FAQs

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NOTE: We have a great selection of short videos documenting everything from installing the Carb Adapters to converting your Distributor and even installing and setting up the Throttle Position Sensor…….along with running fuel line, positioning the various components, doing a data log etc…..
there are many videos (with more being added as needed) which should answer most of your installation questions. Watch the videos, read through the FAQs below and the all the installation tips under the installation link……..if you can't find your answer feel free to drop me an email.

General Questions.
What performance improvements will I see?

The first TBI conversion was been done to a stock 1971 Triumph TR6. Driving impressions are excellent with much improved drivability and a noticeable performance gain. Actual horsepower gain is not really known at this time although testing with a G-Tech accelerometer showed delivered (rear wheel) horsepower of ninety seven. From what I've seen the average TR6 dynos with rear wheel horsepower of 60 to 75! There have only been a handful of G-Tech runs made and this is the best of the bunch so these figures may not be accurate. Considering
drivetrain inefficiencies of 20% a reasonable flywheel figure is 121BHP. Originally the carbureted car was rated at 106BHP.

UPDATE May 2009: Here we are five years later and conversion kits have been shipped worldwide covering everything from Triumphs to Land Rovers to Datsun 240Z's.

Will my fuel economy be impacted?

The supplied chip is programmed for fuel economy over 45 MPH. TR6 users with overdrive or 5 speed conversions are getting in excess of 30 MPG on the highway while those without overdrive are averaging about 28 MPH. Around town mileage is in the low 20's.

How dependable is this upgrade?

The components are mostly from GM and have been proven dependable for over 20 years and millions of miles of driving. Tune ups are far and few between. Maintenance consists of changing filters, spark plugs, and an occasional gulp of fuel injection cleaner in the gas tank. Basic fuel injection components often go for 100K miles or more without adjustment or failure.

Can I buy components to build my own system?

TBI conversion adapters and TPS kits are available separately for use with your own engine management system. Some folks are experimenting with the low cost Megasquirt.

Are parts readily available?

Yes. Parts are mostly common GM items that your local parts store will carry. Because the parts are used in so many cars, the price is correspondingly low.

How long does it take to get the kit?

Please email me for a shipping date but most kits ship within 2 – 3 weeks.

What wiring modifications are needed?

The harness is plug and play with the exception of the battery connection. The original harness is usually unchanged.

I am not a mechanic, can I do it myself?

Yes. There is good set of instructions with many photos. If you are somewhat mechanically inclined or have a buddy willing to lend a hand it goes quickly and easily.

What is the Idle Air Control and why do I want one?

The Idle Air Control, referred to as the IAC, is actually a variable flow valve that bleeds air into the intake manifold. It's purpose is to provide air during startup, raise the idle speed during engine warm up, stabilize idle speed, prevent stalling, act as a damper during deceleration, and provide additional air during hard acceleration. Although optional, it's suggested it be included in all new installations and is a must on engines with air conditioning or automatic transmissions to maintain a steady or increased idle speed. We recommend adding an IAC whenever possible.

Advance Auto-Wire (AAW) Harness Questions

I'm going to install the AAW Power Block and wire harness. What do I order?

When placing your TBI order, make sure you specify that you have an AAW harness and special harness will be provided at no extra charge

I already have an AAW harness and have ordered my TBI kit with the AAW adapter. How do I hook it up?

The Blue wire from AFI harness that energizes the AAW fuel pump relay connects to pin 86 of the AAW Fuel Pump Relay. The jumper between pin 30 and pin 86 of the AAW fuel pump relay should be snipped, separating those pins. Power remains on pin 30.

I have a Patton TBI system installed and want add an AAW wire harness. How do I do that?

Email Rick@pattonmachine.com for options

Carburetor & Adapter Questions
Can a triple ZS carb setup be converted to TBI?

Yes. We now support the triple carb set up.

Can I convert my TR4A or dual carbed MGB?

Yes.

Will your TPS driver fit up ok with the round shaft end on the SU Carb?v

Yes the SU driver is designed to fit the round shaft.

My carbs are old and in need of rebuilding. How sensitive is your TBI solution to leaks in the throttle shaft seals?

Minor leaks are no problem, they just supply a little extra idle air. Carbs work by air passing over a venturi to pick up fuel but in TBI applications fuel is squirted into the throat not caring much where the air comes from. Should be no problem unless the leak is quite severe making it idle fast.

Do the the mounting holes on your HS6 adaptor plate align to the three bolt pattern on the HD6 carbs?

No problem. The HS6 adapter is round and held in place by three screws unless you modify the dome to hide / hold it down.

What purpose do the carbs have after this installation other then to house the injectors?

They are simply “Air doors” used to meter air into the engine and house the injectors.

Do the bowls still fill with fuel that’s regulated by the floats shutting off the needle valve?

No fuel is in the carb float bowls. The troublesome floats and needle valves are not used.

What modifications are made to the SU carb dome? Is there a hole/slot needed to run the wires?

The domes are only ornamental with TBI. The system operates just fine without them however if you want to hide the conversion, modified domes can be refitted. To modify the dome, the guide tube for the piston is cut off even with the underside of the dome and in most cases the top post needs to shortened about 1/2″. Once modified the domes can no longer be retuned to carb duty. The wires run out thru a slot milled into the adapters.

Can it be installed without altering the carb domes?

You have 3 options:

- **Modify the domes and retain the “stock/original look.**
- **Leave the injectors visible.**
- **Install the optional covers.**

If I send you my carbs will you do the conversion for me?

It’s not necessary to remove your carbs and send them to me as installing the adapters is very easy as shown in this video.

Unable to adjust idle speed down – causes?

- Vacuum leak
- Choke fast idle cams engaged

- On ZS carbs, the idle stop screw hits a moveable stop on the side of some carbs. Wire the stop so it's immobile .
- Throttle linkage binding or misadjusted

Technical Questions

Troubleshooting….. TBI is very reliable and problems can usually be resolved with these basic tips

Basic trouble shooting should start with checking for spark, checking for fuel, reading the plugs, etc. If you are relatively certain it is fuel injection related see the troubleshooting flow chart on the Affordable Fuel Injection CD or the web site https://affordable-fuel-injection.com/wp-content/uploads/2019/09/TBI-INSTALLATION-INSTRUCTIONS_v10.pdf#page=11 . If that fails contact rick@pattonmachine.com. If you are contacting Patton Machine for assistance include pictures of the installation, fuel pressure, error codes, timing setting, Datalog and BLM files.

Can I use my Pertronix or Crane ignition system?

The best option, if available for your vehicle, is to use the Patton Machine conversion for Lucas distributors which will allow the onboard computer to have complete control over ignition mapping.

Alternatively, you can use any ignition system that produces a square wave to fire the coil, but you will need to use our Tach Filter to provide timing pulses to the on board computer. Use of the Tach filter and your ignition system ***does not*** allow for computer controlled ignition mapping. Some systems suitable for use with a Tach Filter are: Pertronix, Crane and 123. If you have any doubt about compatibility, please ask.

The Tach Filter will not work with points.

Can I reprogram it myself?

The short answer is yes, however AFI does not supply components or support for do-it-yourself tuning. If you wish to do your own programming there is a lot of support on the web from sites like tunercat.com. In fact, very very few people go this route as the professional tuning from AFI is so good.

Your system will arrive preprogrammed and the experts at Affordable Fuel Injection will help fine tune it to your car and your driving style. The kit price includes their support and up to three tuning chips. I would be surprised if it took more than one try to hit the mark for optimum performance. Should you at some point make significant changes to your car and have used up the three included chips, AFI will still work with you however there will be a charge for their efforts.

AFI does have a service that they will loan you a chip burner (deposit required) and they will create tuning profiles and you can burn your own chips. There is an additional charge for this level of tuning. This is especially suited for one of a kind installations.

What if I have a modified engine?

The present system is running a stock or mildly modified engine. Affordable Fuel Injection can tailor the software at no extra charge up to three times during installation for most any modified engine. A good guideline is to measure the intake vacuum at idle and you must have at least 12in, preferably 15 in or better. Be sure to mention engine modifications when ordering.

Where does the ECM computer mount?

Originally we mounted it on the right side forward of the “A” post within the passenger foot well, and that’s still a great location. The ECM has been mounted at the very far reaches of

the passenger foot well under a panel. The harness is long enough to mount the ECM nearly anywhere but the trunk. TR6 under dash mounting with Velcro is the best option as noted here.

Do you provide for datalogging?

Yes this system has the ability to datalog. A laptop is used to record all the engine sensor readings as well as fuel load while driving down the road. Tuning your system amounts to connecting a laptop using the ALDL cable and taking a fifteen to twenty minute drive in varied conditions. The resulting datalog file is emailed to Patton Machine . If additional tuning is warranted a new profile is programmed into a chip by Affordable Fuel Injection and sent to you for installation. Chips are done on an exchange basis.

Why isn't WinALDL showing any data being logged?

If WinALDL is logging any data or is logging suspect data, please check the following in the WinALDL configuration: ECM Model#, Com Port and Baud Rate which must be set to 4800. You should also check your cable connections and review the video on setting up WinALDL.

What type of injector is used?

The adapters are designed to use standard GM throttle body injectors from late 80's and 90's cars and trucks. We use the later style GM mini TBI injector because they are smaller and fit better in some applications, such as the SU HS6 carb.

Can Bosch Multiport Injectors (MPI) be used?

No……MPI injectors will not fit the carb adapters that I produce. The TBI Adapters and TBI Kit that I supply IS NOT compatible with MPI injectors or a multi-port installation but stay tuned as 2020 may make Bosch injectors a possibility.

What is BLM?

BLM stands for Block Learning Mode. This GM ECM has the ability to learn about how you drive and adjust accordingly.

Do you have an IAC?

Initially to keep the cost of the TR6 kit down and keep things simple we did not use an Idle Air Control Motor. Instead the original choke cables are used for fast idle warm up as the fast idle cams are still functional. That still works well and may not even be required in warm weather.

If you run air conditioning or an automatic transmission an IAC circuit is required to prevent stalling.

On recent systems it is recommended to add the optional IAC circuit when possible. It does offer automatic fast idle at warm up, has stall prevention, and follows the throttle on acceleration.

Pricing for this option is on the Order and Pricing page

SHOP / THROTTLE BODY INJECTION KIT (TBI)

Does it work with a Turbo or Supercharger?

No. This TBI setup is not presently compatible with a supercharger or turbo. (it may be possible to use it with a "draw thru" type SU on a supercharger) but again stay tuned.

Is it smog legal?

No. Although it is very likely that a converted car will easily meet your state's smog emission requirements there is no guarantee. In most cases it will run far more efficiently than as a carbed engine hence less emissions. But for legal reasons I must state "for off road and racing use only". One customer did take his car through emissions just to see what would happen and it easily passed.

Do I need a swirl pot?

In case this is a new term to you, a swirl pot is a small reserve tank that supplies fuel to the fuel pump during hard cornering. The stock TR6 fuel tank is not baffled so during a long hard left turn at low fuel levels the pump may starve for fuel. Not really necessary unless you are a very serious autocrosser or run on fumes all the time. A swirl pot can be be added just below the tank and a vent line run back up to the top of the fuel tank. Homemade pots are sometimes made from aluminum air conditioning filter/driers.

Do I need to upgrade my coil?

Compatible coils can be found here

Can I send you my distributor for conversion?

Please review these two video to see how easy it is to convert the distributor to electronic. If after reviewing it you still have concerns, let me know and we can discuss the alternatives.

What is the part number for the lower injector O-Rings?

The lower injector o-ring for mini TBI injectors is industry number “014” and needs to be gasoline resistant such as Viton. Be sure to lube it with light oil such as ATF etc and place it into the housing prior to sliding the injector into it’s socket. If nicked during install it can cause flooding and rich running of adjacent cylinders

Installation & Kit Questions

What type of hose is in the kit?

Hose is not included in the kit and must be sourced locally.

TBI systems such as this run at a relatively low pressure. The fuel pump puts out a maximum of 60 psi however the regulator reduces that to 15 psi.

January 2020: As a result of increased levels of alcohol in

gasoline, new types of alcohol compliant fuel hoses, considered “Green” as in environmentally friendly, are coming to market. One of these “Green” hoses is offered by Gates Corp and is their Barricade series (it is still black in color). Standard fuel hose can be porous to the alcohol in the gas and often hardens the hose over time. Depending on where you live, alcohol concentrations and formulas may vary. Most hose classified as “Fuel Injection” are alcohol resistant. You can also run steel or copper-nickel fuel lines.

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[Do I need any special tools?]

Not really but a bung needs to be welded to the exhaust header for the O2 sensor. If you can’t do this any muffler shop or neighborhood garage can do it very reasonably. Beyond that a few common hand tools, a hole saw, a 3/8″ pipe tap, and a voltmeter are all that’s needed.

[What is in the kit?]

While the kit components are from two separate vendors (Patton Machine and AFI), the complete kit actually ships from Patton Machine so you're only dealing with one vendor for your purchase. Included is the hardware unique to convert the ZS carbs or SU carbs to fuel injection. It consists of one TBI adapter for each carb, a throttle position sensor bracket, actuator, and bypass block off plates, a "plug and play" wiring harness, filter & relays. ECM preprogrammed for your type of car, fuel pump, regulator, sensors, injectors, regulator, and incredibly important- programming and technical support. There may be a few minor hardware type items that will need to be sourced locally depending on how you layout your system.

Can the process be reversed?

Sure. Converting the carbs back to carbureted use takes only about fifteen minutes especially if you leave your old fuel pump and lines in place. Just remove the TBI adapters from the carbs, drop in the pistons, and put the domes back on. Switch the fuel source back to the mechanical pump and you are right back to a carbed engine. The only caveat is that if you wanted to mask the TBI installation, modification to the original carb dome is required and that precludes it's return to carb use. A spare set of domes is readily available if needed. Of course I can't imagine you ever converting back anyway.

How long does it take to install?

If you have all parts on hand and some help, the installation can easily be done in a long weekend.

Can it be installed in stages?

Yes you can still drive the car while much of the conversion work is done. Things that can be done ahead of time; coolant temp sensor, throttle position sensor, fuel lines, ECM mounting and harness, ignition conversion.

Does the return line connect to the gas tank and is it required?

Yes, we have tried re-circulating the fuel back to the pump but it heats up so it must be returned to the tank. The tank connection varies from car to car and year to year so you will need to look over your tank connections. Sometimes it can be connected to a vent line and at other times a fitting can be added to the sender for the return. Because of these variations you will need to determine how to connect to the tank. We can help with some applications and can modify or supply fittings for return via the sender at a small additional cost.

What size hose off the manifold is needed for the connection with the map sensor?

1/4″ hose barb and keep it as short as possible. Under 10″ of hose is best.

Besides the Oxygen sensor welding, what other modifications are needed?

The TPS just bolts onto the side of the carb using the carb mounting nuts. Other than replacing the throttle shaft nut with a special driver nothing is else modified. Just like unbolting the carbs, it is an easier job for folks with tiny little fingers. Installing the TPS can be done well ahead of the actual changeover as it does not affect the carb operation.

Are any special tools required?

Optional tools are a digital voltmeter and a GM style OBD-1 code reader (cheap on ebay). You will need access to a laptop computer to verify sensor readings, gather trouble codes, and finally create a data log.

I’m installing the TPS and I can’t get it to read correctly.

Start by reviewing all five (5) videos dedicated to installing the TPS and if you still cannot get it read correctly, chances are you've over-rotated the sensor beyond its range and it has been internally damaged. A new sensor will be required.

Can the black wires in the TBI harness be connected to the negative post on the battery?

NO……these are signal wires and must be connected directly to the engine block.

The wire harness is too long/short…..can I modify it?v

The harnesses are intentionally on the long side to accommodate installing the ECM in various locations. Simply cutting the harness and splicing it back together with butt splices is NOT recommended. Some of the wires carry signals operating at low voltage so a poor or corroded connection will cause a malfunction. Best to find a spot under the dashboard where a loop or two can be tucked away. Before attempting to shorten the harness contact Patton Machine or Affordable Fuel Injection.

Does the kit include a Check Engine Light?

The kit includes a generic round light which may require the drilling of a hole in the location of your choice for installation. It is often mounted in the choke dashboard hole as the choke is no longer used.

The Datalog is reading 6375 RPM…. what's wrong?

Occasionally there is a 6375 RPM reading in the log and that is almost always due to the air gap with the reluctor being a bit too wide or an irregularity in distributor shaft that the reluctor rides on or sometimes even a tooth of the reluctor being a few thousandths of an inch too tall. It's pretty easy to resolve. The distributor must be removed to check the gap as you turn it by hand. If there is a tooth too tall a few

strokes with a points file will take care of it. I also hold it up to a light to check that the reluctor tooth is parallel to the pole piece of the pick up coil and if it's not a little pressure on the pick-up takes care of that. Set the gap as close as possible but make sure no teeth touch the pole piece. As you spin it by hand you can hear if a tooth touches and feel the magnetic attraction of the components. I use a small strip of copy paper folded into three layers between the tooth and the pole piece and then use the adjustment screw to just pinch the paper. Rotate the distributor to loosen the grip on the paper and see how it looks/feels.

Car stalls when returning to idle… why?

The other suggestion is about stalling when returning to idle. A common finding is that the idle stop screws are not equally engaged. When the throttle snaps back if only one carb's idle screw is doing all the work the other throttle plate closes too much and then you are running on only one carb while the other three cylinders have a closed throttle plate and are drawing an extra heavy dose of fresh air from the idle air control. A quick check is to push on the idle adjustment screws and if the idle drops that screw is not fully engaged. That condition does not show up in the logs. The solution is to double check the air balance between carbs, first at 2500 adjusted by the connectors on the interconnecting shaft between carbs. Then the idle needs to be balanced using BOTH idle adjustment screws making sure both screws are making contact with the stops on the throttle shaft linkage. At idle if you can jiggle one of the throttle plate levers that stop screw is not loaded properly. Set a TR6 with a warmed up engine to the base idle speed of 900rpm with a balanced air flow. You will need a Unisyn or something similar to make an accurate balance adjustment. If you are absolutely certain that the carbs are already properly balanced, a possible quick solution with a warm engine is to very slowly tighten the idle stop on the carb WITHOUT the throttle position sensor until

the idle just barely starts to increase and then back off 1/8th turn. When set properly the base idle on a warm engine will rest about 900 rpm and the IAC value in WinALDL will be 0 or in low single digits.

Regulator Questions
What fittings come with the regulator?

I provide an assortment of fittings that should work for most people. Additional fittings can be bought at most hardware, auto or home improvement stores.

What are the port thread sizes?

The five (5) fittings in the red body section are all 3/8″ NPT while the one fitting in the black body section is 5/32″ NPT.

What fittings go where?

The fitting on the bottom of the red section CAN ONLY be used for the return line to the gas tank. The other four fittings around the mid-line of the red section can be used for input from fuel pump, output to injectors and pressure gauge. Use them in whatever way fits your installation best. The fitting in the black section of the regulator CAN ONLY be used as the vent/overflow line in case of a regulator failure.

How do I seal the fittings so they don't leak?

Use a Teflon based pipe sealant approved for gasoline on the threads of the fittings.

Can I use the fitting on the very bottom for anything other then the return line?

NO……that port CAN ONLY be used for the return line to the gas tank.

Can I remotely mount the pressure gauge in the car?

NO….the pressure gauge MUST BE mounted directly to the

regulator.

Does the regulator have to be mounted in a vertical position?

The regulator can be mounted in any position that best meets your installation.

Is there any distance limitations regarding mounting location?

The only limitation is with the fuel lines being connected to the injectors. Those lines should not exceed 3 feet in length.

What do I connect the overflow/vent fitting to?

This fitting does not connect to anything. Just run a hose from it so that any gas overflow would run to the ground. It's unlikely that this will ever occur and it's provided as an overflow safety release point.

What do I adjust the pressure to?

Most installations perform better with the fuel pressure set to 14 PSI. New installations should be set at 15 to 16 PSI.

How do I adjust the pressure?

Clockwise increases pressure and counter clockwise decreases pressure. Do a complete turn at a time and then check it and adjust accordingly.

Why does the regulator show pulsating fuel pressure and/or why is my fuel pump noisy?

In normal operation the fuel pump will only run a few seconds when the key is first turned on or if the starter is engaged but the fuel pump runs continuously whenever the engine runs. Fuel pressure should be set to between 15 and 16 PSI. When the engine shuts off it will take a few minutes for the fuel pressure to bleed off completely.

Reasons for a noisy fuel pump or excessive pressure pulsing:

- **Fuel level in tank too low allowing air to be drawn into fuel inlet. Before troubleshooting pulsing pressure be sure tank is at least half full.**
- **Filter plugged. Remember a filter can plug in an instant if there is dirt in the tank.**
- **Improper fuel line size.**
- **Something loose in tank restricting intake.**
- **Restrictive shut off valve.**
- **Bad 12V connection to pump or poor ground.**
- **Kinked or collapsed hose on suction side.**
- **Restricted return circuit.**
- **Return not plumbed into tank.**
- **Light spring in regulator, try heavy spring.**
- **Vacuum connection on regulator not open to atmosphere.**

Fuel Pressure won't go low enough.:

With the regulator pressure adjusting screw backed fully off there should be no more than one or two psi reading on the gauge if he car has been shut off for a day or two. With the engine shut off and pressure bled off at one of the injector hoses (use caution around gasoline) the gauge should go to 0 or 1psi. If it won't go down the gauge has likely been damaged by over pressure due to the regulator screw being set too tight. Remember the gauge only show 0 to 30 psi however the fuel pump can deliver as much as 60psi.

This customer ran his 1975 TR6 for 6 months with the adapters & injectors exposed

Then he added the optional covers