

## Silent Diesel

OK, so maybe it's not silent, but you may have noticed that the Dodge 6.7L High Pressure Common Rail (HPCR) Diesel is much quieter at idle than the older diesel system. You may or may not know why the older system diesel engine was so noisy at idle. With the mechanically injected system, injection was timed by adjusting or turning the pump housing. At higher engine speeds, fuel has to be injected into the cylinder early enough so that combustion is finished as the piston reaches top dead center (TDC) or slightly after TDC. At idle, piston speed is much slower so that combustion is finished sooner and the piston is still traveling upward in the cylinder. This produces very high peak cylinder pressure and causes the knock that is characteristic of a diesel engine at idle. With electronically controlled injectors, the injectors are pulsed up to five times per four-stroke cycle. There are two pilot injection events, one main injection event, and two post injection events. But there is much more going on here besides a quieter idle.

The two pilot injection events slightly raise the pressure in the combustion chamber before main injection occurs. This shortens the delay of the combustion of main injection, reducing peak combustion pressure at idle, and causing the reduction of noise. Pilot injection also reduces diesel particulates in the exhaust.

Main injection occurs after the pilot injection events, and provides the major amount of the torque and performance of the engine. The Engine Control Module (ECM) varies the amount of fuel injected according to the various inputs.

Post injection 2 injects a small amount of fuel during combustion and causes any soot to burn off. Post injection 2 also adds slightly to the torque of the engine. Post injection 1 occurs 40 degrees or later after TDC. It does not add to the torque of the engine but adds hydrocarbons to the exhaust needed to raise the temperature of the catalyst to cause an exothermic reaction. This exothermic reaction further raises the temperature of the exhaust gases to trigger the regeneration of the diesel particulate filter. Regeneration is simply the burning of particulates trapped in the diesel particulate filter.

The beauty of this system is that the ECM can monitor the power pulses of individual cylinders and increase the amount of fuel to the weaker cylinder. Each injector is calibrated and coded. This code number must be entered into the ECM. If a new ECM is installed, these numbers need to be read with a scan tool and recorded before removing the old ECM. If this cannot be done, the valve cover needs to be removed and the codes read off each injector.

That is a brief description of this diesel system that is not only much quieter but also a much cleaner burning diesel engine. If you need any diagnostic help, just give us a call.

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