SYTY Trouble Code:

ALDL INFORMATION

A -- Ground	G -- Fuel Pump
B -- Diagnostic Terminal	H -- Brake Sense Speed Input
F -- TCC	M -- Serial Data (special tool needed - Do Not Use)

For ECM Trouble Codes, See Below

DTC CODES: 13 I 14 I 15 I 21 I 22 I 23 I 24 I 25 I 31 I 32 I 34 I 35 I 42 I 43 I 44 I 45 I 51

CODE 13 OXYGEN (02) SENSOR CIRCUIT (OPEN CIRCUIT) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The ECM applies a bias voltage of approximately 450 millivolts (350-550 mV is normal bias voltage) between terminals “GE14” and “GE15.” The oxygen (02) sensor varies the voltage within a range of about 1 volt if the exhaust is rich, down through about .10 volt if exhaust is lean. Code 13 is set when the voltage does not vary on CKT 412 within a predetermined amount of time. The sensor is like an open circuit and produces no voltage when it is below 360°C (680°F). An open sensor circuit causes “Open Loop” operation.

CODE 14 COOLANT TEMPERATURE SENSOR (CTS) CIRCUIT (HIGH TEMPERATURE INDICATED) 4.3L TURBO (VIN Z) SYCLONE (PORT)

Circuit Description: The Coolant Temperature Sensor (CTS) uses a thermistor to control the signal voltage to the ECM. The ECM applies a voltage on CKT 410 to the sensor. When the engine is cold, the sensor (thermistor) resistance is high, therefore, the ECM will see high signal voltage. As the engine warms, the sensor resistance becomes less and the voltage drops. At normal engine operating temperature, the voltage will measure about 1.5 to 2.0 volts at the ECM terminal “GE16.” Coolant temperature is one of the inputs used to control: Fuel Delivery Torque Converter Clutch (TCC) CAC (Charge Air Cooler) Pump Idle Air Control (IAC)

CODE 15 COOLANT TEMPERATURE SENSOR (CTS) CIRCUIT (LOW TEMPERATURE INDICATED) 4.3L TURBO (VIN Z) SYCLONE (PORT)

Circuit Description: The Coolant Temperature Sensor (CTS) uses a thermistor to control the signal voltage to the ECM. The ECM applies a voltage on CKT 410 to the sensor. When the engine is cold, the sensor (thermistor) resistance is high, therefore, the ECM will see high signal voltage. As the engine warms, the sensor resistance becomes less and the voltage drops. At normal engine operating temperature, the voltage will measure about 1.5 to 2.0 volts at the ECM terminal “GE16.” Coolant temperature is one of the inputs used to control: Fuel Delivery Torque Converter Clutch (TCC) CAC (Charge Air Cooler) Pump Idle Air Control (IAC)

CODE 21 THROTTLE POSITION SENSOR (TPS) CIRCUIT

(SIGNAL VOLTAGE HIGH) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The Throttle Position Sensor (TPS) provides a voltage signal that changes relative to the throttle valve. Signal voltage will vary from less than 1.0 volt at idle to about 4.6 volts at wide open throttle (WOT). The TPS signal is one of the most important inputs used by the ECM for fuel control and for many of the ECM controlled outputs.

CODE 22 THROTTLE POSITION SENSOR (TPS) CIRCUIT (SIGNAL VOLTAGE LOW) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The Throttle Position Sensor (TPS) provides a voltage signal that changes relative to the throttle valve. Signal voltage will vary from less than 1.0 volt at idle to about 4.6 volts at wide open throttle (WOT). The TPS signal is one of the most important inputs used by the ECM for fuel control and for many of the ECM controlled outputs.

CODE 23 MANIFOLD AIR TEMPERATURE (MAT) SENSOR CIRCUIT (LOW TEMPERATURE INDICATED) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The Manifold Air Temperature (MAT) sensor uses a thermistor to control the signal voltage to the ECM. The ECM applies a voltage (about 5 volts) on CKT 472 to the sensor. When the air is cold the sensor (thermistor) resistance is high, therefore the ECM will see a high signal voltage. If the air is warm, the sensor resistance is low, therefore, the ECM will detect a low voltage.

CODE 24 VEHICLE SPEED SENSOR (VSS) CIRCUIT 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The ECM applies and monitors 12 volts on CKT 437. CKT 437 connects to the DRAC, which alternately grounds CKT 437, when receiving voltage pulses from Vehicle Speed Sensor (VSS) when drive wheels are turning. This pulsing action takes place about 2000 times per mile and the ECM will calculate vehicle speed based on the time between “pulses.” A “Scan” tool reading should closely match the speedometer reading with drive wheels turning.

CODE 25 MANIFOLD AIR TEMPERATURE (MAT) SENSOR CIRCUIT (HIGH TEMPERATURE INDICATED) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The Manifold Air Temperature (MAT) sensor uses a thermistor to control the signal voltage to the ECM. The ECM applies a voltage (about 5 volts) on CKT 472 to the sensor. When the air is cold the sensor (thermistor) resistance is high, therefore the ECM will see a high signal voltage. If the air is warm, the sensor resistance is low, therefore, the ECM will detect a low voltage.

CODE 31 (code 1 of 2) TURBO WASTEGATE OVERBOOST 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: On turbo charged engines, the exhaust gases pass from the exhaust manifold through the turbocharger, turning the turbine blades. The compressor side of the turbocharger also turns, pulling air through the air filter and pushing the air into the intake manifold, pressurizing the intake manifold. The wastegate is normally closed, but opens to bypass exhaust gas to prevent an overboost condition. The wastegate will open when pressure is a lied to the actuator, and is controlled by a wastegate control solenoid valve pulsed “ON” and “OFF” by the ECM. Under normal driving conditions, the control solenoid is energized all the time which closes “OFF” the manifold pressure to the wastegate actuator. This allows for a rapid increase in boost pressure. A boost increase will be detected by the MAP sensor, and the ECM will pulse the wastegate control valve. Manifold pressure will then be allowed to pass to the wastegate actuator, and the actuator will open the wastegate. This will prevent an overboost condition on heavy acceleration. As boost pressure decreases, the ECM closes the control valve and the wastegate actuator pressure bleeds “OFF” through the vent in the control valve. If an overboost does exist as indicated by the MAP sensor, the ECM will reduce fuel delivery to prevent damage to the engine.

CODE 31 (code 2 of 2) TURBO WASTEGATE OVERBOOST 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: If the level of coolant in the charge air cooler (CAC) is low, the turbo boost cut-out relay will shut off all power to the wastegate solenoid. This will open the wastegate to bypass exhaust gas and lower the boost. The “LOW TURBO COOLANT” lamp will remain “ON” until coolant is added.

CODE 32 EXHAUST GAS RECIRCULATION (EGR) CIRCUIT 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The ECM operates a vacuum solenoid to control the Exhaust Gas Recirculation (EGR) valve. This solenoid is normally closed. By providing a ground path, the ECM energizes the solenoid, allowing vacuum to reach the EGR valve. Under certain conditions, when the EGR valve is normally open, the ECM tests the EGR function by de-energizing the EGR control solenoid, blocking vacuum to the EGR valve diaphragm. Without EGR, the system will sense a lean condition and will increase the fuel integrator rate in response. The ECM monitors the amount of fuel delivery increase. If the increase is below a specified value, the ECM will interpret that the test was failed. The failure indicates that closing the EGR valve when it would normally be open does not make a significant change, indicating a problem in the EGR system.

CODE 33 MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE HIGH - LOW VACUUM) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from less than

1.0 volt at closed throttle idle, to 4-4.5 volts at wide open throttle (low vacuum or boost). If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

CODE 34 MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT (SIGNAL VOLTAGE LOW - HIGH VACUUM) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The Manifold Absolute Pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from less than 1.0 volt at closed throttle idle, to 4-4.5 volts at wide open throttle. If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the Throttle Position Sensor (TPS) to control fuel delivery.

CODE 35 IDLE SPEED ERROR 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The ECM controls engine idle speed with the IAC valve. To increase idle speed, the ECM retracts the IAC valve pintle away from its seat, allowing more air to bypass the throttle bore. To decrease idle speed, it extends the IAC valve pintle towards its seat, reducing bypass air flow. A “Scan” tool will read the ECM commands to the IAC valve in counts. Higher counts indicate more air bypass (higher idle). The lower the counts indicate less air is allowed to bypass (lower idle). Code 35 will set when the closed throttle engine speed is 225 rpm above or below the desired (commanded) idle speed for 20 seconds. Review the general description of the IAC operation in section “C2.”

CODE 42 ELECTRONIC SPARK TIMING (EST) CIRCUIT 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The ignition module sends a reference signal (CKT 430) to the ECM when the engine is cranking. While the engine speed is under 400 rpm, the ignition module will control ignition timing. When the engine speed exceeds 400 rpm, the ECM applies 5 volts to the bypass line (CKT 424) to switch the timing to ECM control (EST CKT 423). When the system is running “ON” the ignition module, that is, no voltage on the bypass line, the ignition module grounds the EST signal. The ECM expects to see no voltage on the EST line during this condition. If it sees a voltage, it sets Code 42 and will not go into the EST mode. When the rpm for EST is reached (about 400 rpm), voltage will be applied to the bypass line, the EST should no longer be grounded in the ignition module, so the EST voltage should be varying. If the bypass line is open or grounded, the ignition module will not switch to EST mode, so the EST voltage will be low and Code 42 will be set. If the EST line is grounded, the ignition module will switch to EST but, because the line is grounded, there will be no EST signal. A Code 42 will be set.

CODE 43 ELECTRONIC SPARK CONTROL (ESC) CIRCUIT 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The knock sensor is used to detect engine detonation and the ECM will retard the electronic spark timing based on the signal being received. The circuitry within the knock sensor causes the ECM 5 volts to be pulled down so that under a no knock condition, CKT 496 would

measure about 2.5 volts. The knock sensor produces an A/C signal which rides on the 2.5 volts, DC voltage. The amplitude and signal frequency is dependent upon the knock level. If CKT 496 becomes open or shorted to ground the voltage will either go above 3.5 volts or below 1.5 volts. If either of these conditions are met for about 5 seconds, a Code 43 will be stored.

CODE 44 OXYGEN (0,) SENSOR CIRCUIT (LEAN EXHAUST INDICATED) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The ECM applies a bias voltage of approximately 450 millivolts (350-550 mV is normal bias voltage) between terminals “GE14” and “GE15” (if measured with a 10 megohm digital voltmeter, this may read as low as .32 volt). The oxygen (0,) sensor varies the voltage within a range of about 1 volt, if the exhaust is rich, down through about .10 volt, if exhaust is lean. A lean exhaust condition will cause the oxygen sensor to output a low voltage, which will pull the bias voltage from CKT 412 low. The ECM is programmed to interpret any voltage less than 500 mV as a “lean exhaust condition.” The sensor is like an open circuit and produces no voltage when it is below about 316°C (600°F). An open sensor circuit causes “Open Loop” operation. The heating element in the 02 sensor causes the sensor to heat up quickly, allowing for quicker closed loop operation.

CODE 45 OXYGEN (0,) SENSOR CIRCUIT (RICH EXHAUST INDICATED) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: The ECM applies a bias voltage of approximately 450 millivolts (350-550 mV is normal bias voltage) between terminals “GE14” and “GE15” (if measured with a 10 megohm digital voltmeter, this may read as low as .32 volt). The 02 sensor varies the voltage within a range of about 1 volt if the exhaust is rich, down through about .10 volt if exhaust is lean. The sensor is like an open circuit and produces no voltage when it is below about 316°C (600°F). An open sensor circuit causes “Open Loop” operation. The heating element in the 02 sensor causes the sensor to heat up quickly, allowing for quicker closed-loop operation.

CODE 51 PROM ERROR (FAULTY OR INCORRECT PROM) 4.3L TURBO (VIN Z) SYCLONE AND TYPHOON (PORT)

Circuit Description: Check that all pins are fully inserted in the socket and that PROM is properly seated. If OK, replace PROM, clear memory, and recheck. If Code 51 reappears, REPLACE ECM.