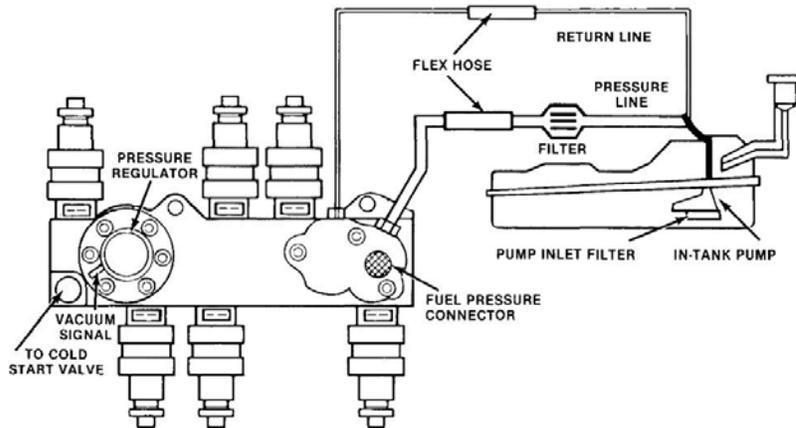




Tech Articles

Fuel Pumps

By: Ryan Gick



Discussions have risen as of late on a few of the Fiero Internet forums about fuel pumps; what pump you need, what is the best brand, and what is the difference between stock, OE-replacement, and aftermarket performance pumps. Before we get to this, I would like to provide a little bit of background on the fuel system and pump used in the Pontiac Fiero.

The Fiero has the typical GM electronic fuel injection fuel supply system which consists of an electric, constant flow producing fuel pump, fuel supply line that goes thru a filter then on to the fuel rail, a fuel pressure regulator (vacuum referenced in 2.8 V6 applications), and a return line that sends unused fuel back into the fuel tank. The fuel pump is energized by either an ECM controlled relay or by the oil pressure switch mounted on the engine. The oil pressure switch was used by GM to run the fuel pump should the fuel pump relay fail. If the fuel pump relay is working properly, then low engine oil pressure cannot prevent the fuel pump from running. This system is not designed to prevent fuel pump operation due to low oil pressure or a vehicle rollover/impact accident.

The fuel pump itself contains an electric motor which drives a vane or gerotor type pump depending on the design, and also contains a check valve and overpressure blow off valve. Fuel pumps used with the 2.5L TBI engines typically have a lower output of flow rate and have their overpressure blow off valves set to exhaust pressures above 13-15 psi while V6 pumps have a higher output of flow rate and have their blow off valves set to exhaust pressures above 65-80psi or so, depending on the model. The pump draws fuel from the bottom of the tank thru an inlet "sock" or strainer which filters out large particles so the pump cannot be damaged by them. The filter used in the Fiero's fuel system is designed to filter smaller particles out of the fuel which could clog up the injectors. The fuel pressure regulator determines the amount of pressure present in the supply side and fuel rail of the system, assuming the fuel pump is able to supply adequate volume of flow and pressure. V6 engines have a fuel pressure regulator that references manifold vacuum which will impact fuel rail pressure depending on manifold pressure/engine load. This was done by GM for many years in order to maintain a consistent pressure drop across the injector no matter what the manifold pressure/vacuum was. TBI systems do not require their regulators to

reference manifold pressure since the fuel is injected above the throttle blades in atmospheric pressure – which results in the same pressure drop always being present across the injector since atmospheric pressure does not fluctuate with engine load (only manifold pressure does). In later vehicles where GM went to a return-less fuel system, the fuel pressure regulators no longer referenced manifold pressure thus the fuel pressure setting was fixed. The programming of the engine computer had settings built in to compensate for differences in the pressure drop across the injectors as manifold pressure varied in these applications.

So what fuel pump do you need? Well that depends on what you are doing with the car/engine. If you have a stock engine, then an OE-replacement pump should work fine. But what brand to get? There are several different brands out there and the prices vary depending on brand and warranty. AC Delco and Delphi pumps used to be some of the best until the manufacturing for these was outsourced overseas. It seems as though just about every over-the-counter OE-replacement pump you can find at just about any auto parts store is made overseas these days. But I have seen some still made in the USA. I have generally had better luck with USA made pumps vs. those made in China. Regardless of what you get, educate yourself about their warranty and return policies on these parts. I wouldn't expect a pump that comes with a 1-year warranty to be as good as one that comes with a lifetime warranty. Although I must admit I've had a few pumps with lifetime warranties fail on me in the past.

So when do you need to use a different or aftermarket performance pump? Well that depends on the requirements of your engine. If you have a 2.5 duke or 2.8 V6, most bolt-on performance upgrades you can get and install on these engines will not warrant a fuel pump upgrade. Concerning the stock Fiero 2.8 fuel pump; as long as this pump is working properly, it should be able to supply enough fuel for just about any non-turbo or non-supercharged GM V6 you can swap into the Fiero. Now if you are doing a V8 swap, turbo/supercharging your stock V6, or are swapping in a different super or turbocharged V6, then you really should upgrade your fuel pump. The pump you get should be rated to output the necessary amount of fuel volume at the maximum pressure the engine demands it run at. On most non-super and non-turbocharged engines this is about 50psi. On engines that have turbo or superchargers, this can be as high as 70psi or more depending on how much boost you are running. All fuel pumps produce less volume of flow output the higher the fuel pressure gets. Aftermarket performance pumps usually outflow stock and OE replacement pumps at pressures higher than 45psi which makes them ideal for use in boosted applications. One way you can tell whether or not your existing pump can keep up with your engine is to do a full throttle fuel pressure test. This involves hooking up a fuel pressure gauge to your engine and taping it to the back window and having a passenger ride along with you while you drive the car at full throttle so they can watch the fuel pressure. If your fuel pump is able to keep up with the demands of your engine, your fuel pressure should hold steady throughout the entire RPM range at full throttle and should not drop off as engine revs increase. If the pressure does drop off as engine RPMs increase and there is no drop in boost or manifold pressure at the same time, then it is likely either your pump cannot keep up with the demands of your engine or your fuel system has a restriction somewhere. But checking fuel pressure at WOT is only one part of the equation. WOT **AFR** should be verified to be rich enough for the application (that's no leaner than 13.0:1 for non-boosted engines and no leaner than 12.0:1 for boosted engines) using a wideband O2 sensor. *For street applications, I actually recommend richer WOT AFR's than these minimal requirements to keep things safe for your engine.* If your engine is running too lean at WOT; before having a look at the chip/PCM tune, a WOT fuel pressure check should be done.

So you've determined you need an aftermarket fuel pump, but which one should you get? Good question. There are several brands available on the market. Whatever you get should exceed the minimum requirements of your engine's needs. I am a fan of and have used the 255lph Walbro pumps sold for the turbo Buick V6 community in many of my swaps. But

some people do not like the whine noise these pumps can generate (usually if not installed properly) nor the fact that these pumps can burn up if they are starved of fuel (ie: if the tank is run low on fuel). If you have concerns about this you can choose a different pump. Some like the Turbo Supra pump work great and are quiet, but are physically bigger than the OE-replacement and OE-sized aftermarket pumps (like the Walbro) and won't fit into the Fiero tank's sending unit hole without some modifications. Regardless of what pump you get, you need to be sure of a few things:

- 1) Make sure the fuel pump you get can supply enough volume of flow at the pressures your engine is going to demand of it. An OE-replacement pump designed for a non-boosted V8 LT1 engine may not be able to supply enough fuel volume of flow at the higher pressures a boosted engine may demand of it.
- 2) Make sure you know what you are getting. There has been a rash of problems in the automotive aftermarket recently concerning counterfeit pumps being re-badged and sold as known-brand name pumps. These fakes usually fail to meet even factory, OE-replacement pump specifications. So buyer beware and know what you are getting. Only buy from trusted sources that have good reviews.
- 3) Make sure the electrical system in your Fiero can supply the new pump (OE-replacement or aftermarket performance) with enough voltage and current to work effectively. The stock fuel pump power circuit in the Fiero runs thru many connections (twice thru the C203 connector alone) before it can get to the fuel pump. The length of wiring in the stock Fiero fuel pump system as well as all of these connections does not make it suitable for use with most aftermarket performance pumps that require more power (current/amps) to run. Anyone using an aftermarket performance pump should consider upgrading the electrical system in their Fiero's fuel pump wiring circuit so it can supply enough power to the new pump. Such an upgrade can be found here:
http://www.gmtuners.com/fiero/hot_wire.htm.

In addition, a stock or OE-replacement fuel pump may not be able to work properly and provide enough output if it is not getting enough power. I have seen many Fieros with poor connections at the C203 connector which resulted in less power getting to the fuel pumps in those cars - and this can create problems.

Lastly, there are mathematical formulas you can use to determine the size of fuel pump you may need for your application based on how much HP the engine is making. These are:

- For non-boosted engines: $HP \times 0.5 =$ how many lbs/hr of fuel the pump will need to supply for this engine.
- For boosted (super/turbocharged) engines: $HP \times 0.65 =$ how many lbs/hr of fuel the pump will need to supply for this engine.
- 1 lb/hr of gasoline = about 0.61 lph

Again, make sure your pump can supply enough volume of flow of fuel at the pressure your engine requires. Not all pumps are flow rated at the same pressure level. So know what you are getting.