR DTC's No ECT sensor DTC's Closed loop Air/Fuel ratio ≥ 14.5 but ≤ 14.8 Throttle position > 3% but < 40% Above met for 5 seconds	90 test failures in a 100 test sample 5 sets of samples 100ms/test Continuous	DTC Type B
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 and DFCO	O2 sensor voltage > 0.975 volts or O2 sensor voltage > 0.110 volts in DFCO mode	No misfire DTC's No transmission DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No Fuel trim DTC's No EGR DTC's No ECT sensor DTC's Closed loop Air/Fuel ratio ≥ 14.5 but ≤ 14.8 Throttle position > 3% but < 40% Above met for 5 seconds	90 test failures in a 100 test sample 5 sets of samples 100ms/test Continuous	DTC Type B

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O2S Circuit-Slow Response(Bank 1, Sensor 1)	P0133	This DTC determines if the O2 sensor functioning properly by checking its response time.	O2 sensor average transition time: L/R > 140 msec R/L > 110 msec	No misfire DTC's No transmission DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No Fuel trim DTC's No EGR DTC's No ECT sensor DTC's DTC P0135 (O2 Heater) not set Closed loop for > 60 sec O2 voltage low threshold.300 and high threshold .600 V Coolant temp > 50C RPM >1000 < 3000 10gps < MAF < 30gps	100 seconds response data Once per key cycle	DTC Type B
O2S Circuit-No Activity Detected (Bank 1,Sensor 1)	P0134	This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open.	O2 sensor > 0.400V but < 0.500V	No misfire DTC's No transmission DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No Fuel trim DTC's No EGR DTC's No ECT sensor DTC's Engine run time > 200 seconds.	290 test failures in a 300 test sample 100ms/test Continuous	DTC Type B
O2S Heater Circuit Malfunction (Bank 1, Sensor 1)	P0135	This DTC determines if the O2 sensor heater is functioning properly by monitoring the amount of time necessary for the O2 sensor to become active after start - up.	The elapsed time to obtain $\pm$ .150V from the mean O2 bias voltage. *Time based on table: Time vs Start Up Coolant Temp.	ECT < 35°C IAT < 35°C Δ ECT-IAT $\leq$ 6°C Avg MAF < 19 gps Engine run time > 3 seconds	From cold start to a run time maximum of 140 seconds. *Time determined by table. Once per key cycle	DTC Type B

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O2S Circuit-Low Voltage(Bank 1, Sensor 2)	P0137	This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady throttle and PE.	O2 sensor voltage < 0.010 volts or O2 sensor voltage < 0.600 volts in PE mode	No misfire DTC's No transmission DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No Fuel trim DTC's No EGR DTC's No ECT sensor DTC's Closed loop Air/Fuel ratio ≥ 14.5 but ≤ 14.8 Throttle position > 3% but < 40% Above met for 5 seconds	900 test failures in a 1000 test sample 5 sets of samples 100ms/test Continuous	DTC Type B
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 and DFCO	O2 sensor voltage > 0.999 volts or O2 sensor voltage > 0.200 volts in DFCO mode	No misfire DTC's No transmission DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No Fuel trim DTC's No EGR DTC's No ECT sensor DTC's Closed loop Air/Fuel ratio ≥ 14.5 but ≤ 14.8 Throttle position > 3% but < 40% Above met for 5 seconds	900 test failures in a 1000 test samples 5 sets of samples 100ms/test Continuous	DTC Type B
O2S Circuit-No Activity Detected (Bank 1,Sensor 2)	P0140	This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open.	O2 sensor > 0.424V but < 0.475V	No misfire DTC's No transmission DTC's No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No Fuel trim DTC's No EGR DTC's No ECT sensor DTC's Engine run time > 200 seconds	900 test failures in a 1000 test sample 100ms/test Continuous	DTC Type B

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O2S Heater Circuit Malfunction (Bank 1, Sensor 2)	P0141	This DTC determines if the O2 sensor heater is functioning properly by monitoring the amount of time necessary for the O2 sensor to become active after start - up.	The elapsed time to obtain ± .150V from the mean O2 bias voltage. *Time based on table: Time vs Start Up Coolant Temp.	ECT < 35°C IAT < 35°C Δ ECT-IAT ≤ 6°C Avg MAF < 27 gps	From cold start to a maximum time of 365 seconds. *Time determined by table. Once per key cycle	DTC Type B
System Too Lean (Bank 1)	P0171	Determines if the system is in a lean condition.	The average of short term fuel trim samples ≥ 1.01 and The average of adaptive index multiplier samples ≥ 1.16	The following DTC's are not set: TPS DTC's Misfire DTC's IAC DTC's Injector DTC's MAF DTC's O2 sensor DTC's MAP DTC's EGR DTC's Evap. DTC's ECT DTC's IAT DTC's Throttle position < 90% Engine speed > 600 rpm but < 4000 rpm Baro > 70kpa (9000 ft) ECT > 20°C but < 110°C MAP > 18 kpa but < 90 kpa IAT > -18 °C but < 70°C Air flow > 4 g/s < 180 g/s Vehicle speed < 75 mph	30 samples failing lean ≥ 5 sets of samples 200ms/test Continuous	DTC Type B
System Too Rich (Bank 1)	P0172	Determines if the system is in a rich condition.	The average of short term fuel trim samples ≤ 0.98 and The average of adaptive index multiplier samples < 0.82	The following DTC's are not set: TPS DTC's Misfire DTC's IAC DTC's Injector DTC's MAF DTC's O2 sensor DTC's MAP DTC's EGR DTC's Evap. DTC's ECT DTC's IAT DTC's Throttle position < 90% Engine speed > 600 rpm but < 4000 rpm Baro > 70 kpa (9000 ft) ECT > 20°C but < 110°C MAP > 18 kpa but < 90 kpa IAT > -18 °C but < 70°C Air flow > 4 g/s < 180 g/s Vehicle speed < 75 mph	30 samples failing rich ≥ 5 sets of samples 200ms/test Continuous	DTC Type B

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O2 Sys. Fault - Too Few O2S R/L or L/R Switches, Insufficient Activity (Bank 1, Sensor 1)	P1133	This DTC determines if the O2 sensor functioning properly by monitoring the number of L/R and R/L switches.	Number of switches in 100 seconds: L/R switches < 40 R/L switches < 40 O2 voltage between .300 and .600V	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No Fuel trim DTC's No EGR DTC's No ECT sensor DTC's DTC P0135 (O2 Heater) not set Closed loop	100 seconds after closed loop enable Once per key cycle	DTC Type B
O2S Incorrect Ratio (Bank 1, Sensor 1)	P1134	This DTC diagnoses degraded slow rich to lean or lean to rich response times.	Ratio of average response times. Ratio > 6 or < 0.3 O2 voltage between .300 and .600V	No injector DTC's No MAF DTC's No TP sensor DTC's No Evap. DTC's No IAT sensor DTC's No MAP DTC's No Fuel trim DTC's No EGR DTC's No ECT sensor DTC's DTC P0135 (O2 Heater) not set Closed loop	100 seconds after closed loop enable Once per key cycle	DTC Type B
Injector Circuit Fault	P1200	9V - 16V	Output state is invalid	----------	5 sec Continuous	DTC Type B
Random Misfire Detected Cylinder 1 Misfire Cylinder 2 Misfire Cylinder 3 Misfire Cylinder 4 Misfire Cylinder 5 Misfire Cylinder 6 Misfire	P0300 P0301 P0302 P0303 P0304 P0305 P0306	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 CamshaftPosition FTP Threshold - 1.85% I/M Threshold - 1.85% Catalyst Damage - see speed/ load chart	Engine run time 0-5 sec depending on startup rpm No VSS DTC's No transmission DTC's No fuel trim DTC's No TP sensor DTC's No MAP sensor DTC's No ECT sensor DTC's Fuel cutoff not active Brake torque management not active ECT > -6.75°C but < 120°C Engine speed > 550 RPM but < 5800 RPM System voltage > 9 volts but < 16 volts + Throttle position Δ < 6.25%/100ms - Throttle position Δ < 1.5%/100ms Rough Road- Ratio of consecutive positive peak delta ref times to nonconsecutive peaks.	Emission Level: 5 failed 200 revolution blocks out of 16 Catalyst Damaging Level: 1 failed 200 revolution block Continuous	DTC Type B *EMISSION* DTC Type A *CATALYST DAMAGING*

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Crankshaft Position Sensor Circuit- Range/Perf	P0336	18X Signal This diagnostic will detect an incorrect signal from the crankshaft sensor.	If in one engine cycle 36 med. res. pulses are not seen	Engine run time > 3 sec 3X crank signal	290 ref pulse failures within a 300 sample limit. 100ms/test Continuous	DTC Type B
Camshaft Position Sensor Circuit Range/Perf	P0341	1X Signal This diagnostic will detect if the Cam Sensor signal is present.	Engine Running Cam Sensor reference pulse is not seen once every 6 cylinder events..	----------	If Cam signal is not detected 290 out of 300 test samples. 100ms/test Continuous	DTC Type B
Crank Angle Sensor Learned Error	P1336	This DTC will determine if the Machining tolerance in the crankshaft system has been learned by the vehicle	Sum of compensation factors not within range.	PCM state = run	0.5 sec 100 ms loop Continuous	DTC Type A
EST Output High	P1350	This diagnostic will determine if a failure has occurred due to an open circuit.	EST voltage > 4.9 V	EST Enabled Engine speed < 250 RPM	EST circuit open > 5.1 sec Once per ignition cycle	DTC Type B
EST Not Toggling After Enable	P1361	This diagnostic will determine if a failure has occurred due to a grounded circuit.	EST voltage < 0.04V	EST Enabled Engine speed > 600 RPM	5 seconds Every low res pulse	DTC Type B
Crank to Low Res Correlate	P1374	Pulsed 0V to 10V	3X signal 18X signal	Engine runtime > 3 sec Incorrect number of 3X signals per engine cycle	290 out of 300 test samples 100ms/test Continuous	DTC Type B

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Exhaust Gas Recirculation - Insufficient Flow Detected	P0401	This diagnostic will determine if there is a reduction in EGR flow.	With EGR valve open,the peak + MAP Δ is monitored over a time of 1 second. 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.	***Test Enable*** No TP sensor DTC's set No MAP DTC's set No VS sensor DTC's set No IAT sensor DTC's set No ECT sensor DTC's set No IAC DTC's set No Linear EGR Pintle Position DTC set No Misfire DTC's set No MAF DTC's set ECT > 75° C Baro > 70 kpa (9000 ft) Vehicle Speed > 25 mph IAC Δ < 5 counts AC clutch status is unchanged Transmission status is unchanged 10V < ign voltage < 16V ***Start Test*** Throttle Position < 1% EGR Position < 1% Engine Speed > 1000 rpm but < 1300 rpm MAP Δ < 1.5 A/D count Compensated MAP > 10 kpa but < 50 kpa ***Run Test*** Stabilized MAP (valve closed) recorded and EGR valve "ramped" open over a time interval and peak MAP value recorded and MAP Δ computed. EGR valve "ramped" closed over a time interval.	1 second Once per trip	DTC Type A

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Catalyst System Efficiency Below Threshold	P0420	This diagnostic will determine the efficiency of the catalytic converter.	Deviation Difference Average = 8 mv from O2 sensor #2	No EST DTC's set No EGR DTC's set No IAT DTC's set No IAC DTC's set No injector DTC's set No VS sensor DTC's set No TP sensor DTC's set No O2 sensor DTC's set No Misfire DTC's set No MAP sensor DTC's set No Fuel Trim DTC's set No ECT sensor DTC's set ***Converter Warm Up Status*** Engine in closed loop Commanded Air/Fuel ratio = 14.7:1 ECT > 75° C Air flow > 7 g/sec Catalyst warm ***Test Enable*** Air Flow ≤ 32 g/sec Δ engine load ≤ 70% / sec Vehicle Speed ≥ 20 mph but ≤ 75 mph Engine load ≤ 63% 1000 rpm < Engine speed ≤ 3000 rpm	50 tests per trip 1 sec/test Continuous	DTC Type A
Evap. Emission Control System - Incorrect Purge Flow	P0441	This diagnostic will detect a purge solenoid stuck closed by monitoring the Evap. Purge Vacuum switch state when the Evap. Purge solenoid duty cycle is > 85%. The vacuum switch state should change to high (open) if there is vacuum (solenoid open) applied to the system.	Evap. purge vacuum switch state = Low (closed) vacuum for a period > 4 seconds	Evap. Purge Solenoid Diagnostic Vacuum Switch DTC not set No IAT DTC's set No IAC DTC's set No MAP DTC's set No TP sensor DTC's set No EGR DTC's set Baro > 70 kPa (9000 ft) ECT ≤ 113 °C Powerup IAT > 0°C IAT ≤ 70 °C ECT-IAT ≤ 10°C Purge DC ≥ 75% Manifold Vacuum ≥ 10kPa Throttle Position ≥3% but ≤ 28% Engine Speed ≥ 650 RPM but ≤ 5000 RPM	For 16 test failures 100ms/test Continuous	DTC Type B

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Exhaust Gas Recirculation System - Pintle Position Error	P1406	This diagnostic will detect three conditions: 1. An open or short 2. Closed valve position too high 3. Position error too high	1. Pintle position < 7 A/D counts for 20 seconds 2. Pintle position > 20 A/D counts from learned closed valve position for 20 seconds 3. Deviation between actual position and desired position > 20% for 20 seconds	Ignition voltage > 10 volts 5 volt supply OK	All three tests must run before a 'test passed' is reported. Continuous	DTC Type B
Evap. Emission Control System - Continuous Open Purge Flow	P1441	This diagnostic will detect a purge solenoid stuck open by monitoring the Evap. Purge Vacuum switch state when the Evap. Purge solenoid duty cycle is < 3%. The vacuum switch state should change to low (closed) if there is no vacuum (solenoid closed) applied to the system.	Evap. purge vacuum switch state = High vacuum for a period > 4 seconds	Evap. Purge Solenoid Diagnostic Vacuum Switch DTC not set No IAT DTC's set No IAC DTC's set No MAP DTC's set No TP sensor DTC's set No EGR DTC's set Baro > 70 kPa (9000 ft) ECT ≤ 113 °C Powerup IAT > 10°C IAT ≤ 70 °C ECT-IAT ≤ 10°C Purge DC ≤ 3% Manifold Vacuum ≥ 10kPa Throttle Position ≥3% but ≤ 28% Engine Speed ≥ 600 RPM but ≤ 5000 RPM	For 16 test failures 100ms/test Continuous	DTC Type B
Idle Control System RPM Lower Than Expexcted	P0506	This DTC will determine if a low idle is the result of a IAC valve or circuit. A low idle is defined as 100 RPM below the desired idle. (Desired RPM range 725 to 800)	RPM < (Desired RPM - 100)	***Test Enable:*** No CCP DTC's set No misfire DTC's set No EGR DTC's set No TP sensor DTC's set No VS sensor DTC's set No ECT DTC's set No MAP DTC's set No Fuel Trim DTC's set No MAF DTC's set No Misfire DTC's set ECT > 70°C System Voltage > 9V but < 16 V IAT > -18°C Engine run time > 120 seconds Baro > 65 kPa (12000 ft) TP < 1% VS < 3 MPH Above met for a time > 5 seconds to enable diagnostic.	15 seconds Continous after enable	DTC Type B

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Idle Control System RPM Higher Than Expected	P0507	This DTC will determine if a high idle is the result of a IAC valve or circuit. A high idle is defined as 175 RPM above the desired idle. (Desired RPM range 725 to 800)	RPM > (Desired RPM + 175)	***Test Enable:*** No CCP DTC's set No misfire DTC's set No EGR DTC's set No TP sensor DTC's set No VS sensor DTC's set No ECT DTC's set No MAP DTC's set No MAF DTC's set No Misfire DTC's set No Fuel TrimDTC's set ECT > 70°C System Voltage > 9V but < 16 V IAT > -18°C Engine run time > 120 seconds Baro > 65 kPa (12000 ft) TP < 1% VS < 3 MPH Above met for a time > 5 seconds to enable diagnostic.	15 seconds Continous after enable	DTC Type B
Check Sum Error	P0601	This DTC will be stored if the calibration check sum is incorrect.	Output state invalid	PCM state = crank or run	0.5 sec 50 ms loop Continuous	DTC Type B
PCM Programming Error	P0602	This DTC will be stored if the PCM has been replaced and has not been programmed.	Output state invalid	PCM state = crank or run	0.5 sec 100 ms loop Continuous	DTC Type B
V5BA Voltage Circuit Fault	P1635	5 Volts	Voltage state invalid	----------	10 sec Continuous	DTC Type B
Fan 1 Relay Circuit Fault	P1651	0V to 12V	Output state invalid	PCM state = crank or run	30 sec Continuous	DTC Type B
Fan 2 Relay Circuit Fault	P1652	0V to 12V	Output state invalid	PCM state = crank or run	30 sec Continuous	DTC Type B
CCP Solenoid Circuit Malfunction	P1655	0V to 12V	Output state invalid	PCM state = crank or run	30 sec Continuous	DTC Type B