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Shift Problems Traced to Injection Pump

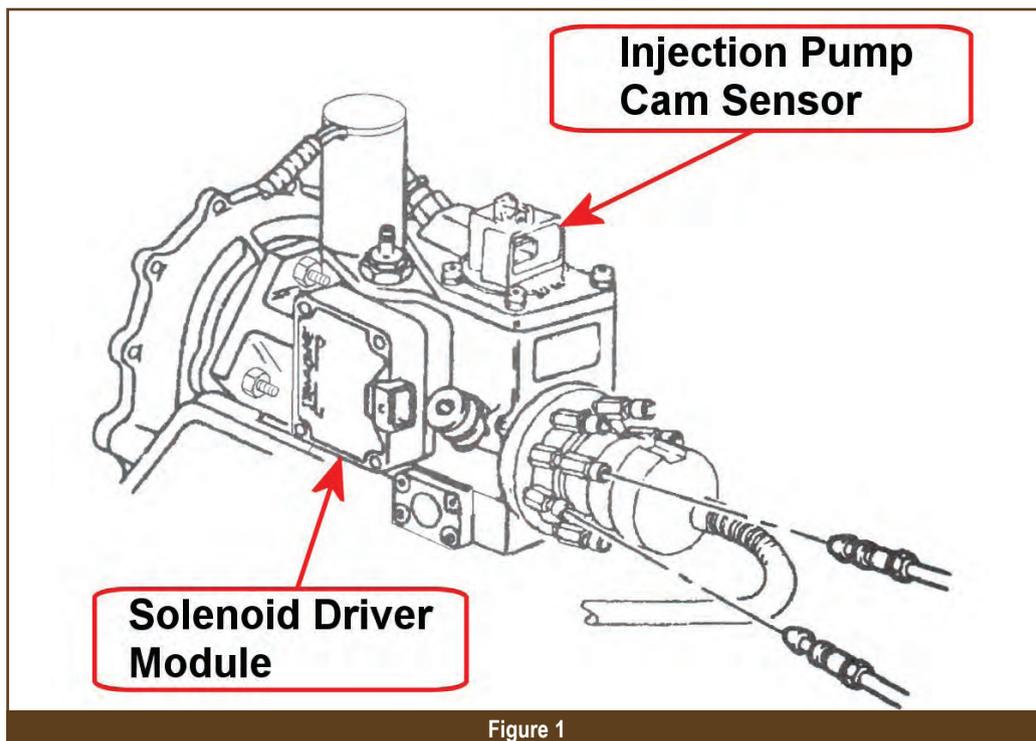


Figure 1

...It can never hurt to disconnect the battery feed wire to the alternator as a quick test to eliminate it being the cause. Alternator EMI is an all-too-common problem on many vehicles...

Shifting complaints can be cumbersome. Even worse sometimes is trying to interpret the customer's complaint. Does it happen all the time? Hot or cold? And then there's the inevitable, "well I'm not sure." This is where you come in. You have to determine the real problem using the tools necessary to identify and repair it.

We had a 2001 Chevrolet 3500 Van in our shop with a shift complaint. The vehicle was equipped with a 6.5L diesel and a 4L80E transmission. At one point or another we've all had this unit in the shop. This one had an erratic shift during the 2-3, 3-2 and 3-4, 4-3 shifts.

After some initial questions we learned it had an intermittent hard shift when the throttle is at 25% or higher.

It's also hard starting in the morning; it cranks for a long time before it starts. A quick check revealed no codes stored in memory.

During the test drive, the scan tool data revealed that the PCM was commanding the erratic shifts. This particular vehicle is equipped with drive-by-wire Accelerator Pedal Position Sensor (APPS); no TPS.

We checked the APPS signal: no problems. We also know that a failing alternator can create electromagnetic interference (EMI), which can cause a ton of different, problems, including erratic shifts.

It can never hurt to disconnect the battery feed wire to the alternator as a quick test to eliminate it being the cause. Alternator EMI is an



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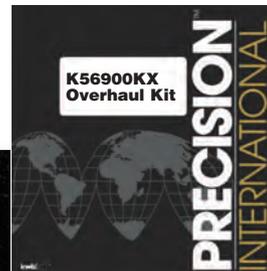


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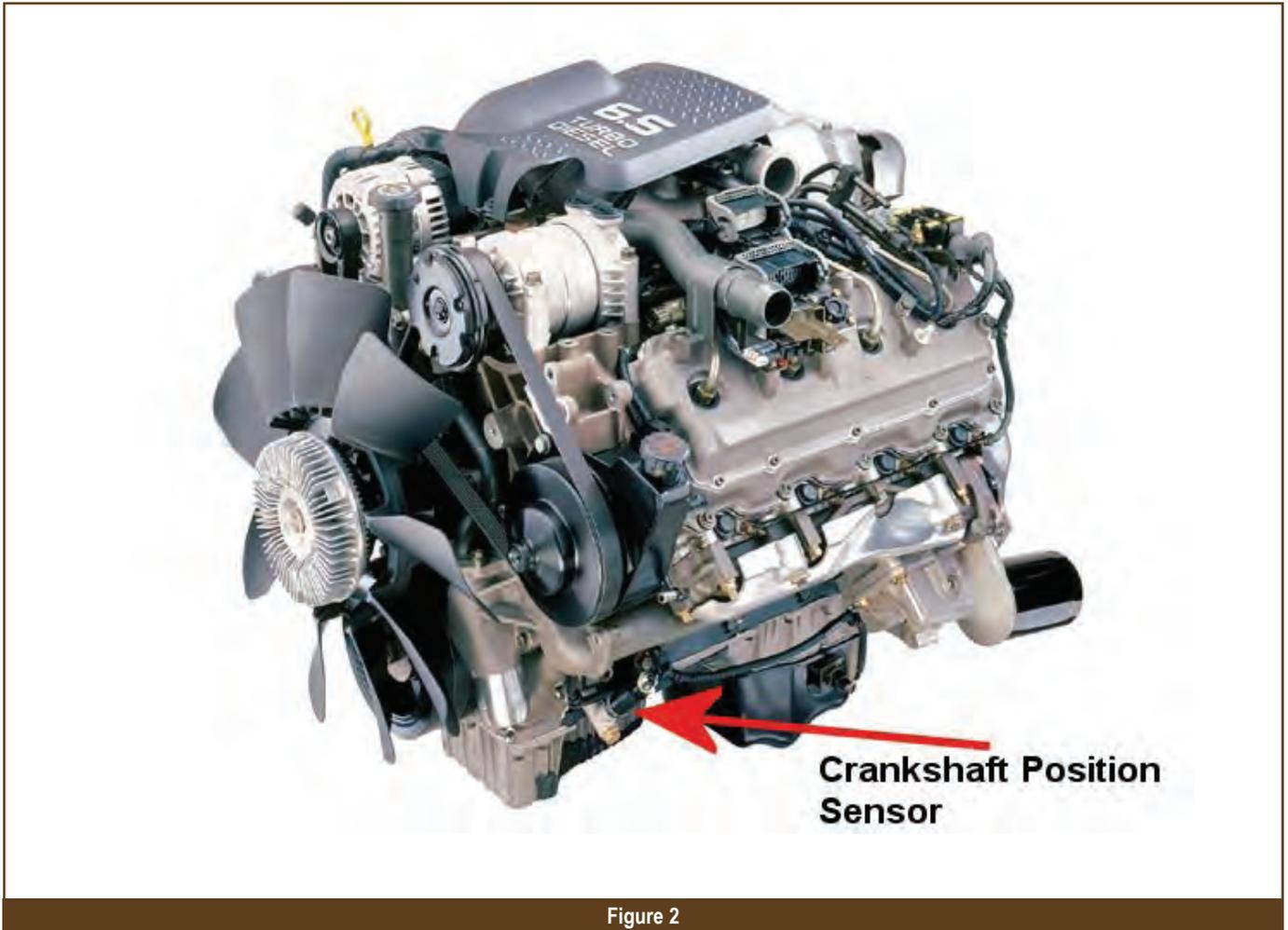


Figure 2

all-too-common problem on many vehicles, foreign and domestic. The HotLine logs calls almost daily on speed sensor signal problems caused by EMI, due to faulty sensor grounds.

Unfortunately it wasn't that easy. In this case the same symptom was caused by the Pump Cam Optical/Fuel Temperature sensor. This sensor is mounted on top of the injection pump. According to General Motors, the Injection Pump Cam signal is an optical sensor that receives a 5-volt reference signal (Figure 1).

This signal allows the PCM to measure fuel injector pulse ring RPM and position, which is used to control fuel injection timing on start up. The PCM also compares this signal with the Crankshaft Position (CKP) sensor for diagnostic purposes (Figure 2).

As a quick test we decided to get the vehicle running and then disconnect the Pump Cam Optical/Fuel Temperature sensor. Then we drove the vehicle; the problem was gone, so we replaced the sensor. The Pump Cam

Optical/Fuel Temperature sensor comes with the injector pump.

Another Chevrolet 6.5L diesel van was experiencing no line rise. We performed a pressure test and verified the condition. Oddly enough, when we performed a stall pressure test (brake torque), the line rise was perfect. But as soon as the wheels began to turn about 5 to 7 MPH, line pressure wouldn't rise above 60 PSI (base line pressure).

We checked for codes and looked at scan data. The EPC was being commanded properly. Again we checked the APPS, Temperature Sensor, Pump Cam, and Crankshaft Position sensors for abnormal readings. The only readings we suspected were from the Solenoid Driver Module.

The PCM receives signals from the Accelerator Pedal Position (APP), Temperature, Pump Cam Optical/Fuel Temperature, and Crankshaft Position sensors. The PCM uses these signals to control fuel flow through the Fuel Solenoid and Fuel Solenoid Driver, and to control line rise for the transmission.

We replaced the Solenoid Driver Module and solved the problem. This has also been known to happen with a new Fuel Solenoid Driver right out of the box. Just because it's new doesn't mean it's good, and the driver can be faulty without causing any noticeable engine driveability issues.

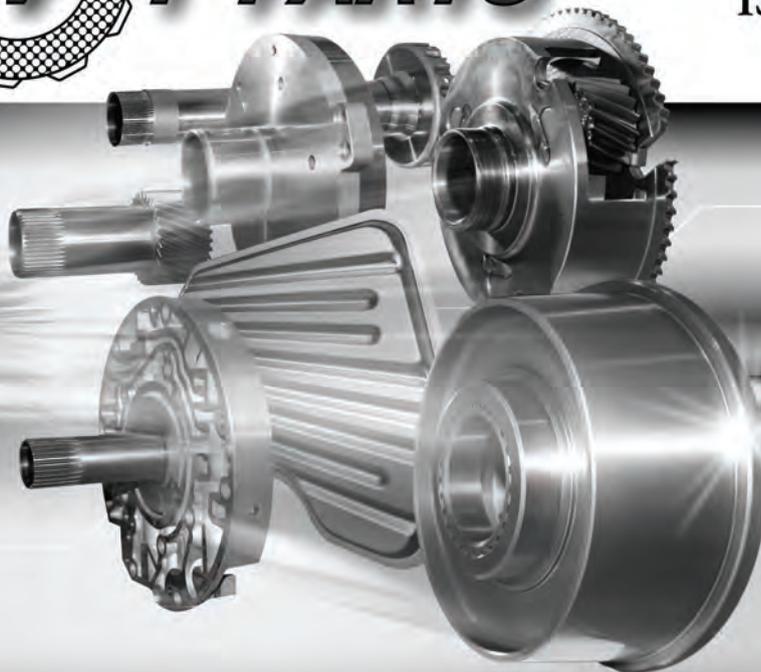
The Solenoid Driver Module is available through the aftermarket with a pigtail harness to relocate it to the firewall. The fuel injector pump assembly, sensors, and module are located where they can become quite hot.

The long and short of it is that these problems, even though not all that common, were both caused by problems from the same general area: the injection pump. Where heat can cause problems, having a thorough understanding of the systems and following a clear diagnostic routine will help you track down even the most unlikely situations.





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