RON FRANCIS Wiring

TELORVEK EFI
4.6 Sequential Fuel Injection
System MK-97

WIRING INSTRUCTIONS

Thank you for purchasing the absolute finest of wiring kits for the Ford Motor Co. 4.6. This harness works with the MARK VIII and selected 1998 Ford fuel injection engines. 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. You must use a high pressure fuel pump and we recommend that it is mounted in the fuel tank. Custom installations are available from Tanks Inc. (320-558-6882) and Rock Valley (800-344-1934).

NOTE: FORD diagnostic procedures are very detailed, lengthy and impossible to cover in this set of instructions. Purchasing the FORD ENGINE/ EMISSIONS DIAGNOSIS shop manual will help you learn about the engine you installed and guide you through the correct diagnostic procedures Ford recommends. **This book is available through your local Ford dealer or Helm Inc. Helm is the distributor for the shop manuals for General Motors and Ford Motor Company. Helm can be contacted at 800-782-4356 or on their web site www.helminc.com**

*****Notes*****

1) The ECM for this engine must be reprogrammed to have the PATS anti-theft removed. This was explained to you at the time of order. If you have not had the ECM reprogrammed or have any questions please call us at 610-485-1981.

2) Due to the way the 1997-98 Lincoln Mk 8 ECM communicated with different modules in the original vehicle, it can be difficult to connect to a scan tool. Best method is to choose generic OBD II when setting up communication.
For this same reason, fan control is not available on the 1997-98 Lincoln ECM.

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. There will be many connections to the TELORVEK panel so plan the location of the panel in an area with room to work. We suggest mounting the panel in an assessable location, in the trunk, under the seat or under the dash are good. In order to allow for the proper spacing between the computer and the Telorvek panel, plug the connector into the computer (ECM) and mount the panel and computer. **For safety, disconnect the ECM connector until finished the installation.** 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 panel.**

After all wires are connected to the engine, wire tie them together or use 3/4 inch Zip loom to protect them. This can be done before any connections are made to the panel. Since all wires are marked, running the entire group to the panel at one time is fine. Some terminals on the panel may not be used!

Important! We have supplied three sizes of terminals for your use on the panels itself. The Yellow is for 10-12 gauge wire, Blue for 14-16 gauge wire and red for 18 gauge wire. Each individual bag instructions will be marked as to which terminal to use.

☞ NOTE ☜

You will be moving around to different terminals on the TELORVEK panel to make connections. For this reason extra care is needed when making all connections to the panel.

Bag #60 MASS AIR FLOW SENSOR: Attach the connector to the M.A.F sensor located in the air intake tube between the intake manifold and air cleaner. Using a blue terminal run the Red wire (MAF->23) to **#23**. Now using the red terminals run the Black (MAF->24) to **#24**, Tan (MAF->2) to **#2** and the Lt Blue (MAF->1) to **#1.**

Bag #61 EXHAUST GAS RECIRCULATION VALVE POSITION SENSOR: Not needed if emissions has been removed from ECM. This wiring is not included if it has been eliminated from the ECM programming. Plug in the connector to the EGRVP located on the left rear of the engine. Using red terminals run the White wire (EGRVP->4) to **#4**, Brown wire (EGRVP->3) to **#3** and the Gray (EGRVP->31) to **#31**.

Bag #62 THROTTLE POSITION SENSOR (TPS): Plug into the sensor located in the rear of the engine on the throttle body and run the wires back to the panel. Using the red terminals run the Dark Blue (TPS->6) to **#6**, White (TPS->4) to **#4** and Gray (TPS->31) to **#31**.

Bag #63 INTAKE AIR TEMPERATURE SENSOR (IAT): Plug the connector onto the IAT sensor located on the top rear of the engine near the throttle body. Run the wires to the Telorvek Panel and using the red terminals connect the Lt Green wire (IAT->7) to **#7** and the Gray wire (IAT->32) to **#32**.

Bag #64 INTAKE MANIFOLD RUNNER CONTROL MONITOR/SOLENOID (IMRC): The IMRC is located on the rear of the engine. Plug in the connector and run the wires back to the Telorvek panel. Connect the Red wire (IMRC SOL->23) to **#23,** Lt Green wire (IMRC SOL->8) to **#8,** Brown wire (IMRC SOL->9) to **#9**, Black wire (IMRC SOL->24) to **#24** and the Gray wire (IMRC SOL->33) to **#33**.

Bag #65 KNOCK SENSORS: Our connector plugs into the harness located on the motor that attaches to the left and right knock sensors. Plug the connector together and run the wires back to the panel. Using the red terminals, connect the Gray wire (KNOCK GRND->33) to **#33,** Yellow wire (RT KNOCK->11) to **#11** and the Dk Green wire (LF KNOCK->10) to **#10**.

Bag #67 EGR SOLENOID: Not needed if emissions has been removed from ECM. This wiring is not included if it has been eliminated from the ECM programming. Plug the connector into the EGR solenoid located on the left rear of the engine. Using a the red terminals run the Red wire (EGR SOL->22 to **#22** and the Brown wire (EGR SOL->14) to **#14**.

Bag #68 OXYGEN SENSOR (4): Ford now uses four heated O2 sensors. This area of the vehicle is hot so keep the wires away from the exhaust. Four sensors are required per engine. **Install the left and right front O2 sensors in each exhaust manifold or in the header collector as close to the block as possible. The left and right rear O2 sensors mount behind the catalytic converters in each exhaust pipe.** These sensors monitor the status of the converters and WILL set a trouble code if a faulty converter is detected or a converter is not used at all (UNLESS YOU HAVE HAD YOUR COMPUTER REPROGRAMMED). NOTE: The O2 sensors do not send a signal to the ECM until they reach 600 degrees. Mounting them in header collectors may take longer for them to heat up causing the ECM to stay in OPEN LOOP longer than normal. If you must install an adapter, use part # OS-30.

LEFT FRONT O2: The four gang connector with the Red, Dk Blue, Yellow and Gray wires running from it plugs into the left front oxygen sensor.

RIGHT FRONT O2: The four gang connector with the Red, Lt Blue, White and Gray wires running from it plugs into the right front oxygen sensor.

LEFT REAR O2: The four gang connector with the Red, Lt Green, White and Gray wires running from it plugs into the left rear oxygen sensor.

RIGHT REAR O2: The four gang connector with the Red, Purple, Tan and Gray wires running from it plugs into the right rear oxygen sensor.

Run all the wires back to the panel and using the blue terminals connect the Red wires (LEFT FRT O2->22) to **#22**, (RIGHT FRT O2->21) to **#21**, Red wires (RIGHT RR O2->101) & (LEFT RR O2->101) to **#101**. The Gray wires (LEFT FRT O2->34) to **#34**, (LEFT RR O2->38) to **#38**, (RIGHT FRT O2->35) to **#35** & (RIGHT RR O2->38) to #**38**. Now using the red terminals connect the Dk Blue (LEFT FRT O2->16) to **#16**, Yellow (LEFT FRT O2->15) to **#15**, Lt Blue (RIGHT FRT O2->18) to **#18**, White (RIGHT FRT O2->17) to **#17**, Purple (RIGHT RR O2->105) to **#105**, Tan (RIGHT RR O2->106) to **#106**, Lt Green (LEFT RR O2->103) to **#103** and the white (LEFT RR O2->104) to **#104**.

Bag #70 IGNITION COIL: This 4.6 engine has eight coil packs, one for each spark plug. The coil packs are located above each cylinder. Locate the right coil connector with the Red and Lt Green wires and connect it to cylinder number (1) coil one. Now plug in the rest of the coil connectors (injectors 2, 3, 4) in that half of the harness. In the left coil harness locate the coil connector with the Red and Yellow wires and connect it to injector number (5). Plug in the rest of the coil connectors (injectors 6, 7, 8) and run all the wires from both haves of the harness to the Telorvek Panel.

Using the blue terminals connect the Red wires (IGN COIL 1->49) and (IGN COIL 5->49) to **#49**. Now connect the remaining eight wires as follows using the red terminals, Lt Green (IGN COIL 1->41) to **#41**, Pink (IGN COIL 2->42) to **#42**, White (IGN COIL 3->43) to **#43**, Dk Green (IGN COIL 4->44) to **#44**, Yellow (IGN COIL 5->45) to **#45**, Orange (IGN COIL 6->46) to **#46**, Lt Blue (IGN COIL 7->47) to **#47** and Dk Blue (IGN COIL 8->48) to **#48**.

WARNING !!!

The distributorless ignition system (DIS) on this engine is a high energy system operating in a dangerous voltage range which could prove to be fatal if exposed terminals or live parts are contacted. Use extreme caution when working on the vehicle with the ignition on or the engine running.

TACH: With these coil on plug motors Ford has the ECM providing the tach signal to the dash cluster. This tach signal is delivered multiplexed with other data that only the original dash instruments can read. For this reason, if you are using a tachometer, you will need to acquire a tach module or driver. Most gauge manufacturers have such units as this is a common problem that every 1999 and newer Mustang owner encounters when attempting to install an aftermarket tach. If you are using an Autometer Tach Adapter (part number 9117) or similar, see illustration 1 at the end of these instructions for how to wire. Please consult your gauge manufacturer or give us a call to solve this issue or help wire up a tach module/driver 610-485-1981.

Bag #71 INJECTORS: The injector wiring is made up in two harnesses, one for the left bank of injectors and one for the right bank. Locate the right injector connector with the Red and Lt Green wires and connect it to cylinder number (1) injector one. Now plug in the rest of the injector connectors (injectors 2, 3, 4) in that half of the harness. In the left injector harness locate the injector connector with the Red and Yellow wires and connect it to injector number (5). Plug in the rest of the injector connectors (injectors 6, 7, 8) and run all the wires from both haves of the harness to the Telorvek Panel. Using the blue terminals connect the Red wires (INJ 1->69) and (INJ 5->69) to **#69**. Now connect the remaining eight wires as follows using the red terminals, Lt Green (INJ 1->61) to **#61**, Pink (INJ 2->62) to **#62**, White (INJ 3->63) to **#63**, Dk Green (INJ 4->64) to **#64**, Yellow (INJ 5->65) to **#65**, Orange (INJ 6->66) to **#66**, Lt Blue (INJ 7->67) to **#67** and Dk Blue (INJ 8->68) to **#68**.

Bag #72 IDLE SPEED CONTROL: The ISC is located on the rear of the engine in the throttle body. Plug in the connector and run the wires back to the panel. Using the red terminals, connect the White wire (ISC->70) to **#70** and the Red wire (IAC->21) to **#21**.

Bag #73 COOLANT TEMPERATURE SENSOR: After attaching the plug to the sensor located on the lower front of the engine, underneath the alternator run the two wires to the panel. Connect them using the red terminals, Lt Green wire (ECT->71) to **#71** and the Gray wire (ECT->35) to **#35**.

Bag #74 CAMSHAFT POSITION SENSOR (CSP): requires the wires to be shielded from any electrical interference.

Carefully uncoil the harness and plug it into the CSP located on the left front of the engine. Run the wires to the Telorvek panel. Remove the tape and shielding material back only as far as it is necessary for the length of the wire to be cut and allowing enough wire to make the connections on the panel. In the shielded harness there is a solid strand wire with no insulation, install a blue terminal on it and connect it to **#26**. After the connection is made wrap the exposed wire from the shielded harness to **#26** with electrical tape. Connect the remaining two wires as follows: Dk Blue (CAM POS SEN->72) to **#72** and the Gray (CAM POS SEN->36) to **#36.**

Bag #75 CRANK POSITION SENSOR (CPS): requires the wires to be shielded from any electrical interference.

Carefully uncoil the harness and plug it into the CPS located on the right front of the engine down by the balancer. Run the wires to the Telorvek panel. Remove the tape and shielding material back only as far as it is necessary for the length of the wire to be cut and allowing enough wire to make the connections on the panel. In the shielded harness there is a solid strand wire with no insulation, install a blue terminal on it and connect it to **#26**. After the connection is made wrap the exposed wire from the shielded harness to **#26** with electrical tape. Connect the remaining two wires as follows: Black wire (CPS->73) to **#73** and the Gray wire (CPS->74) to **#74**.

4R70W Electronic Controlled Overdrive Transmission Wiring
(Bags #76 or 76A, #77, #78)

Bag #76 4R70W TRANSMISSION CONNECTIONS: The 4R70W transmission is a electronically controlled four speed automatic transmission. Plug the connector into the transmission and run the wires to the Telorvek panel. Using the red terminals, connect the Gray (TRANS 9->37) to **#37**, Orange wire (TRANS 1->79) to **#79**, Lt Blue (TRANS 3->80) to **#80**, Black (TRANS 5->81 to **#81**, Purple (TRANS 6->82) to **#82** and the White (TRANS 10->83) to **#83** . Using blue terminals, connect the Red (TRANS 2->50) to **#50**, Red (TRANS 7->50) to **#50** and the Red (TRANS 8->51) to **#51**.

The Purple wire (88->BRAKE SW) connects to **#88** and runs to the cold side of the brake light switch. This wire should only have 12 volts with the brake pedal depressed.

Bag #76A Late 4R70W & 4R100W TRANSMISSION CONNECTIONS: These transmissions are electronically controlled four speed automatic transmission. Plug the connector into the transmission and run the wires to the Telorvek panel. Using the red terminals, connect the Gray wire (TRANS 2->37) to **#37**, Orange wire (TRANS 7->79) to **#79**, Lt Blue (TRANS 3->80) to **#80**, Black (TRANS 5->81 to **#81**, Purple (TRANS 8->82) to **#82** and the White (TRANS 6->83) to **#83** . Using blue terminals, connect the Red (TRANS 4->50) to **#50**. The Purple wire (88->BRAKE SW) connects to **#88** and runs to the cold side of the brake light switch. This wire should only have 12 volts with the brake pedal depressed.

Bag #77 DIGITAL TRANSMISSION RANGE SELECTOR : This switch is located on the left hand side of the transmission. The DTR controls neutral safety, back-up and lever position functions. We have included wires in the MLPS connector to allow you to get full use out of the switch. Connect the circuits in the switch as follows:

NEUTRAL / SAFETY: The heavier gauge Lt Blue (DTR 12 -> IGN SW) and the Purple (DTR 10 -> START SOL) wires are for the neutral safety circuit. Locate the wire that runs from the ignition switch to the starter solenoid. Cut the wire and connect the Lt Blue wire (DTR 12 -> IGN SW) to the wire running from the ignition switch and the Purple wire (DTR 10 -> START SOL) to the wire running from the starter solenoid. **NOTE:** If you are wiring this circuit to a Ron Francis Wire Works Wiring Kit, these wires will be a color for color match.

BACK-UP LIGHTS: Connect the Orange wire (BACK UP LT FEED) to a 12 volt ignition source. This wire should have 12 volts only with the key in the run position. Run the other Dk Green wire (BACK UP LTS) to the rear of the vehicle and connect it to both back-up lights. The lights must be grounded.

LEVER POSITION CIRCUIT: Run these wires to the Telorvek panel. Using the red terminals, connect the Gray wire (DTR 2 -> 36) to **#36**, Lt Blue wire (DTR 3 -> 76) to **#76,** Yellow wire (DTR 4 -> 78) to **#78,** Black wire (DTR 5 -> 77) to **#77** and the White wire (DTR 6 -> 75) to **#75**.

Bag #78 TRANSMISSION CONTROL SWITCH (TCS): The ECM has the capability to lock-out fourth gear of the transmission with a push of a button. Pushing the momentary contact switch button will lock-out fourth gear in the transmission for city driving. Pushing the button again will release the lock-out allowing the transmission to shift into fourth gear for highway driving.

Mount a momentary contact switch in dash or near the shifter lever. Connect the Red wire (51->TCS) to **#51** and the Tan wire (84->TCS) to **#84** and run both wires to the TCS switch. You may connect the wires to either terminal on the switch.

Bag #79 TRANSMISSION SPEED SENSOR: The transmission speed sensor is located on the left front of the transmission case. This sensor combined with other sensors inputs determine proper shift points and torque converter lock-up. After plugging in the connector run the wires back to the panel. Connect the Dk Blue wire (TRANS SPD SEN->85) to **#85** and the Gray wire (TRANS SPD SEN->37) to **#37**.

Bag #80 VEHICLE SPEED SENSOR: Install the connector onto the speed sensor located in the speed-ometer assembly on the transmission and run the wires back to the Telorvek panel. Using the red terminals connect the Gray wire (VEH SPD SEN->86) to **#86** and the Black wire (VEH SPD SEN->59) to **#59**.

Electronic speedometers can be connected to terminal **#86** to pick up the VSS signal. This is a standard Ford 8000 pulse per mile signal.

Bag #81 FUEL PUMP & INERTIA SWITCH: We have included the wiring necessary for the Ford inertia switch. The inertia switch cuts off the electric fuel pump in the advent of an accident. Mount the inertia switch in the rear of the vehicle in a dry area. Using the blue terminals, plug in the connector to the inertia switch and run the Tan wires (INERTIA SW->98) to **#98** and (INERTIA SW->99) to **#99** on the Telorvek panel. Run the other Tan wire (98->PUMP) to the electric fuel pump. Hook the wire to the positive terminal on the pump. From the negative terminal on the pump connect a wire and run it to a good ground.

There are two loose wires in this package of wires. These two wires only get connected IF YOU ARE RUNNING A FUEL SYSTEM WITH A FUEL PRESSURE REGULATOR AND RETURN LINE. Connect the short Tan jumper wire 95->99 to terminals 95 and 99. Then connect the Black jumper wire 94->29 to terminals 94 and 29. **AGAIN, ONLY INSTALL THESE WIRES IF YOU RUNNING A RETURN LINE. DISCARD THESE TWO WIRES IF YOU ARE RUNNING A FACTORY RETURNLESS FUEL SYSTEM.**

NOTE 1: The inertia switch has a red button on top of it that must be set (pushed down) in order for the fuel pump to operate. If the pump fails to operate check the inertia switch making sure the red button is in the down position.

NOTE 2: There are two relay sockets in the cover of the panel. The one closest to the fuses is for the fuel pump relay. Relays are not supplied with our wiring kit. The proper can be ordered locally under Airtex part #1R1061, Standard Motor Products part #RY116 or GM part #14100455.

Bag #83 DATA LINK CONNECTOR (DLC): Mount the connector inside the vehicle under the dash. We have supplied a connector cover for the connector when not in use. Now run the wires to the Telorvek Panel and using the red terminals connect the Tan (DLC 2->118) to **#118**, Yellow (DLC 16->20) to **#20**, Pink (DLC 10->117) to **#117**, Purple (DLC 13->116) to **#116** and the Black wires (DLC 4->28) & (DLC 5->28) to **#28**.

The remaining Lt Green & Red wires are for the dash mounted service engine soon (S.E.S) light. The light must be a two wire un-grounded light. Connect the Lt Green wire (115->MIL LT) to **#115** on the Telorvek Panel and run it to a dash indicator light and connect it to one of the wires running from the light. The red wire (53->MIL LT) connects to **#53** on the panel and run to the other wire running from the light. This light is not required as the light on top of the Telorvek Panel has the same function.

FINISHING UP

Connect the large pre-wired **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 pre-wired **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. If you have a Master Disconnect switch, install this wire on the battery side of the switch so it will remain hot with the Disconnect off.

The **black** ground wire from the TELORVEK Panel runs direct to the battery. Run the battery ground directly to the engine not the frame first.This includes rear mounted batteries.

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.

We're trying...

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 system we sold you.

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 Ford Motor Company Dealership with no difficulty.

Fuse Designation & Size

The harness has a total of eight fuses. Shown below is a diagram of what each fuse protects. The illustration is the front view of the Telorvek panel.

Fuse Block #1	
Fuse Designation	Fuse Size Block #1
Emission Equipment	15 AMP
Mass Air Flow Sensor	15 AMP
Left & Right Coils & Transmission	20 AMP
Left & Right Injectors	20 AMP

Fuse Block #2	
Fuse Designation	Fuse Size Block #2
Left & Right O2 Sensors	15 AMP
Emission Equipment	20 AMP
Fuel Pump Relay	30 AMP
VLCM (Fuel Pump Relay)	30 AMP

FUEL PUMP RELAY

The relay housing mounted in the cover of the Telorvek panel closest to the fuses is the FUEL PUMP relay. The relay can be ordered under General Motors part number 14100455 or Ford equivalent.

Disregard the second relay socket located below the HIGH SPEED FUEL PUMP RELAY.

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.

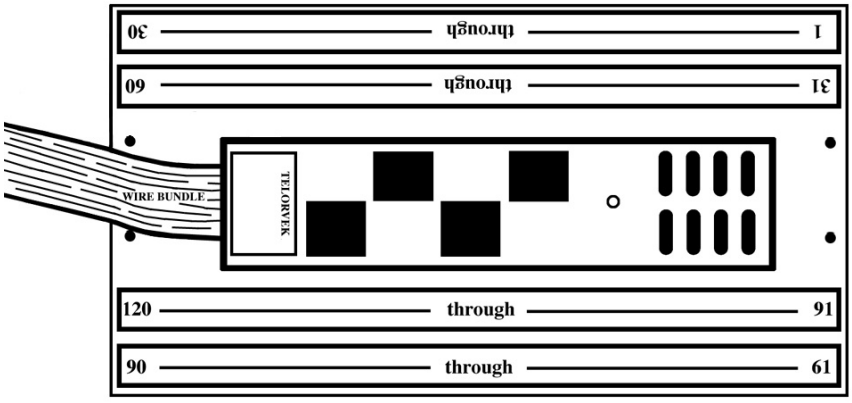

ILLUSTRATION 1: TACH ADAPTER WIRING

If using an Autometer 9117 or similar tach adapter, follow these instructions.