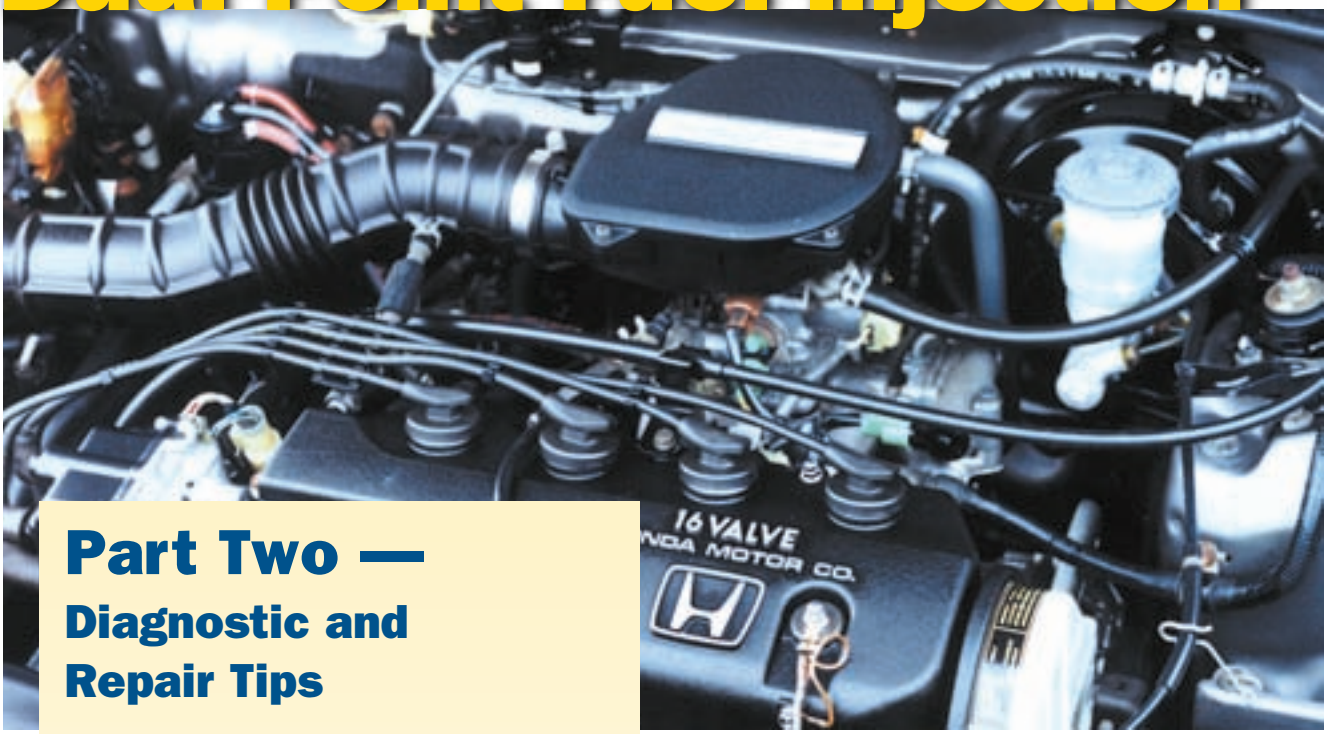
1988-1991 Honda Civic Dual Point Fuel Injection



Part Two — Diagnostic and Repair Tips

Last month we examined the behavior of a failed TW sensor on a 1991 Honda Civic. This month we'll add a few more details to the diagnosis, and explain the other components that make this system tick. How do the injectors and main relay work? Which injectors fire when? And what about that alternator control? We'll give you a complete a rundown on the Dual Point fuel injected engine's system operation, its quirks and several other things you should become familiar with.

Dual Point Fuel Injection means two fuel injectors. The injector mixer, or throttle body, houses the injectors. This may look like a carbureted model, especially if you remove the lid from the helmet on top of the throttle body and see what appears to be a choke butterfly. This butterfly has a curved cutout on the valve cover side to force air to accelerate through it as it passes in front of the main injector at slow speed or cruise conditions. This provides for better fuel atomization.

At wide open throttle, there is a vacuum diaphragm that uses ported vacuum to open the valve fully to increase airflow. The two injectors are on the front, or valve cover side of the throttle body. The auxiliary fuel injector is at the base of the throttle body, below the throttle blade. This injector uses a green plastic connector. The main injector is above it, right under the helmet, with a brown plastic connector.

Auxiliary Injector

The auxiliary injector sits under the throttle blade and fires all the time. It's the only injector pulsed at idle. Because it sits below the throttle blade, it is exposed to manifold vacuum at all times.

Unlike most throttle body cars you'll see, it runs the same higher 36-41 psi fuel pressure as its multiport cousin. The yellow/black wire is power from the PGM-FI main relay. The yellow wire goes to the PCM, where it is connected at two terminals on the white connector.

Main Injector

The main injector is pulsed while cranking, after a cold startup while the PCM keeps the idle speed up via the Electronic Air Control valve and at any throttle opening greater than idle. This usually means any throttle value greater than 0.510 volts on the TPS. The car will run if the two injector connectors accidentally get swapped, although poorly. If you just got done laying sod, you might mix up the injectors' connectors. Remember, it's green-down, brown-up on this car (refer to **Photo 1**, p. 28). The connectors on the harness and the connectors on the injectors match when assembled correctly.

Tandem Valve

This is the part that looks like a choke butterfly (refer to **Photo 2**, p. 28). Those guys at Keihin just couldn't let go of those wonderful little carburetors! The purpose of the cutout on the valve cover side is to make any air traveling into the throttle body confined and accelerated as it passes the main fuel injector nozzle. This does wonders for fuel economy during most driving modes. As the throttle is opened further, venturi vacuum acts on the diaphragm on the top rear of the throttle body, which connects to the tandem valve. Opening it allows greater air flow at wide open throttle.

Electronic Load Detector

The ELD is like having an inductive ammeter in the fuse box (**Photo 8**, p. 30) to tell the PCM when it's okay to turn off the alternator to conserve fuel or help an engine catch its breath after a cold start. Wires to the ELD include a black/yellow wire from the ignition switch (12 volts key ON), a black ground wire and a green with red stripe wire that reports to the PCM. The PCM sends 5 volts out on this wire and waits for the ELD to do something with it. You may have noticed, particularly if you just installed a new alternator, that the alternator may not start charging right after the engine is started. After about one minute, or after turning on an electrical load (headlights or rear defog), the alternator should start to charge.

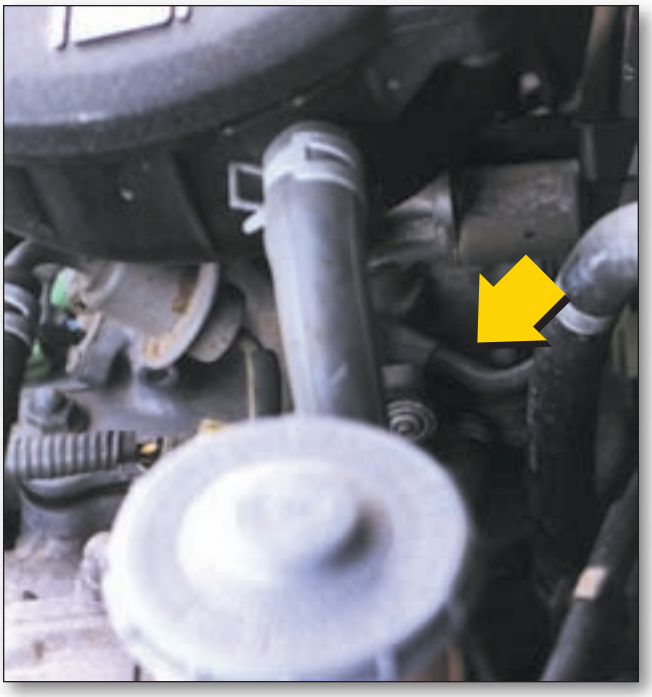
1 *This is the front of the Dual Point fuel mixer. You can see the green connector at the base of the mixer for the auxiliary injector, and above it the brown connector for the main injector. The rubber hose with the spring clamp is the fuel return line and it is attached to the fuel pressure regulator. Unregulated pressure is 36-41 psi. The large rubber hose goes from the helmet above the injector where fresh filtered air is made available to the EACV. If you have a high idle speed that slows down when this hose blocked, suspect a stuck EACV or a TW sensor commanding the engine to hold the EACV open. If the idle speed drops with the green connector at the EACV unplugged, the TW sensor or ECU is likely at fault.*

2 *The tandem valve is visible after the top of the helmet is removed. Nope, this is not a choke. There is a cutout on the forward edge of this valve, directly over the main injector. When air passes through this area at modest throttle openings, it really helps that fuel get atomized, thus making for a very fuel efficient engine.*

3 *To check injector pulse at idle, probe the solid yellow wire either at the injector or at this connector. We're reading 0.59 ms at idle on a clean-running, warmed-up engine. A rich-running engine with a lower pulsewidth may be caused by worn injectors that can't accurately control the amount of fuel sprayed when they open. I've fixed many Civics that have failed an emissions test by installing new injectors. Both injectors are available from Honda in kit form.*

4 *Just above idle the top or main injector reads 1.93 ms. Probe the solid red wire to obtain your reading. There should be no pulse on this injector at idle. If there is, inspect the base idle or more important the TPS. The red/blue wire on the TPS must read less than 0.510 volts at closed throttle with the engine running. If it doesn't, turn the base idle screw marked with yellow paint on the passenger side of the mixer, below the throttle cable.*

5 *At idle, the MAP sensor should read about 0.8-0.9 volts. This one reads 0.885 at 20.5 in.hg. Key ON engine OFF (KOEO) the MAP sensor on a Dual Point system will read about 2.9 volts. This may not be what you are used to. Honda MAP sensors use a 5 volt reference. The third wire in this connector is a sensor ground.*



6 *Hose 21 for the MAP sensor is right in the middle of this photo. It's the small hose attached to the base of the throttle body at a slight angle. The hose often cracks right at its attaching point. If it does, the MAP value will be higher than normal, and the engine will run very rich. Always compare engine vacuum to your MAP sensor reading if you have these symptoms.*

7 *The Dual Point fuel system ECU is below the glove box and under the carpet, on the sloped part of the passenger floor. When the key is ON, the LED on the side of the ECU should blink once, then go out. If you get a flashing LED with the key left ON, you have a fault code stored.*

8 *1988 and later Civics have the Electronic Load Detector. For purposes of fuel savings, and to allow a cold engine a leg up during initial startup, the ECU can turn off the alternator by grounding the C terminal (control) on the alternator connector. When the engine starts, battery voltage will remain at approximately 12.6 volts for up to one minute as long as there are no electrical devices being operated. If the headlights are turned on or if the brakes are applied, the alternator should start to charge right away.*

I have seen cases on Hondas and Acuras where the ECU failed and kept the alternator turned off indefinitely. Removing the C wire (usually blue, but check a wiring diagram for your specific model) will take the ECU out of the circuit, and the alternator will then charge like every other car out there. Here we're probing the green/red wire which reports to the ECU. The ECU sends 5 volts to the ELD, which modifies this voltage as current passes through it. It reads 2.9 volts at idle, with no additional electrical loads turned on. With the parking lights on it drops to about 1.5 volts and about 0.5 volts with the headlights on.

9 *The main relay is located on the left side of dash, just above the hood release lever. I got this one out with a 1/4-inch drive air ratchet and a short 10mm socket. There are four wires in one row of the relay connector. Each wire has something to do with yellow, either as a primary color or as a stripe. If you don't have a diagram for your particular year, remember this: On the row with four wires, one corner is hot all the time. Next is the output to the ECU. Next is a key ON input from the ignition switch, and in the opposite corner is the output to the injectors and fuel pump.*

The last wire is hot for two seconds with the key ON, should remain hot while cranking and stay hot when the engine starts. A common problem with this car is a code 16 and an occasional stalling problem or a no start. Most techs read code 16 as an injector code and start with new injectors. Most of the time, the reason the code sets is because the ECU output to the fuel pump and fuel injectors goes dead. The ECU sets a code 16 because it doesn't know whether an injector is open or the relay went bad. It just knows the ECU is powered up, but there is nothing on either injector control side. The books don't tell you that. If you get a code 16 on a Dual Point Civic, replace the main relay.

Stem To Stern

I'm pretty comfortable about the 'once over' treatment I gave the once-dying Civic, even though it took me two articles to describe the symptoms, diagnosis and cure. 'While I was in there,' I made sure the car got a new water pump and timing belt, along with the fresh set of plugs, cap, rotor and plug wires and new tires.

This Civic will be around for at least another 90,000 miles. Heck, the ball joints are still tight! Wait, what about those CV boots? They must be starting to crack somewhere, I just know it And as cold as it gets during Minnesota winters, cracked CV boots can't be overlooked. Cracked in September, open in December. I'm sure I heard that somewhere. ■

—By Marlowe Peterson