



TELORVEK TPI
**WIRING INSTRUCTIONS FOR
TH-90 (95 CK TRUCK)
4.3,5.0,5.7,7.4 TBI Fuel Injection System
W/4L60-E or 4L80-E Transmission**

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 a high pressure in-tank fuel pump. **NOTE: Check the shop manual for the proper fuel pump pressure your engine requires.** 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 automakers have toughened the emission outputs of their engines, which in the future will be even tougher.

Just like you, I was used to building my street rods over the years with out all the plumbing that was necessary for the emissions to function properly. Just for the record, by the 1990 clean air act it is illegal to remove the emission control devices from the engine they were intended to be used on. We have found by talking to customers throughout the country that most states are not enforcing this law, but I promise you in the future they will! It sure will be nice to know that you are prepared.

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.

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.

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

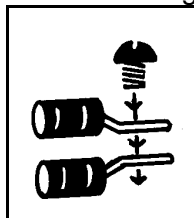
Since there are so many individual circuits to complete, we recommend that you connect them in the order that we prescribe. Disconnect the battery before starting and do not reconnect until instructed.

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. There should be a total of 15 bags. Each bag contains at least one sensor connection and approximately 20 feet of wire to reach the TELORVEK panel. We suggest opening bag #20 (Coolant temp) 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 CTS sensor is always 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 #20 ENGINE COOLANT TEMPERATURE SENSOR: The sensor is located off to one side of the water pump. Plug the connector into the sensor and run the wires back to the panel. Connect the black wire CTS A->12 to #12 and the yellow wire CTS B->13 to #13.

Bag #21 THROTTLE POSITION SENSOR (TPS): The TPS sensor is located on the right 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->11 to #11, black wire TPS B->12 to #12 and the dk blue wire TPS C->10 to #10.

Bag #22 MAP SENSOR: install the MAP (Manifold Air Pressure) sensor in a location higher than the intake manifold with the nipple facing down. Plug the connector into the sensor and run the wires back to the panel. Connect the purple wire MAP A->7 to #7, It green wire MAP B->8 to #8 and the gray wire MAP C->9 to #9.

Bag #23 IDLE AIR CONTROL (IAC): The IAC is located on the right side of the throttle body. Two types of IAC motors are used on throttle body engines. The 5.0 & 5.7 engines use a square, four pin type IAC connector. The 5.7 heavy duty and 7.4 engines use a flat four pin type connector. Follow the paragraph below that pertains to the type of engine you have. Plug the four gang connector into the IAC and run the wires back to the panel.

NOTE

This connector has two light blue and two light green wires. READ the printing on the wires carefully making sure the wires are being connected to the correct terminals.

5.0, 5.7 Engines: Connect the wires to the panel as follows: It green IAC B->15 to #15, It green IAC C->16 to #16, It blue IAC A->14 to #14 and It blue IAC D->17 to #17.

5.7 HEAVY DUTY ENGINES & 7.4 ENGINES: Connect the wires to the panel as follows: It green IAC D->15 to #15, It green IAC C->16 to #16, It blue IAC A->17 to #17 and It blue IAC B->14 to #14.

Bag #24 INJECTORS: Notice that the injector wiring is marked **LEFT INJECTOR** (drivers side) and **RIGHT INJECTOR** (passengers side). Plug in the injector wires to the injectors. Run the pink wire for the Left Injector to #36 and light blue to #38. Run the pink wire for the Right Injector to #37 and light green to #39.

Bag #25. KNOCK SENSOR WIRING (5.0,5.7,7.4): This sensor will inform the computer of detonation and readjust the timing accordingly. The knock sensor must be used because it advances and retards the timing. Connect the single dk blue to the sensor and run the wire back to the panel. Connect the KNOCK->29 wire to #29. The second knock sensor wiring is not used with this engine.

4.3 ENGINE requires using two knock sensors. Connect the dk blue wires to each sensor and run the wires back to the panel. Connect the KNOCK->29 wires both to #29.

Bag #26. OXYGEN SENSOR: GM used two types of O2 sensors on the truck engines. The 4.3, 5.0 & 5.7 engines with a 4L60-E transmission and the 4.3 engine with a 4L80-E transmission used an heated, three wire O2 sensor. The 5.7 & 7.4 engines with a 4L80-E transmission used the one wire type O2 sensor. Follow the paragraph below for the type of O2 sensor you have.

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.

4.3 5.0,5.7, ENGINES W/4L60-E TRANSMISSIONS & 4.3 ENGINE W/4L80-E TRANSMISSION: Plug the connector into the sensor and run the wires back to the panel. Connect the pink wire O2 A->28 to #28, black O2 B->26 to #26 and purple O2 C->6 to #6.

5.7,7.4 ENGINES W/4L80-E TRANSMISSION : Plug the connector into the sensor and run the wire back to the panel. The Purple wire connects to #6.

Bag #27 ELECTRONIC SPARK TIMING (Distributor) \IGNITION COIL: The connector on the wires will plug directly into the distributor. Run the wires back to the panel and connect the black wire EST A->46 to #46, the purple wire EST C->44 to #44, the tan wire EST B->45 to #45 and the white wire EST D->43 to #43.

IGNITION COIL: Plug the gray connector into the coil. Using the yellow terminal run the orange wire IGN COIL->5) to #5 on the Telorvek panel. The purple wire TACH runs to the tach.

NOTE: External coil distributors must use the factory harness that connects the coil to the distributor. If needed it may be ordered direct from GM under part # 12039177.

Bag #28 EGR VALVE: Enclosed are three types of EGR connectors. The two gang connector is for the 4.3, 5.0, 5.7 engines with the 4L60-E transmission and the 4.3 engine with the 4L80-E transmission. The three gang connector is for the 5.7 engine with the 4L80-E transmission. The five gang connector is for the 4.3 engine with a 4L60-E transmission (California emissions only), 7.4 engine with the 4L80-E transmission. Use the connector that pertains to your engine and discard the other two.

TWO GANG CONNECTOR: Plug connector into the EGR Solenoid and run the gray wire to #40 and the pink wire to #41.

THREE GANG CONNECTOR: Plug connector into the EGR Solenoid and run the gray wire to #40, pink wire to #41 and the black wire to #25.

THREE GANG CONNECTOR: Plug connector into the EGR Solenoid and run the gray wire to #40, pink wire to #41 and the black wire to #25.

FIVE GANG CONNECTOR: Plug connector into the EGR Solenoid and run the gray wire EGR SOL A->40 to #40, gray wire EGR SOL D->9 to #9, pink wire EGR SOL E->27 to #27, brown wire EGR SOL C->1 to #1 and the black wire EGR SOL B->35 to #35.

It is important that this be working properly as the idle speed is effected by this.

Bag #29 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 (Airtex part #1R1061, Standard Motor Products part #RY116 or GM part #14100455) or the pump WILL NOT operate.

Connect the tan 33->FUEL PUMP wire to #33 on the panel and run it to the fuel pump. The tan wire then connects to the positive terminal on the pump. The fuel pump must be grounded.

OIL SWITCH: This switch normally 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 OIL SW D->3 to #3 and the tan OIL SW C->33 to #33.

Bag #30 SERVICE ENGINE SOON LIGHT (S.E.S) and ASSEMBLY LINE DATA

LINK. (ALDL): The ALDL is the diagnostic link for computerized testing at your local GM dealer or a hand held scanner. We have supplied a Cover for the ALDL 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 ALDL A->24 to #24, white wire ALDL B->23 to #23 and the orange wire ALDL M->22 to #22.

The S.E.S light can be any two wire un-grounded 12 volt lamp located on the dash board or where ever desired. Connect the pink 41->SES LT to #41 and the brown 42->SES LT to #42. Run the wires to the SES LT and make the connection. Connecting a S.E.S light on the dash is not necessary, the yellow L.E.D light on top of the TELORVEK panel performs the same function.

Bag #31 BRAKE SIGNAL (TCC CUT OUT RELAY): The TCC relay is mounted in the cover of the Telorvek panel and is pre-wired. A relay must be installed in the connector (Airtex part #1R1061, Standard Motor Products part #RY116 or GM part #14100455) or the circuit WILL NOT operate. 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 58->BRAKE SW connects to #58 and run to the cold side of the brake switch (hot only when the brakes are applied).

4L60-E or 4L80-E Transmission Wiring

At the time your order was placed you were asked what type transmission you were installing. If you are installing the 4L60-E or 4L80-E automatic transmission we have provided the correct wiring for the transmission. The 4L60-E & 4L80-E transmission are fully automatic rear wheel drive electronically controlled transmissions. Shift points are controlled by the ECM via two shift solenoids. Shift schedules and torque converter lock-up are also controlled by the ECM and are influenced by transmission temperature.

Below are the installation instructions for both the 4L-60-E & 4L80-E transmissions. Follow the paragraph that pertains to your transmission:

Bag #32 AUTOMATIC 4L60-E or Bag #32A 4L80-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 & 4L80-E transmissions 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.

4L60-E Transmission Wiring: Connect the wires to the TELORVEK panel as follows: It green TRANS A->49 to #49, yellow TRANS B->50 to #50, red TRANS C->51 to #51, It blue TRANS D->53 to #53, pink TRANS E->56 to #56, black TRANS L->52 to #52, purple TRANS M->7 to #7, brown TRANS U->60 to #60 pink TRANS N->54 to #54, red TRANS P->57 to #57, dk blue TRANS R->55 to #55, white TRANS S->48 to #48 and the tan TRANS T->47 to #47.

4L80-E Transmission Wiring: Connect the wires to the TELORVEK panel as follows: It green TRANS A->49 to #49, yellow TRANS B->50 to #50, pink TRANS C->51, pink TRANS D->53 to #53, pink TRANS E->56 to #56, yellow TRANS L->52 to #52, purple TRANS M->7 to #7, brown TRANS S->60 to #60, pink TRANS N->54 to #54, dk blue TRANS R->55 to #55 and red TRANS P->57 to #57.

TRANSMISSION INPUT SPEED SENSOR (4L80-E Transmission Only): This sensor is located on the left side of the transmission just forward of center. Plug the connector into the sensor and run the wires back to the panel. Connect the gray TRANS SPD A->31 to #31 and the dk blue TRANS SPD B->32 to #32.

More Transmission Information

The ECM tells the 4L60-E & 4L80-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. Listed below are the codes that set with the transmission disconnected.

CODES: 59, 73,

Bag #33 SPEED SENSOR: 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 transmission shifts, some of the EGR and IAC functions. Plug the connector into the sensor and run the wires to the TELORVEK panel. Connect the purple VSS A->20 to #20 and the lt green VSS B->21 to #21.

Bag #34 BUFFER: On a stock vehicle installation the buffer compensates for various axle ratios and converts the VSS signal into a square wave for use by the ECM. The buffer sends two different signals to the ECM. It relays transmission output speed which is used to control shift points. The other signal is used to control engine operating functions. Buffers are calibrated to give the correct speed signal into the ECM depending on rear ratio.

In the past GM listed many different part numbers for these electronic devices depending on rear ratio and tire size. Now they can only be purchased from an AC Delco authorized electronic repair facility. Any GM dealership can handle the purchase of a buffer.

The following information must be given to the GM dealership when ordering a Buffer:

- 1) Rear Ratio _____
- 2) Tire Size _____
- 3) Outside Diameter of rear Tires _____

Mount the buffer close to the Telorvek panel. Plug the connector into the buffer and connect the lt green wire to #21, black wire to #26, orange wire to #4, dk blue wire to #19, purple wire to #20 and brown wire to #18

Bag #35 CANISTER PURGE SOLENOID (California Emissions only): The vapor canister will store vapor until the engine is able to use the extra fuel vapor. Plug in the connector into the canister purge solenoid and run the wires back to the panel. Connect the pink wire to #4 and the dk green wire to #30.

Bag #36 IDLE SPEED ACTUATOR SOLENOID (7.4 ENGINES ONLY): The idle speed control actuator system assists the idle air control system in controlling the idle speed, primarily at cold temperatures.

Plug in the connector into the ISCAS located on the right front of the intake manifold and run the wires back to the panel. Connect the pink wire to #28 and the dk green wire to #47.

OTHER HARNESS CONNECTIONS

AIR CONDITIONING REQUEST: If you vehicle has A/C then connect wires to the following terminal on the TELORVEK panel:

A/C REQUEST: Splice a wire into the wire running from the A/C on-off switch to the thermostat control switch. This circuit will have 12 volts when the A/C switch is on. After making the splice run the wire back to the TELORVEK panel and connect it to terminal #59.

FINISHING UP

The ECM accepts two 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

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 Row #2	
Fuse Designation	Fuse Size Block #1	Fuse Designation	Fuse Size Block #2
(BATTERY FEED) Oil Switch, ECM	20 AMP	(IGNITION) Left Injector	10 AMP
(BATTERY FEED) Fuel Pump	15 AMP	(IGNITION) Right Injector	10 AMP
(IGNITION FEED) Buffer, ECM, Ignition Coil Canister Purge Solenoid	20 AMP	(IGNITION) EGR Solenoid, S.E.S LT	10 AMP
(IGNITION) Heated O2 Sensor, Idle Speed Actuator Solenoid	15 AMP	(IGNITION) Transmission	20 AMP

Fuel Pump Relay

TCC Relay

RELAY CENTER: In the cover of the TELORVEK panel are two relays the ECM uses to control fuel pump & TCC control. 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.

TROUBLE CODE DEFINITION

The ECM 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 service engine soon light. There is two types of trouble codes:

HARD CODE: A hard code will light the S.E.S light and in most cases (not all) put the ECM into a back-up (open loop) mode. When this happens the timing remains fixed (will not advance or retard), both cooling fans will turn on 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 S.E.S light. This type of code will set, store and can only be read by jumping the A & B slots in the ALDL connector. This type of code WILL NOT put the computer into a back-up mode or cause any running problems.

With the engine off and the ignition key on, connecting a jumper wire from terminal A to terminal B of the ALDL connector (white and black wires) will allow the computer to "flash" trouble codes on the S.E.S 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.

1995 4.3,5.0,5.7,7.4 CK TROUBLE CODES

13 Oxygen Sensor Circuit (open)	54 Fuel Pump Circuit (Low Voltage)
14 Coolant Temperature Sensor (High Temp. Indicated)	55 Faulty ECM
15 Coolant Temperature Sensor (Low Temp. Indicated)	58 Transmission Fluid Temperature circuit (High Temp Indicated)
16 VSS Buffer Fault	59 Transmission Fluid Temperature circuit (Low Temp Indicated)
21 Throttle Position Sensor (Signal Voltage High)	66 3-2 Control Solenoid Circuit Fault
22 Throttle Position Sensor (Signal Voltage Low)	67 TCC Clutch Circuit
24 Vehicle Speed Sensor	68 Transmission Component Slipping
28 Transmission pressure switch assembly fault	69 TCC Stuck On
32 Exhaust Gas Recirculation Circuit (EGR)	72 Vehicle Speed Sensor Loss
33 Map Absolute Pressure (High Voltage Low Vacuum)	73 Transmission Pressure Control Solenoid circuit (Current Error)
34 Map Absolute Pressure (Low Voltage High Vacuum)	74 Transmission Input Speed Sensor Circuit
35 IAC Error	75 Transmission System Voltage Low
37 Brake switch circuit (stuck on)	79 Transmission Fluid Over Temp
38 Brake switch circuit (stuck off)	81 Transmission 2-3 Shift Solenoid Circuit
39 Torque Converter Clutch Stuck Off	82 Transmission 1-2 Shift Solenoid Circuit
42 Ignition Control circuit (Shorted or Grounded Circuit)	83 TCC Pulse Width Modulated Solenoid Circuit
43 Knock Sensor circuit	85 Ratio Error
44 Oxygen Sensor (Lean)	86 Ratio Error (Low)
45 Oxygen Sensor (Rich)	87 Ratio Error (High)
51 Faulty Prom (MEM Cal Problem)	
52 System Voltage High to Long	
53 System Voltage High (Check Alternator)	

Optional Accessories

GM Part #

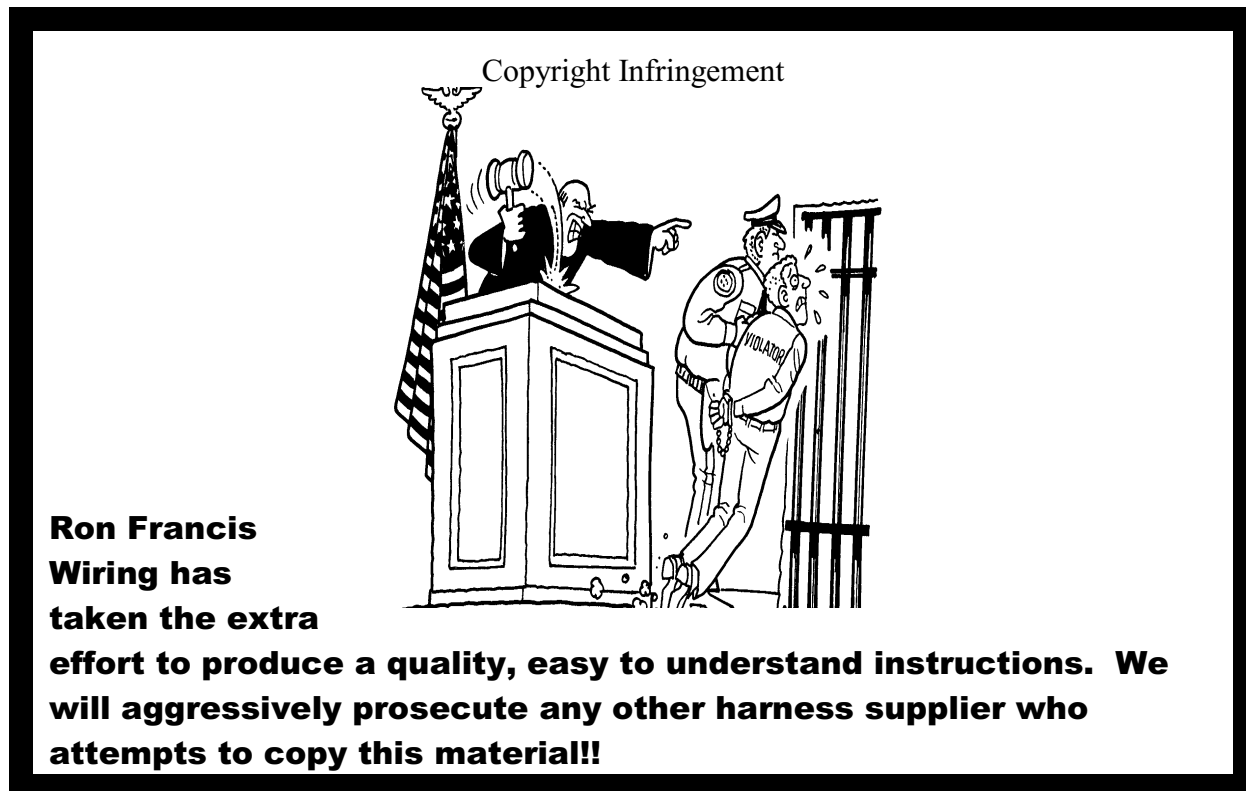
Ron Francis Wiring Part #

Fuel Pump Relay
TCC Cut Out Relay

14100455
14100455

FP-25
FP-25

CUSTOMER SERVICE: 610-485-1981



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