1998 2.4L (LD9) N-car (*except* N-*Malibu or* N-*Cutlass*) - ENGINE DIAGNOSTIC PARAMETERS

98c24T_N__aE.DOC

SENSED PARAMETER	FAULT CODE	MONITOR STRATEGY DESCRIPTION	MALFUNCTION CRITERIA AND THRESHOLD VALUE(S)	SECONDARY PARAMETERS AND ENABLE CONDITIONS	TIME LENGTH AND FREQUENCY	MIL ILLUMINATION TYPE
Manifold Pressure Sensor Rationality	P0106	Detects a MAP Sensor that is stuck or responding slowly	Part A: 1. MAP > 53 kPa or 2. Change Of MAP < 10 kPa or Part B: Change in MAP < Table value	Part A: 1. Idle MAP > 65 kPa 2. RPM > 900 TP between 0% & 50% Δ TP > 12% MAP < 53 kPa Part B: Idle MAP < 65 kPa RPM .> 900 TP between 0% & 50 % MAP < 65 kPa None of the following DTC's set: 107, 108, 117, 118, 121, 122, 123, 131, 132, 171, 172, 200, 300, 325, 341, 342, 404, 405, 440, 1441, 442, 502, 506, 507, 601, 602	19/20 Cts 15.6 ms/Ct Continuous check	DTC Type B
Manifold Pressure Too Low	P0107	Detects a continuous short to ground or a MAP sensor signal that is out of range low	MAP < 0.08 V (11.8 kPa)	RPM > 1150 TP Sensor >15.2 % Or RPM < 1150 No 122, 123 DTC's set.	400/500 Cts 15.6 ms Per Ct Continuous check	DTC Type A
Manifold Pressure Too High	P0108	Detects a continuous short to voltage or a MAP sensor signal that is out of range high	MAP > 3.80 V (82 kPa)	TP Sensor < 12% VSS < 1 MPH Engine run time > 20 - 40 sec No 122, 123 DTC's set.	80/100 Cts 15.6 ms Per Ct Continuous check	DTC Type A
Intake Air Temperature Sensor Shorted	P0112	Detects a continuous short to voltage or an IAT sensor signal that is out of range high	IAT < 48 Cts (> 128°C)	VSS > 15 MPH Engine run time > 320 sec	25/100 Cts 125 ms Per Ct Continuous check	DTC Type A
Intake Air Temperature Sensor Open	P0113	Detects a continuous short to ground or an open in the IAT sensor signal	IAT > 253 Cts (< -57°C)	VSS < 15 MPH Engine run time > 320 sec ECT > -40°C Air flow > 127.5 g/sec	25/100 Cts 125 ms Per Ct Continuous check	DTC Type A
Coolant Temperature Sensor Shorted	P0117	Detects a continuous short to voltage or an ECT sensor signal that is out of range high	ECT < 4 Cts (> 138°C) (High R) Or ECT < 36 Cts (> 142°C) (Low R)	Engine run time > 128 sec	50/100 Cts 125 ms Per Ct Continuous check	DTC Type A
Coolant Temperature Sensor Open	P0118	Detects a continuous short to ground or an open in the ECT sensor signal	ECT > 251 Cts (< -50°C) (High R) Or ECT > 252 Cts (< -71°C) (Low R)	Engine run time > 60 sec	50/100 Cts 125 ms Per Ct Continuous check	DTC Type A

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TP Sensor Stuck	P0121	Detects a stuck TP sensor	TP Vs RPM Table	Engine run time > 20 sec ECT > 20°C MAP < 37.2 kPa TP Sensor Δ < 2% None of the following DTC's set: 106, 107, 108, 171, 172, 200, 300, 325, 335, 341, 342, 404, 405, 440, 1441, 442, 502, 506, 507, 601, 602	48/50 Cts 125 ms Per Ct Continuous check	DTC Type B
TP Sensor Low	P0122	Detects a TP Sensor that is open or shorted to ground	TP Sensor < .20 V	Engine running	50/200 Cts 125 ms Per Ct Continuous check	DTC Type A
TP Sensor High (Part "A")	P0123	Detects a TP Sensor signal that is shorted to voltage	TP Sensor > 3.9 V	Engine running RPM < 1500 MAP < 60 kPa	110/200 Cts 125 ms Per Ct Continuous check	DTC Type A
TP Sensor High (Part "B")	P0123	Detects a TP Sensor signal that is shorted to voltage	TP Sensor > 4.8 V	Engine running RPM > 1500 MAP > 60 kPa	110/200 Cts 125 ms Per Ct Continuous check	DTC Type A
Closed Loop Coolant Fault	P0125	Detects if a stabilized minimum closed loop temperature is reached and maintained after engine start-up	If Closed Loop Timer Is Exceeded: 120 sec at 10°C 300 sec at -7°C 1350 sec at -40°C ECT < 40°C	Start Up ECT < 40°C IAT > -7°C, < 66°C Max. Idle Time<: 90 sec at 50°F (10°C) 225 sec at 20°F (-7°C) 1012 sec at -40°F (-40°C) Air flow < 10 gpm to be considered idle None of the following DTC's set: 112, 113, 117, 118	11 Cts 125 ms Per Ct Continuous check	DTC Type B
O2S 1 Lean	P0131	Detects an O2S 1 signal which is below the range considered lean	O2S 1 < 52 mV	Engine run time > 20 sec TP Between 8% & 50.2% ECT > 70°C Air flow > 3 g/sec Engine operating in Closed Loop Above conditions met for 3.1 sec None of the following DTC's set: 106, 107, 108,112, 113, 117, 118, 121, 122, 123, 171, 200, 300, 341, 404, 506, 507, 601, 602	999/1000 Cts 125 ms Per Ct Continuous check	DTC Type A

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O2S 1 Rich	P0132	Detects an O2S 1 signal which is above the range considered rich	O2S 1 > 946 mV or O2S 1 > 1042 mV for 2.5 sec while in DFCO	Engine run time > 20 sec TP between 8% & 50.2% Air flow > 3 g/sec ECT > 70°C Engine operating in Closed Loop Above conditions met for 3.1 sec None of the following DTC's set: 106, 107, 108,112, 113, 117, 118, 121, 122, 123, 171, 200, 300, 341, 404, 506, 507, 601, 602	399/400 Cts 125 ms Per Ct Continuous check	DTC Type A
O2S 1 Slow Response	P0133	Determines if the O2S 1 is functioning properly by checking its response time	100 mV < 02 < 900 mV Avg. O2S 1 Response Times: R/L > 249 ms L/R > 249 ms Ratio Of L/R To R/L Is > 3.5 Or < 0.44	Engine run time > 10 sec TP between 9% & 20% RPM between 1600 & 2600 EVAP > 35.6% PWM ECT > 75°C PLM > 176 None of the following DTC's set: 106, 107, 108,112, 113, 117, 118, 121, 122, 123, 171, 200, 300, 341, 404, 506, 507, 601, 602	100 Sec Once per ignition cycle	DTC Type B
O2S 1 Open	P0134	Detects an O2S 1 signal that is not switching at bias voltage	399 mV < O2S 1 < 499 mV	Engine run time > 30 sec TP between 4% & 56% ECT > 70°C Air flow > 3 g/sec None of the following DTC's set: 106, 107, 108,112, 113, 117, 118, 121, 122, 123, 171, 200, 300, 341, 404, 506, 507, 601, 602	999/1000 Cts 125 ms Per Ct Continuous check	DTC Type A
O2S 1 Not Enough Switches	P1133	Determines if the O2S 1 is functioning properly by checking the number of switches	O2S 1 Switch Numbers L/R < 10 Cts R/L < 15 Cts	Engine runt time > 10 sec TP between 9% & 20 % RPM between 1600 & 2600 EVAP > 35.6% PWM ECT > 75°C PLM > 176 None of the following DTC's set: 106, 107, 108,112, 113, 117, 118, 121, 122, 123, 171, 200, 300, 341, 404, 506, 507, 601, 602	100 Sec Once an ignition cycle	DTC Type B
O2S 2 Lean	P0137	Detects an O2S 2 signal which is below the range considered lean	O2S 2 < 43 mV	Engine run time > 140 sec TP between 8% & 50.2% ECT > 40°C Air flow > 5.5 g/sec Above conditions met for 3.1 sec None of the following DTC's set: 106, 107, 108,112, 113, 117, 118, 121, 122, 123, 171, 200, 300, 341, 404, 506, 507, 601, 602	1199/1200 Cts 125 ms Per Ct Continuous check	DTC Type B

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O2S 2 Rich	P0138	Detects an O2S 2 signal which is above the range considered rich	O2S 2 > 1042 mV	Engine run time > 30 sec TP between 4.7% & 50.2% ECT > 40°C Air flow > 5.5 g/sec Above conditions met for 3.1 sec None of the following DTC's set: 106, 107, 108,112, 113, 117, 118, 121, 122, 123, 171, 200, 300, 341, 404, 506, 507, 601, 602	399/400 Cts 125 ms Per Ct Continuous check	DTC Type B
O2S 2 Open	P0140	Detects a signal that is not switching at bias voltage	425 mV < O2S 2 < 456 mV	Engine run time > 30 sec TP between 4% & 56% ECT > 40°C Air flow > 5.5 g/sec None of the following DTC's set: 106, 107, 108,112, 113, 117, 118, 121, 122, 123, 171, 200, 300, 341, 404, 506, 507, 601, 602	999/1000 Cts 125 ms Per Ct Continuous check	DTC Type B
O2S 2 Heater Circuit Malfunction	P0141	Checks for sensor activity within a given period of time after cold start	O2S 2 Voltage Changes > ±148 mV From Mean O2S 2 Bias Voltage	Engine run time < 400 sec ECT and IAT < 45°C Difference in ECT & IAT < 7°C Battery voltage >11.6 V, < 16 V Average flow prior to activity must be < 20 g/s None of the following DTC's set: 106, 107, 108,112, 113, 117, 118, 121, 122, 123, 171, 200, 300, 341, 404, 506, 507, 601, 602	Time determined by table Once per ignition cycle	DTC Type B
Fuel Trim Lean (AMT)	P0171	Monitors fuel control system during normal operating range of FTI 110 < FTI < 145	Fuel Trim Index > 165	Baro > 72 kPa ECT > 60°C & < 115°C IAT > -25°C & < 115 °C MAP > 26 kPa RPM between 750 & 3400 VSS < 72 MPH Fuel level > 9.8 % None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 200, 300, 325, 335, 341, 342, 401, 404, 1404, 405, 1441, 502, 503, 601, 602	Continuous check	DTC Type B

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Fuel Trim Lean (SMT)	P0171	Monitors fuel control system during normal operating range of FTI 110 < FTI < 145	Fuel Trim Index > 165	Baro > 72 kPa ECT > 60°C & < 115°C IAT > -25°C & < 115 °C MAP > 26 kPa RPM between 850 & 3400 VSS < 72 MPH Fuel level > 9.8 % None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 200, 300, 325, 335, 341, 342, 401, 404, 1404, 405, 1441, 502, 503, 601, 602	Continuous check	DTC Type B
Fuel Trim Rich (AMT)	P0172	Monitors fuel control system during normal operating range of FTI 110 < FTI < 145	Fuel Trim Index < 70	Baro > 72 kPa ECT > 60°C & < 115°C IAT > -25°C & < 115 °C MAP > 26 kPa RPM between 750 & 3400 VSS < 72 MPH Fuel level > 9.8 % None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 200, 300, 325, 335, 341, 342, 401, 404, 1404, 405, 1441, 502, 503, 601, 602	16 Sec Once every 180 seconds	DTC Type B
Fuel Trim Rich (SMT)	P0172	Monitors fuel control system during normal operating range of FTI 110 < FTI < 145	Fuel Trim Index < 70	Baro > 72 kPa ECT > 60°C & < 115°C IAT > -25°C & < 115 °C MAP > 26 kPa RPM between 850 & 3400 VSS < 72 MPH Fuel level > 9.8 % None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 200, 300, 325, 335, 341, 342, 401, 404, 1404, 405, 1441, 502, 503, 601, 602	16 Sec Once every 240 seconds	DTC Type B
Injector Circuit Problem	P0200	Monitors fuel injectors for proper electrical operation	Injector Current < 4 Amps	Engine running Battery Voltage < 9 V	7 Sec Continuous check	DTC Type A

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Random Misfire Cylinder 1 Misfire Cylinder 2 Misfire Cylinder 3 Misfire Cylinder 4 Misfire	P0300 P0301 P0302 P0303 P0304	Detects a change in crankshaft angular velocity	FTP Threshold - 1.5% I/M Threshold - 1.5% Catalyst Damage - see speed/load chart	Engine run time > 5 sec RPM Between 469 & 6406 -7°C < ECT < 123°C Fuel level > 10 % Battery voltage > 9 V, < 17 V None of the following DTC's set: 106, 107, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 171, 172, 325, 335, 341, 342, 1336, 404, 1404, 405, 502, 503, 506, 507, 601, 1621, 740, 742	Emission Level 10 of 16 blocks failed (200 engine revolutions/block) Catalyst Damage Level 4 of 16 blocks failed in FTP region. (See speed chart outside FTP region) Continuous check	DTC Type B EMISSION DTC Type A CATALYST DAMAGING
Knock Sensor (KS) Output	P0325	Detects a disconnected or faulty knock sensor	Instantaneous Voltage < 1.0v	RPM > 1600 ECT > 56°C MAP > 60 kPa Engine run time > 20 sec Vacuum < 33 kPa	60 Sec Continuous check	DTC Type A
Crankshaft Sensor Position Resync	P0335	Detects an open crank sensor or too many resyncs	7x Resync Counter > 15 Counts	Engine Running No 341 DTC set	256 Sec Continuous check	DTC Type A
Camshaft Sensor Position Resync too often	P0341	Monitors for too many recyncs in the camshaft sensor signal	Cam Resync Counter > 15 Counts	Engine Running	256 Seconds Continuous check	DTC Type A
Camshaft Sensor Missing	P0342	Checks for a missing camshaft sensor signal	No Change In Cam Activity > 16 Cycles	Engine Running	16 Cycles Cycle = 180°Crankshaft rotation Continuous check	DTC Type A
Misfire Crank Angle Sensing Error	P1336	Detects invalid crankshaft angle correction factors	CCF Sum above or below 2 by 7 Counts (2 = 65536 counts)	None of the following DTC's set: 335, 341, 342	.5 Sec Once per ignition cycle	DTC Type A
EGR Flow Insufficient AMT	P0401	Detects insufficient EGR flow	MAP change vs. speed/baro chart	RPM between 1150 - 2100 Vehicle speed > 37 MPH ECT > 75°C MAT < 65°C Baro > 72.3 kPa MAP > 11.8 kPa, < 31.7 kPa None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 200, 300, 335, 1441, 502, 506, 507, 601	10 Tests per trip after NVM reset else once per trip Up to 3 tests per trip for next 6 trips if a step change in flow data occurs	DTC Type A

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EGR Flow Insufficient SMT	P0401	Detects insufficient EGR flow	MAP change vs. speed/baro chart	RPM between 1100 - 2200 Vehicle speed > 30 MPH ECT > 75°C MAT < 65°C Baro > 72.3 kPa MAP > 11.8 kPa, < 30.3 kPa None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 200, 300, 335, 1441, 502, 506, 507, 601	10 Tests per trip after NVM reset else once per trip Up to 3 tests per trip for next 6 trips if a step change in flow data occurs	DTC Type A
EGR Open Valve Pintle Error	P0404	Detects a stuck EGR pintle during non zero desired EGR	Absolute value of (desired EGR - actual EGR) > 9% Allowable valve fluctuation < 20% once test is running	Battery voltage > 11.7 V EGR enabled	18 sec Continuous check	DTC Type B
EGR Closed Valve Pintle Error	P1404	Detects a stuck EGR pintle during zero desired EGR	Actual EGR Closed Position > 15 Cts	Battery voltage > 11.7 V EGR Enabled	20 Sec 4 Fails per drive cycle (With desired pintle movement > 15% between test)	DTC Type B
EGR Sensor Signal Low	P0405	Detects open circuit on actual EGR	Actual EGR > 6 Cts	Battery voltage > 11.7 V	25 Sec Continuous check	DTC Type B
Catalyst Monitor AMT	P0420	Detects a catalytic converter with unacceptable amounts of oxygen storage capabilities	Oxygen Storage Capability (OSC) Time Difference ≥ 0.081 sec OSC Time Difference = OSC Worst Pass Thresh - OSC Compensation Factor * (O2S 2 Response Time - O2S 1 Response Time) OSC Worst Pass Thresh = .810 sec	Engine speed ≥ 1000 RPM for minimum of 34 sec since end of last idle period Predicted catalyst temp ≥ 510°C, < 750°C Baro ≥ 72.3 kPa IAT between -20.5°C & 80°C ECT between 75°C & 125°C Idle ≤ 45 sec MPH < 3 Test attempted this trip ≤ 12 -75 RPM ≤ (Engine Speed - Desired Speed) ≤ 150 RPM Engine run time > 510 sec Battery voltage > 9 V Flow < 14 g/sec None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 131, 132, 133, 134, 1133, 137, 138, 140, 141, 172, 200, 300, 1336, 440, 1441, 442, 452, 453, 503	Maximum 1 test attempt per idle period Maximum 6 tests per trip until idle catalyst I/M flag set Maximum of 1 test per trip after Idle catalyst I/M flag set 15.6 Ms/Ct	DTC Type A

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Catalyst Monitor SMT	P0420	Detects a catalytic converter with unacceptable amounts of oxygen storage capabilities	Oxygen Storage Capability (OSC) Time Difference ≥ 0.133 sec OSC Time Difference = OSC Worst Pass Thresh - OSC Compensation Factor * (O2S 2 Response Time - O2S 1 Response Time) OSC Worst Pass Thresh = 1.29 sec	Engine speed ≥ 1200 RPM for minimum of 44 sec since end of last idle period Predicted catalyst temp ≥ 510°C, < 750°C Baro ≥ 72.3 kPa IAT between -20.5°C & 80°C ECT between 75°C & 125°C Idle ≤ 45 sec MPH < 3 Test attempted this trip ≤ 12 -75 RPM ≤ (Engine Speed - Desired Speed) ≤ 150 RPM Engine run time > 510 sec Battery voltage > 9 V Flow < 14 g/sec None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 131, 132, 133, 134, 1133, 137, 138, 140, 141, 172, 200, 300, 1336, 440, 1441, 442, 452, 453, 503	Maximum 1 test attempt per idle period Maximum 6 tests per trip until idle catalyst I/M flag set Maximum of 1 test per trip after Idle catalyst I/M flag set 15.6 Ms/Ct	DTC Type A
EVAP System Large Leak Detected	P0440	Checks for adequate vacuum being held in the fuel tank when applied	Vac < 3.0 V	Baro > 75 kPa 4°C < ECT < 30°C at start up 4°C < IAT < 30°C at start up ECT - IAT < 8°C IAT - ECT < 1.5°C Fuel Level between 15% - 85% 7% < TPS < 35% Engine run time > 120 sec MPH < 70 EVAP Solenoid enabled None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 452, 453, 502, 503, 601, 602, 1621	400 Sec Once per ignition cycle	DTC Type A

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EVAP Purge Valve Leaking	P1441	Checks for a stuck open purge solenoid	Vac >2.0 V	Baro > 75 kPa 4°C < ECT < 30°C at start up 4°C < IAT < 30°C at start up ECT - IAT < 8°C IAT - ECT < 1.5°C Fuel Level between 15% - 85% 7% < TPS < 35% MPH < 70 Engine running None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 452, 453, 502, 503, 601, 602, 1621	300 Sec Once per ignition cycle	DTC Type A
EVAP System Small Leak Detected	P0442	Checks for a small leak in the fuel vapor handling system	0.024 - 0.10 V Per Sec Decay Varies With Fuel Level	Baro > 75 kPa 4°C < ECT < 30°C at start up 4°C < IAT < 30°C at start up ECT - IAT < 8°C IAT - ECT < 1.5°C Fuel Level between 15% - 85% 7% < TPS < 35% Engine run time > 120 sec MPH < 70 EVAP Solenoid enabled None of the following DTC's set: 106, 107, 108, 112, 113, , 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 452, 453, 502, 503, 601, 602, 1621	15 Sec Once per ignition cycle	DTC Type A
EVAP Canister Vent Blocked	P0446	Checks for excessively high vacuum in the vapor handling system	Vac > 4.2 V	Baro > 75 kPa 4°C < ECT < 30°C at start up 4°C < IAT < 30°C at start up ECT - IAT < 8°C IAT - ECT < 1.5°C Fuel Level between 15% - 85% 7% < TPS < 35% Engine run time > 120 sec MPH < 70 EVAP Solenoid enabled None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 452, 453, 502, 503, 601, 602, 1621	100 Sec Once per ignition cycle	DTC Type A

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EVAP Tank Vacuum Sensor Low	P0452	Detects a continuous short to ground or a disconnected tank vacuum sensor	Tank vacuum transducer < .01 V	Engine running	25 Sec Continuous check	DTC Type A
EVAP Tank Vacuum Sensor High	P0453	Detects a tank vacuum sensor that is shorted to voltage	Tank vacuum transducer > 4.9 V	Engine running	25 Sec Continuous check	DTC Type A
Low Speed Fan Fault	P0480	Checks commanded fan state against output to fan relay	Battery voltage > 9.5 V		50/100 Cts Continuous check	DTC Type A
Vehicle Speed Sensor Loss SMT	P0502	Detects a missing VSS signal	VSS < 2 MPH	RPM between 1700 & 3600 TPS < 1% Vacuum between 70 kPa & 80 kPa	5 Seconds Continuous check	DTC Type A
Idle Speed Low	P0506	Detects an idle speed which is less than a delta from desired	IAC > 145 Steps	Engine run time > 20 sec Baro > 72kPa ECT > 40°C Idle Speed > 100 RPM below desired Idle stabilized for 5 sec Battery voltage > 10 V, < 17.1V None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 171, 172, 200, 300, 325, 335, 341, 342, 404, 1404, 405, 440, 1441, 442, 446, 480, 481, 502, 503, 601, 602, 652, 653, 705, 706	18.8 Sec Continuous check	DTC Type B
Idle Speed High	P0507	Detects an idle speed which is greater than a delta from desired	IAC < 2 Steps	Engine run time > 20 sec Baro > 72kPa ECT > 40°C Idle Speed > 60 RPM above desired Idle stabilized for 5 sec Battery voltage > 10 V, < 17.1 V None of the following DTC's set: 106, 107, 108, 112, 113, 117, 118, 121, 122, 123, 125, 131, 132, 133, 134, 1133, 171, 172, 200, 300, 325, 335, 341, 342, 404, 1404, 405, 440, 1441, 442, 446, 480, 481, 502, 506, 601, 602, 652, 653, 705, 706	12.5 Sec Continuous check	DTC Type B
PCM Has EEPROM Flash Error	P0601	Checks for an incorrect checksum or Program ID failure	Checksum Detection Incorrect > 3 Times		Continuous check	DTC Type A
EEPROM Not Programmed	P0602	Checks for a PCM that is not programmed	Unprogrammed EEPROM		Immediately Once per key cycle	DTC Type A

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EEPROM General Fault	P1621	Checks for a write error	Incorrect Checksum		Immediately on next key up if flagged on previous key down Once at key down	DTC Type A