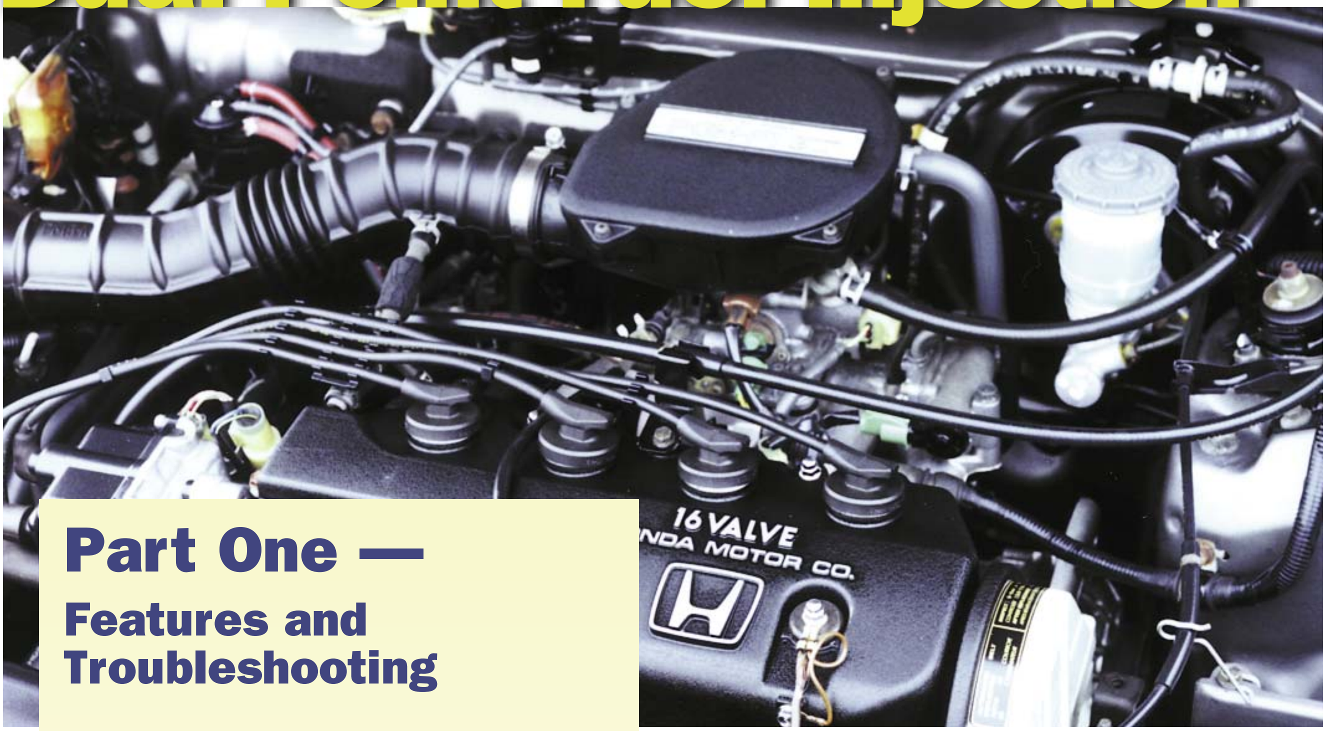
1988-1991 Honda Civic
Dual Point Fuel Injection



Part One —
Features and Troubleshooting

Honda introduced the 1988 Civic with a completely new fuel injected engine. All traces of the venerable CVCC carbureted engine were gone, and everything in the Civic line was fuel injected. The CRX and Civic Si had a multiport fuel injected engine since 1985, but a new twist came in 1988 with the introduction of the Dual Point fuel injection system. This Dual Point engine came in two horsepower configurations, with the base four-speed hatchback getting less punch than the five-speed and A/T models.

Like a lot of folks, I started wearing bifocals when I turned 40. Heck, now I have to take off my glasses to read wiring diagrams or to work under dashes. Even with my new specs, I find that it's easier than ever to miss things. I'll give you an example: I was searching for a topic for my next article, and it turned out there was a pretty good idea parked right under my nose.

It was a 1991 five-speed Civic sedan. Not surprisingly, the Civic was getting a little ornery after 191,000 miles of service. It had regularly delivered 400 highway miles from a tank of gas, which works out to about 40 mpg. It wasn't getting that kind of mileage any more, but that wasn't an all-the-time occurrence. The owner started noticing that "hey, didn't I just fill up this tank four days ago?"

There were other indications that everything wasn't working the way it had in the past. The Civic occasionally refused to restart after a hot soak. During warm summer temperatures, the idle speed also occasionally stayed very high after the initial startup or surged during warm idle. Based on the symptoms, I was pretty sure I was onto a failing TW (*t*emperature of *w*ater) sensor. But the more I poked around under the hood, the more I found.

1 *The TW sensor is on to the passenger end of the cylinder head, which makes it difficult to probe with a meter. Instead, use the large round connector above the passenger-side strut tower for meter probes. The red/white TW signal wire is on the outside of the connector. Probing here should yield 2.025 volts on an 80-degree F afternoon. The green/white wire is the ground for all of the PGM-FI sensors.*

2 *Fully warmed-up, this TW sensor is reading 0.580 volts. I waited patiently with camera in hand, but the sensor value refused to flare. But as soon as I set the camera down, I watched the value fluctuate to 3.8 volts, thus providing the evidence needed to condemn the TW sensor.*

3 *Make sure you have the right kind of socket before attempting a TW sensor replacement. The TW sensor has a built-in connector collar, which makes it difficult to remove. This one needs a 19mm deep socket with the hex flank extending all the way to the drive end. A short shoulder style is fine for removing the sensor if you don't care about destroying the old one. Installing a new one takes the deep socket. Since the sensor has internal circuits with no external ground, it's okay to use gasket sealer or silicone on the threads if you wish. Otherwise, the rubber O-ring can handle the job just fine.*

The TW sensor can be problematic. The tough part is knowing all the symptoms that point to a failed TW sensor. Then you've got to have your meters attached to the right wires at the right time to catch the right values for the symptoms when the darn thing acts up. Years of listening to customers, watching coolant sensor values, and being lucky enough to catch one 'in the act' have given me an edge.

The most common complaint I've heard is "I stopped for gas this morning on the way to work, and after I filled up, it wouldn't start." That gives me the time frame involved (about five minutes or so), with an engine that has heat-soaked from a fully warmed-up condition.

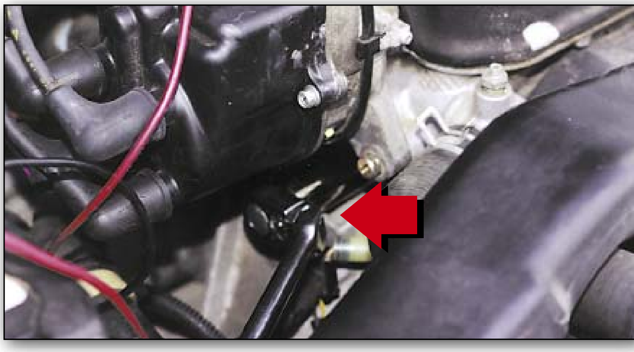
Often a meter attached to the TW sensor will read normal voltage (starting at about 2.5 volts on a 70 degree F engine). The voltage signal should decrease as the engine warms up, down to about 0.5-0.6 volts by the time the cooling fan comes on. Turn the engine off and leave the meter attached. If you can't afford to stand around and watch the engine hot soak, do something else. After five minutes have passed, try to restart the engine.

If the car will not start, the TW reading has probably risen from 0.5 volts when the hot engine was shut off to about 3.8 to 4.2 volts before turning the key to start it back up. This makes the PCM think the coolant temperature of a fully warmed-up engine is far below zero. The PCM will respond by *gushing* fuel into the engine and flooding it out — right now. I have also seen the TW voltage go from 0.6-0.7 right up to 3.2 *while the engine was running*, then settle right back to normal again.

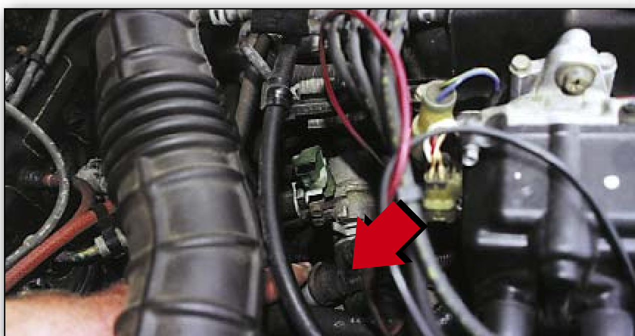
If you have one of these vehicles in the failure mode (the car won't start when hot), unplugging the TW sensor will probably allow it to start right up. This prompts the PCM to default to a simulated coolant temperature reading of about 170 degrees F. Another way to determine whether you're on the right track is to check the injector pulse-width with a 'noid light or a scope. A bright 'noid light flash compared to a dull pulse you had been getting earlier on the warm engine indicates the pulse width has dramatically increased.

This system has no fast idle valve, so the TW sensor also helps the PCM determine idle speed. On a cold engine, the PCM uses the TW input to decide how much to open or close the Electronic Air Control Valve (EACV) and maintain proper idle.

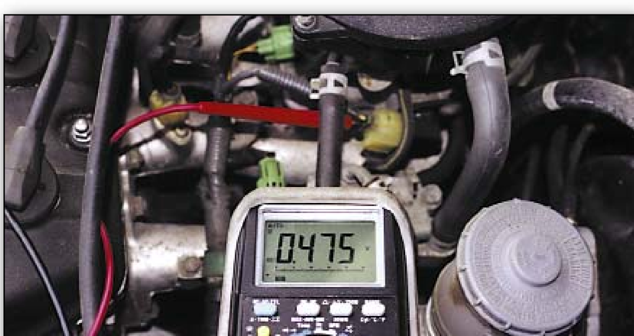
If the idle speed flares, see whether the PCM is providing a longer ground duty cycle to the EACV. Read duty cycle or dwell on the blue wire at the EACV. The black/yellow wire is a 12-volt power supply from the ignition switch. Most times, if the idle speed has just flared, or the car has started to run 'lumpy,' something has changed on the red/white wire at the coolant sensor. I've caught this a number of times. There's nothing like being sure when you tell your customer, "Yes, the car is fixed."



4 The TW sensor is under the distributor on this Civic. It's similarly located on other Hondas. To replace the sensor, loosen the radiator cap to relieve any pressure, then reinstall the cap. With the cap in place, and no pressure in the system, only minimal coolant will be lost while you swap the sensors.



5 I always do a cranking voltage-drop test on the grounds when troubleshooting Hondas. In this case, the green/white wire at the coolant sensor showed a 0.5-volt drop while cranking. I removed, cleaned and reinstalled this ground strap at the thermostat housing where the lower radiator hose attaches to the engine. Always clean this ground when diagnosing a driveability complaint on any Honda.



6 The TW sensor on this vehicle was making the idle speed flare on occasion. But even when it ran normally, the idle speed was still a bit slow and lumpy. The closed throttle value at the red/blue wire on the throttle position sensor was 0.475 volts — just a bit low. The TPS is not adjustable, but base idle is, and moving the base idle screw directly affects the TPS reading.

7 The base idle screw is on the passenger side of the throttle body, at the end of the screwdriver in this photo. With the EACV (Electronic Air Control Valve) disconnected, base idle should be around 600 rpm. The TPS value at idle is more important than the actual idle speed.

If the TPS reads over 0.510 volts at idle, the upper injector will start to spray. This will make the engine run rich, and your customer may fail an emissions test. The 0.499 volts I achieved here allowed the engine to idle smoothly once again but still be clean enough to pass the emissions test.

After shutting the engine OFF, disconnect the battery, reinstall the EACV harness connector, then reconnect the battery to clear the DTC that you set when you unplugged the EACV. When you restart the engine, turn ON the A/C (if equipped), the headlights, etc., to make sure the computer controls the idle speed to about 750 rpm or so. The engine must be running while inspecting the TPS value because there is a vacuum dashpot which holds the throttle closed at idle. Without vacuum, as on an engine that is not running, the throttle will open slightly, and the TPS value will be higher (over 0.7 volts).

That's enough for this month. Now you know what to do with a Honda that's hard to start hot. Next month I'll show you a few other key elements to expand your vision when one of these Civics shows up acting cranky. ■

—By Marlowe Peterson