Clewett Engineering Throttle Body Installation Instructions

by Clewett Engineering

To install this system safely, first and most importantly, DISCONNECT THE BATTERY before starting this project!

When removing the original induction system and disconnecting fuel lines, fuel will drip and be a fire hazard. Use great care in cleaning up any fuel spills and properly disposing of soiled rags to prevent fire hazard and protect the environment. Check the complete fuel system for leaks before starting the engine.

We recommend extreme caution when working around open intake ports. Throughout this entire process be aware that if anything drops into an intake port and the engine, it will likely require engine disassembly to remove the object. If the engine is started or just turned over by hand with a foreign object in the port or combustion chamber, severe engine damage will be the result. Cover the engine with a towel whenever possible and take great care to keep foreign objects out of the engine.

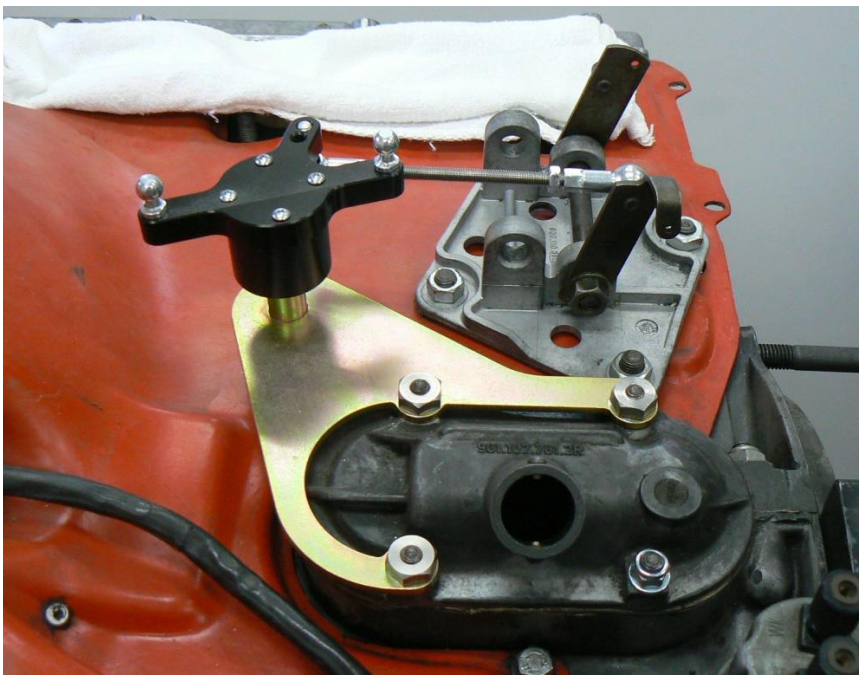
There are many ways to harm yourself and your engine. Safety glasses should be worn when installing this system. If there is something you do not understand with any part of these instructions, contact a qualified automotive repair professional for assistance.

Getting started:

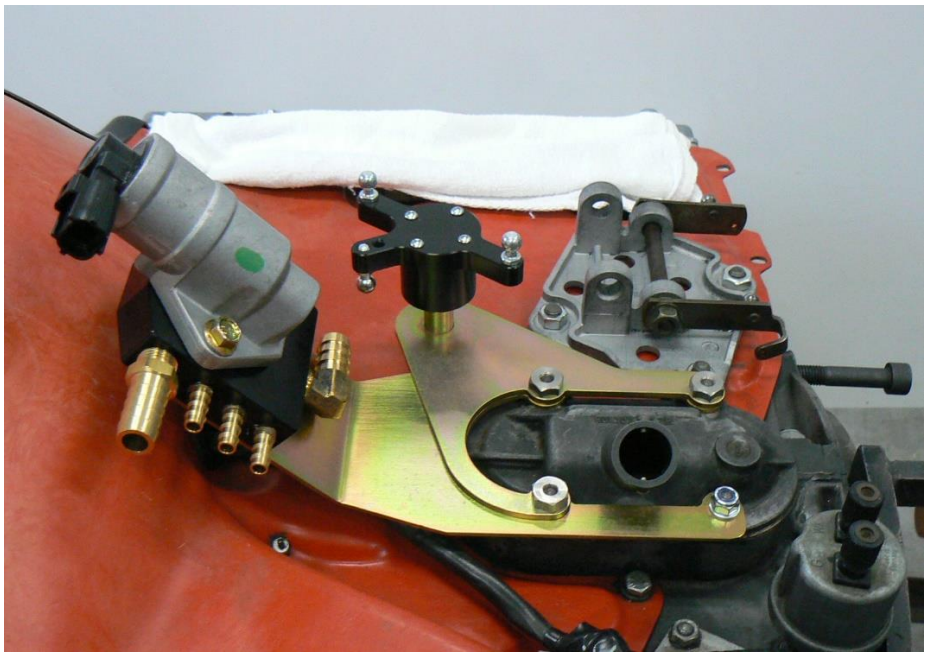
DISCONNECT THE BATTERY. Remove the existing induction system, wiring, and components that will not be required upon completion of the new system.

1. **Preparation for throttle installation -** Verify that the mating surfaces on the head around the intake port are clean and that studs are straight and in good condition. Use a rag or tack cloth to keep particulate from entering the engine. Longer Intake studs are required on engines prior to 1984.

2. Install throttle bell crank assembly as shown. Attach bracket with 3 included step nuts.



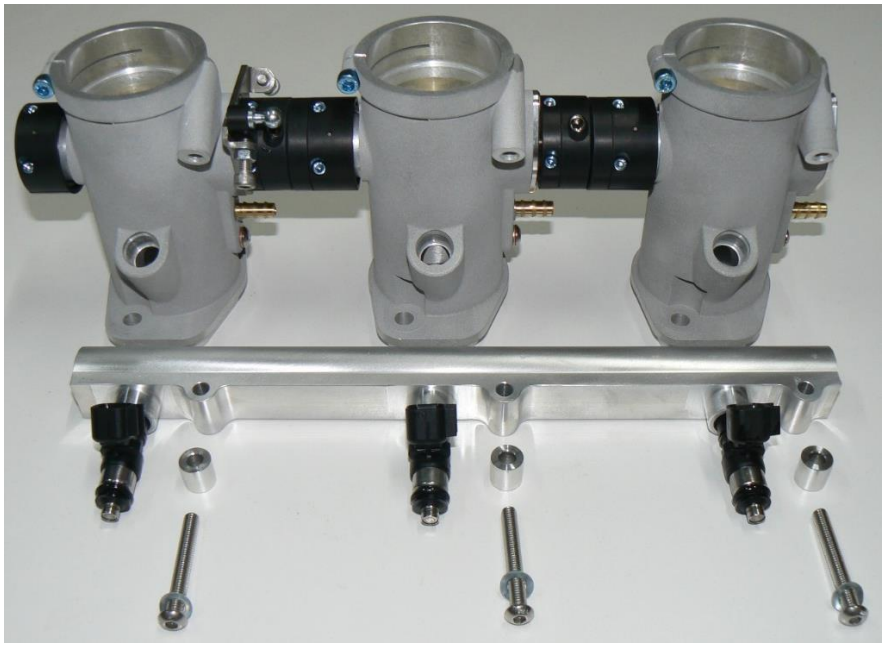
If using our idle speed control valve, verify that the required fittings are installed in the valve body. For power brakes, install 90-degree fitting at the bottom of valve body. Place included gasket on valve body and install the valve using 2- M6 flange screws. Attach valve body assembly to bracket using 2- M6 button head cap screws. Install IAC mounting plate beneath the throttle bell crank assembly as shown.



3. Intake Gaskets - All 6 ports must have a matched set of top and bottom gaskets and insulators for the throttles to seal properly and remain straight after tightening. On each pair of intake manifold studs, place an intake gasket, insulator block and another intake manifold gasket, as shown in the photo below.

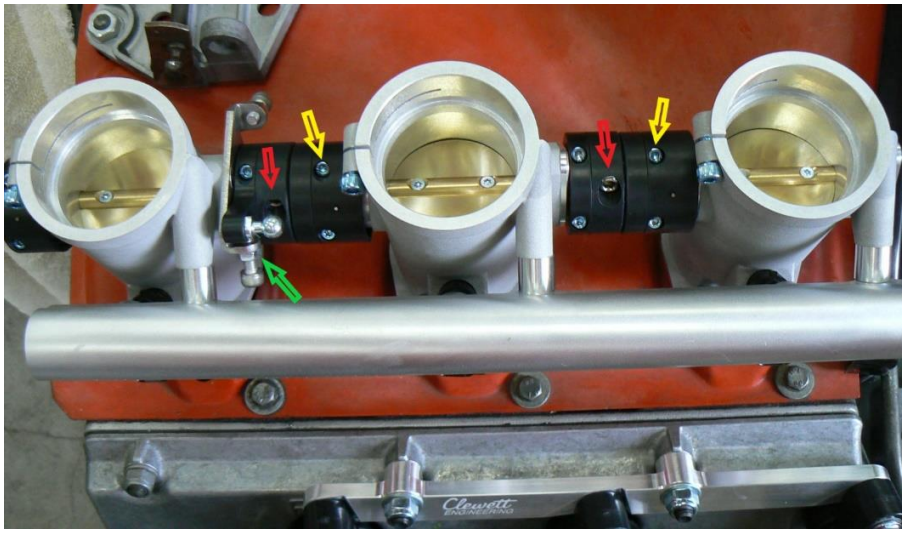
4. Throttle Bodies - are supplied as left (cylinders 1,2,3) and right (cylinders 4,5,6) assemblies. The right side includes the TPS sensor.

5. Installing injectors - Remove the fuel rail and do not separate the throttles. Apply oil to top and bottom O-rings of each injector and insert the injector into the fuel rail. Insert the injector/fuel rail assembly into the throttle bodies. Reattach fuel rail to the throttles with spacers between fuel rail and throttle body and screws and wave washers. Lightly tension the spring washers when tightening the screws. They will be fully tightened later.



6. Attaching throttle bodies – With the gaskets and insulators installed from step 3, install throttles over the studs and slide down to the head. Finger tighten mounting nuts/bolts. The fuel rail should have only slight tension on the spring washers while tightening the throttles. Tighten nut/bolts for throttles in stages for uniform straightness. For 2 bolt flanges tighten the nuts to 18 ft/lb. For 3 bolt flanges, tighten the socket head cap screws to 7 ft/lb. After throttles are fully tightened to head, tighten the fuel rail bolts.

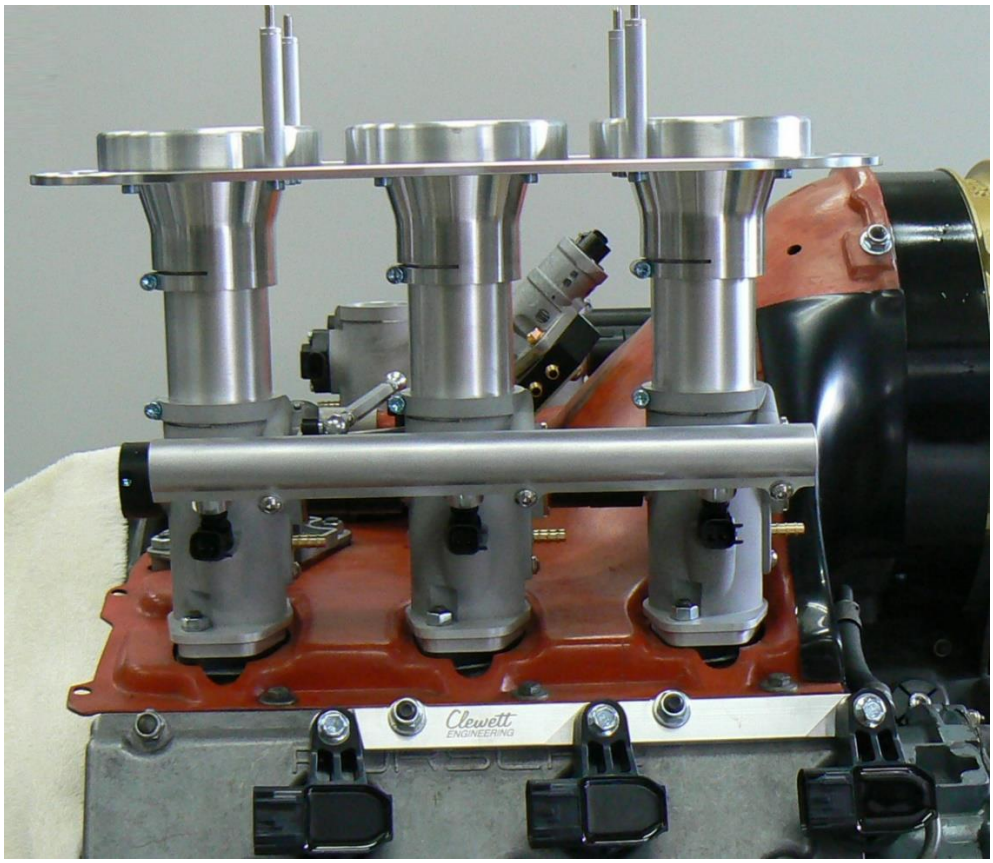
8. Procedure to set closed throttle plates – At this point the throttles installed on the cylinder heads and tightened to specifications. Verify that there is a 3mm gap between the throttle arm (green arrow) and the stop bracket (not the stop screw) with the throttle plates fully closed. Use the throttle body with the throttle linkage arm as the master for the fully closed throttle adjustment. If the 2 remaining plates are not fully closed, tighten or loosen the adjusting screw (red arrow) until all throttle plates are fully closed. With all the throttle plates fully closed, rotate the stop screw (green arrow) until contact is made. Starting position for the throttle plates is ¾ turn open with the stop screw and snug the lock nut.



9. Throttle linkage – Apply anti-seize grease to each of the ball pins and ball cups. Install linkage rods as shown. Kits for 964/993 engines with throttle cable will include a different throttle bracket. Separate Instructions will be included for that application.

10. Air horn/air filter base assembly – Attach air horns to air filter base plate and air filter support posts as shown.

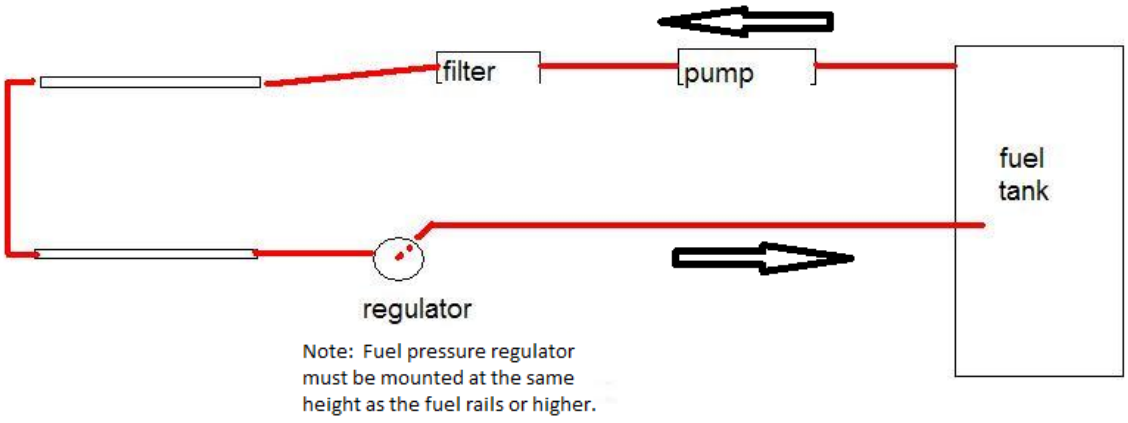
Installing air filter base – Insert tubes into throttles. Slide air horn assembly onto tubes. Snug clamp bolts. Do not over tighten.



11. Installing the fuel lines - Fuel lines must be rated for high pressure, minimum 250 PSI working pressure for fuel injection systems. The recommended minimum fuel pressure for this system of 45 PSI (3 bar), and may be run as high as 74 PSI (5 bar). The fuel rails accept -8 AN port fittings. Our fuel line kits include adapters from -8 to -6 AN flair fittings. The fuel pressure regulator included in our management kits are -6 AN.

Do not use slip on hose fittings and hose clamps for high pressure fuel systems! A fuel pressure gauge can be installed permanently on the regulator or in line. A temporary gauge can be installed in the fuel line to set the fuel pressure and then be removed.

Fuel Line Routing



Upon completion of installing all the fuel lines, gauge and setting the fuel pressure, it's time to check for leaks.

Turn on the fuel pump and check for fuel leaks around all fuel fittings and injectors. If the smell of fuel is present, chances are good that there is a leak. If a leak is detected, immediately turn off the pump and correct the problem.

Adjust the fuel pressure to the desired pressure. If removing a temporary gauge or loosening any fuel line, always use caution and cover the fitting with a rag before loosening. Fuel systems will have residual pressure in the lines which will spray fuel out of the fittings when loosened. To protect yourself, wrap the fittings with a rag when loosening or removing fuel fittings that have been pressurized. Never tighten or loosen fuel line fittings with the fuel pump running! Verify that the fuel lines do not interfere with the throttle linkage.

TPS Sensor – The TPS is a high-resolution Hall Effect sensor. The connector is a Pull-To-Seat style. The wires are inserted through the connector before crimping the terminals on to the wires.
Sensor Connections : A= 5V, B = Signal, C = Sensor Ground.

MAP sensor vacuum lines – If using a MAP signal for fuel delivery, attach a vacuum line from the base of each throttle to a vacuum manifold. The manifold is connected to the MAP sensor. See Clewett Engineering item # 1005-01

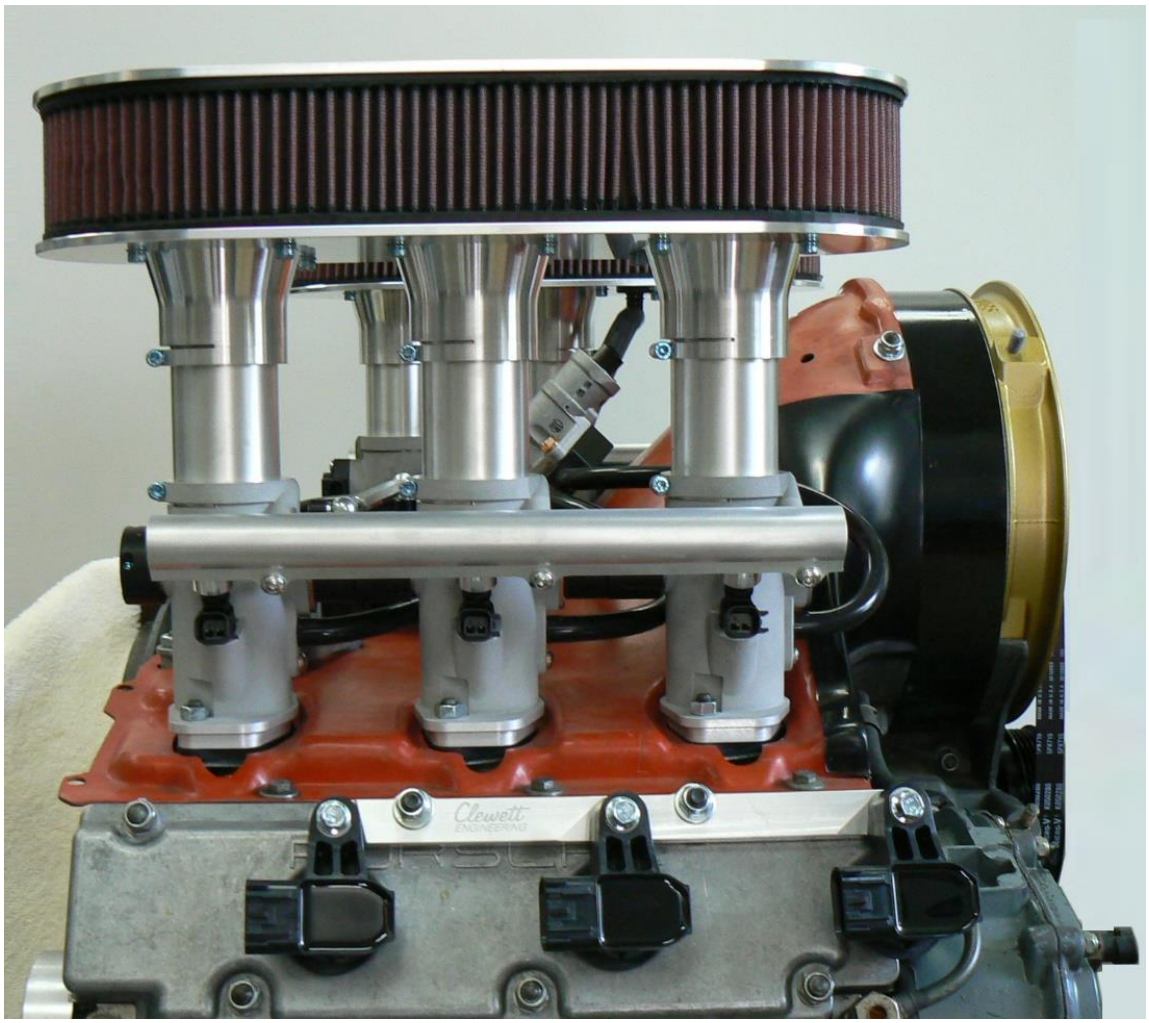
It's now time to check the installation.

- Throttles and linkage are tight.
- Fuel lines are tight and fuel pressure set to desired pressure and no fuel leaks.
- Throttle linkage is rough balanced and the throttle opening stops set
- Throttle linkage clear of wiring, hoses and operates freely.
- All air horns and tubes are tight.
- MAP signal vacuum lines are in place.
- Engine management system wires connected to all sensors, injectors and coils.
- Verify that the engine has oil.
- Final fuel line leak check is OK.
- Tie up any loose wires
- Address anything else that may be a concern.

First start up and balancing the throttle bodies –

Note - Before balancing throttles, Idle control valve hoses should be removed and fittings on throttles capped.

1. Start the engine and adjust mixture if needed.
2. Once the engine is running and stable, remove the right-side throttle link so that the throttles work independently
3. Using a large Syncrometer, adjust the throttle stop screws balancing the idle air flow and idle speed.
4. Next, check the balance of each throttle body one bank at a time. Start with the throttle having the linkage arm as a base measurement. This will be the master throttle for the bank. Go to next closest throttle and adjust the throttle coupling adjuster matching the flow of the master throttle. Use the same procedure for the third throttle. Repeat this process for the second set of throttles.
5. Adjust the idle stop screws until the desired idle speed is met and the Syncrometer flow numbers match.
6. Reattach right side press rod and bring the engine RPM up to 2500-3000 RPM using the throttle linkage to activate the throttles. Using the right and left linkage rod adjust, adjust the balance left to right and tighten the jam nuts. It may be necessary to readjust the idle speed once the engine is up to full operating temperature.
7. Install the air filters and now the throttle body installation is complete. It's time to start tuning.



We appreciate any comments on this installation manual. If there is something we missed or you see that we can improve the procedure to help others, please let us know.