Conversion of a ’89–’93 MAF 5.0 Mustang EFI Wiring Harness to Standalone Operation in Another Vehicle

1. I’ll assume that you already have a place to mount your EEC and that you’ve already cut a hole in the firewall for the harness. If you haven’t done this yet, you’ll need to figure out where you want the EEC and where to cut the hole in the firewall.

2. Prior to removing any wires, I recommend you verify that you are removing the correct wire by performing a continuity check from the harness connector to the 60 pin EEC connector.

3. Removing wires from the Ford connectors is very easy. The first thing you need to do is remove the red plastic retainer. A small pick or other pointed tool and some needle nose pliers is usually all it takes to remove the retainer. Once the retainer is removed, you’ll see the metal terminals and each one will be retained by a plastic barb within the connector. Using a tiny screwdriver, carefully pry the plastic barb away from the wire terminal and pull the wire from the connector. The terminals are inserted from the wire end, so just pull on the wire associated with the terminal and it should slide out of the connector.

4. I am using a 1991 harness for reference. Ford changed some of the colors over the years. The colors referred to are what are present in my harness. Your harness may differ slightly. When a wire color is listed, the first color is the main wire color and the second color is the tracer stripe, if there is one. For example, light green/black would be a light green wire with a black tracer stripe. Some colors fade, run, or may appear to be a different color.

5. When making the modifications, it is easiest if you completely unwrap the harness. Small zip ties are helpful for maintaining the harness somewhat orderly while you are working on it. As you unwrap the harness, you can use small sip ties to hold the wires together into the same bundles they were in when they were wrapped up.

6. For splices, I highly recommend that you solder the connections and cover them with heat shrink tubing. EEC sensors use very small differences in voltage for their signals, and a bad connection can lead to a rough running engine. Don’t just twist the wires together and cover them with tape. I also do not recommend crimp connectors. For heat shrink, I suggest using the marine grade heat shrink that has an adhesive lining and is generally a little thicker – it’s the best way to keep moisture out of your connections. You can find it at marine & boating supply stores such as West Marine. Harbor Freight also sells a kit that is loaded with marine heat shrink – it works great and is the most economical.
7. Prepare your harness for installation in the car. These steps will describe what can be removed from the harness and what must stay.
   a. Items that you MUST retain:
      i. 60 pin EEC connector
      ii. Ground (3 different places)
      iii. EEC power relay
      iv. MAF connector
      v. O2 harness connector
      vi. TFI connector
      vii. SPOUT connector
      viii. Barometric pressure sensor
      ix. Diagnostic link connectors (black & gray – gray has a single wire)
      x. Ignition coil connector
      xi. +12V power connection (should have a fusible link w/ a ring terminal)
      xii. Fuel injector connectors (8)
      xiii. Throttle position sensor
      xiv. Engine coolant temperature sensor
      xv. Exhaust gas recirculation valve position sensor
      xvi. Intake air temperature
      xvii. Idle air bypass valve
   b. Items which you may remove:
      i. Emissions air dump valve solenoid
      ii. Emissions air port valve solenoid
      iii. EGR vacuum control solenoid
      iv. A/C Wide Open Throttle relay
      v. A/C pressure safety switch connector
      vi. A/C compressor connector
      vii. Canister purge solenoid connector
      viii. Coolant temperature gauge feed
      ix. Oil pressure gauge feed

8. If you do not plan on using any of the emissions control equipment, remove the connectors from the harness as follows:
a. Locate the 3 connectors for the 3 emissions control valves (Thermactor air diverter, Thermactor air bypass, and EGR vacuum control). They look like this:

b. All 3 of these connectors have a red wire which is +12V supply that comes from a splice within the harness. Unwrap the harness to locate the splice and clip these 3 red wires.

c. The remaining 3 wires are the control signals from the EEC. At the 60 pin EEC connector, remove the following wires: Pin 32 (light green/black), 33 (dark green), & 38 (white/red).

d. Locate the Canister Purge Solenoid connector: It looks like this:
e. The red wire is a +12V supply that connects to a splice in the harness just like the 3 connectors that were just removed. Unwrap the harness, locate the splice, and clip the wire.

f. The remaining wire is the control signal from the EEC. At the 60 pin EEC connector, remove the wire at pin 31 (gray/yellow).

9. For air conditioning, you have several options. If you do not have any plans of using air conditioning, you can remove the A/C connections from the harness. If you are using air conditioning and don’t want to connect it to the EFI harness, you can remove the A/C connections from the harness. The engine will run fine, but you will be removing what is known as a “feed-forward” signal to the EEC. When the EEC senses the +12V going to the compressor clutch, it anticipates the load on the engine and increases the idle slightly. Without this input, your engine might stall when the compressor engages with the engine at idle. In all reality, the engine probably will stay running, but may stumble for a second at idle when the A/C compressor engages. Above idle, this signal does not matter. The other EEC control function is WOT (Wide Open Throttle) cutoff. If the EEC senses WOT from the throttle position sensor, it will deenergize the A/C WOT relay and cut power to the compressor. This function is solely to cut the parasitic drag from the compressor at WOT so the engine can put maximum power to the transmission. The A/C compressor and engine will work just fine without this function connected. If you want to use these functions with your air conditioning, it’s easy enough to do. The following steps refer to the A/C WOT relay, pressure safety switch, compressor clutch connector, and the gray round 8 pin connector. They look like this (the WOT relay in my harness was messed with at one time – the crimp connectors should not be there):
a. If you have no plans of using air conditioning or don’t wish to use the EEC control functions for A/C, do the following:
   i. Remove the light green/purple wire from the round 8 pin connector. This wire runs directly to the pressure safety switch.
   ii. Remove the pink/light blue wire at pin 10 of the 60 pin EEC connector & the orange/light blue wire at pin 64 of the 60 pin EEC connector. These wires go to the WOT relay. An additional pink/light blue wire runs between the pressure safety switch and the WOT relay.
   iii. Follow the red wire from the WOT to the splice in the harness. Clip this wire from the splice.
   iv. Remove the A/C clutch connector from the harness. It has 2 wires – a black/yellow and black/light green. The black/yellow goes to the WOT relay. Follow the black/light green wire to the splice in the harness and clip this wire from the splice.
   v. The A/C WOT relay, pressure safety switch, clutch connector, and associated wiring should now be free from the harness.

b. If you are using A/C and want to use the control functions, it’s very easy to do.
   Do the following:
   i. Remove the light green/purple wire from the round 8 pin connector. Disconnect the power wire going to your A/C compressor clutch and connect this wire to the light green/purple wire.
   ii. If your system has a pressure safety switch, clip the existing pressure safety switch connector from the EFI harness. Connect the light green/purple wire to one terminal of your pressure switch (it does not matter which terminal). Connect the pair of pink/light blue wires to the other terminal of the pressure switch.
   iii. Connect the black/yellow wire in the clutch connector to your compressor clutch power feed. The black/light green wire is not needed if your compressor clutch is grounded through the compressor case. If your compressor clutch is not grounded through the case, you can use the black/light green wire for your ground.

10. Next will be the various gauge and warning light feeds. None of these connections run to the EEC – they are just part of the EEC harness. The 3 feeds are the low oil level sender, engine temperature sender, and oil pressure sender. You will most likely not use the low oil level sender since this was specific to the later Mustangs – the connector is in the oxygen sensor harness. The sending unit was located in the passenger side of the oil pan. You may want to use the engine temperature and oil pressure wires to feed
your gauges. Locate all of the components:

a. If you have no need for the low oil level sender, remove it from the harness. The sending unit connector is in the O2 sensor harness and has a white/pink wire. Remove the wire from both sides of the O2 sensor harness connectors and from the gray round 8 pin connector. The wire should now be free from the harness.

b. If you want to use the wires for the engine temperature and oil pressure sending units, leave them as is. The oil pressure sender wire is white/red and the engine temperature sender wire is red/white. The oil pressure sender wire is longer and should have a braided sleeve over it. Both of these wires run through the white 10 pin connector (engine harness to main EFI harness connector) and terminate in the black round 8 pin connector. Remove the white/red and red/white wires from the black round 8 pin connector. Connect the red/white wire to your temperature gauge and connect the white/red wire to your oil pressure gauge.

c. If you do not wish to use one or both of the wires, remove the wire(s) that are not needed from both side of the white 10 pin connector and from the black round 8 pin connector.
11. Now for the tachometer feed. It’s a dark green/yellow wire that runs from the negative side of the ignition coil to the gray round 8 pin connector. Remove this wire from the gray round 8 pin connector and connect it to your tachometer feed. If you don’t wish to use this wire, you can remove it from the harness. There is also a dark green/yellow wire that runs from the ignition coil to EEC pin 4 via a 22Kohm resistor. This wire must remain in place. You can remove the extra dark green/yellow wire that feeds the tachometer if you wish.

12. The vehicle speed sensor is not needed if you are running an automatic transmission and not adapting the original cruise control for use on your project. I have heard that the engine will run just fine without the VSS if you have a manual transmission. It’s primary function is to let the computer know that the car is moving above a certain speed. If the EEC senses the car moving and the engine is at idle (i.e. transmission in neutral or clutch pushed in), it will raise the idle by several hundred RPM. Once the car comes to a stop, the engine rpm should drop back its usual speed.
   a. If you do not need the VSS, remove the dark green/white wire from EEC pin 3 and the orange/yellow wire from EEC pin 6. These wires run to the black round 8 pin connector – remove these wires from this connector.
   b. If you want to use the VSS, remove the dark green/white and orange/yellow wires from the black round 8 pin connector and connect the VSS. I don’t think it matters which terminal of the VSS you connect each wire to, but if you are looking into the connector (form the end that connects to the VSS) with the rounded side to the top, the dark green/white goes on the left and the orange/yellow goes on the right.

13. If you want to use a check engine light, obtain a 12V lamp (auto parts stores have these). Connect one side of the lamp to a source that provides +12V with the ignition switch in “RUN”. For the other terminal, remove the pair of tan wires from the green rectangular 8 pin connector (they both go to the same terminal – one goes to the diagnostic connector and the other goes to EEC pin 17) Connect these 2 tan wires to the other side of the lamp. If you don’t want to use a check engine light, you can leave these wires alone. If you have the original fuel pump relay harness, you can use the tan wire in that harness instead of removing the wires from the green connector.

14. Now make sure your O2 sensor harness jumper is set properly for the type of EEC that you are using. The type of transmission doesn’t matter – the type of EEC does. If you are using an automatic transmission EEC, the jumper should connect between two pins next to each other in the same row so that the purple/yellow wire is jumpered to the white/purple wire in the main harness. If you are using a manual transmission EEC, the jumper should connect between pins in different rows so that the purple/yellow wire is jumpered to the light blue/yellow wire in the main harness. You won’t damage an
automatic transmission EEC if this jumper is wrong, but there is a very high likelihood that you will fry the pin 46 circuit board trace inside a manual transmission EEC if you have the jumper set for an automatic transmission. Check the program code on your EEC and set the jumper accordingly. The actual type of transmission installed doesn’t really matter. There have been slight differences in the O2 harness jumpers over the years, so just make sure that the wire is connected correctly in your harness.

15. If you are not using the emissions equipment, you should install an EGR eliminator plug into the EGR valve position connector in the harness. This plug will tell the computer that the EGR valve is closed at all times. If you don’t install the plug, the engine will run fine, but the check engine light will be lit constantly. EGR eliminator plugs are available from www.rjminjectiontech.com. As an alternative, if the EGR valve is still installed on your intake manifold, you can just plug the harness connector into the valve – the valve will always stay shut without the vacuum signal connection.

16. The following wires are for your power sources and grounds and must be connected to an appropriate source.
a. Remove the red/light green and the red/light blue wires from the gray round 8 pin connector.

b. The red/light green wire gets connected to a +12V source that is live with the ignition in the “RUN” position.

c. The red/light blue wire gets connected to a +12V source that is live with the ignition in the “START” position. The “S” terminal on the starter solenoid is a good place to connect this wire.

17. Find the large orange/black wire (possibly yellow for ’92-’93 models) that has a fusible link with a ring terminal. If the fusible link is missing, it would be a good idea to get a replacement (available in the electrical section of an auto parts store). The fusible link acts like a fuse and burns out when there is a short. Connect this wire to a +12V source that is always live. The battery side of the starter solenoid is a good choice. You could also go straight to the positive battery terminal.

18. There are 3 grounds. One is located near the 60 pin connector, one (may be black/light green, black/white, or black) should be near the constant +12V wire (orange/black or yellow), and the other is an orange wire in the engine harness. The ground near the constant +12V wire may have a quick disconnect that looks similar to an inline fuse holder. All 3 of these need to be connected to a good ground.

19. Now for the transmission connections:
   a. For automatics, the neutral safety switch that provides an interlock to prevent starting the car in gear also provides a signal to the EEC using the same switch. If you are using a manual transmission EEC with an automatic, do not connect this switch to the EEC wiring. If you are using an automatic transmission EEC, remove the white/purple wire from the black round 8 pin connector. If you have the original vehicle harness, this wire changes from white/purple to white/pink at the black round 8 pin connector. If you are using a manual transmission EEC and want the starter interlock protection of the neutral safety switch, removal of the jumper from the O2 sensor harness should protect the EEC.  
      i. Since automatics don’t use a clutch pedal position switch, you can eliminate the light blue/yellow wire that runs between the O2 sensor harness and the black round 8 pin connector. You can also leave the wire in place – it doesn’t matter either way.

   b. For manual transmissions, the starter safety interlock was handled by the clutch position switch mounted on the clutch pedal. Some T5 transmission had a neutral sensing switch, but this switch was not used in the starting circuit – it was used along with a second clutch position switch as a feed-forward signal so that the EEC could anticipate engine loading and increase the idle. Most manual transmissions will not have a neutral sensing switch and the car the engine is
being installed in will probably not have a clutch pedal position switch. You can add one if you wish, but it’s not necessary for the EEC. If you want to use a clutch position switch, you need a switch that is closed (completes the circuit) when the clutch pedal is fully depressed. The switch will open once you start to release the clutch pedal. When the EEC sees the loss of this signal, it anticipates that the engine will be loaded. If you don’t connect it, the engine should run just fine, but the idle may be slightly higher (I don’t know for sure). If you want to connect the switch, remove the light blue/yellow wire from the black round 8 pin connector and the black/white wire from the green rectangular 8 pin connector. Connect these wires to your clutch position switch. If you happen to be using an automatic transmission EEC with a manual transmission, don’t connect the clutch pedal switch.

   i. Connect the VSS to the transmission. The engine should run fine without it, but idle characteristics might be affected.

20. Fuel pump relay: The relay will have at least 4, possibly 5, terminals. Terminals 1&2 are the triggering coil for the relay. Terminal 5 will not be used. A connection is made between terminals 3&5 when the relay coil is deenergized, and a connection is made between terminals 3&4 when the relay coil is energized. The coil is energized by applying +12V across terminals 1&2. Terminals 1&2 are the small terminals. Terminals 3,4,&5 are the large terminals. When you look into the relay, you should see the terminals numbered. You will connect the wires listed below to the relay pigtail wire that goes to the specified terminal. You will need the following:
   - Fuel pump relay (BWD part # R647)
   - Fuel pump relay pigtail (BWD part # PT5613)
   - Inertia switch (Available at RJMInjectionTech.com)
   - Inertia switch pigtail (Available at RJMInjectionTech.com)
      a. Remove the following wires from the green 8 pin connector: Red & the 2 wires that are tan/light green stripe.
      b. Connect the large red wire to terminal #1 & #3. This wire will provide the +12V to trigger the relay coil and also the +12V to run the fuel pump.
      c. Connect the two tan w/light green stripe wires to terminal #2.
      d. Terminal #4 is the feed to your fuel pump. The inertia switch should be connected in series between terminal #4 and the fuel pump. This switch will automatically cut power to the fuel pump in the event of a collision.
      e. If you accidentally switch terminals 1&2, it’s no big deal. The relay will work either way.
      f. If you accidentally switch terminals 3&4, it’s no big deal. The fuel pump will still work.
      g. Terminal 5 is not used. You can remove this wire from the pigtail. If you leave the wire in the pigtail, ensure that it is properly insulated so that it won’t cause a short.
h. You can mount the inertia switch pretty much wherever you want. The only thing that matters is that the switch MUST be mounted vertically with the reset button on the top. If you mount the switch any other way, it may not function correctly. Mount the inertia switch in a place that is not too difficult to reach – you might have to reset it one day! You can test the inertia switch by giving it a knock with a knuckle or tapping it lightly with a hammer.

21. All the wires should be accounted for now. Install your harness & connect all the sensors. If you are using a manual transmission EEC and want to make sure you don’t accidentally fry it in the event your O2 sensor harness jumper is wrong, do the following:
   a. Remove the EEC from the 60 pin connector.
   b. Connect a voltmeter between pin 46 of the EEC connector and ground.
   c. While watching the voltmeter, crank the engine. If you see voltage (around +12V) when the engine is cranking, your O2 sensor harness jumper is incorrect. If you don’t see voltage, you are good to go!
   d. Reconnect the EEC and give it a shot!