TELORVEK II
WIRING INSTRUCTIONS FOR
PI-92 Fuel Injection Systems

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. A high pressure fuel pump that is capable of producing a minimum of 55 PSI is required for this engine. Custom in tank fuel pump installations are available from Tanks, Inc. (phone # 320-558-6882) and Rock Valley (phone #800-344-1934).

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 keep you from 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.

STARTING INSTALLATION

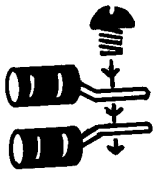
Since there are so many individual circuits to complete, we recommend that you connect them in the order that we prescribe. Disconnect the battery before starting and do not reconnect until instructed.

TELORVEK PANEL LOCATION: (BEFORE DRILLING ANY HOLES) **The location of the TELORVEK** panel and engine control computer (ECM) 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 (ECT) (engine coolant temperature 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 ECT sensor is always mounted in front of the engine.

We have packaged three sizes of terminal forks. The red terminals are for the 18 gauge wires, 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 ENGINE COOLANT TEMPERATURE SENSOR (ECT) After attaching the plug to the sensor, run the two wires to the panel and connect the yellow wire to **#1** and purple wire to **#2**. The sensor is located on the front of the manifold in the water jacket.

Bag #41 INTAKE AIR TEMPERATURE SENSOR (IAT) The IAT is located in the intake air duct attached to the throttle body. Plug in the connector and run the two wires back to the panel. Connect the tan wire to **#9** and the black wire to **#7**.

Bag #42 THROTTLE POSITION SENSOR Plug into the sensor located near the throttle linkage with the connector supplied and run the wires to the panel. Connect the black to **#7**, Dk Blue to **#3** and gray to **#6**.

Bag #43. IDLE AIR CONTROL (IAC): The IAC is located on the throttle body and after plugging in the connector, run black to **#19**, Lt Green to **#20**, white to **#21** and Lt Blue to **#22**.

Bag #44. MAP SENSOR (MAP): The MAP sensor is located on the top of the plenum towards the front of the engine. This is bolted directly to the plenum and if it was removed for any reason a gasket must be installed around the nipple or a vacuum leak will occur. Plug in the connector and run the Purple to **#2**, Lt green to **#4** and the Gray wire to **#5**.

Bag #45. ELECTRONIC SPARK TIMING (Distributor)/IGNITION COIL At this time connect the EST wiring to the distributor and run Black wire to **#34,** Tan wire to **#35**, Purple wire to **#36** and White wire to **#37**. The distributor must be from the engine that the injection came from not an older model with vacuum advance.

COIL: Plug the gray connector into the coil which is located near the distributor. Using the yellow terminal run the orange wire to **#15** on the Telorvek panel. The purple wire (TACH) runs to the tach.

NOTE: Located six inches from the distributor connector in-line on the tan wire is a timing disconnect connector. When setting engine timing this connector must be un-plugged, timing set and then plugged back together. A hard code #42 may set when setting the timing. To clear the code, Un-hook the battery for two minutes or clear the it with a scan tool.

NOTE: A wire harness is needed to interface between the distributor and coil. You must use the factory harness that connects the coil to the distributor. It may be ordered direct from GM under part # 12090012.

Bag #46 CENTRAL MULTIPORT FUEL INJECTOR ASSEMBLY (CMFIA): The CMFIA is located under the upper intake manifold. GM has installed an interface harness that connects to the injector itself and runs out from the left front upper intake manifold eliminating the need to remove the manifold to complete the injector connection.

Plug in the connector to the interface harness connector and run the wires back to the panel. Connect the pink wire to **#44** and the dark blue to **#45**.

Bag #47 FUEL PUMP \ OIL SWITCH: The fuel pump relay is located in the cover of the TELORVEK panel and is pre-wired. A relay must be installed in the connector (GM part #14100455) or the pump WILL NOT operate.

Connect the tan 53->FUEL PUMP wire to **#53** on the panel and run it to the fuel pump. The tan wire then connects to the positive terminal on the pump. The black wire (FUEL PUMP GRD) connects to the negative terminal on the fuel pump and run to a good ground.

OIL SWITCH: This switch is located in the rear of the engine near the distributor. Plug in the connector into the oil pressure switch. Run the wires back to the panel and connect the red to **#12** and the tan to **#53**.

Bag #48 KNOCK SENSOR WIRING (2 required) are located on either side of the engine. These sensors will inform the computer of detonation and readjust the timing accordingly. Connect the (RT KNOCK->33) to the right side knock sensor and the (LF KNOCK->33) to the left side knock sensor and run the wires back to the panel. Connect both wires to **#33**.

Bag #49 ENGINE GROUNDS. Although some of these wires are marked ground they actually complete individual circuits that happen to be grounded. For this reason these are important wires in the kit and must be connected properly. The Black wire marked FRT ENG GRD is connected to a bolt in the front of the intake manifold and run to the number **#28** on the panel. The Black wire marked REAR ENG GRD is run from a rear manifold bolt to number **#28** on the panel.

Bag #50. DATA LINK CONNECTOR (DLC) and SERVICE ENGINE LIGHT (Check Engine Light) 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 under the dash board is recommended. Connect the Orange wire to **#52**, White wire to **#51**, Black wire to **#26** and the Tan wire to **#55**.

The Check Engine light can be any low amperage 12 volt lamp located on the dash board or where ever desired. The Brown wire from **#43** and Pink wire from **#44** make these connections. This light is not required as the yellow light on top of the TELORVEK Panel has the same function.

Bag #51 EGR VALVE: The EGR 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 light green to **#10**, black to **#8**, brown to **#11**, gray to **#5** and the pink to **#16**.

Bag #52. OXYGEN SENSOR (HEATED): This area of the vehicle is hot so keep the wires away from the exhaust. Only one sensor is required per engine. Install as close to the block as possible. O2 Sensors have a 25,000 mile life. Replace used O2 Sensors with new. If you must install an adapter, use The Detail Zone part # OS-30. The Purple wire runs to **#25**, Black wire to **#26** and the Pink wire to **#17**.

Bag #53. INTAKE MANIFOLD TUNING VALVE ASSEMBLY (IMTV): The IMTV is located on top of the plenum and is controlled by the ECM through a relay located in the cover of the Telorvek panel and is pre-wired. **NOTE: A relay must be installed in the cover of the panel (GM Part #14100455) or the IMTV will not operate.**

After plugging into the valve run the wires to the panel and connect the pink to **#50** and the black to **#27**.

Bag #54. VEHICLE SPEED SENSOR (VSS) & VEHICLE SPEED SENSOR BUFFER): The VSS sends a speed signal to the ECM which in turn uses this information to control TCC operation, EGR solenoid and some of the Idle Air Control. The VSS buffer calibrates the VSS signal for different rear ratios and tire sizes. The next to the last page of the instructions will list a number of buffer modules. If you application is not listed, order the closest one to fit your application.

VSS: Plug in the VSS connector into the sensor located in the tail shaft of the transmission and run the wires to the panel. Connect the light green to **#38** and the purple to **#39**.

BUFFER: Mount the buffer close to the panel. Plug the connector into the panel and connect the light green wire **#38**, purple to **#39**, brown to **#40**, dark blue to **#41**, light blue to **#42**, orange to **#48** and the black wire to **#27**.

Bag #55. PARK/NEUTRAL RELAY: This system was developed to allow a regular park / neutral switch tell the computer when the vehicle is in park, neutral or drive. Since the signals are different, we have made this small circuit that will plug into a stock GM neutral switch or splice to just about any two wire neutral switch. The signal input controls the idle air control (IAC), vehicle speed sensor diagnostics (VSS) and exhaust gas recirculation (EGR).

If you are using a Ron Francis Wire Works Wiring kit, this is a simple, color coded plug-in to GM Neutral Safety Switches. The regular car wiring that normally runs to the neutral safety now plugs into the P/N relay kit with the with the blue and purple wires in the black connector. The plug with the blue and black wires is connected to the original neutral safety switch. Run the black wire with the ring terminal to a good ground.

NOTE: Using any other standard neutral switch requires only removing the plug and splicing. Either color wire can be used on either terminal.The black plug with the light blue and black wires is connected into your neutral safety switch. If the connector on the wires doesn't fit your application then remove it and connect the wires to the switch.

✓ The **blue wire** in the plug must be connected to the 12 volt supply from the ignition switch. This wire becomes hot (12 Volts) when you turn the key to crank.

✓ The **purple wire** is connected to the wire that runs to the starter solenoid.

✓ Run the **orange wire** to **#49** on the panel.

✓ Don't forget to install a relay. Use Airtex part #1R1061, Standard Motor Products part #RY116 or GM part #14100455.

Finishing UP

Connect the large prewired orange wire to the ignition circuit of your ignition switch. This is an ignition feed that is controlled by the ignition switch. **This is not an accessory feed and must remain hot even when the engine is cranking.**

Connect the large prewired red battery feed wire to a battery feed. This is a battery feed that must remain hot even with the key off. Make sure this is a good connection.

The ground wire from the TELORVEK II Panel 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.

VEHICLE SPEED SENSOR (VSS): A VSS signal input is needed on all General Motors TPI engines. If the ECM does not see that input a **CODE 24 WILL SET**. The VSS input helps control some of the EGR and IAC functions.

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.

TIMING ADJUSTMENT: To set base timing at **0 degrees (TDC)**, you must disconnect the special timing plug in the tan wire at the distributor first. Pull this apart for timing purposes and then reconnect to run. This will cause code 42 to be stored in the ECM memory. This must be cleared after setting timing. This is best done with a scanner but disconnecting the battery for 30 seconds will accomplish the same. After disconnecting the battery to clear codes etc, the engine will run poorly at least until it is in closed loop and approximately another 10-15 minutes. If there are any defective sensors or other parts, this will take much longer.

Computer controlled timing cannot be tricked by setting it higher without causing problems in other settings. Set the timing at recommended point only.

YOU MUST HAVE:

Medium pressure fuel pump hooked up and tested
5/16 Return line connected to tank
3/8 fuel line from tank through pump to the engine
Gas in the tank
Battery fully charged, grounded to engine directly and all connections tight
Timing set at factory specs
195 degree thermostat
All sensors connected
Test procedures completed without errors
Fuses in place both sides of panel totaling 8- Did you make sure none are blown?
Have you gone back and completed whatever you felt you wouldn't forget?

If you turn the key on but do not crank engine, you will hear the fuel pump for about 4 seconds before it stops. This will indicate the pump is ready. During normal operating it is best if you do not wait till the pump stops as this is not an indication that the pressure is up. There is no need to "pump" the throttle on fuel injection cars.

Ron Francis Wiring has made every effort to assure a quality product and can assure you that this system works well in your application. Most of the 'problem' calls we have had to date are basic trouble shooting questions which have nothing to do with the TELORVEK II system we sold you. Once you have confirmed our simple electrical tests are OK, set the timing and any trouble you experience will be a defective part or seat of the pants repair.

We are committed to offering the most user friendly wiring systems available and support this with many years experience in the wiring and fuel injection fields. Please be certain that all connections are correct and tests run before calling. Your unit can be tested at any General Motors Dealership with no any difficulty.

POSSIBLE PROBLEMS ARE:

Wrong Prom, ECM or Vacuum leaks. No coil spark, Distributor problems, No fuel or Timing incorrectly set, Dirty injectors or fouled plugs if engine runs rich too long.

EXPECT DIRTY INJECTORS: Any engine or Injection unit that has been sitting for 6 months or more may have partially clogged injectors. They may need cleaning for proper operation. This can be accomplished with several commercially available cleaners such as the very good 3M brand injector cleaner.

TROUBLE CODES:

Listed below are trouble codes the ECM will store in the event of a sensor failure. Inserting the code key attached to the ALDL connector into terminal A to terminal B (white and black wires) of the connector will allow the computer to "flash" trouble codes on the Telorvek panel light or a dash mounted light. Each code will flash 3 times. Each number is flashed separate. Example: Thirteen is flashed as a single flash followed by three flashes. This will repeat three times before moving on to any addition codes. Not all that can go wrong on a EFI computer controlled system will set a service code. If no codes are present and there is a runability problem it may be necessary to connect a scan tool to the system or have it serviced at a qualified repair facility.

1) Locate the ALDL connector. With the ignition turned OFF insert the key in slot A & B. **CAUTION: DO NOT INSERT THE KEY INTO ANY OTHER SLOTS.**

2) Turn the ignition on, but DO NOT START THE ENGINE.

3) Read the codes from the service engine soon light. The light will begin flashing two digit codes which will be transmitted three times for each code stored.

13 Oxygen Sensor
14 CTS High Temp
15 CTS Low Temp
21 TPS Voltage High
22 TPS Voltage Low
23 IAT Low Temp
24 Speed Sensor
25 IAT High Temp
32 EGR
33 MAP High Voltage (low vacuum)
34 MAP Low Voltage (high vacuum)
35 IAC System Error
42 EST
43 ESC
44 O2 Lean
45 O2 Rich
51 Faulty Mem-Cal
53 System Over Voltage
54 Fuel Pump low voltage
55 Faulty ECM

Telorvek Panel Fuse Designation and Size 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) Ignition Coil	20 AMP
(IGNITION) EGR Valve	10 AMP
(IGNITION) Injector,S.E.S Light	15 AMP
(IGNITION) ECM	10 AMP

Fuse Row #2	
Fuse Designation	Fuse Size Block #2
(IGNITION) O2 Sensor	10 AMP
(IGNITION) IMTV Relay, VSS Buffer	15 AMP
(BATTERY) Fuel Pump Relay	15 AMP
(BATTERY) Oil Switch, ECM	20 AMP

FUEL PUMP RELAY

IMTV RELAY

Available Options

	Description	Gm Part No.	
	Engine Control Module	16156647	(4.3 Engine)

The following prom is used with the 16156647 computer.

	Prom (4.3)	16176599
TC-59	Computer Controlled Torque Converter Lock-Up wiring harness	
TC-70	Torque Converter Lock-up Adjustable For a 700 R4 Transmission	

Park/ Neutral and Fuel Pump GM Relay Part Number is 14100455

Note:

If you are in need of the clips with studs and nuts to properly bolt down the computer, The clips are available from a GM dealer in packs of 10 under part number 12337892 and the nuts are available individually under part number 11502702.