



## TELORVEK II WIRING INSTRUCTIONS FOR TH-60A 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. We recommend a medium pressure in tank fuel pump. Custom 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.

### **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.

Plug in the computer (ECM) to the wires running from the TELORVEK II panel and mount them in an **ACCESSIBLE LOCATION. For safety, now disconnect the ECM connectors until finished the installation.** Under the dash, under the seat or in the trunk are good. There are a lot of wires so allow room to work. A poor installation will result in a poor running car. The number referred to from this point on will be the location on one of the terminal blocks located on the TELORVEK II panel.

**Bag #21 COOLANT TEMPERATURE SENSOR** After attaching the plug to the sensor, run the two wires to the panel and connect the yellow wire to #13 and black wire to #12. The sensor is located on the front of the manifold in the water jacket.

**Bag #22 THROTTLE POSITION SENSOR** Plug into the sensor located near the throttle linkage with the connector supplied and run black to #12, Dk Blue to #11 and gray to #10. Adjustment is required.

**Bag #23 KNOCK SENSOR WIRING** is a single wire hookup to the knock sensor. This will inform the computer of detonation and readjust the timing accordingly. If your engine is not equipped, the sensor may be installed in the drain plug hole just above the oil pan on either side. Connect the plug to the sensor and run Dark Blue to #45.

**Bag #24 ELECTRONIC SPARK TIMING (Distributor)** At this time connect the EST wiring to the distributor and run Black wire to #49, Tan wire to #48, Purple wire to #47 and White wire to #46. The Electronic Spark Control wiring is connected to the ESC. Run the dark blue wire to #45 along with the dark blue wire from the knock sensor. The Pink wire goes to #4, Black (ESC C->44) to #44 and Black (ESC D->43) to #43. The distributor must be from the engine that the injection came from not an older model with vacuum advance.

Depending on which type of distributor (internal or external coil) the correct ignition and tach connection have been supplied. Follow the instructions below for the type of distributor you have:

**INTERNAL COIL DISTRIBUTOR:** The Orange wire (COIL->3) plugs into the BAT connection on the distributor cap and using a yellow terminal connect to #3 on the Telorvek panel. The purple wire (COIL->TACH) connects to the tach connection of the distributor cap and then run to the tach.

**EXTERNAL COIL DISTRIBUTOR:** Plug the gray connector into the coil. Using a yellow terminal connect the orange wire (COIL->3) to #3 on the Telorvek panel. The purple wire (COIL->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 # 12048976.**

**Bag #25 ASSEMBLY LINE DATA LINK. (ALDL) and SERVICE ENGINE LIGHT (Check Engine Light)** 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 under the dash board is recommended. Connect the Orange wire to #20, White wire to #21 and Black wire to #22, Tan wire (ALDL G->27) to #27, Tan wire (ALDL F->41) to #41, Brown wire (ALDL D->19) to #19 and the other Brown wire (ALDL C->25) to #25.

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 #19 and Pink wire from #33 make these connections. This light is not required as the yellow light on top of the TELORVEK II Panel has the same function.

**Bag #26 IDLE AIR CONTROL:** The IAC is located on the throttle linkage and after plugging in the connector, run Lt Green to #16, Lt Green to #17, Lt Blue to #14 and Lt Blue to #15. **CAUTION! WATCH THE NUMBERS PRINTED ON THE WIRES against the terminal blocks since these wire colors are duplicated.** There are several different similar appearing models of this unit and care should be taken to replace with the correct model if necessary.

**Bag #27 OIL PRESSURE SWITCH and WIRING (two wire unit):** (GM Part #25036553 must be used) This switch normally is located in the rear of the engine near the distributor. Plug in the connectors into the oil pressure switch. It does not matter the way the wires are plugged into the switch. Run Tan to #26 and Red to #2.

**FUEL PUMP RELAY:** 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 wire (26->FUEL PUMP) to #26 on the panel and run it to the fuel pump. The tan wire then connects to the positive terminal on the pump. The black FUEL PUMP GRND wire connects to the negative side of the pump and then to a good ground.

**Bag #28 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 #28 and dark blue to #29. Run the pink wire for the Right Injector to #30 and dark green to #31.

**Bag #29 OXYGEN SENSOR 4.3, 5.0, 5.7, 7.4 ENGINES:** 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. You must also hookup a ground wire to the exhaust pipe itself so weld a stud for this at the same time. The Purple wire goes to #6 and the Black wire (ground) goes to #24.

**Bag #29A OXYGEN SENSOR (HEATED) (1992 4.3 ENGINES ONLY):** 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 #6, Black wire to #24 and the Pink wire to #5.

**Bag #30 MAP SENSOR:** After installing the MAP (Manifold Air Pressure) sensor higher than the engine with the vacuum line facing down, connect the vacuum line to a constant source (Manifold). Plug in the connector and run the Purple to #8, Lt green to #9 and the Gray wire to #10.

**Bag #31 STARTER CRANK WIRE:** Connect this wire to the (S) post of the starter solenoid (The same post that engages the solenoid) and run it to #36.

**Bag #32 EGR VALVE:** Enclosed are two types of EGR connectors. The two gang connector is for the 5.0 and 5.7 engines and the three gang connector is for the 7.4 engine. Use the connector that pertains to your engine and discard the other.

Plug connector into the EGR Solenoid and run the Gray wire to #32 and the Pink wire to #33. If the three gang connector is used run the black wire to #23. It is important that this be working properly as the idle speed is effected by this.

**Bag #33 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 #23 on the panel. The Black wire marked REAR ENG GRD is run from a rear manifold bolt to number #24 on the panel.

**Bag #34 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 recirculating (EGR).

If you are using a Ron Francis 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. Install a relay in the relay socket: Airtex part #1R1061, Standard Motor Products part #RY116 or GM part #14100455

**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 #18 on the panel. Don't forget to install a relay.**

**Bag #35 AIR MANAGEMENT SYSTEM.** The air injection system adds air (oxygen) to the exhaust manifold to continue combustion after the exhaust gases leave the combustion chamber.

Plug the connector into the air diverter solenoid located on the rear of the air pump. Run the pink wire (AIR SW A->5) **#5** and the brown wire (AIR SW B->25) **#25** on the Telorvek panel.

**Now** 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.

A speed signal into the computer can done simply by purchasing pulse generator. It installs into the speedometer cable and following the instructions will wire into the harness. A 4 pulse per rev/4000 pulse per mile speed signal is what the ECM expects to see.

### Other Connections

High Gear Switch	#40	TCC Control/ALDL F	#41
A/C Signal	#38	VSS Input	#42

### 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.

## **IN THE FOLLOWING SEQUENCE ADJUST THE:**

### **MINIMUM IDLE ADJUSTMENT:**

1. Warm the engine.
2. With IAC valve connected, ENGINE OFF, jumper A & B in the diagnostic plug (ALDL).
3. Turn on ignition, do not start engine. Wait at least 45-60 seconds. (Do this with a watch to be sure you don't cheat the time required).
4. With ignition still "ON", disconnect IAC connector.
5. Remove jumper wire from ALDL and start engine. Allow system to go to closed loop, which is when the top radiator hose is too hot to touch.
6. Adjust idle stop screw to 450 RPM in drive (Automatic trans) or 550 RPM in neutral (Manual Trans).
7. Turn ignition "OFF" and reinstall IAC connector on the IAC valve.

**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 IAC, 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, IAC adjustment, 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. The fuel pump can be tested by temporarily connecting a 12 volt source to the 'G' terminal of the ALDL.

- 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.

12 Distributor not operating (turning)  
 13 Oxygen Sensor  
 14 CTS High Temp  
 15 CTS Low Temp  
 21 TPS Voltage High  
 22 TPS Voltage Low  
 24 Speed Sensor

32 EGR  
 33 MAP High Voltage (low vacuum)  
 34 MAP Low Voltage (high vacuum)  
 42 EST  
 43 ESC  
 44 O2 Lean  
 45 O2 Rich  
 54 Fuel Pump low voltage

## 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.

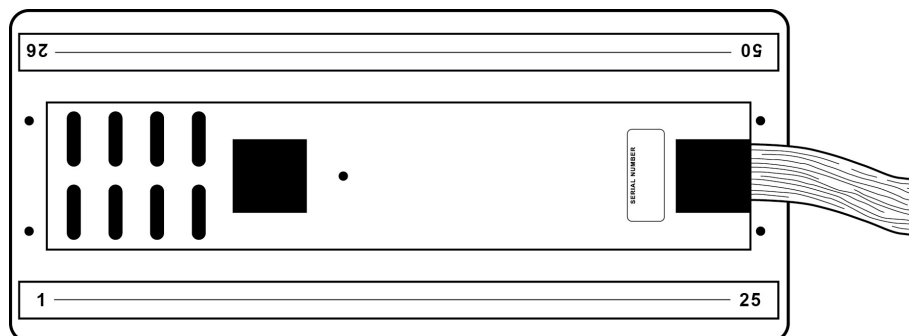
### Top, Front View Of Fuse Blocks

Fuse Row #1		Fuse Row #2	
Fuse Designation	Fuse Size Block #1	Fuse Designation	Fuse Size Block #2
<b>(BATTERY FEED)</b> Oil SW, ECM	15 AMP	<b>(IGNITION FEED)</b> Air Switch Solenoid	10 AMP
<b>(BATTERY FEED)</b> Fuel Pump Relay	10 AMP	<b>(IGNITION FEED)</b> Left Injector	5 AMP
<b>(IGNITION FEED)</b> Ignition Coil	20 AMP	<b>(IGNITION FEED)</b> Right Injector	5 AMP
<b>(IGNITION FEED)</b> ESC, ECM	10 AMP	<b>(IGNITION FEED)</b> EGR, EVRV Solenoid S.E.S LT.	10 AMP

### 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.



### Available Options

Description	Gm Part No.	
Engine Control Module	1227747	(4.3,5.0,5.7 Engine)
	88999146	(New Number)
Engine Computer	1228747	(7.4 Engine)

The following calpack and prom are to be used with the 1227747 computer used on 4.3,5.0,5.7 engines.

Calpack (5.0,5.7)	16060836
Calpack (4.3)	16051636
Prom (5.0) Auto Trans	16139492
Prom (5.7) Auto Trans	16139566
Prom (4.3) Auto Trans (700 R4)	16146750
Prom (4.3) 350,400 Auto Trans, Man trans	16121150

The following calpack and prom are to be used with the 1228747 computer used on 7.4 engines.

Calpack	16089087
Prom (7.4)	16151508

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

O2 Sensor	25166816
Knock Sensor	10456018
Oil Switch	25036553

#### 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.

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**Ron Francis Wiring has taken the extra effort to produce a quality, easy to understand instructions. We will aggressively prosecute any other harness supplier who attempts to copy this material!!**