

1996 3.8L (L36) C-Car Engine Diagnostic Parameters

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SENSED PARAMETER	FAULT CODE	SENSOR SIGNAL TYPE	ACCEPTABLE OPERATING RANGE AND RATIONALITY	PRIMARY MALF DETECTION PARAMETERS	SECONDARY MONITORING PARAMETERS AND CONDITIONS	MONITORING TIME LENGTH AND FREQUENCY OF CHECK	MONITORING METHOD	FAULT CODE STORAGE AND MIL ILLUMINATION
MAF Sensor Range/Perf	P0101	Frequency	0 to 231gps 1500HZ to 10500HZ	Delta > 18-25 gps between the actual airflow and calculated airflow	Delta TPS < 1.5% EGR < 50% 9V < ign voltage < 16V Engine stable = 2 sec	390 test failures out of 400 tests 100ms/test	Hot wire airflow sensor	DTC Type A
MAF Sensor Circuit Low Input	P0102	Frequency	0 to 231gps 1500HZ to 10500HZ	Frequency value < 1200HZ	RPM > 50 Ign voltage > 8V Conditions stable > 0.5 sec TPS < 50%	290 test failures out of 300 tests Every reference pulse	Hot wire airflow sensor	DTC Type A
MAF Sensor Circuit High Input	P0103	Frequency	0 to 231gps 1500HZ to 10500HZ	Frequency value > 11500HZ	RPM > 50 Ign voltage > 8V Conditions stable > 0.5 sec TPS < 50%	290 test failures out of 300 tests Every reference pulse	Hot wire airflow sensor	DTC Type A
MAP Sensor Range/Rationality	P0106	Analog	0 to 5V A change in MAP must be preceded by a significant change in throttle angle and RPM. If not, a faulty MAP condition such as a "skewed" sensor exists.	Raw MAP Δ > 5 counts	No TP sensor DTC's set Engine Running Engine Speed Δ < 100 RPM Throttle Position Δ < 2% Idle Air Δ < 4 counts EGR Flow Rate Δ < 10% Brake Switch State = no change Clutch Switch State = no change Power Steering State = no change AC Clutch State = no change Above stabilized for 1 seconds	160 test failures within a 200 test samples Every 3rd reference pulse	Pressure Differential Sensor	DTC Type B
MAP Sensor Circuit - Low Input	P0107	Analog	0 to 5V This DTC detects a continuous short to low or open in either the signal circuit or the MAP sensor.	Raw MAP < 5 counts	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	Pressure Differential Sensor	DTC Type B
MAP Sensor Circuit -High Input	P0108	Analog	0 to 5V This DTC detects a continuous short to high in either the signal circuit or the MAP sensor.	Raw MAP > 215 counts	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	Pressure Differential Sensor	DTC Type B

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Intake Air Temp. Sensor Circuit - Low Input	P0112	Analog	0 to 5V The DTC detects a continuous short to ground in the IAT signal circuit or the IAT sensor	<u>Low Resistance Pullup</u> Raw IAT < 7 counts <u>High Resistance Pullup</u> Raw IAT < 7 counts	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	Thermistor	DTC Type B
Intake Air Temp. Sensor Circuit - High Input	P0113	Analog	0 to 5V The DTC detects a continuous open or short to high in the IAT signal circuit or the IAT sensor	<u>Low Resistance pullup</u> Raw IAT > 247 counts <u>High Resistance pullup</u> Raw IAT > 247 counts	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	Thermistor	DTC Type B
Engine Coolant Temp. Sensor Circuit-Low Input	P0117	Analog	0 to 5V The DTC detects a continuous short to ground in the ECT signal circuit or the ECT sensor	<u>Low Resistance Pullup</u> Raw ECT < 37 counts <u>High Resistance Pullup</u> Raw ECT < 37 counts	Engine run time > 15 seconds	95 test failures within a 100 test sample 100ms/test Continuous	Thermistor	DTC Type B
Engine Coolant Temp. Sensor Circuit-High Input	P0118	Analog	0 to 5V The DTC detects a continuous short to high or open in the ECT signal circuit or the ECT sensor	<u>Low Resistance pullup</u> Raw ECT > 247 counts <u>High Resistance pullup</u> Raw ECT > 247 counts	Engine run time > 3 seconds	95 test failures within a 100 test sample 100ms/test Continuous	Thermistor	DTC Type B

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Throttle Position Sensor Circuit Range/Rationality	P0121	Analog	0 to 99% The DTC detects a "skewed" or stuck TP sensor	The last throttle position value > predicted throttle position based on engine RPM.	No TP sensor DTC's set or failures flagged No MAP sensor DTC's set Engine Running MAP < 55 kpa TP sensor Δ < 2%	95 test failures within a 100 test sample 100ms/test Continuous	Potentiometer	DTC Type A
Throttle Position Sensor Circuit-Low Input	P0122	Analog	0 to 99% This DTC detects a continuous short to low or open in either the signal circuit or the TP sensor.	Raw TP sensor signal < 3.125%	Engine running	95 consecutive test failures within a 100 test sample 12.5ms/test Continuous	Potentiometer	DTC Type A
Throttle Position Sensor Circuit-High Input	P0123	Analog	0 to 99% This DTC detects a continuous short to high in either the signal circuit or the TP sensor.	Raw TP sensor signal > 94%	Engine running	95 consecutive test failures within a 100 test sample 12.5ms/test Continuous	Potentiometer	DTC Type A
Min. Cool.Temp. to Allow C.L. Op. Not Achieved Without Excess. Time	P0125	Analog	0 to 5V 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 \geq 120 seconds	20 consecutive test failures 100ms/test Continuous	Thermistor	DTC Type B

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O2S Circuit-Low Voltage(Bank 1, Sensor 1)	P0131	Analog	.1V to 1.0V 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 < .175 volts or O2 sensor voltage < .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 for 5 consecutive failures. 100ms/test Continuous	Exhaust Oxygen Sensor	DTC Type B
O2S Circuit-High Voltage(Bank 1, Sensor 1)	P0132	Analog	.1V to 1.0V 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 > .800 volts or O2 sensor voltage > .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 for 5 consecutive failures. 100ms/test Continuous	Exhaust Oxygen Sensor	DTC Type B

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O2S Circuit-Slow Response(Bank 1, Sensor 1)	P0133	Analog	.1V to 1.0V This DTC determines if the O2 sensor functioning properly by checking its response time.	O2 sensor average transition time: L/R > 155 msec R/L > 115 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 > 120 sec O2 voltage low threshold.300 and high threshold .600 V Coolant temp > 75C RPM >1000 < 3000 15gps < MAF < 29gps	100 seconds response data Once per key cycle	Exhaust Oxygen Sensor	DTC Type B

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O2S Circuit-No Activity Detected (Bank 1, Sensor 1)	P0134	Analog	.1V to 1.0V This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open.	O2 sensor > .400V but < .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	Exhaust Oxygen Sensor	DTC Type B
O2S Heater Circuit Malfunction (Bank 1, Sensor 1)	P0135	Software	9V to 16V 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 $\sqrt{ECT-IAT} \leq 6^\circ C$ Avg MAF < 24gps Engine run time > 3 seconds	From cold start to a run time maximum of 115 seconds. *Time determined by table.	Exhaust Oxygen Sensor	DTC Type B

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O2S Circuit-Low Voltage(Bank 1, Sensor 2)	P0137	Analog	.1V to 1.0V 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 <.75 volts or O2 sensor voltage < .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 for 5 consecutive failures. 100ms/test Continuous	Exhaust Oxygen Sensor	DTC Type B
O2S Circuit-High Voltage(Bank 1, Sensor 2)	P0138	Analog	.1V to 1.0V This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and DFCC	O2 sensor voltage >.999 volts or O2 sensor voltage > .200 volts in DFCC 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 for 5 consecutive failures. 100ms/test Continuous	Exhaust Oxygen Sensor	DTC Type B

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O2S Circuit-No Activity Detected (Bank 1, Sensor 2)	P0140	Analog	.1V to 1.0V This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open.	O2 sensor > .424 V but < .475 V	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	Exhaust Oxygen Sensor	DTC Type B
O2S Heater Circuit Malfunction (Bank 1, Sensor 2)	P0141	Software	9V to 16V 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 $\sqrt{ECT-IAT} \leq 6^\circ C$ Avg MAF < 24 gps	From cold start to a maximum time of 434 seconds. *Time determined by table.	Exhaust Oxygen Sensor	DTC Type B
System Too Lean (Bank 1)	P0171	Software	Determines if the system is in a lean condition.	The average of short term fuel trim samples ≥ 1.14 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 > 500 rpm but < 4000 rpm Baro > 75kpa (8500 ft) ECT > 20°C but < 110°C MAP > 18 kpa but < 90 kpa IAT > -18 °C but < 40°C Air flow > 4 g/s < 180 g/s Vehicle speed < 70 mph	If lean counter is ≥ 5 counts 200ms/test Continuous	Short term fuel trim ,adaptive index multiplier and O2 sensor	DTC Type B

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System Too Rich (Bank 1)	P0172	Software	Determines if the system is in a rich condition.	The average of short term fuel trim samples $\leq .97$ and The average of adaptive index multiplier samples < 0.85	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 > 500 rpm but < 4000 rpm Baro > 75 kpa (8500 ft) ECT $> 20^{\circ}\text{C}$ but $< 110^{\circ}\text{C}$ MAP > 18 kpa but < 90 kpa IAT $> -18^{\circ}\text{C}$ but $< 40^{\circ}\text{C}$ Air flow > 4 g/s < 180 g/s Vehicle speed < 70 mph ^{****}	If rich counter is ≥ 5 counts 200ms/test Continuous	Short term fuel trim ,adaptive index multiplier and O2 sensor	DTC Type B
O2 Sys. Fault - Too Few O2S R/L or L/R Switches, Insufficient Activity (Bank 1, Sensor 1)	P1133	Analog	.1V to 1.0V 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	Exhaust Oxygen Sensor	DTC Type B
O2S Incorrect Ratio (Bank 1, Sensor 1)	P1134	Analog	.1V to 1.0V This DTC diagnoses degraded slow rich to lean or lean to rich response times.	Ratio of average response times. Ratio > 3.5 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	Exhaust Oxygen Sensor	DTC Type B

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Injector Circuit Fault	P1200	Digital	9V - 16V	Output state is invalid	-----	5 sec Continuous	Software	DTC Type B
Random Misfire Detected	P0300	Digital	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	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 > 450 RPM but < 5800 RPM System voltage > 9 volts but < 16 volts + Throttle position \ < 6.25%/100ms - Throttle position \ < 1.5%/100ms Rough Road- Ratio of consecutive positive peak delta ref times to nonconsecutive peaks.	5 failed 200 revolution blocks out of 16 Emission Level	Crankshaft position sensor and target wheel and camshaft position sensor	DTC Type B <i>EMISSION</i> DTC Type A <i>CATALYST DAMAGING</i>
Cylinder 1 Misfire	P0301							
Cylinder 2 Misfire	P0302							
Cylinder 3 Misfire	P0303							
Cylinder 4 Misfire	P0304							
Cylinder 5 Misfire	P0305							
Cylinder 6 Misfire	P0306				1 failed 200 revolution block Catalyst damaging Level Continuous			
Crankshaft Position Sensor Circuit-Range/Perf	P0336	Digital	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	Hall Effect Crankshaft Sensor	DTC Type B
Camshaft Position Sensor Circuit Range/Perf	P0341	Digital	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	Hall Effect Cam Sensor	DTC Type B
EST Output High	P1350	Digital	0 V-5V 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	Software	DTC Type B

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Catalyst System Efficiency Below Threshold	P0420	Analog	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 <u>Converter Warm Up Status</u> Engine in closed loop Commanded Air/Fuel ratio = 14.7:1 ECT > 75° C Air flow > 15 g/sec Above met for a time > 180 seconds <u>Test Enable</u> Air Flow ≤ 30 g/sec \ engine load ≤ 70% / sec Vehicle Speed ≥ 40 mph but ≤ 75 mph Engine load ≤ 63% 1000 rpm < Engine speed ≤ 3000 rpm	50 tests per trip 100ms/test Continuous	O2 sensor #1 and O2 sensor #2	DTC Type A
Evap. Emission Control System - Incorrect Purge Flow	P0441	Digital	0V-5V 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 ≤ 65% Engine Speed ≥ 650 RPM but ≤ 5000 RPM	For 16 test failures 100ms/test Continuous	Evap. Purge Vacuum Switch	DTC Type B

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Exhaust Gas Recirculation System - Pintle Position Error	P1406	Analog	0V 0 5V 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 > 9 volts 5 volt supply OK	All three tests must run before a 'test passed' is reported. Continuous	Potentiometer	DTC Type B
Evap. Emission Control System - Continuous Open Purge Flow	P1441	Digital	0V-5V 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 > 0°C IAT ≤ 70 °C ECT-IAT ≤ 10°C Purge DC ≤ 3% Manifold Vacuum ≥ 10kPa Throttle Position ≥ 3% but ≤ 65% Engine Speed ≥ 600 RPM but ≤ 5000 RPM	For 16 test failures Continuous	Evap. Purge vacuum switch	DTC Type B

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Idle Control System RPM Lower Than Expepected	P0506	Software	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)	<u>Test Enable:</u> 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 Continuous after enable	Software	DTC Type B
Idle Control System RPM Higher Than Expected	P0507	Software	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)	<u>Test Enable:</u> 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 Continuous after enable	Software	DTC Type B

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V5BA Voltage Circuit Fault	P1635	Analog	5 Volts	Voltage state invalid	-----	10 sec Continuous	Software	DTC Type B
Fan 1 Relay Circuit Fault	P1651	Digital	0V to 12V	Output state invalid	PCM state = crank or run	30 sec Continuous	Software	DTC Type B
Fan 2 Relay Circuit Fault	P1652	Digital	0V to 12V	Output state invalid	PCM state = crank or run	30 sec Continuous	Software	DTC Type B
CCP Solenoid Circuit Malfunction	P1655	Digital	0V to 12V	Output state invalid	PCM state = crank or run	30 sec Continuous	Software	DTC Type B