

GM TBI 220 & TBI 300 ADJUSTABLE FUEL PRESSURE REGULATOR

It has become common practice to remove the original fuel pressure regulator and replace it with an aftermarket adjustable unit. While the advantages of being able to adjust fuel injector pressure are not certain, adjustment does give the opportunity to change open-loop fuel flow and trim the part-throttle mixture somewhat if necessary. The only situation in which a setting outside the OEM specification may be necessary is after considerable modification to the rest of the system. That said, the cost of purchasing an adjustable regulator may be wasted. Instead of purchasing such a device, the original regulator can be converted to an adjustable type with little difficulty.

Since the regulator must be removed in either case, that labor would be equal. For an additional hour of labor, the adjustment hardware can be added. The cost of the hardware is less than \$1.00, unless you use exotic parts (stainless steel nuts and bolts, new diaphragm, gaskets, etc.), in which case the cost may approach \$15.00.

APPLICATION

This modification is outlined for GM Model TBI 220 and TBI 300 units only. The later TBI 700 units have an externally accessible regulator that does not require removal of the injector pod parts and is not as adaptable to the modification. Those with the TBI 700 unit should research the design of the system before attempting any such modification.

Tools Required:

T-10 Torx driver;
T-15 Torx driver;
Center punch and hammer;
1/4" drill and bits;
Flat mill file;
1/4-28 UNF tap;
Tap handle;
5/32" hex wrench;

Materials Required:

(1) 1/4-28 UNF x 3/4" flat head hex recess bolt;
Anti-seize compound;
Replacement TBI gaskets*;
Replacement regulator diaphragm*.

* - May not be necessary in all cases

IMPORTANT! - *You will be working around liquid and vaporized gasoline, and you must open the pressurized fuel system to accomplish this modification. This creates a hazard of fire or explosion. Isolate the work area from any sources of ignition and ventilate the area well. Clean up any spilled fuel immediately and wash body areas that may contact the fuel with soapy water. Discard any fuel contaminated articles safely and appropriately.*

Park the car in a place where you can work on it for a couple of hours. Assemble all tools and supplies, and allow the engine to cool to a safe and comfortable temperature before beginning. You may want to apply penetrating oil to the fasteners and components a couple of days in advance to permit easy removal of fasteners and parts.

REMOVING THE REGULATOR

Remove the air cleaner assembly and expose the TBI (Throttle Body Injection) unit. Apply penetrating oil to the screws that hold the top on the fuel injector pod. Allow this to soak while you continue.

Follow the service manual procedure to relieve fuel system pressure. This generally involves disconnecting power from the fuel pump and starting the engine to use the remainder of the fuel in the line. Check your service manual for specific instructions and precautions.

Once fuel pressure is relieved, loosen the Torx screws holding the top on the fuel injector pod. After all screws are loosened several turns, work the top loose from the gasket. If you are working with a TBI 220 unit, you will have two injectors and two gaskets. A TBI 300 unit has one injector and two gaskets. The secondary gasket seals the fuel return passages and is smaller than the larger main gasket. If you are careful, you can remove these without damaging the gaskets. A new gasket set is recommended, but an undamaged used gasket may be serviceable. Remove the top and regulator. Clean the unit and make a mark along the locating slot in the spring can to indicate the factory position of the regulator.



MODIFICATION

Once the regulator is off the vehicle, the screws on the spring cap should be removed. The Torx bolts holding this cover in place are T-10. If a screw is stubborn, it can be loosened by grabbing the head with a small pair of pliers to start its movement. Applying penetrating oil to the screws will make the process easier.

Remove all the screws evenly to allow the spring to relax as the cover opens. Take care to make certain the gaskets/diaphragms are not sticking to either surface and tearing. Once the screws are removed, the cap should lift off.



The spring/diaphragm assembly should be cleaned, then stored in a manner that will not damage the highly polished valve face on its lower side. The valve seat in the regulator body requires the same caution.

The spring cap should have a screw at its center. This screw is typically brazed in place at the factory to prevent unintentional or deliberate adjustment.



This brazed area must be drilled out to free the adjustment screw. Using the center punch, make an indentation at the center of the recess. Using this center and the inside of the recess as a bushing, drill the bronze out with a 21/64" or 'R' (0.339") drill. A 1/4" spot weld cutter also works nicely if you have access to one.



Remove the screw and spring disc from the can and unscrew the screw. At this point, you can decide whether you want to keep the original shoulder screw or replace it. You may be able to file the top of the screw flat and cut a slot to enable adjustment with a standard screwdriver. If the screw was damaged in the drilling process or you prefer a hex recess (Allen) screw for adjustment, set the screw aside.

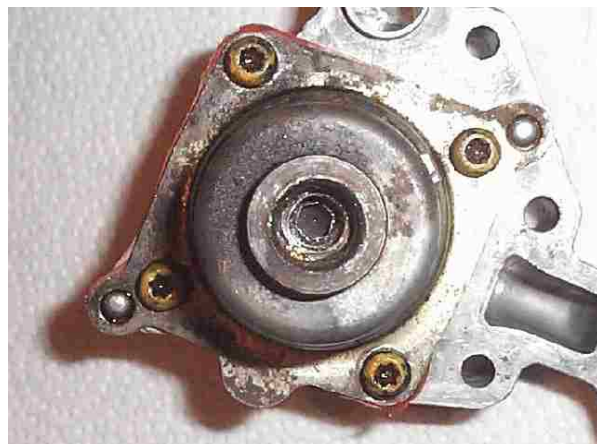


If you are using the replacement 1/4-28 screw, you must drill the hole in the spring disc with a 7/32" or #3 drill and tap 1/4-28 UNF threads for the new screw.



Install the screw into the spring plate and the spring over the plate. Your assembly should look like this. The flat top of the screw will bear the pressure of the spring just as the original, and the recess in the cap will prevent the screw from wandering too far from center to create problems.

Reassemble the spring disc and new screw into the cap. Insert the spring, gasket/valve disc assembly, and align the parts. Press the parts together by hand to assure correct alignment and that the gasket is not being distorted or damaged. Install the T-10 Torx screws and snug them in place. Once you are satisfied with the replacement, remove one screw at a time and apply a light coating of the anti seize compound. Tighten each screw to 20-24 inch/pounds when finished.



Adjust the regulator spring disc position to the same point as your original marks to begin with. Reassemble the regulator to the TBI unit in the reverse order of disassembly. If there is any question about the integrity of the gaskets, replace them. Connect the fuel lines if removed and operate the fuel pump to test the system for leakage. Turning the ignition switch to the RUN position without cranking the engine should cause the fuel pump to run long enough to build pressure.

ADJUSTMENT

To increase the fuel pressure, turn the adjustment screw counter-clockwise. This will cause the spring to exert more pressure on the regulator diaphragm and regulate at a higher pressure. Monitor your adjustment with a fuel pressure gauge. A little adjustment should be all that's necessary, 1-2 PSIG at a time. You can verify your results with a scanner monitoring the oxygen sensor output at wide-open throttle, or your time slips at the track.

If you have made substantial modifications and have a lean condition, this modification may be beneficial. Remember, the pressure change will make the greatest difference at wide-open throttle. At any other time, the ECM will attempt to adjust the injector pulse rate to achieve the correct oxygen sensor reading regardless of fuel pressure. Pressure that is too far from the stock setting may have an adverse effect on part-throttle performance if the ECM cannot compensate for the difference. Unnecessarily high pressure will only make your in-tank fuel pump work harder than it should, potentially shortening its useful life. If you think changing the regulator was fun, wait until you have to replace the fuel pump.

Happy motoring.

06/06/2001 Vader