

Inject Your Horse PART 5, THE FINISH LINE

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With the Ron Francis harness installed in "Horsing Around," Project Orange Crush getting a Painless Body harness, and my "Inject your Horse" EFI series; there are so many wires floating around this magazine, you should buy stock in the copper industry. Buckle up; we need to get all your fuel injection engines started. Calm down, you didn't miss a page or issue; we will start the engine in an hour or two. A lot of people assume there are books they need to read in order to make this stuff work. WRONG; if you've kept up these last months, you're almost finished and didn't even know it. I'll summarize the last issues to help you catch up. In the first article you were shown the different parts of this EFI system. The second article gave you a shopping guide, and compared different options. The third article was the fuel system, and last time we got some of the small details worked out. So what is left? Plug it in, run some pre-start tests, then drive the vehicle. It really is that simple, if you have the correct parts, there isn't a lot of work left.



If you have exhaust manifolds or headers ready for oxygen sensors you are even closer to the finish line. If not, you need to weld an exhaust bung into both sides of the exhaust approximately 9-12 inches from the last cylinder, or 3" behind the collector. There are oxygen sensors available for any exhaust system, instead of cutting the harness, use a longer sensor. It is a must to use new oxygen sensors in a new EFI install; they are maintenance items that wear out. Using old oxygen sensors could really ruin the computers learning curve. Clean any debris from the oxygen sensor bungs and threads then use a small amount of anti-seize when installing them.

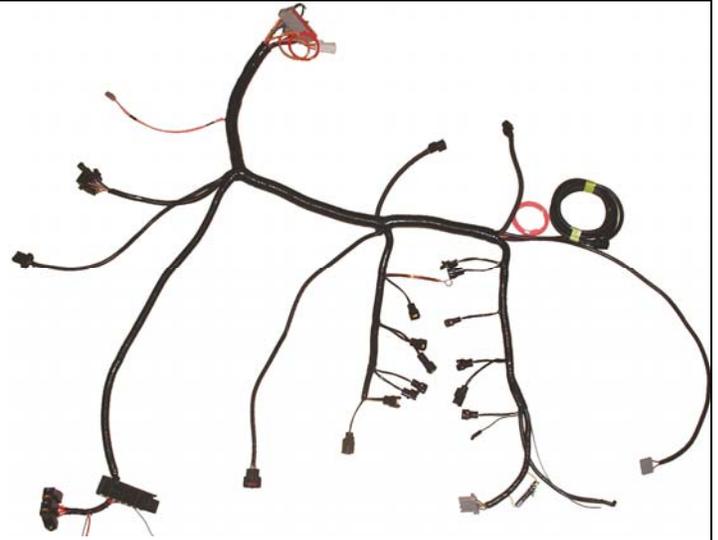
Some people go without a Vehicle Speed Sensor (VSS), which is all right. Not everyone needs one, if you have an automatic transmission. If you have a manual transmission, it could stall when you disengage the clutch. Installing the VSS is not difficult, it will help the engine run smoother when coming to a stop and sitting at stoplights. Take off your old speedometer cable, and install the old plastic drive gear onto the VSS. The typical Ford speed sensor will plug into the Dana 20 transfer case used on all early Broncos. The old speedometer cable will not plug into the VSS. You will need a cable from an early 80's full-size Bronco with cruise control.



Last time we mounted the computer behind the center speaker in the dash. So we need to locate where in the firewall to route the harness to reach the computer and other under-dash connections. The RJM Injection Tech harness is designed to enter the firewall above the heater box. Simply cut a 1.5" X 2.75" oval hole, using the template provided with the harness.

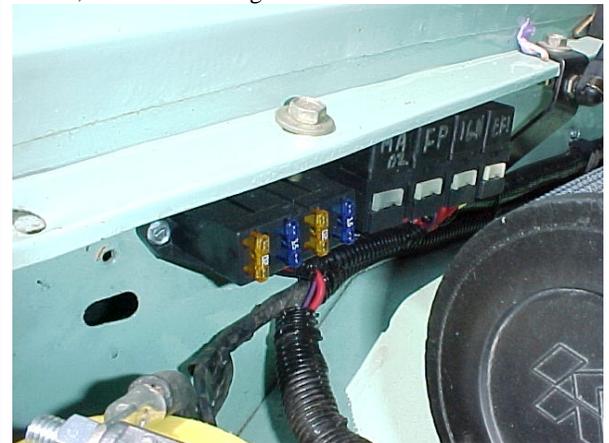


Mike Bautista has supplied us with pictures of his wife's fully-restored Bronco. He wanted the factory correct restoration look, with the best that modern technology could offer. When he learned of the RJM Injection Technologies EFI harness, he found the factory look and modern technology all in one product.



We are now ready for the wiring; the harness comes with a very detailed manual. When you lay the harness into the Bronco all the connectors are lined up near their component, and they only mate with the correct item, so the harness almost installs itself. Only the fuel injector connectors are the same, simply start in the front and you can't mess up. Mike told us that he spent under an hour doing all this. It's easier to make the first connections with the upper intake removed. It's best to start by bolting the Ground to one of the intake bolts now, rather wonder why the engine won't start later.

The harness comes with an adaptor to plug into the stock body harness. If you have an aftermarket body harness or your factory body harness is in poor condition, connect the EFI harness to the body harness with the supplied 3ft adaptor. There are only 3 wires to connect; ignition Run, oil pressure gauge, and engine temp gauge. Then, under the dash are 3 more wires; one is for a tachometer if you choose. The other 2 wires connect to the check engine light on the dash. You don't have to use a tachometer or check engine light, but they make life easier down the road. The last few connections are for power; mount the relay and fuse blocks on the inner fender, then bolt the rings to the starter solenoid.

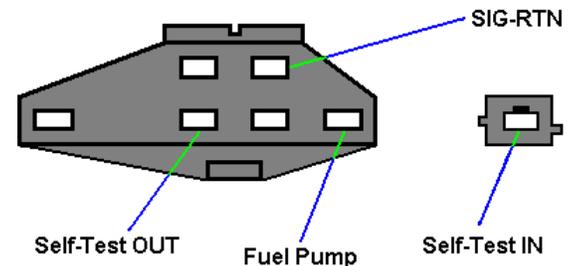


Our final budget includes a new ignition coil; they are cheap and ensure a good spark. We also bought a new speed sensor and barometric pressure sensor, not because they wear out, but they are hard to find used.

Now that everything is connected, we have a few pre-tests before we can tear up the trail. First, by running a diagnostic self-test with the computer. This will clue you in to any faulty sensors or connections you missed. Find the self-test connectors on your harness.

You can buy the tester gizmo, or count the flashes from the engine light on the dash. It's up to you and your budget. You need to document your base line codes. Most of these EFI swaps have codes, and that's OKAY! Typically there are emissions devices not connected; these do not effect performance, drive-ability, or even turn on the engine light. Only be concerned if you removed something from the computer and did not get a code. These are all the codes we got, all are perfectly normal:

- 33 - EGR valve not opening**
- 81 - Smog Pump Air Diverter disconnected**
- 82 - Smog Pump Air Bypass disconnected**
- 84 - EGR vacuum Regulator disconnected**
- 85 - Canister purge solenoid disconnected**



Next, we need to test the fuel system we previously installed. With the same self-test connectors, stick a ground wire into the fuel pump pin. With the key in RUN, the fuel pump(s) should kick on. Run the pump(s) for at least 30 seconds, this fills the filter and fuel line, and pushes any air out of the fuel rail. Checking the fuel pressure is optional, does require purchasing additional tools, but is highly recommended. On the fuel rail is a test port called a Schrader Valve. It looks and works just like a valve stem on a wheel. Perfect fuel pressure is 39PSI with the engine off. Fuel pressure with the engine running depends on the amount of vacuum it produces. 18in-Hg should produce 30PSI; make sure the vacuum is connected to the pressure regulator. Understand what the term perfect means, it means not everyone will see perfect numbers; which is OKAY! The computer will adjust to your fuel pressure by reading the oxygen sensors. So you can be a little off, however 50PSI or more is really pushing the limits of a computers ability to learn.

Now we need to set the base timing to 10° BTDC, and run the engine in varying conditions for the computer to learn. I just made it sound way too simple. To set the timing, we need to get the engine to start, which might not be easy the first time. Used parts don't always come back to life in a split-second. Fuel injectors might be gummed up, the computers is just waking up for the first time in years; lots of things can make this first run stressful. Don't give up; let the injectors warm up, let the computer learn to idle the engine, and life will get better.



To set the base timing you need to disconnect the SPOUT connector, which is near the distributor. This cuts off communication from the computer and allows you to set the base timing. Lots of people preach “set it higher for more power,” DON'T! The computer just woke up, and is now learning about all the performance parts you added to the mix. The stock 10° setting is all you need for now. Once the light is flashing on 10° BTDC put the SPOUT connector back in and tighten the distributor.

No funky computer codes? Fuel system checked out? Base timing set? Engine has oil pressure? Good, start the engine, and let it idle alone! Go take a bathroom break and get something to drink. Let it idle for at least 5minutes so it can learn how to smooth itself out. Is the vehicle legal to drive in your state? I hope so; the next step is an hour long drive around town. There is a complex “drive cycle” Ford spec'ed out for us. But I don't see how anyone can complete it as designed with stoplights and speed limits. So go for a drive, you need lots of cruising above 45MPH, a few quick stops, idling in gear at a stop light. Basically get out and drive it. As you drive, the computer will pull in all the data from the sensors; the longer you drive, the smoother it will get, the more accurate the fuel ratio will get, and the engine will run just like the factory designed it.

Now if you are building your own harness from scratch, skipping sensors, using weird fuel systems; time will add up, the difficulty level will grow, but the final cost will shrink. I'm not done with you yet; I have more knowledge to share, and some feature vehicles to show you. It's hard to find vehicles that impress, so if you think your Broncos EFI swap is in the top 5 percentile send us your information.

A9L Mass Air Computer (used)	125
GT40 Intake, Fuel rail & Injectors	250
65mm Throttle body	100
EFI Wiring Harness	550
Barometric Pressure Sensor (new)	60
Distributor (used)	20
Ignition Coil (new)	25
Oxygen sensors (new)	70
Add Oxygen sensors Bunges	12
Vehicle Speed Sensor (new)	15
Speedometer Cable	15
Fuel filter / Accumulator	70
Low pressure fuel pump	60
High pressure fuel pump	110
Fuel Line and Fittings	41
Total	1523