

**2000 1.9L (LL0 DOHC and L24 SOHC) Z-car (Saturn S-series cars) ENGINE and TRANSMISSION DIAGNOSTIC PARAMETERS**  
**2000file1.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
Heater Circuit open/ground short bank 1, sensor 2	P037	.170 - 2.260 amps detects a open or short to ground	O2 heater circuit Current < .1070 amps	Battery Voltage > 10.9 Volts for .5 seconds	5 failure/ignition cycle Continuous	DTC Type B
Heater Circuit Power Short bank 1, sensor 2	P038	.170 - 2.260 amps detects a power short	O2 heater Circuit Current > 2.26 amps	Battery Voltage > 10.9 Volts for .5 seconds	5 failure/ignition cycle Continuous	DTC Type B
Manifold Absolute Pressure/Throttle Position Rational	P0105	This DTC detects a skewed MAP/TP sensor  Rationality Test	Predicted TP/MAP value in relation to actual TP/MAP vs engine speed > 1600 rpm or < 4000 rpm	No TP, MAP, EGR, IAC, P0601, P0602, P0606, P1635 DTC's Engine speed Delta < 50 rpm	5 failures within a 20 test sample after two consecutive trips 10 samples per second Continuous	DTC Type B
Manifold Absolute Pressure Circuit Low Input	P0107	.20 volts to 4.24 volts This DTC detects a continuous short to low or open in either the signal circuit or the MAP sensor  Range check	Raw MAP < .20 volts, RPM >1600, TP >15.2 RPM < 1600, TP > 0	No TP DTC's TP >=15.2% when engine speed >1600rpm or TP >= 0% when eng speed <=1600rpm	100 test failures within a 100 test sample** Continuous	DTC Type A
Manifold Absolute Pressure Circuit High Input	P0108	.20 volts to 4.24 volts This DTC detects a continuous short to high in either the signal circuit or the MAP sensor  Rationality Check	Raw MAP > 4.24 volts RPM > 1600, TP < 9.8 RPM < 1600, TP < 2	No TP DTC's TP <= 9.8% when eng speed >1600rpm or TP <=2% when eng. speed <=1600 rpm	100 test failures within a 100 sample** Continuous	DTC Type A
Intake Air Temperature Circuit Low Input	P0112	.25 volts To 4.96 volts This DTC detects a continuous short to ground in either the IAT signal circuit or the IAT sensor  Range Check	IAT < .20 volts	NA	20 test failures within a 20 test sample - 1 sample per sec Continuous	DTC Type A
Intake Air Temperature Circuit High Input	P0113	.25 volts To 4.96 volts This DTC detects a continuous short to high in the IAT signal circuit or the IAT sensor  Range Check	IAT > 4.96 volts	No VSS & ECT DTC's VSS < 15 mph ECT >60 deg C airflow < 16gm/sec	20 test failures within a 20 test sample - 1 sample per sec Continuous	DTC Type A

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Engine Coolant Temperature Circuit Low Input	P0117	.14 volts to 4.7 volts This DTC detects a continuous short to ground in the ECT signal circuit or the ECT sensor  Range Check	Low Resistance Pullup - Coolant Temp < .14 volts High Resistance Pullup - Coolant Temp. < .14 volts	Engine run time >= 10 sec	3 test failures within 10 samples - 1 sample per sec Continuous	DTC Type A
Engine Coolant Temperature Circuit High Input	P0118	.14 volts to 4.7 volts This DTC detects a continuous short to high or open in the ECT signal circuit or the ECT sensor  Range Check	Low Resistance Pullup - Coolant Temp > 4.7 volts High Resistance Pullup - Coolant Temp > 4.7 volts	Engine run time >= 250 sec	3 test failures within 10 samples - 1 sample per sec Continuous	DTC Type A
Throttle Position Sensor A Circuit Low Input	P0122	.2 volts to 4.9 volts. This DTC detects a continuous short to low or open in either the signal circuit or the TP  Range Check	TP < .20 volts	None	100 failures within a 100 test samples** Continuous	DTC Type A
Throttle Position Sensor A Circuit High Input	P0123	.2 volts to 4.9 volts. This DTC detects a continuous short to high in either the signal circuit or the TP  Range Check	TP > 4.90 volts	None	100 failures within a 100 test samples** Continuous	DTC Type A
Insufficient Coolant Temperature for Closed Loop Fuel Control	P0125	This DTC detects if a stabilized minimum closed loop is reached and maintained after engine start-up  Rationality Check	If timer is exceeded ECT < 0 Deg C	No Coolant, IAT, P0601, P0606, P1635 DTC's	Exceed time after 2 consecutive trips - 1 sec Continuous	DTC Type B
				Reference table - temp deg C vs closed loop time -40 1350 sec -28 956 sec -16 562 sec -4 255 sec 8 120 sec 20 75 sec 32 30 sec 44 0 sec Above 53 Deg C Closed loop coolant test is no longer run		

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Front O2 closed loop rational	P0130	0 V to 1.1 V This DTC determines if the O2 sensor or O2 sensor circuit has developed an open  Circuit Continuity Check	.3mVolt <= O2 voltage <= .6 mVolt	No MAP, CRK, IAT, ECT, TP, FUEL TRIM, MISFIRE, CAM EGR, CCP, VOLTAGE DTC'S engine run time > 60 secs Predictive front O2 temp > 549 DegC (pred. from RPM and Airflow) TPS > 6.3%	490 failures in a 500 sample test - .1 sec per sample Continuous	DTC Type B
Front O2 Sensor Circuit Low Voltage	P0131	0 to 1.1 V This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady throttle and PE  Range check Low	O2 Voltage < .291 V & O2 Voltage <.291 V in PE mode	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP DTC's Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 secs In closed loop In drive (if auto)	900 failures in a 1000 sample test . 90 failures in a 100 sample test in PE mode - .1 sec , continuous	DTC Type B
O2 Sensor Circuit High Voltage	P0132	0 to 1.1 V This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and DFCO  Range Check High	O2 Voltage > .787V O2 Voltage > .587 V in Decel fuel cut off	No MAP, CRK, IAT, ECT, TP, , Fuel Trim, Misfire, Cam, EGR, CCP DTC's Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 secs In closed loop In drive (if auto)	900 failures in a 1000 sample test . 90 failures in a 100 sample test in DFCO mode - .1 sec, continuous	DTC Type B
Front O2 Sensor Circuit Slow Response	P0133	0 to 1.1 V This DTC determines if the O2 sensor is functioning properly by checking its response time  Rationality Check	O2 Average transition time lean/rich > 125 msec or rich/lean > 156 msec, 1500 < RPM < 3200	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's Closed loop O2 Voltage low threshold .300 O2 high threshold .600 V Airflow > 7 g/sec 1500 < rpm < 3200	100 seconds after closed loop enable once per ignition	DTC Type B
Front O2 Circuit No Activity Detected	P0134	0v to 1.1v This DTC determines if the O2 sensor or the O2 sensor circuit has developed an open  Circuit Continuity Check	.391 V <= O2 voltage <= .491V	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, Voltage, DTC's engine run time > 60 secs. Predictive front O2 temp > 450 Deg C (pred. from RPM and Airflow)	900 failures in a 1000 sample test - .1 sec per sample Continuous	DTC Type B
Rear O2 Sensor Circuit Low Voltage	P0137	0 to 1.1 V This DTC determines if the O2 sensor or circuit is shorted to low by checking for a lean condition during steady throttle and PE  Range Check Low	O2 voltage < .022 V O2 voltage < .291 V in Power Enrichment	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's Closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 secs. In drive(if auto). In closed loop.	1000 failures in a 1000 sample test , 2 consecutive tests 90 failures in a 100 sample test in PE mode - .1 sec per sample, Continuous	DTC Type B

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Rear O2 Sensor Circuit High Voltage	P0138	0v to 1.1v This DTC determines if the O2 sensor or circuit is shorted to high by checking for a rich condition during steady throttle and DFCO  Range Check High	O2 voltage > 1.065 V O2 voltage > .587 V in Decel fuel cut off	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's closed loop 14.5 <= A/F ratio <= 14.8 above met for .5 secs. In closed loop. In drive (if auto).	1000 failures in a 1000 sample test , 2 consecutive tests 90 failures in a 100 sample test in PE mode - .1 sec per sample, Continuous	DTC Type B
Rear O2 Sensor Circuit No Activity Detected	P0140	0 V to 1.1 V This DTC determines if the O2 sensor or O2 sensor circuit has developed an open  Circuit Continuity Check	.426 V <= O2 Voltage<=.461 V	No MAP, CRK, IAT, ECT, TP, Fuel Trim, Misfire, Cam, EGR, CCP, DTC's engine run time > 60 secs Predictive O2 rear temp > 426 Deg C (rpm/airflow)	1450 failures in a 1500 sample test - .1 sec per sample, continuous	DTC Type B
Fuel System too Lean	P0171	Determines if the system is in a lean condition	Long Term Fuel > 15.4%	No ECT, CRK, MAP, IAT,IAC, TP, CCP, Map, TP,CAM, O2's, EGR Flow, Misfire, PCM DTC's 70 KPa< Baro 2< Airflow < 80 g/sec 30 < MAP < 90 KPa -20 < IAT < 80 Deg C 500 < RPM < 4000 TP < 75% 60 < ECT < 115 deg C	If lean counter > 3 seconds Continuous	DTC Type A
Fuel System Too Rich	P0172	Determines if the system is in a rich condition	Long Term Fuel > 21.1%	No ECT, MAP, CRK, IAC, CAM, IAT, TP, VSS, CCP, O2S DTC's 70 KPa< Baro 2< Airflow < 80 g/sec 30 < MAP < 90 KPa -20 < IAT < 80 Deg C 500 < RPM < 4000 TP < 75% 60 < ECT < 115 deg C	If rich counter > 3 seconds Continuous	DTC Type A
Random/Multiple Cylinder Misfire Detected	P0300	These DTC's will determine if a random misfire or a cylinder specific misfire is occurring by monitoring crankshaft velocity	Deceleration/Acceleration Spike vs Engine Speed vs Load vs Camshaft position vs Crankshaft position % Misfire FTP - 2%, IM - 2% (Federal) FTP - 1.75%, IM - 1.75% (Calif)	No TP, CRK, IAT, MAP, CAM, IAC, FUEL TRIM, ECT, V5B, Misfire DTC's 562 < Eng. Spd< 6500 rpm(DOHC) " " " 5500 (SOHC Man) 500 < Eng. Spd < 5500 (SOHC Auto) 8< ign. V<18 Coolant< -7 Deg C, delay until >= 20 deg C	10 failed 200 revolution blocks out of 16 (emission level) 4 failed 200 revolution block out of 16 (catalyst damaging) Continuous	DTC Type B (emission Level) DTC Type B (Catalyst damaging) MIL still flashes but will not latch until 2nd trip

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				ECT > -7 deg C Eng revs > 30 Eng Run Time > 20 Sec Fuel Level > 1 gallon		
Cylinder 1 Misfire Detected	P0301	same as above	same as above	same as above	same as above	same as above
Cylinder 2 Misfire Detected	P0302	same as above	same as above	same as above	same as above	same as above
Cylinder 3 Misfire Detected	P0303	same as above	same as above	same as above	same as above	same as above
Cylinder 4 Misfire Detected	P0304	same as above	same as above	same as above	same as above	same as above
Knock Sensor Circuit Check	P0325	This DTC determines if the knock detection IC in the PCM is responding	Knock IC in PCM is responding to knock signal	1400 < RPM < 4000	2 failures/ Ign. cycle Continuous	DTC Type B
Knock Sensor Input	P0327	This DTC will detect an open or short in the knock sensor circuit  Range Check	ESC Noise accumulator less than diagnostic noise threshold calibration table which is a function of RPM	1400 < RPM < 4000	2 failures/ Ign. cycle Continuous	DTC Type B
Crankshaft Position Sensor Circuit Range/Performance	P0336	This DTC will detect an open or short in the crankshaft position sensor circuit  Range Check	Low res Period > 6.41 & sync pulse missing	None	10 fails to turn on light** Continuous	DTC Type A
Camshaft position Sensor Circuit Malfunction	P0340	This DTC will detect if a cam signal is not present  Circuit Continuity	Cam pulse not seen in 107 engine revolutions	MAP > 30 kPa	Once per ignition	DTC Type B
Camshaft Position Sensor Circuit Range/Performance	P0341	This DTC will determine if the Cam is synchronized correctly	If the cam signal falls in the wrong location 10 times	MAP > 30 kPa	Once per ignition	DTC Type B
Exhaust Gas Recirculation Flow Insufficient Detected	P0401	This diagnostic will determine if there is a reduction in EGR flow.  Functional Check	With EGR valve open, the peak + MAP delta is monitored over a time of 1.0 seconds. This value is compared and subtracted with a threshold from Engine Speed vs Baro. The result is statistically filtered (EWMA) and compared to a decision limit.	No EGR pintle, TP, CAM, CRK, V5B, MAP, VSS, IAT, ECT, P1635, misfire, PCM or IAC DTC's 1250 rpm < eng. speed < 2600 rpm Throttle is closed 35 mph < vehicle speed ECT > 70 deg C Baro < 9500 feet	Once per ignition cycle	DTC Type A

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Exhaust Gas Recirculation Circuit Range/Performance	P0404	This Diagnostic will determine whether the EGR valve is within a certain operating range.  Range Check	Error > 10%, if commanded EGR position is < 80% Error > 23.4%, if commanded EGR position is > 80% Error occurs for 10 seconds	Battery Voltage > 11 Volts	10 seconds Continuous every 100 mseconds	DTC Type B
Exhaust Gas Recirculation Sensor "A" Circuit Low	P0405	Circuit Check	5 second timer EGR Voltage < 7 counts 7 A/D counts	Battery Voltage > 11 Volts	5 seconds Continuous every 100 mseconds	DTC Type B
Secondary Air Injection (Calif SOHC and DOHC)	P0410	This DTC will determine proper airpump function by detecting O2 sensor indications of insufficient time at a lean condition or excessive time at a rich condition during airpump operation. Functional Check	During rich open loop operation, O2 Sensor > 600mV for more than 65% of the diagnostic run time and O2 sensor < 300 mV for less than 25% of the diagnostic run time	No MAP, IAT ECT, TPS, O2, Fuel Trim, EGR, Misfire, P01635 CODES Traction control not in operation 11 < Batt Volt < 18 4 deg C < coolant < 79 deg C Mat > 0 deg C RPM < 3200 14.5>air/fuel ratio > 12 Map > 20 KPa		DTC Type B
				Engine Air flow from a table ranging from 8 to 19 grams/sec O2 sensor must be ready for 2 seconds		
Catalyst System Efficiency Below Threshold	P0420	Oxygen Storage	Oxygen Storage Capacity (OSC) Time Difference > .5 sec OSC time difference = OSC worst Pass Threshold - OSC Compensation factor X (Post cat. O2 Response time - Precat O2 response time)  OSC Worst Pass Threshold = 1.4 sec	No O2s, ECT, Fuel Trim, EGR, CAM, CRK, CCP, V5B, VSS, misfire, MAP, IAT, TP, low and high idle, c/l coolant, ECM A/D DTC's system C/L Delta Map < 6 kpa Test attempt this ign < 10	1 Test attempted/valid idle period. Max of 4 tests/trip until Catalyst i/m flag set or low O2 storage detected. Max 1 test/trip with passing OSC Frequency - 25 ms	DTC Type A
				Engine Run Time > 570 sec engine Rpm > 1200 for 30 sec 122 < int < 134 650 < rpm < 900 375 < cat Temp < 750 vehicle < 1		
Vehicle Speed Sensor Malfunction	P0500	This DTC detects a loss of vehicle speed signal  Functional check	MAP > 23 Kpa and vehicle speed < 5 kph for 6.2 seconds	No P107, P0108 Not in park or neutral and rpm > 1500 RPM. In auto, this DTC will set when P0721 or P0722 is set.	2 failures/ignition cycle continuous	DTC Type A

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Idle Control system RPM lower than expected	P0506	This DTC will determine if a low idle is the result of a IAC valve or circuit at normal operating temperature.  Functional Check	Actual rpm < desired rpm + or - 100 rpm	122 < int < 134	Continuous 17 seconds	DTC Type B
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 at normal operating temperature.  Functional Check	Actual rpm < desired rpm + or - 200 rpm	650 < RPM < 875	Same as above	DTC Type B
Internal Control Module Memory Check Sum Error	P0601	This DTC will determine when the ECM RAM is faulty  Functional Check	Cal'd check sum does not equal stored check sum	none	1 failure/ Ign. cycle Continuous	DTC Type A
Control Module Programming Error	P0602	This DTC will check to see if the PCM is programmed properly  Functional Check	Write patterns are not equal	none	1 failure / Ign. cycle on key up	DTC Type A
PCM internal error/illegal rest	P0606	This DTC detects an illegal reset in the PCM	This DTC will set when any one of the following reset conditions occur: external reset, cpu timeout, double bus fault, loss of clock	None	2 failures/ Ign. cycle Continuous	DTC Type A
Transmission Control System Electrical	P0702	This DTC checks for Power to the Transmission Actuators  Circuit Continuity	The GFD feedbacks don't indicate voltage present at the Transmission Actuators	No 1660 DTC Engine Speed > 300 rpm 9.5 V < Ign voltage < 18V A/D converter has not failed Fuel pump relay activated	2 failures/ign. cycle Continuous	DTC Type A
Transmission Range Sensor Circuit Malfunction (PRNDL Input)	P0705	This DTC checks for illegal shift range positions  Functional Check	Any illegal shift positions for 500 msec	No P0708 DTC Ign. voltage > 9.5V	2 failures/ign. cycle Continuous	DTC Type A

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Transmission Range Sensor Circuit Range/Performance	P0706	This DTC checks that parity = valid parity  Range Check	Any parity discrepancies for 10 sec	No P0705, P0708 DTC Ign. Voltage > 9.5V	2 failures/ign. cycle Continuous	DTC Type A
Transmission Range Sensor Circuit High Input	P0708	This DTC checks for a disconnected switch  Range Check	All inputs from switch read high for 500 msec	Ign. voltage > 9.5V	2 failures/ign. cycle Continuous	DTC Type A
Transmission Fluid Temperature Sensor Circuit Malfunction	P0710	Functional Check	Transmission fluid temperature < ((ECT + IAT)/2) - 40 Deg C for >= 1,280 seconds	No ECT, IAT, P1623, P0712, P0713 or P1639 DTC's	2 failures/ign. cycle Continuous	DTC Type A
Transmission Fluid Temperature Sensor shifted high output	P0711	Range Check	Transmission Fluid Temperature > (IAT+ 9 deg C)	No ECT, IAT, P1623, P0710, P0712, P0713, P0714 or P1639 DTC's Vehicle has experienced a cold soak (i.e. coolant temp = IAT + or - 6 deg) ERT > 2 seconds IAT < 40 deg C	1 failures/ign. cycle Once per ignition cycle	DTC Type A
Transmission Fluid Temperature Sensor Circuit Low Input	P0712	Range Low Check	Transmission Fluid Temperature < .196 Volts for 30 seconds	No ECT, IAT, P1623, P1639 DTC's ECT < 100 deg C	2 failures/ign. cycle Continuous	DTC Type A
Transmission Fluid Temperature Sensor Circuit High Input	P0713	Range High Check	Transmission Fluid Temperature > 4.7 Volts for 30 seconds or more	No ECT, IAT, P1623, P1639 DTC's ECT > -17 deg C Engine Run Time > 240 seconds	2 failures/ign. cycle Continuous	DTC Type A
Transmission Fluid Temperature Sensor Circuit Intermittent	P0714	Circuit Continuity	Transmission Fluid Temperature changes > .196 Volts for 4 consecutive 1 second loop cycles	No P1639 DTC	2 failures/ign. cycle Continuous	DTC Type A
Turbine Speed Sensor Circuit Range/Performance	P0716	0 rpm to 7200 rpm This DTC detects an unrealistically large change in turbine speed  Range Check	Delta Turbine speed > (The sum of last 8 turbine speed time/pulse)/8 * 1.72 or < (the sum of last 8 turbine speed time/pulse)/8 * .52. for 731 msec	Turbine speed > 1400 RPM	2 failures/ign. cycle Continuous	DTC Type A
Turbine Speed Sensor Circuit No Signal	P0717	This DTC checks for Turbine speed equal to 0  Functional Check	Turbine speed = 0 and eng. speed > 3400 rpm for 2 secs or Output speed > 10 Km/hour for 2 seconds and turbine speed = 0	No P0722 or P0721 DTCs	2 failures/ign. cycle Continuous	DTC Type A
Output speed sensor circuit Range/Performance	P0721	0 rpm to 7200 rpm This DTC detects an unrealistically large change in output speed  Range Check	Output speed delta > (filtered output speed time/pulse) * 1.44 or < (filtered output speed time/pulse) * .56 for 731 msec NOTE: 8 pulses are received/360 degree revolution of turbine	Output speed > 24 KPH	2 failures/ign. cycle Continuous	DTC Type A

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Output Speed Sensor Circuit No Signal	P0722	This DTC will detect a loss of output speed  Functional Check	Turbine speed pull down when an upshift is commanded	No P0716, P0717 DTC's Turbine speed > 1400 rpm (turbine speed/ engine speed) < .78 Output speed < 5 kph TP delta < 11% for > 1.5 secs A forward drive gear is selected	2 failures/ign. cycle Continuous	DTC Type A
Incorrect Gear Ratio (no forward gears available)	P0730	This DTC looks for the occurrence when no gears are available from an initial start  Functional check	No turbine speed pulldown during commanded upshift	No P0716, P0717, P0727 DTC's	2 failures/ign. cycle Continuous	DTC Type A
Gear 1 Incorrect Ratio	P0731	This DTC looks for the commanded gear ratio  Functional Check	Commanded gear ratio does not equal actual gear ratio for +/- .0152% for time period based on magnitude of slip (larger the magnitude of slip, the faster the diagnostic will trigger)	Eng. torque > a k value which is a function of gear. Output speed and turbine speed are not substituted A forward drive gear is selected	2 failures/ign. cycle Continuous	DTC Type A
Gear 2 Incorrect Ratio	P0732	same as above	same as above	same as above	same as above	DTC Type A
Gear 3 Incorrect Ratio	P0733	same as above	same as above	same as above	same as above	DTC Type A
Gear 4 Incorrect Ratio	P0734	same as above	same as above	same as above	same as above	DTC Type A
Torque Converter Clutch System Performance or Stuck Off	P0741	This DTC detects the inability to lock up the TCC  Rationality Check	Delta speed/ (engine speed - Turbine shaft speed) > 280 RPM	Transaxle Temperature > 20 Deg C Coolant Temperature > 50 Deg C	2 failures/ign. cycle Continuous	DTC Type A
Torque Converter Clutch System Stuck On	P0742	This DTC detects when the TCC is unable to be disengaged  Rationality Check	Delta speed / (engine speed - turbine shaft speed) < 84 rpm	engine rpm < 3200 input shaft speed is between 224 and 2800 rpm TCC is commanded off > .25 seconds Eng torque > some value obtained from a lookup table based on turbine speed	2 failures/ign. cycle Continuous	DTC Type A
1-2 Shift Malfunction (2nd gear stuck on)	P0781	This DTC looks for gears higher than the commanded ratio Functional/Range Check	1st gear commanded and (turbine/output speed) = 2nd, 3rd or 4th ratio +/- 4% for 3 secs	No P0716, P0717, P0717, P0727, P0705, P0706, P0708 DTC's Eng. Torque > 100Nm Output speed and turbine speed are not substituted	2 failures/ign. cycle Continuous	DTC Type A
2-3 Shift Malfunction (3rd gear stuck on)	P0782	same as above	same as above	same as above	2 failures/ign. cycle 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 ILLUMINATION TYPE
3-4 Shift Malfunction (4th gear stuck on)	P0783	Same as above	Same as above	Same as above	2 failures/ign. cycle Continuous	DTC Type A
Oxygen Sensor System - Too Few O2S R/L and L/R Switches	P1133	0 V to 1.0 V This DTC determines if the O2 sensor is functioning properly by checking its switches  Rationality Check	O2 sensor switches < 10 counts	No MAP, IAT, ECT, TP, Fuel trim, Misfire, Cam, EGR, CCP, Voltage and crank DTC's Closed loop O2 Voltage low threshold .300 V High threshold .600 V Flow > 7 g/sec 1500 < RPM < 3000	100 seconds after closed loop enable, Once per ignition	DTC Type B
O2 Sensor Circuit Transfer Switch Time Ratio Malfunction	P1134	0 V to 1.0 V This DTC will determine if the O2 sensor is functioning properly by checking its ratio  Rationality Check	Ratio of average response time ratio < .6 or Ratio of average response time ratio > 2.8	No MAP, IAT, ECT, TP, Fuel trim, Misfire, Cam, EGR, CCP, Voltage and crank DTC's & closed loop & O2 Voltage low threshold .300 V and high threshold .600 V & flow > 7 g/sec & 1500 < RPM < 3000	100 seconds after closed loop enable, Once per ignition	DTC Type B
Crank Position Error not Learned	P1336	This DTC determines whether the crankshaft position sensor learned allowing it to be used in the misfire diagnostic  Range Check	Position error not learned in the PCM processor	Vehicle speed > 15 mph	1 failure/ignition cycle Continuous	DTC Type A
Exhaust Gas Recirculation System - Valve B	P01404	This DTC detects a malfunction in the operation of the EGR valve  Functional Check	Close Value Position> 4% if RPM < 5000 Closed Value Position> 7.8 % if RPM > 5000 for 20 seconds when desired EGR position equals 0 & valve must be cycled > 61 % four times	Battery Voltage > 11 volts	20 seconds Continuous every 100 msec	DTC Type A
5 Volt Reference Low/High	P1635	This DTC verifies the 5 volt reference line  Functional Check	3.7< AD Volt < 5.0 or Volt state invalid	None	Continuous	DTC Type A

\*\* 2 samples per revolution, 600 rpm = 20 samples/sec, 3000 rpm = 100 samples/sec, 6000 rpm = 200 samples/sec

**2000 1.9L (LL0 DOHC and L24 SOHC) Z-car (Saturn S-series cars) ENGINE and TRANSMISSION 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 TYPE
Evaporative Emission Control System Malfunction (Large Leak)	P0440	This diagnostic will detect a missing gas cap or a "gross" leak in the system  Functional Check	Tank Vacuum < 8" H2O for 3.2 seconds	Engine running No IAT, CT, Tank Pressure, MAP, VSS, PCM DTC's 11v <= Batt Volt <= 18 v Baro > 80.8 KPa 15% < Fuel Level < 85% 41F < IAT < 90F IAT - Coolant <= 10C Coolant - IAT <= 10C ERT < or = 600 sec Purge mass accumulated > or = 6000 grams	Once/cold start 120 sec warm test 240 sec cold test	DTC Type A (Behaves as a B code)
Evaporative Emission Control System Leak Detected (small leak)	P0442	This Diagnostic will detect a small leak in the evap system  Functional Check	Tank Vacuum Decay Slope is compared and subtracted from a threshold value from a lookup table based on fill level of fuel tank. The result is statistically filtered (EWMA) and compared to a decision limit	Engine Running No IAT, CT, Tank Pressure, VSS, MAP, PCM DTC's 11 v <= Batt Volt<= 18 v Baro > 80.8 KPa 15% ≤ Fuel Lvl ≤ 50% (.40" Ik) 50% < Fuel Lvl < 85% (.020" Ik) 41 F < IAT < 90F IAT - Coolant <= 10C Coolant - IAT <= 10C Vacuum decay < 8.0" H2O	Once/ cold start 240 seconds	DTC Type A
Evaporative Emission Control System Vent Control Malfunction	P0446	This diagnostic will detect a blockage in the evap system which would keep the system from venting  Functional Check	Tank Vacuum > 12 "H2O for 1.6 seconds Purge flow accumulated > or = 350 grams	Engine Running No IAT, CT, Tank Pressure Sensor, VSS, MAP, PCM Dtc's 11v <= Batt Volt <= 18 v Baro > 80.8 KPa 15% < Fuel Level < 85% tank vacuum > 9" H2O 41 deg F < IAT < 90F IAT - Coolant <= 10C Coolant - IAT <= 10C ERT < or = 144 seconds	Once/ cold start 96 seconds	DTC Type A (Behaves as a B code)
Evaporative Emission Control System PressureSensor Low Input	P0452	Rationality Test	Tank Pressure < 7.5 " H2O pressure	Engine Running	Once/ignition cycle 100 msec	DTC Type A
Evaporative Emission Control System PressureSensor High Input	P0453	Rationality Test	Tank Pressure > 17.2"H2O vaccum	Engine Running	Once/ignition cycle 100 msec	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 TYPE
Evaporative Emission Control System Continuous Open Purge Flow	P1441	This diagnostic will detect a purge valve stuck open.  Functional Check	Tank Vacuum > 6" H2O for 4 seconds	Engine Running No IAT, CT, VSS, MAP, tank pressure, PCM DTC's 11 v <= Batt Volt <= 18 v Baro > 80.8 KPa 15% < Fuel Level < 85% 41deg F < IAT < 90F IAT - Coolant <= 10C Coolant - IAT <= 10C Tank Vacuum < 2.5" H2O purge mass accumulated > 4000 grams	96 seconds Once/ cold start	DTC Type A (Behaves as a B code)
Fuel Level Sender Stuck	P0461	This DTC will detect if the fuel sender is stuck in a range	Delta Fuel Volume change less than 7 A/D counts over 3 accumulated miles	9 Volts < Battery Voltage	Runs continuously	DTC Type D History Code, No MIL Light
Fuel Level Sender Stuck Low	P0462	This DTC will detect a fuel sender stuck out of range low	Fuel level A/D counts < 10 A/D counts for 8 seconds	9 Volts < Battery Voltage	Runs continuously	DTC Type D History Code, No MIL Light
Fuel Level Sender Stuck High	P0463	This DTC will detect a fuel sender stuck out of range high	Fuel level A/D counts > 248 A/D counts for 8 seconds	9 Volts < Battery Voltage	Runs continuously	DTC Type D History Code, No MIL Light

\*\* 2 samples per revolution, 600 rpm = 20 samples/sec, 3000 rpm = 100 samples/sec, 6000 rpm = 200 samples/sec