TELORVEK TPI
WIRING INSTRUCTIONS FOR
PI-97 (96-Up S/T TRUCK)
4.3 Central Port Fuel Injection System

Thank you for purchasing the absolute finest of wiring kits for the General Motors fuel injection. We have taken considerable time to work out the circuitry so that you, the customer will understand at least some of what this is all about. We ask that you follow our instructions closely. We recommend an high pressure in-tank electric fuel pump. It must be capable of producing 60 PSI. Custom installations are available from Tanks, Inc. (phone # 320-558-6882) and Rock Valley (phone #800-344-1934).

Computers in automobiles as well as the computers we use in our home or office are getting more and more sophisticated. The auto makers have the capability now to incorporate much more computing power into a small package. In complying with federal law auto makers have toughened the emission outputs of their engines, which in the future will be even tougher.

In the older TPI engines the computer controlled, but did not look for or set a trouble code if the emissions control devices malfunctioned or were removed. The newer engine computers (like the one you are installing) not only look (sense) for but will set a trouble code and put the PCM into a back-up mode if the emission control devices malfunction or are not installed.

In 1996 "ALL" automobile manufactures implemented the OBD II diagnostic system mandated by the Federal Government. This system monitors all computer controlled functions "closely" and will set trouble code(s) if it senses a problem or a device is removed from the system. This system also monitors exhaust emissions as well. In the past car makers have used one or two O2 sensors in the exhaust manifold(s) to monitor fuel calibration. In 1996 they have added two more, one in front and rear of the catalytic converter. These are used to monitor the performance of the converter and set a trouble code if a defective converter is detected.

Note: If your engine is a model year 1998 or newer and you have the computer out of that year vehicle, you will need to swap to the 1996 or 1997 model year computer. This is due to anti-theft circuitry built into the 1998 and newer computer. The most common and affordable computer should be GM part #16244210.

NOTE: Now that the automotive manufacturers have made tremendous improvements in the emission outputs of their engines, they have now turned there attention to capturing and utilizing all fuel vapors generated by gasoline moving around the fuel tank as the vehicle is being driven down the road. This is accomplished by the canister purge tank, canister vent valve and fuel pressure sensor. This system requires that the fuel tank be sealed when the gas cap is on and the use of a non-vented gas cap. The pressure/vacuum in the tank is monitored by a pressure sensor installed in the fuel tank. The PCM controls excess pressure/vacuum through the canister vent solenoid and the vapors are utilized through the canister purge tank. Failure to install these devices will cause trouble codes to set.

IMPORTANT: Should you eliminate a sensor, your injection system will not work at its peak and will probably be in some variation of back up mode. There are many factors that will help you get a trouble free start up that you must consider.

DIAGNOSTIC PROCEDURES

It would be impossible to cover all the procedures that GM requires to diagnose all possible problems a fuel injection system could have in a set of installation instructions. If this is the first time you worked with a fuel injection system, we highly recommend purchasing a shop manual from the year, make and model the engine and computer came from. The book will not only help with diagnosing problems but will also teach you about the engine you just installed.

You will need all stock parts and sensors. The back page of the instructions is a list of optional accessories we offer and some of the General Motors part numbers you may need.

WARNING!

After the kit installation is complete and it is necessary to diagnose a starting or drive ability problem, follow the procedures recommended in the shop manual. All voltage tests must be preformed using a HIGH impedance, digital voltmeter. DO NOT use a test light on this system! DAMAGE WILL BE DONE to the engine computer if a test light is used on this system.

STARTING INSTALLATION

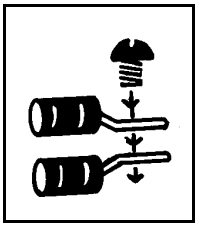
Since there are so many individual circuits to complete, we recommend that you connect them in the order that we prescribe. Disconnect the battery before starting and do not reconnect until instructed.

TELORVEK PANEL LOCATION: (BEFORE DRILLING ANY HOLES) The location of the TELORVEK panel and powertrain control computer (PCM) can be any where you choose **INSIDE** the vehicle. They should be mounted in an accessible location, under the dash, under the seat or in the trunk are good. A lot of wires will be connected to the panel, so the more accessible the panel, the easier the wire connections will go. After the Telorvek panel installation is complete, only the fuses need to be readily available.

If mounting the panel under the dash or seat, leave enough extra wire so it can be pulled down from under the dash or from under the seat after all the connections are made. The reason for this, the panel can be used as a BREAKOUT BOX for diagnosing (trouble shooting) problems in the future. Some diagnostic procedures require taking volt readings on wires to find a problem. It is a lot easier to sit in a seat then bending over a fender.

IMPORTANT: Check to be sure you have all the bags required for the installation. Each bag contains at least one sensor connection and approximately 20 feet of wire to reach the TELORVEK panel. We suggest opening bag #40 (mass air flow sensor) first. Plug the connector into the sensor and run the wires back to the TELORVEK panel. If they reach, then all the other sensor connections will also, because the MAF sensor is mounted on the front of the engine.

We have packaged three sizes of terminal forks. The red terminals are for the 18 gauge wires and the blue are for 16-14 gauge wires and yellow are for 10-12 gauge wires. Use the red forks when installing terminals on the wires unless other wise directed.



Always put the first terminal under a screw with the fat wire side down as in the drawing. Install any second terminals just the opposite as this will allow the screw to hold squarely and tight. The insulation from one terminal should not interfere with the one next to it.

Use a crimping tool that is designed for insulated terminals. If the tool punctures the insulation (plastic) or damages it in any way, you **ARE** using the wrong tool. The proper tool will only "flatten" the plastic and if the handles are squeezed completely, the proper crimp has been made. Get in the habit of test pulling at each terminal as you crimp it to the wire.

Any sensor that is difficult to hook-up should not be eliminated. All sensors are important if you desire your conversion to run as good as a factory engine. Eliminating any part of this kit WILL cause some portion of the EFI to work improperly.

Ron Francis Wiring has made every effort to assure a quality product and can assure you that this system works well in your application. Once you have confirmed proper installation, any trouble you experience will be a defective part or seat of the pants repair. Your unit can be tested at any General Motors Dealership with no difficulty.

BAG #40 MASS AIR FLOW SENSOR (MAF): The MAF sensor is located in the air duct running between the air cleaner and throttle body. Plug in the connector and run the wires to the Telorvek panel. Connect the yellow wire MAF A->1 to #1, pink wire MAF C->19 to #19 and the black wire MAF B->28 to #28.

BAG #41 INTAKE AIR TEMPERATURE SENSOR (IAT): The IAT sensor is located in the air duct running between the air cleaner and throttle body. Plug in the connector and run the wires to the panel. Connect the tan wire IAT A->2 to #2 and the black wire IAT B->3 to #3.

BAG #42 ENGINE COOLANT TEMPERATURE SENSOR (ECT): The sensor is located on the thermostat housing. Plug the connector into the sensor and run the wires back to the panel. Connect the black wire ECT A->7 to #7 and the yellow wire ECT B->6 to #6.

BAG #43 THROTTLE POSITION SENSOR (TPS): The TPS sensor is located on the left front of the upper intake manifold on the side of the throttle body. Plug the connector into the sensor and run the wires back to the panel. Connect the gray wire TPS A->8 to #8, black wire TPS B->7 to #7 and the dark blue wire TPS C->9 to #9.

BAG #44 IDLE AIR CONTROL (IAC): The IAC is located on the upper intake manifold just below the throttle position sensor. Plug the four gang connector into the IAC and run the wires back to the panel. Connect the wires to the panel as follows, dark blue IAC D->17 to #17, light blue IAC C->16 to #16, dark green IAC B->15 to #15 and the light green IAC A->14 to #14.

BAG #45 MAP SENSOR: The MAP (Manifold Air Pressure) sensor is bolted directly onto the upper intake manifold assembly with the nipple facing down through the manifold. **IMPORTANT: A seal is needed between the MAP sensor and the manifold to avoid any vacuum leaks. Check this area after the engine is running for any vacuum leaks.** Plug the connector into the sensor and run the wires back to the panel. Connect the black wire MAP A->3 to #3, light green wire MAP B->10 to #10 and the gray wire MAP C->11 to #11.

BAG #46 EGR VALVE: The EGR solenoid is located on the front of the engine, near the throttle body. Plug in the connector and run the wires back to the panel. Connect the dark green (EGR A->68) to #68, black (EGR B->5) to #5, brown (EGR C->69) to #69, gray (EGR D->12) to #12 and the pink (EGR E->19) to #19.

BAG #47 CRANK SHAFT POSITION SENSOR: The crank position sensor is located on the right side of the engine by the crank balancer. Plug in the connector and run the wires to the panel. Connect the pink wire CRANK POS A->20 to #20, purple wire CRANK POS B->33 to #33 and the yellow wire CRANK POS C->34 to #34.

BAG #48 CAM SHAFT POSITION SENSOR (DISTRIBUTOR): Plug the connector into the sensor located in the distributor and run the wires to the panel. Connect the pink wire CAM POS C->20 to #20, black CAM POS A->31 to #31 and white wire CAM POS B->32 to #32.

BAG #49 FUEL TANK PRESSURE SENSOR, FUEL LEVEL SENSOR, FUEL PUMP: FUEL TANK PRESSURE: This sensor monitors fuel tank pressure for emission control purposes. Failure to install this sensor in the fuel tank will cause a trouble code. The fuel system must be sealed and able to contain pressure. The pressure is monitored and released through the canister purge solenoid and the canister vent valve that will be wired in later.

FUEL LEVEL SENSOR: This sensor is an important input to the control module for the control of the emission system. The fuel level is needed for the control module to know the amount of fuel in the tank. The fuel level affects the rate of change in the air pressure in the tank. (NOTE: The sending unit in the tank must be equivalent to the unit used in the 1997 GM S series vehicle (zero to ninety ohm unit). VDO produces this type sending unit but normally must be special ordered. If the control module does not receive this signal a trouble code will set.

FUEL PUMP: The fuel pump must be capable of producing 60 PSI. The fuel tank should be designed with baffles to limit fuel from moving away from the pick-up line during turns.

After plugging into the tank pressure sensor run the wires to the panel. Connect the black wire TANK VAP A->4 to #4, dark green TANK VAP B->13 to #13 and the gray TANK VAP C->11 to #11.

Now connect the fuel level light green 75->SENDER to #75 and the black 5->SENDER GRND to #5 and run both wires to the tank. Connect the light green wire to the center post (stud) of the sending unit and the black wire to on of the screws that hold the sending unit in the tank.

1996 ENGINE ONLY require installing a jumper wire between terminals #74 & #75 on the Telorvek panel. Failure to install this wire will prevent the fuel level signal to be sent to the dash mounted fuel gauge.

The tan 70->F PUMP connects to #70 and the black wire 26->F PUMP GRND connects to #26 and run to the fuel pump. Connect the tan to the positive terminal on the pump and the black to the negative terminal on the pump.

NOTE: YOU MUST INSTALL A RELAY (Airtex part #1R1061, Standard Motor Products part #RY116 or GM part #14100455.) IN THE HOUSING ON TOP OF THE PANEL OR THE FUEL PUMP WILL NOT OPERATE.

BAG #50 NOT USED

BAG #51 FUEL INJECTOR CONNECTION: This connection is located on the intake manifold rear of the throttle body. After plugging in the connector run the wires back to the panel. Connect the white wire PIN A->40 to #40, pink PIN B->18 to #18, pink PIN E->18 to #18, purple PIN C->39 to #39, black PIN F->38 to #38, light green PIN G->41 to #41, light blue PIN K->42 to #42 and the yellow PIN M->43 to #43.

BAG #52 ELECTRONIC SPARK CONTROL \ IGNITION COIL: The connector on the wires will plug on to the spark control located on top of the intake manifold. Run the wires back to the panel and connect the orange wire ESC A->21 to #21, red wire ESC B->37 to #37, black wire ESC C->28 to #28 and the white wire ESC D->36 to #36.

IGNITION COIL: Plug in the connector into the coil. Using the blue terminal run the orange wire IGN COIL A->21) to #21 on the Telorvek panel. Connect the white wire IGN COIL C->36 to #36 and the purple wire TACH runs direct to the tach. If a tach is not used in your vehicle, cut this wire off flush with the plug.

BAG #53. OXYGEN SENSOR (O2) (FOUR REQUIRED): With the inception of OBD II in 1996 mandated by the federal government, all vehicles are required to monitor the emission output of the catalytic converter. A signal converter is required for this system. Mount the sensors in the following locations:

LEFT FRONT: In the left exhaust manifold or header collector.
RIGHT FRONT: In the right exhaust manifold or header collector.
PRE O2 SENSOR: In the exhaust pipe before the converter.
POST O2 SENSOR: In the exhaust pipe after the converter.

Wiring Connections

LEFT FRONT O2: The four gang connector with the pink, black, tan and purple wires running from it plugs into the left front oxygen sensor.

RIGHT FRONT O2: The four gang connector with the pink, black, brown and white wires running from it plugs into the right front oxygen sensor.

PRE O2 SENSOR: The four gang connector with the pink, black, light blue and dark blue wires running from it plugs into the oxygen sensor located before the catalytic converter.

POST O2 SENSOR: The four gang connector with the pink, black, light green and dark green wires running from it plugs into the oxygen sensor located after the catalytic converter.

After plugging into all the sensors run the wires back to the panel. Using the blue terminals, connect the pink wires LF FRT O2 D->53 & RT FRT O2 D->53 to #53. Connect the pink wires POST O2 D->52 & PRE O2 D-52 to #52. Connect the black wires LF FRT O2 C->30 & RT FRT O2 C->30 to #30. Connect the black wires POST O2 C->29 & PRE O2 C->29 to #29. Using the red terminals, connect the tan LF FRT O2 A->45 to #45, purple LF FRT O2 B->44 to #44, brown RT FRT O2 A->47 to #47, white RT FRT O2 B->46 to #46, light green POST O2 A->48 to #48, dark green POST O2 B->49 to #49, light blue PRE O2 A->50 to #50 and the dark blue PRE O2 B->51 to #51.

BAG #54. KNOCK SENSOR WIRING: This sensor will inform the computer of detonation and readjust the timing accordingly. The knock sensor is located on the rear of the engine. Connect the dark blue KNOCK SEN->54 to #54.

BAG #55. OIL SWITCH WIRING: The oil switch is a back-up for the fuel pump relay. If the relay ever becomes defective, cranking the engine and build up oil pressure will allow the fuel pump to operate. The oil switch is located on the rear of the engine next to the distributor. Make the connection and run the wires back to the panel. Using the blue terminals, connect the red wire OIL SW C->71 to #71 and the tan wire OIL SW D->70 to #70.

BAG #56. CANISTER PURGE SOLENOID (CPS) / CANISTER VENT SOLENOID (CVS): The canister purge solenoid is located on the right side of the intake manifold. This solenoid allows the fuel vapor to flow from the canister to the engine. The canister vent solenoid is located in a stock application on the cross member on top of the canister tank. This vale replaces the air vent used in the past on the canister itself.

NOTE: BOTH SOLENOIDS REQUIRE THE SAME TYPE CONNECTOR. FOLLOW THE PRINTING ON THE WIRES TO ENSURE THE CORRECT CONNECTIONS. After plugging in both connectors run the wires back to the panel. Connect the pink wires CPS B->22 & CVS A->22 to #22. Connect the dark green CPS A->66 to #66 and the white CVS B->67 to #67.

4L60-E Transmission Wiring

The 4L60-E transmission is a fully automatic rear wheel drive electronically controlled transmission. Shift points are controlled by the PCM via two shift solenoids. Shift schedules and torque converter lock-up are also controlled by the PCM and are influenced by transmission temperature.

This wiring is not supplied if you have specified a manual or non-electronic transmission.

BAG #57 AUTOMATIC 4L60-E TRANSMISSION: Un-coil the large harness and plug the connector into the transmission. Run the wires to the TELORVEK panel.

☞ NOTE ☜

Due to the amount of wires necessary to operate the 4L60-E transmission and to follow GM color codes, some wire colors had to be duplicated. READ the printing on the wires carefully before connecting them to the TELORVEK panel.

Connect the wires to the TELORVEK panel as follows: light green TRANS A->97 to #97, gray TRANS B->98 to #98, red TRANS C->106 to #106, light blue TRANS D->107 to #107, pink TRANS E->96 to #96, yellow TRANS L->105 to #105, black TRANS M->4 to #4, light green TRANS N->102 to #102, dark green TRANS P->104 to #104, dark blue TRANS R->103 to #103, white TRANS S->99 to #99, tan TRANS T->101 to #101 and the brown TRANS U->100 to #100.

More Transmission Information

The PCM tells the 4L60-E transmission when to shift from gear to gear. The ECM is also looking for certain signals produced by the transmission. If these signals are not received by the ECM, codes WILL SET. We tested the transmission on our dyno, simulating the transmission was not there. We found no difference in engine performance but some soft codes did set.

BAG #58 VEHICLE SPEED SENSOR: A VSS signal input is needed on all General Motors fuel injection engines. If the ECM does not see that input a **CODE WILL SET**. The VSS input helps control transmission shifts, some of the EGR and IAC functions. Plug the connector into the sensor located on the side of the transmission and run the wires to the TELORVEK panel. Connect the purple VSS B->112 to #112 and the light green (VSS A->111) to #111.

BAG #59 BRAKE SIGNAL (TCC CUT OUT RELAY): This wiring is not supplied if you have specified a manual or non-electronic transmission. The TCC relay is mounted in the cover of the Telorvek panel and is pre-wired. In order for the transmission and torque converter clutch to operate properly a signal must be sent to the ECM to tell it when the brakes are applied. The purple wire 117->BRK SW connects to #117 and run to the cold side of the brake switch (hot only when the brakes are applied). This color matches Ron Francis Wire Works wiring kit. **NOTE:** A relay must be installed in the connector (Airtex part #1R1061, Standard Motor Products part #RY116 or GM part #14100455.) or the brake signal circuit WILL NOT operate.

BAG #60 MALFUNCTION INDICATOR LAMP (MIL) and DATA LINK CONNECTOR (DLC): The DLC is the diagnostic link for computerized testing at your local GM dealer or a hand held scanner. We have supplied a Cover for the DLC to dress up the appearance. Please consider a very accessible location for this important part. Mount the connector in the desired location and run the wires back to the panel. Connect the black wire DLC 4->27 and DLC 5->27 to #27, purple DLC 2->114) to #114 and the red DLC 16->115 to #115.

The MIL light can be any two wire un-grounded 12 volt lamp located on the dash board or where ever desired. Connect the pink 95->MIL LIGHT to #95 and the brown 116->MIL LIGHT to #116. Run the wires to the MIL LT and make the connection. Connecting a MIL light on the dash is not necessary, the yellow L.E.D light on top of the TELORVEK panel performs the same function.

OTHER CONNECTIONS

In a stock application the engine computer accepts other inputs from various items that are not used in or would be very difficult to duplicate in an aftermarket application. The Detail Zone runs these wires from the computer plug to individual terminals on the Telorvek panel. If you wish to attempt to make connections to any of the following terminals you must use a shop manual to complete the connections. The Detail Zone does not offer wiring for these connections.

#55 LF Wheel Sensor (96 only)
#56 LF Wheel Sensor (96 only)
#57 RT Wheel Sensor (96 only)
#58 Rt Wheel Sensor (96 only)
#59 ABS Pump Motor (96 only)
#60 ABS Motor Control (96 only)
#62 RF Solenoid Control (96 only)
#63 LF Solenoid Control (96 only)
#64 RR Solenoid Control (96 only)
#65 ABS Motor Feed Back (96 only)
#77 ABS Lamp (96 only)
#78 Brake Control Lamp (96 only)
#79 Brake Pressure Sw. (96 only)
#80 Clutch Input
#81 Shift Indicator Light
#82 A/C Compressor Relay Control
#83 A/C Request
#84 A/C Cycling Switch
#85 Cruise Engaged Input
#86 Cruise VSS Input
#91 ABS Module RF (96 only)
#92 ABS Module LF (96 only)
#93 ABS Pump Motor Feed (96 only)
#94 ABS Module Rear (96 only)
#108 Four Wheel Drive Indicator Light
#109 Four Wheel Drive Lock Input
#110 VSS Output
#113 VSS High Output

FINISHING UP

The ECM accepts five connectors. The TELORVEK panel has two ECM connectors running from it with different color plugs. Plug the connectors into the computer.

Three connections remain, battery hot, ignition and battery ground. These three wires are running out of the TELORVEK panel along with the wires to the computer. Un-coil them and wire as follows:

BATTERY CONNECTION: The red wire out of the plug connects to a battery (hot all the time) source. Run this wire to the positive battery post if the TELORVEK panel and battery are mounted in the rear of the vehicle or to the starter solenoid if the panel is mounted towards the front of the vehicle. If your vehicle is equipped with a master disconnect, connect this wire to the hot side of the switch.

IGNITION CONNECTION: The orange wire is connected to a keyed ignition source (hot with the key in run and crank).

NOTE: After you wired in the ignition connection, check it with a test light, make sure this wire remains hot with the key in the run position and crank position.

BATTERY GROUND: The Black ground wire from the plug runs direct to the battery. Do not consider grounding the battery to the frame and then the engine to the frame. Run the battery ground directly to the engine.

STARTING THE ENGINE

You have now made all of the connections necessary to TRY to start your car. If you try now, you will be disappointed since you did not hook up the battery. You can do so now. If you turn the key on but do not crank engine, you will hear the fuel pump for about 2 to 4 seconds before it stops. This will indicate the pump is ready. During normal operating it is best if you do not wait until the pump stops as this is not an indication that the pressure is up. There is no need to "pump" the throttle to start a fuel injected car.

Telorvek Panel Fuse Designation, Size and Relay Center Layout

Fuse Designation & Size

The harness has a total of eight fuses. Shown below is a diagram of what each fuse protects.

Top, Front View Of Fuse Blocks

Fuse Row #1	
Fuse Designation	**Fuse Size Block #1**
(IGNITION FEED) PCM, Left & Right Injectors, MAF, EGR	20 AMP
(IGNITION FEED) Cam Shaft & Crank Shaft Position, Ign Coil, Spark Control	30 AMP
(IGNITION FEED) Canister Purge & Canister Vent, TCC Relay	15 AMP
(IGNITION) Fuel Buffer Module	10 AMP

Fuse Row #2	
Fuse Designation	**Fuse Size Block #2**
(IGNITION) O2 Sensors	20 AMP
(IGNITION) Transmission, MIL Light	15 AMP
(BATTERY) DLC, Oil Switch, PCM	30 AMP
(BATTERY) Fuel Pump Relay	30 AMP

Relay Center

Fuel Pump Relay

TCC Relay

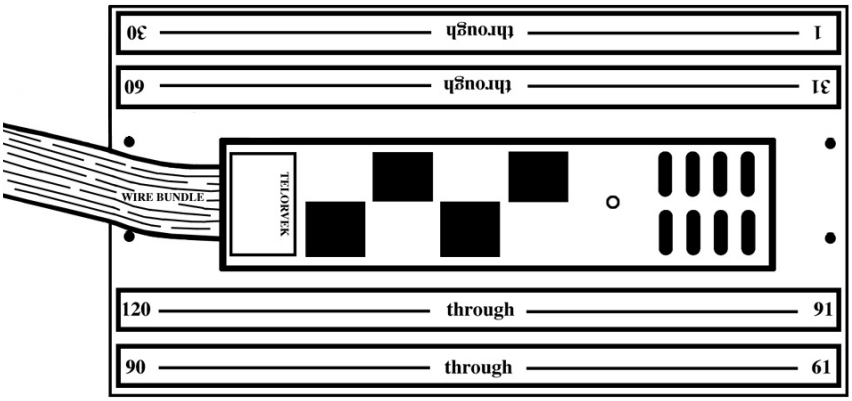
RELAY CENTER: In the cover of the TELORVEK panel are relays the ECM uses to control fuel pump and the TCC. The ECM can not handle heavy load items and it requires a relay to handle the load and the ECM then controls the relay. The harness has a total of two relays. All relays in the harness require Airtex part #1R1061, Standard Motor Products part #RY116 or GM part #14100455.

WARNING: All relays must be installed in the connectors. Eliminating any of them will cause damage to the engine.

Numbered terminal block cover strip reference.

The drawing below is for your reference on the correct positioning of the Telorvek fuel injection panel terminal block cover strips.

When connecting wires to the panel be sure the numbered terminals match the drawing below.



TROUBLE CODE DEFINITION

The PCM looks for certain parameters from each sensor it controls. If it sees one out of specification it will set and store a trouble code. Not all codes will light the malfunction indicator lamp. There is two types of trouble codes:

HARD CODE: A hard code will light the MIL and in most cases (not all) put the PCM into a back-up (open loop) mode. When this happens the timing remains fixed (will not advance or retard) and the engine will run only taking the input from the TPS sensor. This usually causes a rich condition as well.

SOFT CODE: A soft code will not light the MIL. This type of code will set, store and can only be read by connecting a scanner to the DLC connector. This type of code WILL NOT put the computer into a back-up mode or cause any running problems.

4.3 VORTECH TROUBLE CODES

PO101 MAF System Performance
PO102 MAF Low Frequency
PO103 MAF High Frequency
PO106 Map System Performance

PO107 MAP Low Voltage
PO108 MAP High Voltage
PO112 IAT Low Voltage
PO113 IAT High Voltage

PO117 ECT Low Voltage
PO118 ECT High Voltage
PO121 TP Sensor Performance
PO122 TP Sensor Low Voltage

PO123 TP Sensor High Voltage
PO125 ECT Excessive Time To Closed Loop
PO131 O2 Sen Bank #1 Sen #1 Low Voltage
PO132 O2 Sen Bank #1 Sen #1 High Voltage

PO133 O2 Sen Bank #1 Sen #1 Slow Response
PO134 O2 Sen Bank #1 Sen #1 Insufficient Activity
PO135 O2 Sen Bank #1 Sen #1 Heater Circuit
PO137 O2 Sen Bank #1 Sen #2 Low Voltage
PO138 O2 Sen Bank #1 Sen #2 High Voltage

PO140 O2 Sen Bank #1 Sen #2 Insufficient Activity
PO141 O2 Sen Bank #1 Sen #2 Heater Circuit
PO143 O2 Sen Bank #1 Sen #3 Low Voltage
PO144 O2 Sen Bank #1 Sen #3 High Voltage

PO146 O2 Sen Bank #1 Sen #3 Insufficient Activity
PO147 O2 Sen Bank #1 Sen #3 Heater Circuit
PO151 O2 Sen Bank #2 Sen #1 Low Voltage
PO152 O2 Sen Bank #2 Sen #1 High Voltage

PO153 O2 Sen Bank #2 Sen #1 Slow Response
PO154 O2 Sen Bank #2 Sen #1 Insufficient Activity
PO155 O2 Sen Bank #2 Sen #1 Heater Circuit
PO171 Fuel Trim Lean Bank #1

PO172 Fuel Trim Rich Bank #1
PO174 Fuel Trim Lean Bank #2
PO175 Fuel Trim Rich Bank #2
PO218 Transmission Fluid Over Temperature

PO300 Engine Misfire
PO301 Cylinder #1 Misfire
PO302 Cylinder #2 Misfire
PO303 Cylinder #3 Misfire
PO304 Cylinder #4 Misfire
PO305 Cylinder #5 Misfire

PO306 Cylinder #6 Misfire
PO327 Knock Sensor Low Voltage
PO336 Crank Shaft Position Performance
PO337 Crank Shaft Position Low Frequency

PO338 Crank Shaft Position High Frequency
PO339 Crank Shaft Position Intermittent
PO340 Cam Shaft Position Circuit
PO341 Cam Shaft Position Performance

PO401 EGR System
PO420 Catalytic Converter Performance
PO440 EVAP System
PO442 EVAP Leak Detected

PO446 Canister Vent Blocked
PO461 Fuel Level Sensor Performance
PO462 Fuel Level Sensor Low Voltage
PO463 Fuel Level Sensor High Voltage

PO500 VSS Circuit
PO502 VSS Circuit Low
PO506 IAC Control Low RPM
PO507 IAC Control High RPM

PO560 System Voltage Malfunction
PO704 Clutch Switch Circuit
PO711 Trans Fluid Temp Sensor Range/Performance
PO712 Trans Fluid Temp Sensor Low Input

PO713 Trans Fluid Temp Sensor High Input
PO719 Brake Switch Circuit Low Input
PO724 Brake Switch Circuit High Input
PO740 TCC Solenoid Valve High Input

PO742 TCC Stuck On
PO748 Pressure Control Solenoid Valve Circuit
PO751 1-2 Shift Solenoid Valve Performance
PO753 1-2 Shift Solenoid Valve Electrical

PO756 2-3 Shift Solenoid Valve Performance
PO758 2-3 Shift Solenoid Valve Electrical
PO785 3-2 Shift Solenoid Valve Electrical
P1106 Map Sensor Intermittent High Voltage

P1107 Map Sensor Intermittent Low Voltage
P1111 IAT Sensor Intermittent High Voltage
P1112 IAT Sensor Intermittent Low Voltage
P1114 ECT Sensor Intermittent Low Voltage
P1115 ECT Sensor Intermittent High Voltage
P1121 TP Sensor Intermittent High Voltage
P1122 TP Sensor Intermittent Low Voltage

P1133 O2 Insufficient Switching Bank #1 Sensor #1
P1134 O2 Transition Time Ratio Bank #1 Sensor #1
P1153 O2 Insufficient Switching Bank #2 Sensor #2
P1154 O2 Transition Time Ratio Bank #2 Sensor #1

P1345 Cam Shaft & Crank Shaft Sensor Correlation
P1810 Trans Fluid Pressure Manual Valve
P1860 TCC PWM Solenoid Valve.
P1870 Transmission Component Slipping

P1875 Four Wheel Drive Circuit Low

Optional Accessories

	GM Part #	Ron Francis Wiring#
Powertrain Control Module (96 Auto Trans.)	16244210	
Powertrain Control Module (96 Manual Trans.)	16184738	
Powertrain Control Module (97)	16229684	
ELEK Ign Control	16208961 (96-97)	
Fuel Pump Relay	14100455	FP-25
TCC Cut Out Relay	14100455	FP-25