

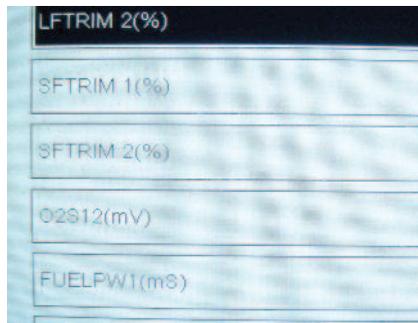
Five Things to Remember About Pulse-Modulated Fuel Pumps

Just this summer, I experienced a situation in which the fuel pump had been replaced four different times on a single vehicle with no result because the various repair shops attempting to repair the vehicle didn't understand how to diagnose a pulse-modulated fuel delivery system.

Instead of a defective fuel pump, the problem was caused by a defective electronic fuel pump control module (FPCM). So it's no stretch of the imagination to find yourself, as a parts professional, dealing with unjustified warranty returns on similar pulse-modulated fuel delivery systems. With that said, here are five things you should know about selling parts for pulse-modulated fuel delivery systems:

1 Supply And Demand: Conventional electric fuel pumps constantly operate at 100 percent capacity, which wears the fuel pump out relatively early in the vehicle's life. To remedy this situation and establish more accurate fuel control, engineers designed a fuel pump that runs on electrical impulses rather than a steady current. Running the fuel pump on electrical impulses not only allows the Powertrain Control Module to control fuel pump speed and pressure according to engine demand, it also extends fuel pump life and reliability.

2 System Identification: Pulse-modulated systems can be identified because they generally have no external Schrader valve port for testing fuel



pressure. Instead, when the technician connects his professional scan tool, he will usually see fuel pressure as a data display transmitted from an electronic fuel pressure sensor located on the fuel injector manifold or "rail." In addition, he will observe the "duty cycle" or the length of pulse modulation available at the fuel pump.

3 Pulse Modulation Principles: The basic operating principles of pulse-modulated fuel pumps are relatively simple. When the PCM senses that the engine is demanding more fuel, it commands another key component, the fuel pump control module (FCM), to increase the fuel pump speed by increasing the length of the electrical pulses being sent to the fuel pump. Similarly, when engine's fuel demand decreases, the length of the electrical pulses sent to the fuel pump is decreased as well. Electronically managing the fuel pump speed and fuel pressure through pulse

modulation is a convenient method for helping the fuel injectors to efficiently meet minimum and maximum fuel demands.

4 Fuel Delivery Diagnostics: Most failures in a pulse-modulated fuel system are instantly recognized by the on-board diagnostics built into the engine's Powertrain Control Module (PCM). The on-board diagnostic process is basically simple. When the PCM senses that a longer than usual pulse width is required to meet a commanded fuel pressure value, it stores one or more diagnostic trouble codes in its diagnostic memory indicating that the fuel pump isn't performing at its commanded level. Keep in mind, of course, that a common failure such as a restricted external or in-tank fuel filter or pinched fuel line also can store these and other trouble codes in the PCM's diagnostic memory.

5 Selling Pulse-Modulated Parts: When you're selling to a retail customer, remember that conventional fuel pump testing methods won't work on pulse-modulated fuel pumps. Consequently, pulse-modulated systems can be accurately diagnosed only by using a professional scan tool to recover diagnostic trouble codes and perform specified testing procedures, such as bi-directional pump control. Last, remember that, while the aftermarket might supply the fuel pump, the FCM itself might be a dealer-only item. In any case, modern fuel pump testing is best left to the hands of a qualified service professional. **CM**