

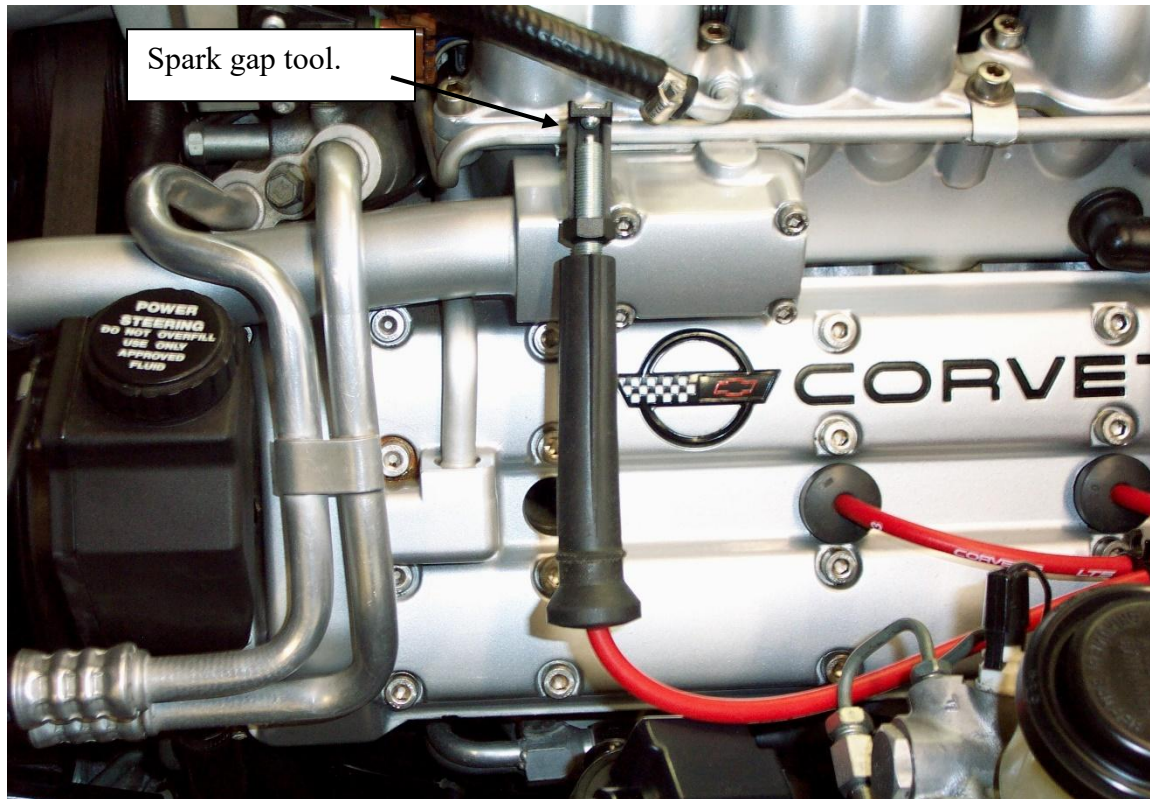
LT5 Specific Diagnostic Processes

These are three of my recent more interesting diagnostic encounters.

1. The Engine Cranks but Will Not Fire.

Recently we were starting an engine after some major repair work. I test drove the car before beginning the repair. The engine ran normally during the incoming test drive.

After the repair, the engine would crank but not fire. We checked for a spark with a spark gap tool. The spark was ¼" long and blue. No problem there.



We installed a fuel pressure gage and observed that the fuel pressure was normal with the pressure spiking to 50 psi and holding at 45 psi after turning the ignition key on. This is from the prime cycle. The fuel pumps turn off after two seconds.

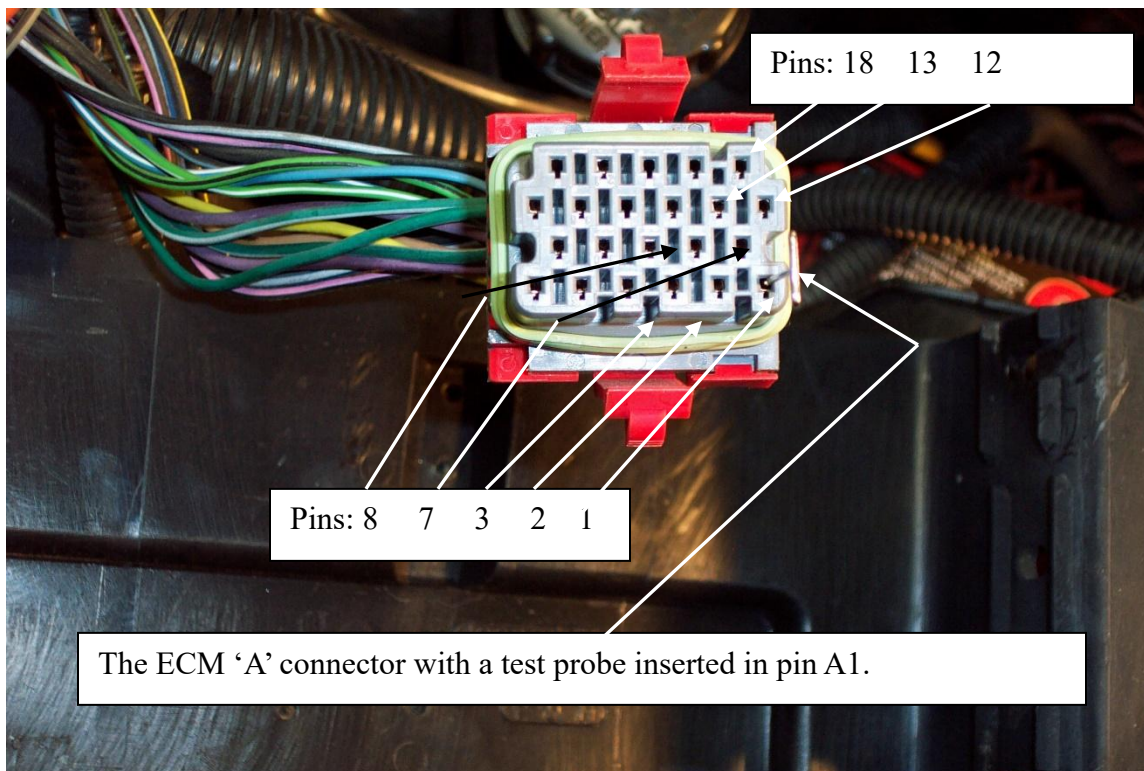
When connecting the gauge, we noticed that the fuel smelled stale. More like kerosene than gasoline. The car had been with us for six months. We removed most of the fuel and added fresh fuel. The engine still would not fire.

Next, the question was, are the fuel injectors spraying? This was a '95 car and it is easy to access the fuel pump fuses. We pressurized the fuel rail by turning the ignition key on and removed the easy to reach FP1 and FP2 fuses. When the engine was cranked the fuel pressure did not go down. This indicates that the fuel injectors were not spraying during cranking. To run this test on '90 to '92 cars the FP2 fuse is under the right hush panel. I think that it is easier to remove the

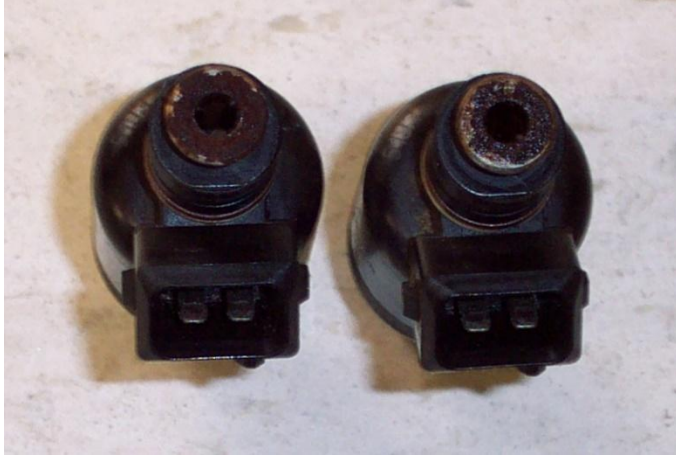
boot from around the fuel filler cap and disconnect the fuel sender cable than to remove the hush panel to access the FP2 fuse.

Is the ECM not pulsing the injectors or are they clogged? We ran a fuel injector spray test. Test the fuel injectors by pressurizing the fuel rail and spraying them.

Remove the 'A' connector (yellow on '90s, gray on '91 – '95) from the ECM. Turn the ignition on. Then ground the individual primary fuel injectors via connector pins 1,2,3,7,8,12,13, and 18. Be very gentle when touching the pins. If a test lead is jammed into the pin the spring will yield and the pin will fit loose on the ECM. Caution, a loose fitting connector pin can send you to intermittent electrical problem hell. In a quiet shop, listen for a click as the fuel injector opens and hear the fuel spray. If a fuel pressure gauge is attached to the fuel rail you should observe that the pressure drop is the same for each injector flow.



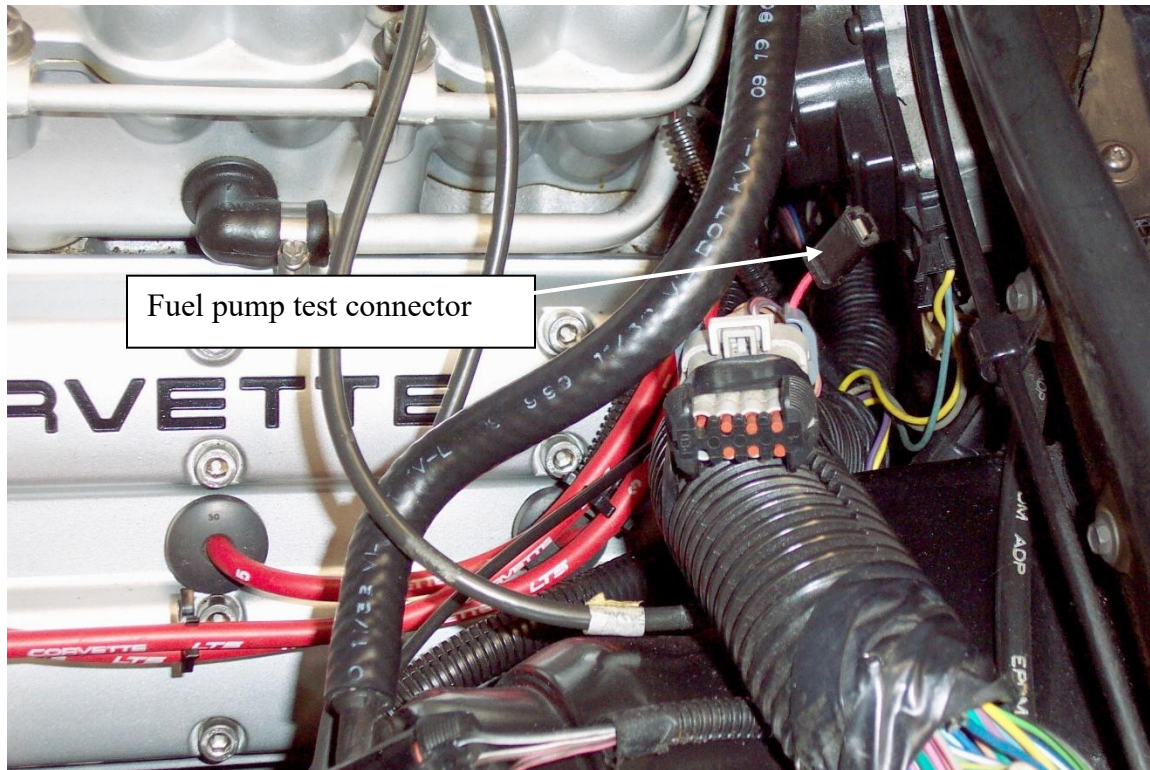
We discovered that six of the fuel injectors were not spraying. Two fuel injectors had very low flow. We removed the fuel injectors and found them severely rusted on the inlet side.



New fuel injectors were installed and the engine fired and ran normally.

2. Strategies For Testing the Fuel Pumps.

On cars built after about 1990 VIN 400 there is a fuel pump test connector near the wiper motor. It has one red wire. If it is connected to the battery's positive terminal, both of the fuel pumps will be driven. For convenience we normally use a current clamp probe on the fuel pump test connector circuit. Each OE pump draws 3.5 to 4.5 amps so if seven to nine amps are drawn it is likely that the pumps are operating normally. A meter can be connected in series with the connector to measure the current. 1990 cars with a VIN less than about 400 will have the fuel pump test connector buried next to the right side of the battery. The connector can be very hard to find on these cars. To test the pumps, see the section below.



Testing the pumps individually

On '90 to '92 cars the individual fuel pumps can be driven from the FP1 fuse. Remove the FP1 fuse. Applying battery power to the FP1 fuse block pin closest to the front of the car will drive the primary pump. Applying battery power to the FP1 fuse block pin closest to the rear of the car will drive the secondary pump. In a quiet shop you will be able to hear each pump run. The FP2 fuse is located under the right hush panel on the '90 to '92 cars. Check it if the secondary pump does not run. To protect the car, the battery power source wire that you use should have a 10 ampere fuse.

On '93 to '95 cars there are FP1 and FP2 fuses in the fuse panel. To test the individual pumps, verify that the fuses are good and then apply battery power to the little exposed metal part on top of each of the fuses.

At the fuel sender the primary pump has a grey wire. The secondary pump has a green/black wire on '90 cars. On '91 and '92 cars the secondary pump has a light green wire.

3. A Very Unusual Problem, and How I Got Lucky.

This car was in for engine repairs. There was also a request to repair intermittent operation of the HVAC. The HVAC button panel display would show --- when it was malfunctioning.

After the engine repairs some fine tuning of the fueling was needed. After driving for a few minutes, the idle speed increased from the programmed 750 to about 1000 rpm. I noticed that the IAC count was rapidly varying from 30 to 40. The IAC count should be zero when the idle speed is higher than the programmed value. Since I was doing full load fuel tuning, I ignored the

problem because the idle control has no effect at full throttle. I went on and completed the full throttle fuel tuning.

I took a closer look at the idle control problem and noticed that the idle was normal until the engine went into closed loop fuel control. In closed loop the idle was much too high and the IAC values were varying wildly.

I installed a new IAC valve and there was no change. I have heard of a defective alternator creating electrical noise that disrupts the engine control system. I unplugged the alternator control cable from the alternator to turn it off. There was no change with the IAC problem. Next, I installed spare engine control computer. No change. Now what! The end of the day had arrived and I planned to continue the next day.

Morning came and so did rain. I do not test drive in the rain so I decided to repair the HVAC problem.

The HVAC control panel was responding to the buttons and displaying the temperature as it should. After about two minutes, the --- appeared on the LCD display. The button panel displays --- when the communications link between the button panel and the HVAC computer, known as the Programmer is not working. The Programmer often fails when the electrolytic capacitors age out. I noticed that a low-level screeching sound was emitted by the Programmer during the malfunction.

I replaced the four capacitors and the Programmer and the HVAC system returned to normal operation. I hope that it is good for another 28 years.

Now it was time to go back to the IAC problem. Amazingly, it was gone.

In conclusion, it seems that the electrical problem with the Programmer power supply was interfering with the engine control system. The electrical noise was causing the IAC system to malfunction after the engine went into closed loop fuel control. It is interesting to observe that the Programmer module is located on the fiberglass firewall above the accelerator pedal. About two inches forward lies the engine harness that contains the IAC control wires. Strange but true! Boy did I get lucky.