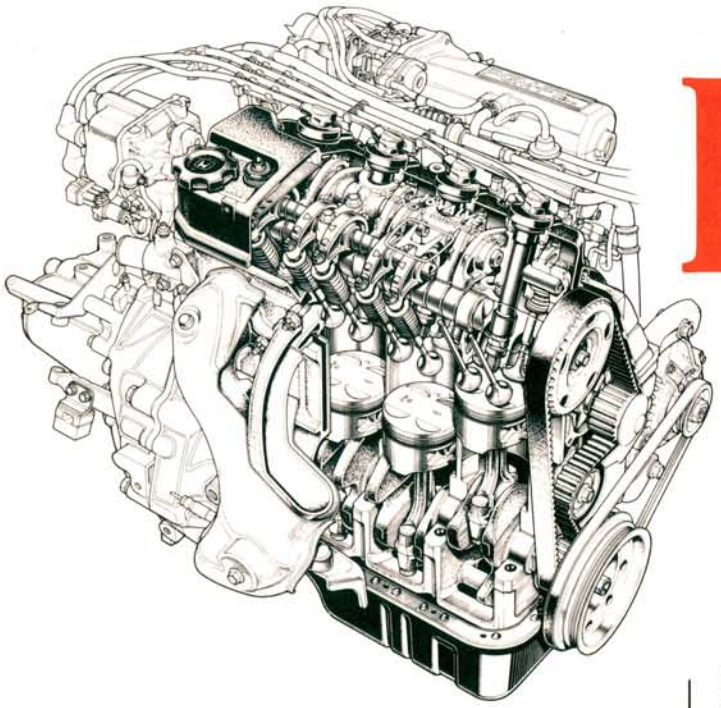


Honda PGM

PART TWO

Last month we gave you some introductory information on Honda's PGM-Fi system. This month we'll look at some specific troubleshooting tips and repair hints.

Honda PGM-Fi can look more frightening than it really is. Honda has thrown in any number of variations on the PGM theme that make it look complicated. If you think you'll memorize every single one of these changes, on every model and every year, you'd better be one of those guys who memorizes whole pages of the phone book over lunch.

But this doesn't have to lead to high anxiety if you remember that the system has a reputation for reliability, and that the tools needed to test and repair the system are few.

The Right Stuff

Getting the right stuff in terms of equipment isn't all that difficult. For example, the factory manual recommends a whopping total of six special tools as basic issue for working on PGM-Fi. That's right, six.

1) A high impedance DVOM.
2) A combination vacuum pump/gauge.
3) A fuel pressure gauge.
4) A vacuum pressure gauge.

As you can see, your tool box probably contains two thirds of the suggested dealer tool list.

5 and 6) are the factory test harnesses, one for the ECU, and another for EGR position sensor and MAP sensor tests. As we pointed out in part one of this article, the harnesses are as much a convenience as they are a necessity. Testing takes a little longer without them, and you have to be very careful not to damage wires or connectors, or to short the wrong wire to ground or voltage. But it is possible to carefully backprobe car harness connectors and make your tests.

• Most techs told us that the factory repair manuals are far better than average in terms of technical accuracy. Troubleshooting is broken down into trouble trees for individual components. While we all know the limitations of trouble tree diagnosis, the technical information that goes with these trees seems to be consistently accurate.

• After talking with many Honda technicians across the country, we came away with the impression that component failures are rare on the PGM system—even on high mileage cars. After the basics have been eliminated, the majority of failures were traced to loose or plugged vacuum hoses, bad electrical connections, damaged wiring, or to problems with fuel pressure or fuel quality. So those four "special tools" we listed are all you need to fix these cars.

• Finally. Honda has moved components around like a defensive coach moves linebackers. We'll show how the fast idle control valve moved from the right rear of the intake plenum on a 1988 Accord, to the left front on 1990 models. But it's easy to recognize in its new location, and it still does the same job. Honda has also moved the ECUs from piller to post, and used different LED designs to signal problem codes. With all these changes, it's important to remember that the PGM game plan has been consistent, even though the face has been changed to protect the innocent.

—By Ralph Birnbaum

Quick Tips

Here are some quick tips that may help you diagnose specific problems in the PGM system. The tips included here are a logical starting point that may correct the problem without lengthy diagnostic procedures. They won't work in every case, but may help you keep things simple.

Quirky Code 1, Part One

If you get a code 1 indicating a problem in the oxygen sensor circuit, don't forget to check fuel pressure as a part of your diagnostic procedure. Fuel pressure is critical to the system's operation. If fuel pressure in the loop is over 36 PSI with the engine running and the vacuum hose connected, then the pressure is too high.

Check for vacuum at the hose to the regulator. If you replace the pressure regulator, and pressure is still too high, disconnect the fuel return line from the pressure regulator. Let the line drain into a (safe, flame-proof) container and retest. If the pressure drops to 36 PSI with the return line disconnected, you'll have eliminated the regulator as a cause. The higher than normal fuel pressure is being caused by blockage in the return line to the tank.

If fuel pressure was okay, perform your normal tests of the oxygen sensor (or sensors on some cars) with a high impedance DVOM. Look for voltage to fluctuate between 0.1 and 0.9 volt at idle. If high fuel pressure fooled the oxygen sensor into triggering a fault code, correct the pressure problem. Erase the code stored in the ECU, and run the engine at about 1500 RPM for 15 minutes. This will normalize the system. Then check the oxygen sensor voltage and make sure the LED no longer flashes.

Quirky Code 1, Part Two

Once in a while, a special set of circumstances will fool the ECU into thinking there's a problem, when there isn't. A case in point happens when the car is driven at high speed for a long distance in very hot weather, and then allowed to heat soak after shut down. When the car is restarted, pressurized fuel vapor in the charcoal canister may be drawn into the intake too quickly. This flood of extra fuel can fool the ECU into thinking there's a more serious fuel mixture problem. It will turn on the check engine light, and store a Problem Code 1.

Before you spend an afternoon on a wild goose chase, erase the stored code, and test drive the car. Those warning lights may have been a false alarm.

Tach-less Idle Speed Adjustment

Here's a quick way to adjust idle speed on pre-1986 cars, without using a tachometer. Place your hand on the Idle Control Solenoid Valve. With the engine at normal operating temperature, and all accessories turned off, the valve should not pulse or click at idle.

Use the idle bypass screw to adjust idle speed until the Idle Control Solenoid Valve just stops clicking, and you're done.

If the valve wasn't clicking when you started, and you want to double check idle speed, simply turn the idle bypass screw until the clicking starts, then turn the screw the other way until it stops.

Civic Ground Connection

A bad ECU ground connection at the thermostat housing on 1988 Civics can cause problems ranging from ignition misfire (or no fire) to an erratic tachometer. It can also trigger any number of fault codes. If you're getting Problem Codes 1, 8, 16, or 20 flashed at you, clean and tighten the ground terminal at the thermostat housing and retest.

• **Accord/Prelude stumble right after start up**. Honda describes a one- to two-second stumble after start up as a normal condition. Lightly revving the engine will normalize things if nothing else is wrong. If this condition is worse than normal on an intermittent basis, don't rule out the possibility that dirty or very volatile fuel is the cause. Also check for a pinched MAP sensor hose.

• **1988 Civic no-start**. The main power supply relay on these cars is located under the dash to the far left. Originally, the open end of the relay where the harness plugs in faced upward. If the vehicle was ever damaged in an accident or has a water leak in that area (a loose antenna lead?), the relay will fill with water and drown. A no-start will result. Honda replacement relay P/N H/C 2907640 has a connector face that points to 6 o'clock instead of high noon to prevent a rerun.

• **1989 Prelude flashes Problem Code 16**. Check for a loose or high resistance connection at the connector to the injector resistance block. Sometimes, disconnecting and properly seating the connector will eliminate the problem.

• **1987 LXi no-start**. Check to see if the number 1 fuse is blown.

• **1987 Civic hesitates on cold acceleration**. The number 8 vacuum hose may be pinched. The preheat door on the air intake isn't working properly, causing intake icing.

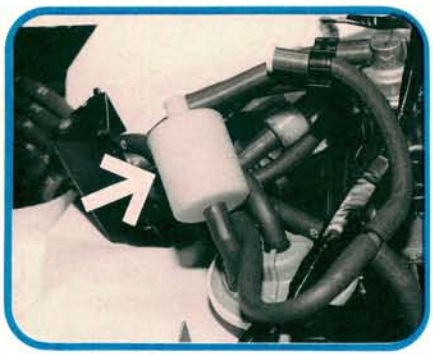
• **1986 Accord stumbles or bucks on deceleration only when the air conditioner is turned on**. This may be caused by an improper adjustment of the base idle.

• **Checking EGR vacuum**. Since the EGR position sensor tells the ECU when the EGR is NOT working, a blocked vacuum supply means a trouble code. Those of you tempted to retrofit vacuum lines to EGR valves with ball bearings or golf tees, beware. Here's a quick test for EGR vacuum that may save some time.

Assuming that the vacuum hoses are all open and tight fitting, connect your vacuum gauge to the number 16 vacuum hose to the EGR valve. Let the engine idle. Find the number 17 hose from the control box. Pinch it shut. The vacuum gauge should read 6 inches of vacuum within one second after you pinch the hose. If not, there's a problem with a pinched hose or plugged air chamber. (The air chamber is the white plastic chamber connected by a black vacuum hose to the EGR vacuum solenoid.)

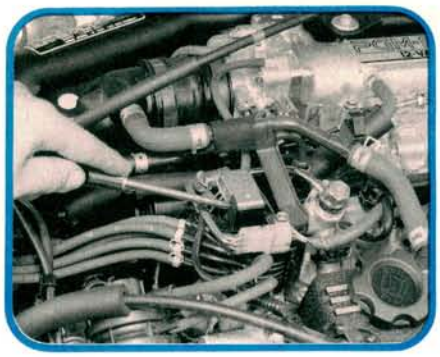
Vacuum readings were okay? Still have a problem code? Disconnect the connector at the EGR solenoid valve. Apply 12 volts to the black/yellow terminal on the solenoid. Ground the other side of the solenoid and repeat the test.

If you still don't get 6 inches of vacuum, the EGR solenoid has probably given up the ghost.



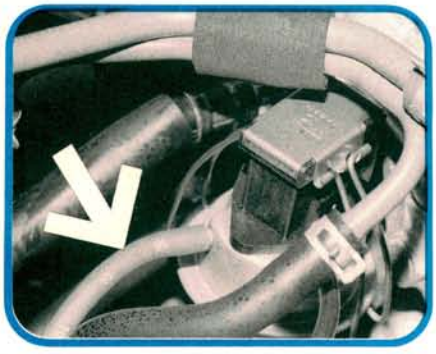
1

We pulled the control box on this Accord, opened it up, and flipped it over so you can see what the air chamber looks like. Vacuum to the EGR must pass through the chamber, but it has a small orifice, and can become plugged with debris. (Note the numbering on the vacuum hoses.)



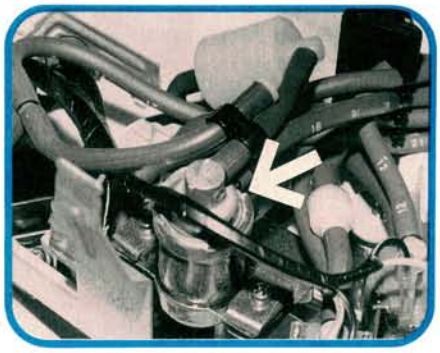
2

The Honda's EGR has a position sensor that sends a message to the ECU. The ECU compares this message to other input signals, decides how far it wants the EGR to open, and then controls vacuum to the EGR with an EGR solenoid valve.



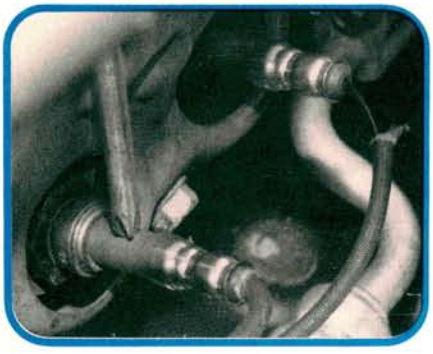
3

Checking EGR valve operation is not all that different from checking other EGR valves. Start by pulling the number 16 hose to the EGR valve. Use your vacuum pump to check the valve. The valve should hold vacuum, and the engine should stall at idle, just as it would on any other car.



4

To check supply vacuum to the EGR, pull the number 24 vacuum hose from the throttle body and connect a vacuum gauge. If there is no vacuum, either the hose is kinked shut, or the vacuum port is plugged. Vacuum from this port must pass through the EGR vent solenoid to reach the EGR valve.



5

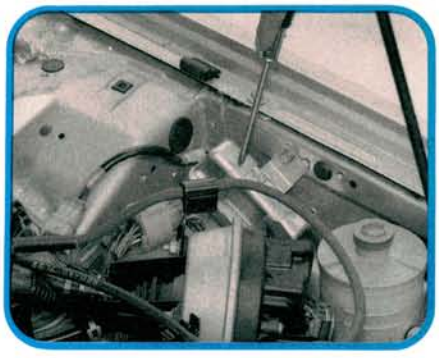
One possible cause of a problem code 1 can be a simple fix. Some cars have two oxygen sensors, and since it's possible to reverse the connectors for the two sensors, a code 1 may flash if the leads are reversed. The connectors are color coded, one green and one white. Reverse the leads and retest.

6

As noted, fuel pressure tests are critical when diagnosing a problem car, since the correct fuel pressure is vital to system operation. The Honda fuel pressure gauge screws into this fitting in the fuel filter. A threaded adapter and your standard fuel pressure gauge will put you in business, however.

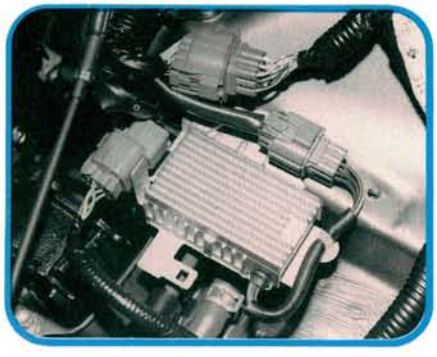
7

Nobody likes a face full of gas. To minimize the amount of spilled gas when you disconnect the test port at the fuel filter, crack the fill cap briefly. Even if you relieved the pressure at the fuel rail, there may still be enough tank pressure to keep forcing fuel through the feed line.



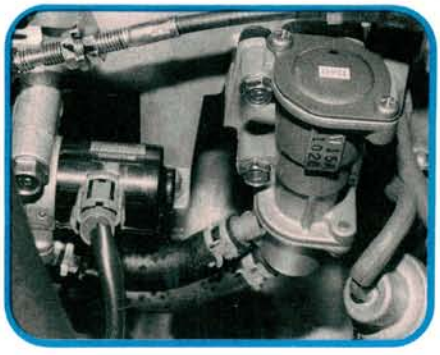
8

The next three photos show how changes in component appearance and location can cause some confusion. The resistor for the injectors on this 1988 Accord is bolted to the left front inner fender. Power from the main relay passes through the resistor block on its way to the injectors.



9

The resistor on this 1990 Accord is different in appearance from the one in our last photo. To check either style, disconnect it from the car harness. Alternately check between the "A" terminal (red wire) and each of the four remaining terminals to the injectors. Look for 5-7 ohms. Replace a resistor out of specs.

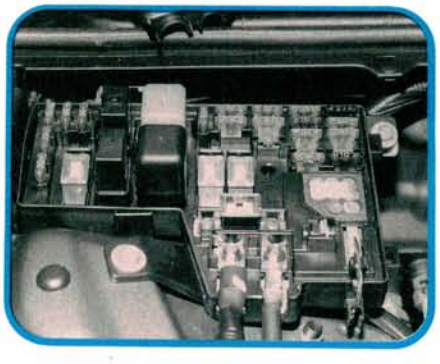


10

The fast idle control valve shown in photo 7 of last month's article was attached to the back of the intake plenum next to the throttle angle sensor on a 1988 Accord. Now it moved to the front of the plenum, next to the EACV. It still does the same job, it just moved. Don't be fooled.

11

This is a sample of a Honda breakout harness. The open ended plug is nothing more than a series of test points for ECU volt/ohm checks. Unfortunately, one harness won't fit all Honda ECUs, and they're not cheap. Use only a high impedance DVOM when testing, whether you use a test harness or backprobe.



12

Erasing Problem Codes from the ECU memory can be done in two ways. You can either refer to the repair manual for the car you're working on (they're not all the same), or you can disconnect the main battery cable for ten seconds. The battery cable method also erases the radio presets, however.