

Installing An Adjustable Fuel Pressure Regulator On A GM TBI Unit.

This modification requires that you will be exposed to gasoline. It may also require welding and work on fuel lines. There is really only one good reason for doing a modification like this. That is that you have modified or changed the fuel requirements of your TBI equipped engine. This may include such things as swapping to a larger motor, using forced induction, using a radical camshaft profile or a combination of several things. So now you know why you might need an adjustable regulator lets look at how a stock one work and what we can do to fix the problem.

The fuel pressure on a TBI system is a bypass type system. This means that the fuel pump, pumps a given amount of fuel which travels up the inlet pipe into the injectors and then some fuel will make it into the engine while some will pass through into the regulator where the fuel must act against a pressurized diaphragm to return to the tank. The fuel acting against the diaphragm is what creates pressure in the fuel system while in operation. A stock regulator consists of four parts. First is the diaphragm. This consists of a flexible piece of rubber with a metal center. This piece also serves as the gasket between the injector body and the fuel pressure regulator housing. The second piece is the regulator spring. The spring keeps pressure on the center of the diaphragm which in turn controls the pressure of the fuel system. The third part of the system is the spring retainer. This piece sits at a preset level from the factory. This is one of the pieces that must be modified to make the stock regulator adjustable. The last piece is the regulator housing. This is a metal cup that encases the three previous pieces and is the other part that must be modified to make the regulator adjustable.



On the left are the stock components (unmodified) that make up the regulator. On the far left is the diaphragm. In the center you can see a metal piece which is half of the valve that the fuel flows through. Next is the spring which applies pressure to the diaphragm. Next is the housing where everything fits inside. Finally we see the top half of the injector assembly. The hole seen in the center of the regulator section is the outlet. This is where the metal valve sits against to control the fuel flow.

There are two ways to go about having adjustable fuel pressure. Lets take a look at the options.

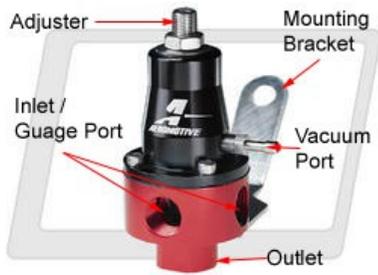
The first way. Is to modify the stock regulator or buy an adjustable housing that will allow adjustment of the regulator. You can go and buy an adjustable regulator housing and install it in place of the stock one and your done. Another way is to modify the stock one. This way is more satisfying and only costs as much as a couple nuts and bolts. The stock regulator has a threaded rod in the end of it that is held in by a spot weld. This part must be drilled out and the rod removed. The second step is to cut off the end of the housing and replace this by welding on a prevailing torque nut. By installing this nut you will now have a threaded end which an adjustment bolt can pass through. Remember you cannot use a regular nut it will allow the bolt to back off and your fuel pressure will slowly drop off over time. You can now re install your regulator as it was before. Your bolt size does not matter just choose something that will fit. You may have to pick up a few different

bolt lengths. Some systems (like ones found in 2.8L S-Trucks) have a vacuum line directly below the regulator which a protruding bolt may hit. But in most cases you will not have any clearance issues to get in your way. To get proper adjustment you should install a gauge into the system so you have a way of knowing what your pressure is at all the time. A small under hood gauge is simple reliable and easy. This step requires cutting of the fuel line and a pipe flaring tool. Install a "T" fitting into the inlet side of the system and attach your gauge and your fuel system is now fully adjustable and measurable.

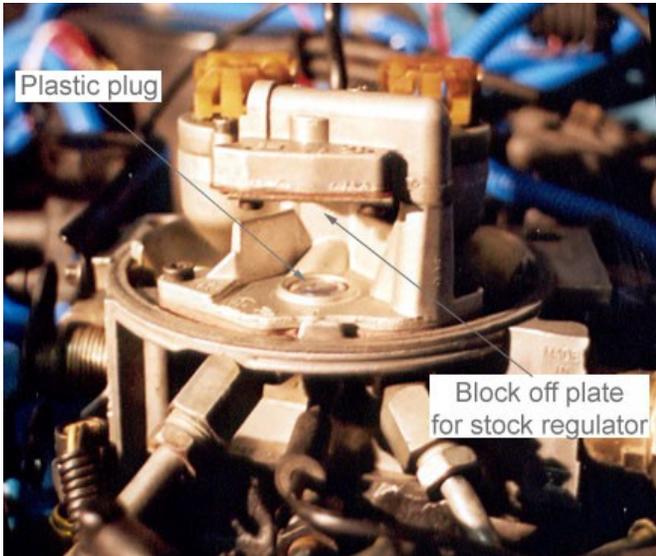


You can see how an adjustable fuel pressure regulator is made. There is a nut welded on the end where the bolt threads through. This bolt will move the spring retainer up or down and allow for adjustable pressure.

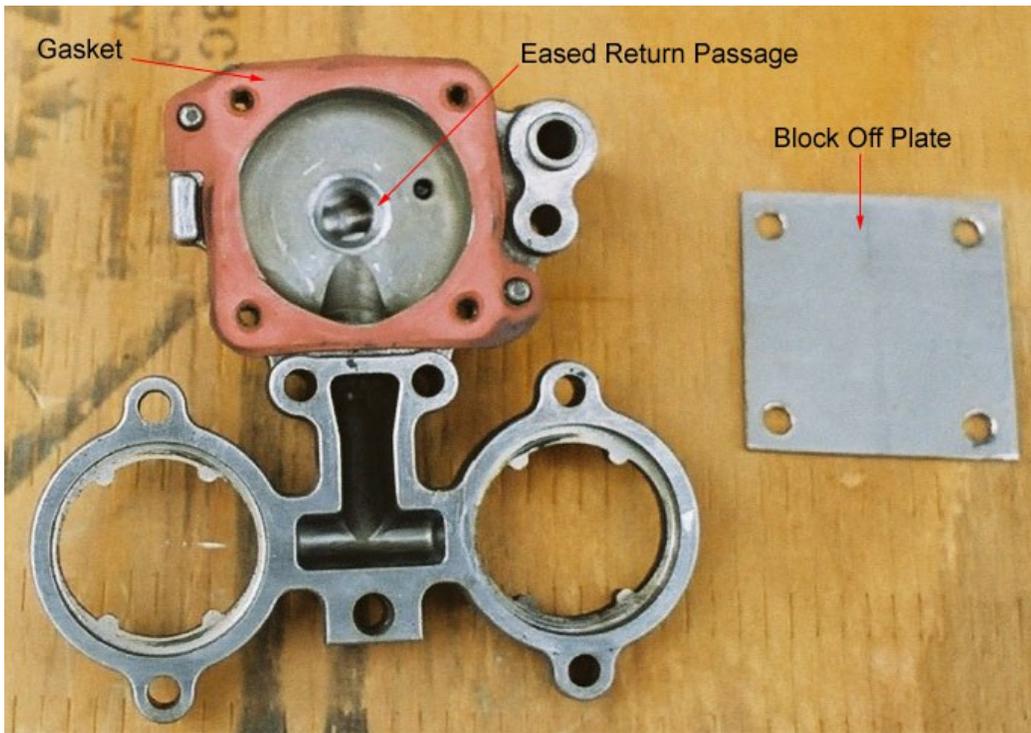
The best way to make your fuel system adjustable is to install an external regulator. These regulators often feature multiple ports which allows a gauge and schrader valve to be installed. These regulators are also made out of high quality aluminum and last forever and look good. A great regulator to choose is the Aeromotive 13301 bypass regulator. It comes with 2 different springs (one low pressure and one high pressure) this way if you ever upgrade to a high pressure system you will have a great regulator for it. First we need to eliminate the stock regulator. Start by taking the housing off and putting all the parts aside except for the diaphragm. Take a razor blade and cut out the center of the diaphragm, you need the outside part later to serve as your gasket. You now need to make a cover plate to replace the old housing. Use the regulator to trace and cut out a flat piece of metal. Aluminum, mild steel or stainless work good, something the same gauge as the old housing would be ideal. Once you have a piece the same size as the old housing base drill out the four holes. One extra step that is recommended is to drill out the passages in the injector housing to make the transitions smooth. This is not a must, but reduce flow restrictions. Now install your gasket that you made out of the old diaphragm and install your new cover plate. If you have injectors with a hole in the mounting base you need to plug this. You can fill the hole with just silicone or silicone down a plastic frame plug or maybe a small freeze plug. Now you can reinstall the injectors and tackle the fuel line changes. You now need to splice in your external regulator into the return line on the system. It should be as CLOSE to the throttle body as possible for the most accurate operation. There is no way to tell you how to do this because every application is different. But the best way is to find a close mounting spot. Take the return line off the throttle body and hook it up to the inlet of the regulator and the output line from the regulator must feed back into the return line. Now attach a gauge and any other accessories to the regulator and you're done.



Here you can see the Aeromotive 13301 bypass regulator. Not visible are 2 more inlet/gauge ports on the back side (there are 4 in total.) This regulator is symmetrical in design which allows for easy mounting and orientation.



Here is a modified regulator housing with the block off plate installed



Here you can see the eased return passage (the old protrusion is simply drilled out). You can also see the gasket made by cutting out the center of a regulator diaphragm and last the block off plate.

Here is an Aeromotive 1330 adjustable fuel pressure regulator installed on a 1993 GMC Sonoma with a 3.4L V6 and TBI fuel injection. Notice the gauge and schrader valve that can simply be added to the inlet ports of the fuel pressure regulator.



Now that you have completed either one of these modifications you can now start you engine and check for leaks. There is also a fuel pump prime lead which is a gray wire with a black connector on it. By giving this connector positive power you can run you fuel pump and check for leaks. Leaks will commonly occur at the diaphragm/gasket of the stock regulator. So be sure you check under your air filter lid.

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