

SETUP & INSTALLATION



Step 1 - Pre Installation Procedures

A) Before beginning this installation, read the instructions completely and be certain you understand all aspects of the installation before proceeding. There will also be some necessary tests to perform on the vehicle to ensure a successful install.

Check voltage output of the alternator to make sure it falls within acceptable tolerances. This will be between 12.7-14 volts. Check the battery to make sure it is fully charged and is in good condition.

The standard Bosch "Blue Coil" is **NOT** compatible with this system.

Standard VW solid core plug wires must **NOT** be used. A high quality suppression core wire is required. **RESISTER SPARK PLUGS ARE REQUIRED!** Ask the tech representative at CB Performance for recommendations.

B) Disconnect the battery. **DO NOT** proceed further without doing so. It is advisable after disconnecting the battery to drain the fuel tank and remove it. Disconnect the fuel line at the engine and blow the line clear with compressed air (wear eye protection) to be absolutely certain the fuel line is clear of any foreign material or debris. It is recommended to install two 3/8" fuel lines from the fuel tank to the engine. The larger 3/8" line is needed to prevent fuel starvation to the engine on larger/higher horsepower engines. Make sure the supplied fuel filter is installed. The 1/2" filter is the pre-filter and is installed between the tank outlet and the fuel pump. This is a very high-pressure system. Make sure all hose connections are tight and leak proof.

Remove the existing carburetors and fuel pump. It may be necessary to mock up the throttle bodies and linkage to make sure it fits your particular configuration. Once satisfied with the fit, remove them and use tape to cover the intake ports to prevent any debris from entering the engine.

Step 2 - Wiring

Stretch out the wiring harness to determine the best routing of the wiring for your particular application based on where you want to mount the EMS. If the EMS is going to be installed in a Beetle/Karmann Ghia, the EMS is supposed to be installed under the back seat (opposite the battery). In off-road applications or open cockpit vehicles where the environment is a factor, find the best possible mounting point (an enclosure is a must). Ensure that the harness will reach the engine correctly from it's mounting point. The harness is clearly tagged for where all the wires need to go. The ends which connect to the injectors, throttle position sensor, cylinder head temp sensor, O2 sensor, ignition wiring and the ganged ground wires (engine case attachment required) will need to be routed into the engine bay. A minimum 1 1/4" hole will need to be drilled wherever the wiring is to pass through sheet metal, so plan well. This is the easiest to do when the throttle bodies/carbs are off, for best access. **DO NOT** cut or modify the wire harness. The harness is designed for your application and modifying it will void any type of warranty or support from CB Performance.

*NOTE: The fuel pump must be mounted in the horizontal position. Mounting the fuel pump vertically will damage it. **DO NOT** mount the pump at the rear of the vehicle. The fuel pump is designed to be gravity fed from the tank. Trying to pull the fuel through the small diameter stock fuel line will*

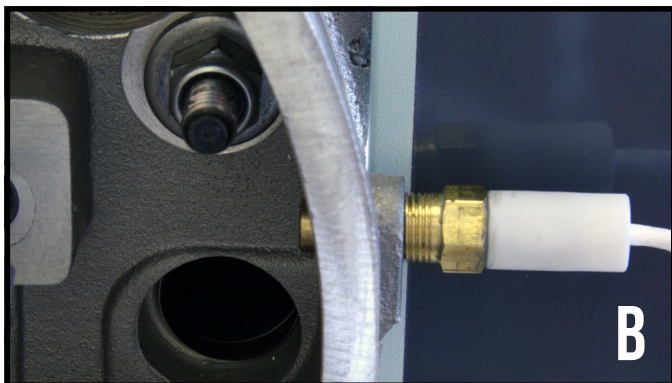
compromise the efficiency of the pump and cause it to run hot or cause it to fail. A pump can tolerate restrictions on the discharge much better than on the suction side.

Mount the EMS under the back seat, opposite the battery side of the tunnel. Keeping the EMS connector where the EMS is mounted, pull the engine bay segment of the wiring through the hole(s) you drilled being careful not to cut the insulation sheathing as you pass it through. Be sure there is enough slack in the wiring to attach all the connectors without stretching the wires too tightly.

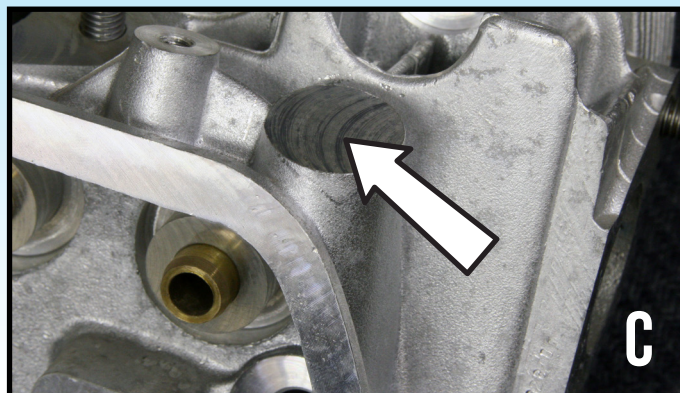
Step 3 - Hardware Installation



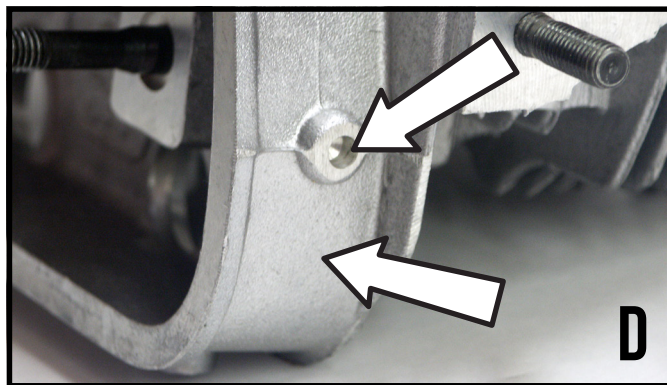
NOTE: Under no circumstances should Teflon tape be used on any threads in this kit. Use only Blue Loctite for threaded sealant. Teflon tape will find it's way into the fuel injectors and or the fuel pump and damage them [A].



The cylinder head temp sensor is to be installed in the 3-4 cylinder area. If using bolt-on valve covers, we recommend that it be installed in the valve cover bail boss [B].

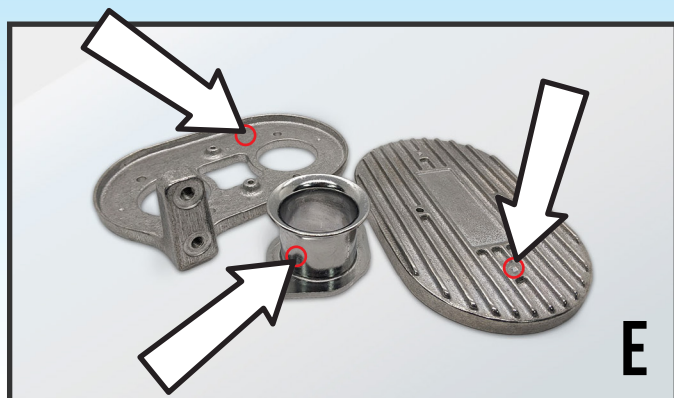


If you have an available boss cast into the cylinder head (New-Style CB 044's or Panchito 044's), you can use the boss [C].

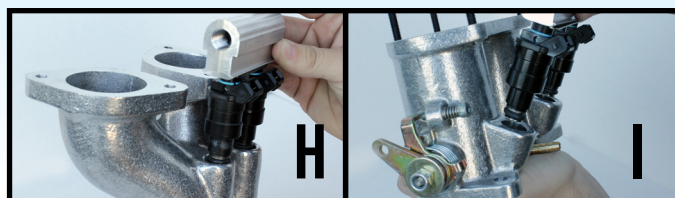


If using clip-on style valve covers, we recommend that it be installed below the boss [D]. Make sure before you drill a hole into your cylinder head, that there is no interference from push rods or head studs and the sensor. Use an 11/32" drill and an 1/8" NPT pipe tap. You will break through into the rocker box of the head, so be prepared to catch the shavings to prevent entry into the engine. Clean the shavings from the tapped hole and install the sensor using blue loctite for thread sealant.

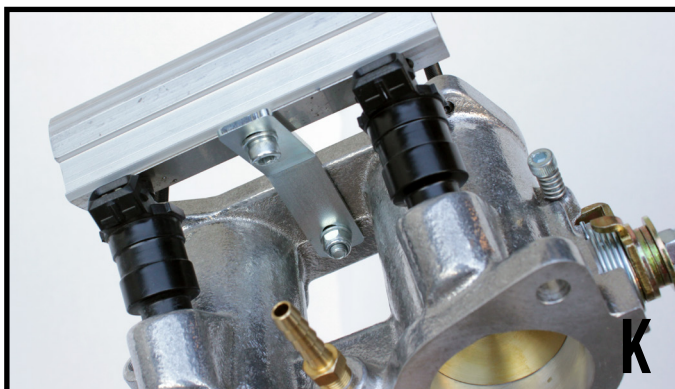
Intake Air Temperature Sensor (IAT) - Installation of the IAT sensor will be on the 3-4 side of the engine, above the throttle plate. Locations for sensor placement can be in the air cleaner lid, air cleaner base, velocity stack or in the side of the throttle body [E]. A 1/8" NPT hole will need to be drilled and tapped in the desired location.



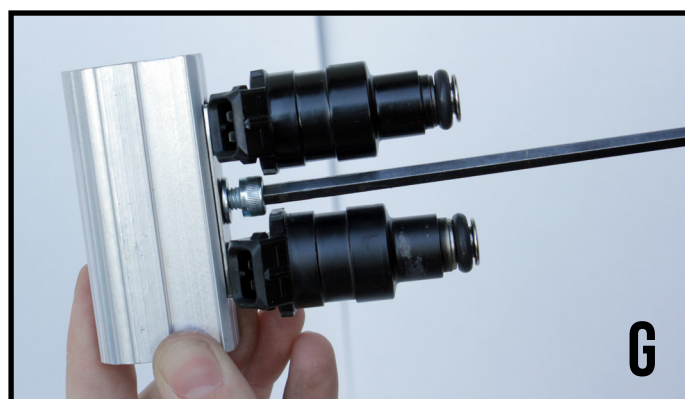
Next, take the rail assembly and push it down into either the throttle body or manifold [H, I]. In either throttle body or manifold assembly, some fuel rail hold downs need to be used. Refer to pictures to correctly assemble the hold down assemblies [J, K, L].



There are several types of throttle body/manifold setups. Regardless of the setup you are running you must first push the fuel injectors into the injector securing clip [F].



Then grease up the "O" rings on the injectors (**DO NOT USE OIL**). Take the injectors and push them up into the fuel rails until they seat all the way and you hear the clip latch onto the rail. Take note that none of the o-rings have been pinched [G].



Depending on your vehicle configuration, it may be easier to install the manifolds first without the throttle body rather than the whole assembly. Remove the tape covering the intake ports and install the throttle bodies with the supplied gaskets.

On all applications, make sure you have a good chassis ground, free of rust or powder coating. Install the Fuel Pressure Regulator (FPR) between the last remaining port of the two fuel rails and the fuel 'T' under the tank. The FPR must NOT be mounted inside the engine compartment. Extended periods of high temperatures will cause fluctuations in your fuel pressure. Make sure the vacuum line is securely attached to the vacuum port of the FPR.

NOTE: After engine is started, the FPR needs to be set to 43 lbs. @ idle. Re-check the pressure after the engine warms up. If the pressure has changed, you will need to re-adjust it to 43 lbs. @ idle.

For those with IAC motors, skip the next part. Connect a 1/4" vacuum hose to the barbed fitting in each throttle body. You will need to install a vacuum T in this line. The T will go to the fuel pressure regulator. In this line, you will add another T to run vacuum to the MAP sensor, located at the ECU. Take a small nylon zip tie, and use it as a clamp to secure the line to the fuel pressure regulator. It will be necessary to weld an O2 sensor bung into the exhaust if one is not already present.



If a 4-into-1 header is being used, install the bung into the muffler head pipe a few inches away from the collector flange, preferably at somewhere between the 10 O'Clock and 2 O'Clock position [M].



Turbo Applications: Weld the O2 sensor bung after the turbo. Please refer to the pictures to see the recommended placement of the O2 sensor [N].

NOTE: Insure O2 sensor clears turbo drain pipe.

Step 4 - Linkage

The first step to assemble your linkage is to slide the linkage arms onto the hex bar. The two linkage arms mount on each end of the hex bar while the straight throttle cable arm mounts in the middle. The throttle cable arm locates 60 degrees, or "one hex degree" down from the linkage arms. There are two centering springs supplied in your kit. Grease these springs very well and push them into each end of the hex bar. Take the two threaded swivel balls and jam nuts and thread them into the linkage bases that are mounted on your throttle bodies. Slip one end of the hex bar into the swivel ball. While centering the other end, slide it into the second swivel ball. It might be necessary to loosen the throttle body or intake manifold to make enough room to slide the hex bar into place. The swivel balls will need to be adjusted outward until there is a 1/4" of side to side movement of the hex bar. Try to keep the outward adjustment of the swivel balls the same from side to side. Once this is accomplished, lock the jam nuts down. Make sure you have at least a 1/4" of hex bar free play after tightening the jam nuts.

The linkage rods and heim joints are next. There are four heim joints in all. Two right hand and two left hand heim joints with corresponding lock nuts. Each side will need one

of each. The linkage rods are equipped with matching right and left hand threads. Thread the locknuts and heim joints onto the linkage rods. Leave these loose for now. After the assembly of the linkage rods is done, secure them to the cross bar linkage arms and the throttle body linkage arms. You will need two open ended wrenches for this operation, an 8mm and 3/8".

Position the aluminum linkage arms on the cross bar so that the throttle linkage rods are vertical when viewed from the rear of the engine. Lock the aluminum linkage arms into position by tightening the Allen set screws to prevent the aluminum linkage arms from sliding on the cross bar. Slide the aluminum throttle cable arm into position to line up with the throttle cable and tighten down the setscrew. Now check the installed linkage rods, both left and right, making sure that the rods rotate freely. Observe the way the rotation changes the length of the rod assembly. Up to this point the linkage assembly should work freely without any drag or binding. If there is any type of resistance, something is not right. Go back and double-check your installation. If everything is in correct working order, tighten up the shake proof lock nuts that secure the heim joints to the upper and lower linkage arms. Tighten these to no more than 2 pounds of torque.

Step 5 - Fine Tuning the Linkage Assembly

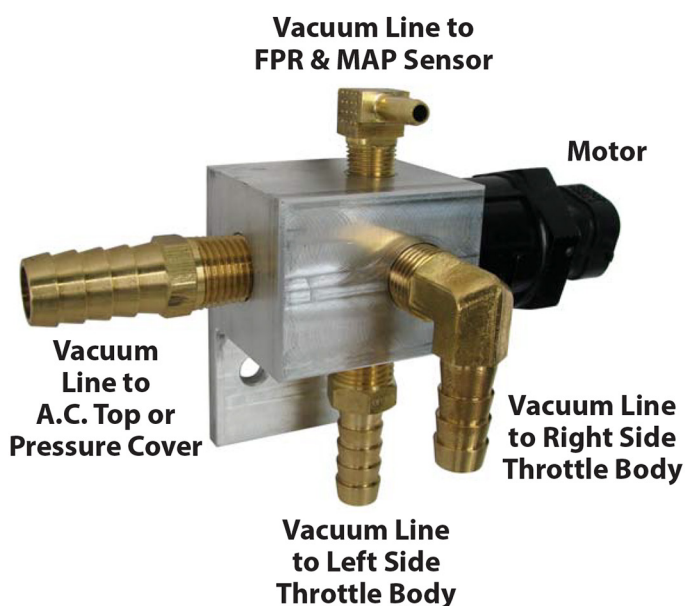
Adjust the throttle linkage by rotating in the right or left hand directions, until both throttle stop arms are resting on the idle speed set screws. By rotating the linkage rods, you'll be able to extend or shorten the length of the rods. This will allow you to match the preset throttle bodies. Do not change the position of the idle speed set screws to match your linkage. Adjust the linkage to match the throttle bodies. Once dialed in, push the aluminum throttle arm downwards and watch the linkage arms, as they should move from their stops or "closed" position at the same identical time. If they don't, then you have some more adjusting to do.

Step 6 - Idle Air Control

Mount the IAC remote mount on the back of fan shroud, in the center. Route the 3/8" hose from each throttle body to the center. Route the 3/8" hose from each throttle body to the two 1/4" NPT ports closest to the motor. DO NOT use 1/4" NPT port directly across from the motor - this is the output.

The 1/8" NPT port on the top of the mount is the vacuum source for your fuel pressure regulator and MAP sensor. The 1/4" NPT port directly across from the motor is routed to the air cleaner lid or a small Uni Vent filter (not supplied) can be used. It is recommended that this uses filtered air.

In a Turbo Application, the output hose must go to the pressure cover. Not doing this will allow a boost leak.



Step 7 - Wiring Connection

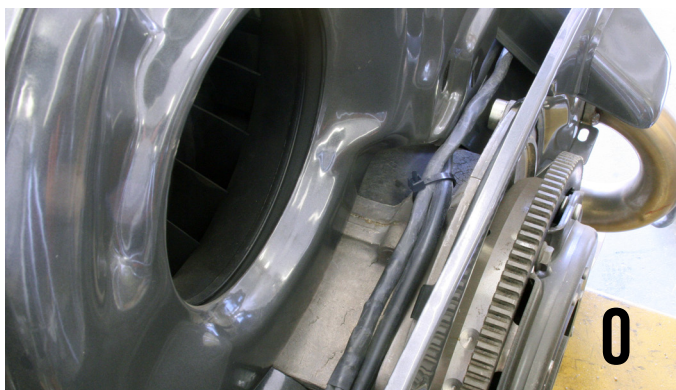
The gang of ground (earth) wires needs to be attached directly to the engine case. One of the case, distributor, or fuel pump block off bolts will suffice for grounding. It's vital that these wires are attached to the engine case to minimize electrical "noise". Snap the injector connectors to

the injectors. The connectors are clearly marked. The injectors may be rotated to facilitate easy wiring connection.

The fuel pressure sensor is screwed into one end of one of the fuel rails. Apply blue Loctite to the threads and tighten it firmly. It uses a clearly marked connector. Attach the TPS, IAT and CHT sensor connectors via their respective weatherpak connectors.

Screw the O2 sensor into the bung with a little anti-seize compound on the threads and attach the connector. Be sure to route the wiring away from the hot exhaust.

The ignition switch wire is located near the ECU. You can run a new wire (recommended) or splice into an existing wire. Then finally connect both the coil connections from the EMS to the coil, one marked negative, and one positive or the single lead marked "to Coil Pack." Make sure that there are no "hot" wires from the ignition switch attached to the coil. After connections have been made, tie the wiring harness up and away from hot surfaces and away from the cooling fan inlet. Use rubber grommets on the holes that the wiring passes through. Do not tie anything up to ignition wires, as this will add EMI noise to your fuel injection, causing problems.



NOTE: It is important that the wire harness is ran behind the fan shroud to help eliminate electrical noise interference. Make sure harness is zip-tied to the case so that it is not pulled into the fan while running [O].

Step 8 - Ignition

Crank Trigger - Bring the engine up to TDC and remove the crank pulley bolt. Install trigger wheel, making sure to line up the keyway. You may need to use the bolt supplied to help draw the wheel into the pulley. Remove the two upper case nuts behind the crank pulley. Install the provided bracket with shouldered nuts provided. Torque to 18 ft. lbs. Install extension bracket, leave bolts loose enough to allow the extension to slide. Install Crank sensor into extension bracket. Line up sensor over 8th tooth, counter-clockwise from the missing tooth on the trigger wheel. Use provided shims if necessary to shim sensor .020" from trigger wheel. Tighten everything down, making sure the sensor is centered over the 8th tooth.

Mount coil pack on firewall or fan shroud. The poles on the coil are marked with which cylinder goes where. The terminals marked Cylinder #1 and #3 can go to either Cylinder #1 or Cylinder #3 - orientation does not matter. Repeat steps for Cylinders #2 and #4.

For distributor hole plug installation, refer to install instructions included with the plug.

Cam-Sync - For sequential ignition systems, it is required to install a cam-sync. Rotate engine so that the crank sensor is directly over the 8th tooth before the missing tooth. This is approximately 25° ABDC for #2 cylinder. Remove old distributor and place aside. Remove cap from cam-sync and install into distributor hole. Make sure the cam-sync is fully seated and route large ring terminal to clamp stud. Rotate the cam-sync until the retractor lines up with the pick-up. Clamp everything down making sure retractor is still lined up.

Step 9 - Fuel Line Connections

A) It is desirable to mount the pump as close to the tank as possible. It uses a rather large 15mm hose attachment on the suction side, along with a similar sized filter. A new tank bung is provided with a 1/2" hose barb as well. The filter goes

in-line between the tank and pump, and is marked with an arrow for direction of flow. Make sure it points the correct way. Two "P" clamps are used to attach the pump to any flat surface. Mount the pump below tank level and in the horizontal position. Make sure there are no kinks in the hose. Connect the discharge end to the fuel line in the chassis.



B) On all engines, two fuel lines need to be installed in your vehicle. One is for pressure and one is for return. Use a 3/8" ID Fuel line for each. Make sure the 1/2" Fuel filter is installed before the fuel pump.

C) The fuel pressure regulator [P] needs to be installed after the last fuel rail. Before installing onto vehicle, remove the 1/8" NPT plug on the front of the fuel pressure regulator and install the provided fuel pressure sensor. Use blue Locktite to seal the threads. The fuel pressure regulator must never be installed in

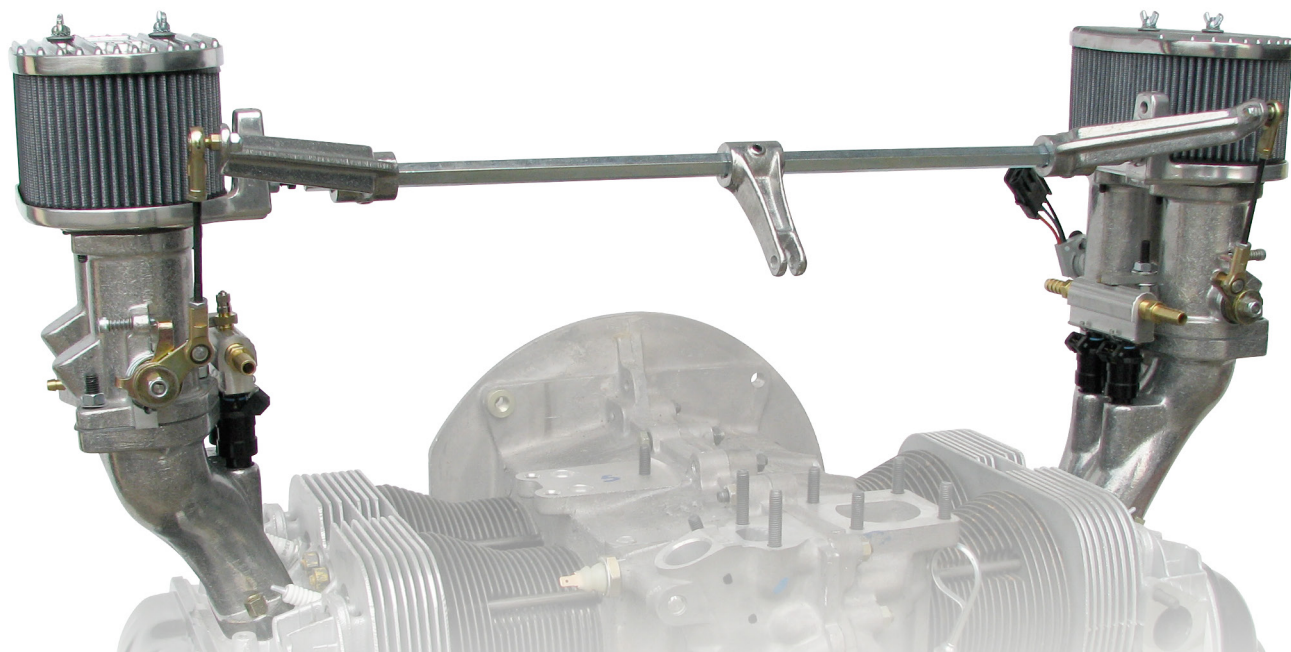
the engine compartment or near high heat areas.

Fuel Pressure fluctuations will occur if the fuel pressure regulator is mounted near heat. Attach the 1/4" vacuum line that is 'T'd between each throttle body to the vacuum port on the fuel pressure regulator. Make sure the connection is tight. Use a clamp if necessary (refer to the fuel pressure schematic page).

D) After engine is started, set fuel pressure to 43 psi @ idle. After engine warms up, recheck pressure and adjust if needed. Refer to instruction manual included with the fuel pressure regulator for plumbing instructions.

A precautionary note: On all applications, it is advisable to install the fuel tank, connect the suction line, pour in a little fuel, and check for leaks. Turn the key on and let the pump cycle. The pump is designed to shut off in one second. Turn the key off and wait 5 seconds and turn the key on again. Repeat this process 3-4 times until you have confirmed there are no fuel leaks.

With all the hardware mounted, the connections to the EMS may now be made. The gang of red battery leads attach directly to the positive side of the battery. **NOTE: If a battery cut-off switch is installed, the 12 volt battery positive leads must be connected to the hot side. The ECU needs to shut down properly or damage/corrupt data could occur.**



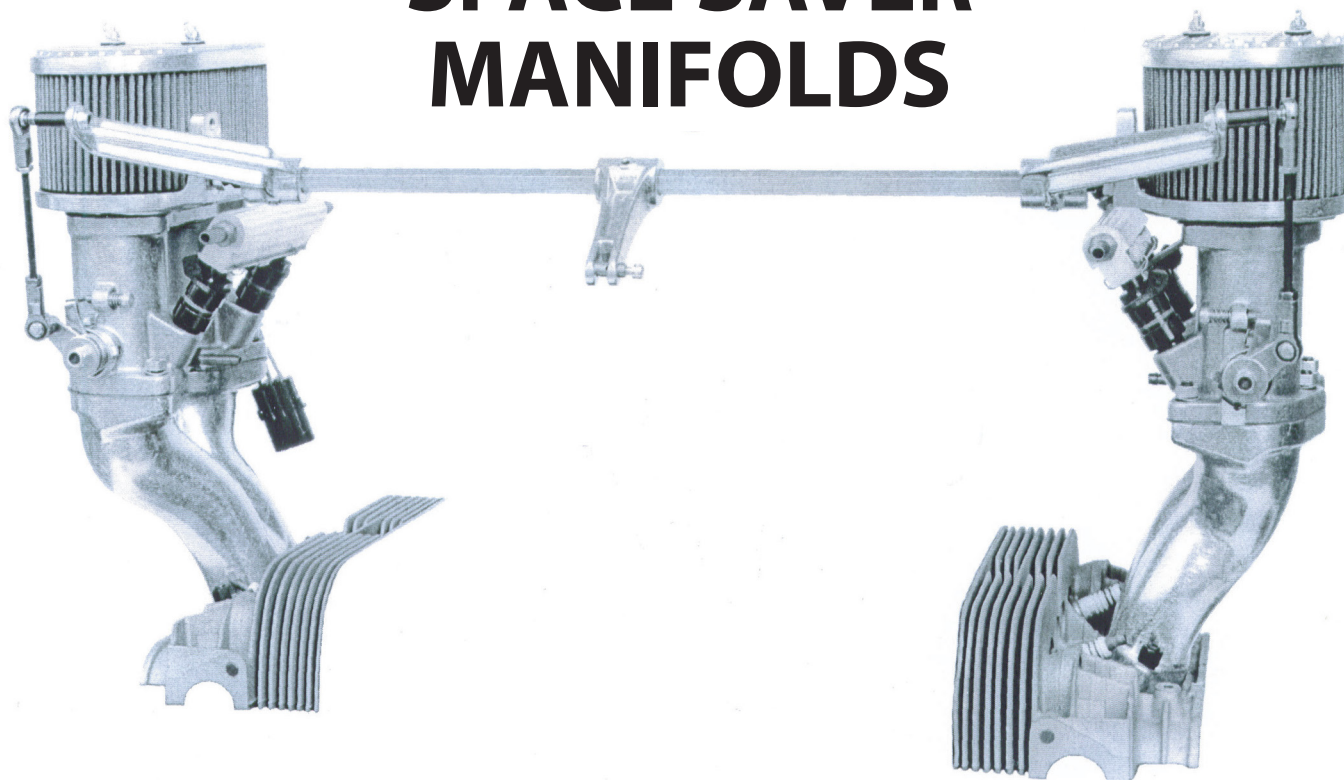
WARNING!

**NEVER, UNDER ANY
CIRCUMSTANCES SHOULD
YOU RUN LEADED RACING FUEL!**

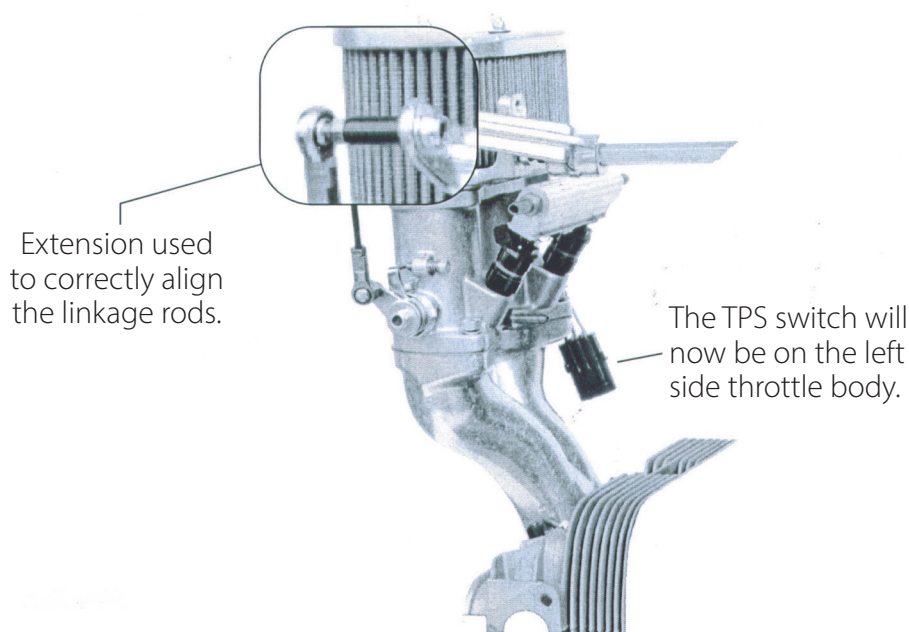
**ONLY UNLEADED RACING FUEL
IS ACCEPTABLE TO RUN IN YOUR
CB TERMINATOR X EFI SYSTEMS**

**SERIOUS DAMAGE TO
OXYGEN SENSOR AND/OR
ENGINE WILL OCCUR
WITH LEADED FUEL.**

SPACE SAVER MANIFOLDS

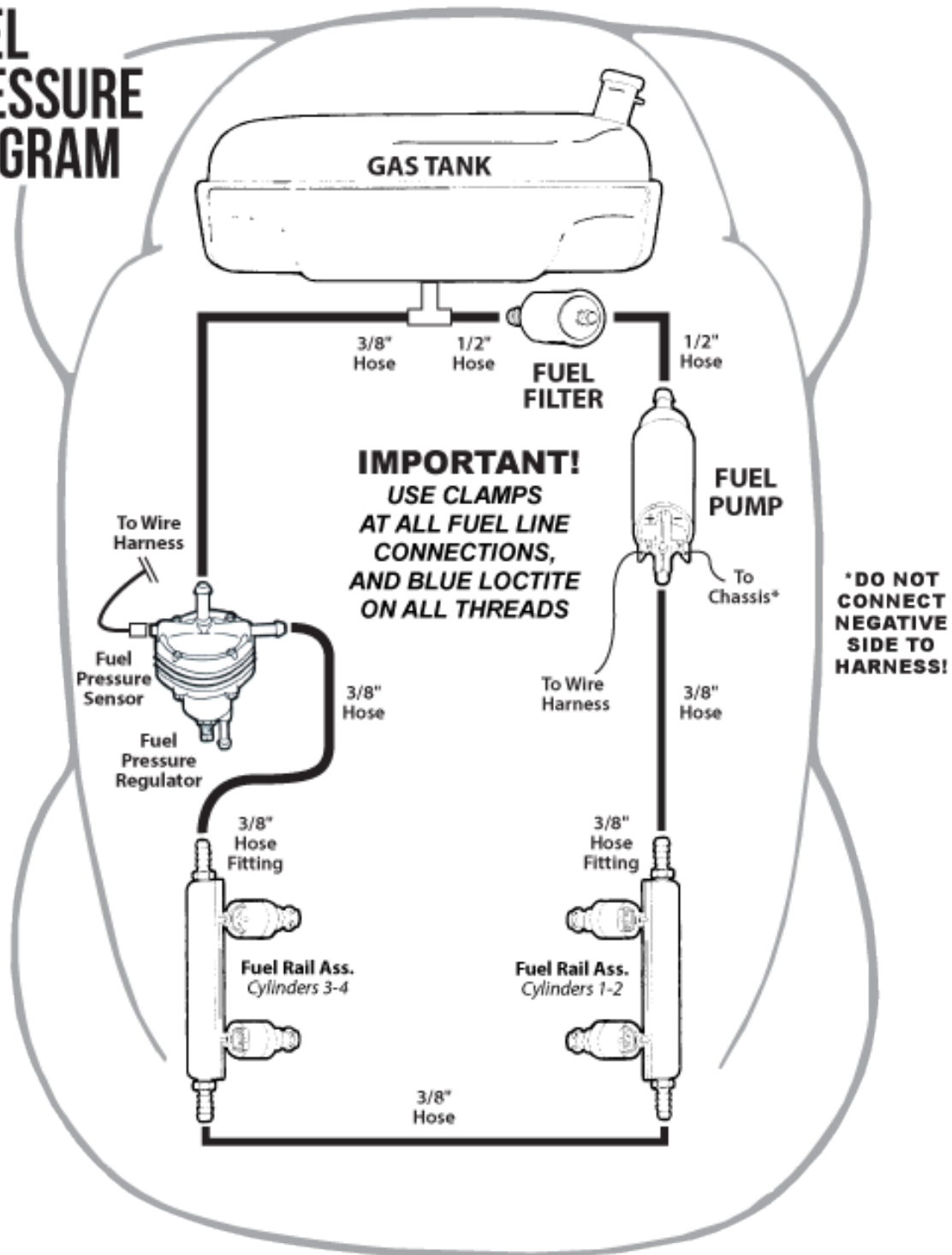


The Space Saver Manifolds installed in a similar manner to what was shown in the manual. The major difference is the use of the Space Saver style linkage and manifolds. This enables throttle bodies machined for injectors to be used within a sedan engine compartment. The TPS will now be on the left side throttle body (drivers side) and the injectors will be inboard. There are two extensions used on the aluminum linkage arms to correctly align the linkage rods. Refer to the above photo for a completed view of a Space Saver Manifold installation.

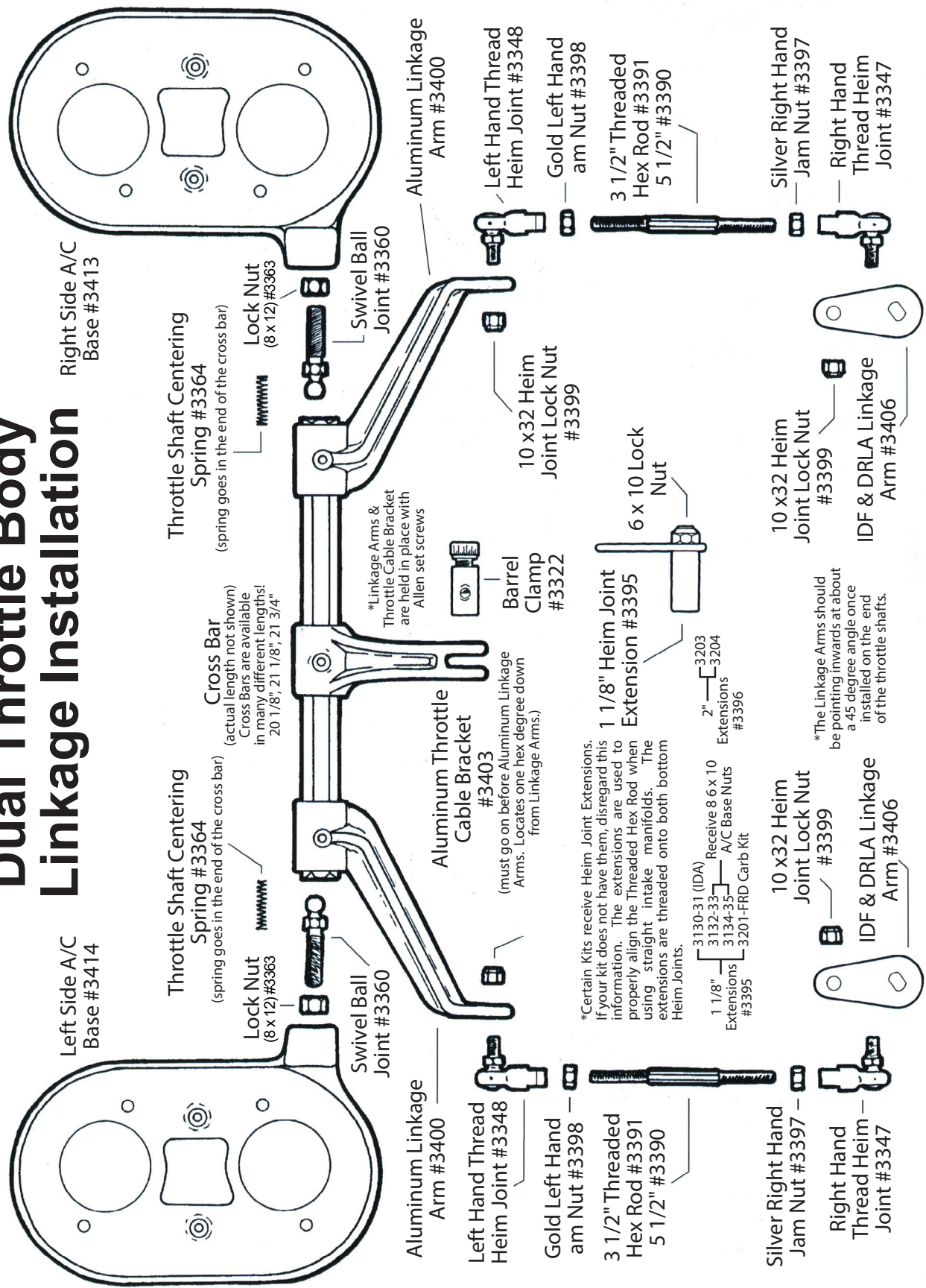


CAUTION - CLEAN AND FLUSH YOUR GAS TANK BEFORE INSTALLING YOUR NEW FUEL LINES. THIS IS AN ABSOLUTE MUST! YOUR FUEL SYSTEM MUST BE CLEAN TO OPERATE CORRECTLY!

FUEL PRESSURE DIAGRAM



Dual Throttle Body Linkage Installation

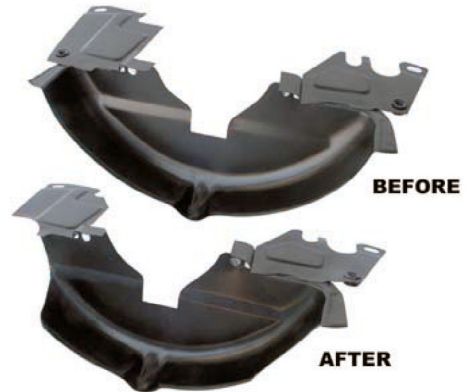


IMPORTANT INFORMATION

*Make sure to fit your header
to the Engine **BEFORE** any
aftermarket coating.*

*Customer assumes any
responsibility for the
header, after coating.*

Hide-away Turbo Assembly Instructions



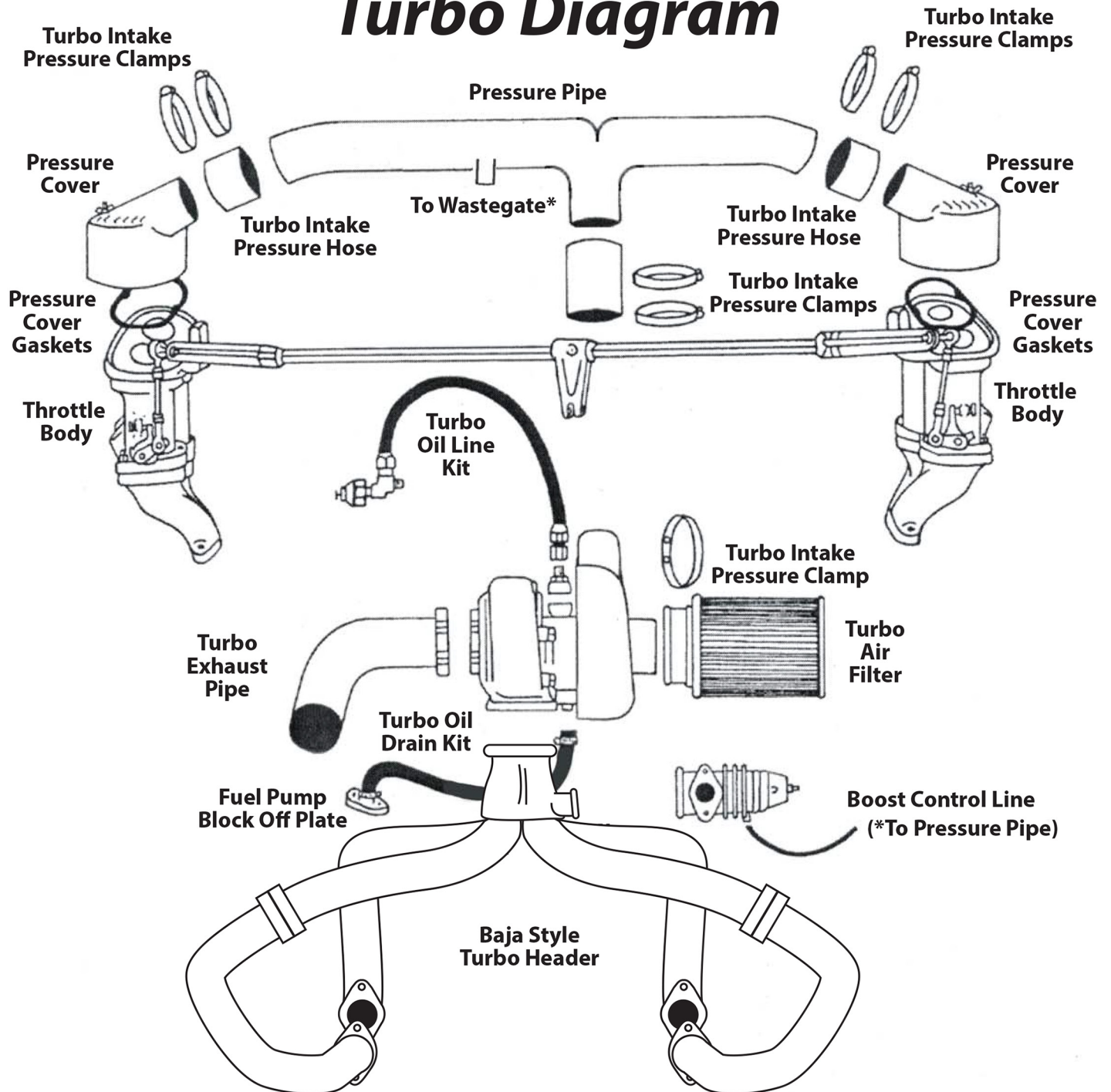
Here you can see some before and after pics of some Engine Sheet Metal that has been modified to run on a Turbo System.



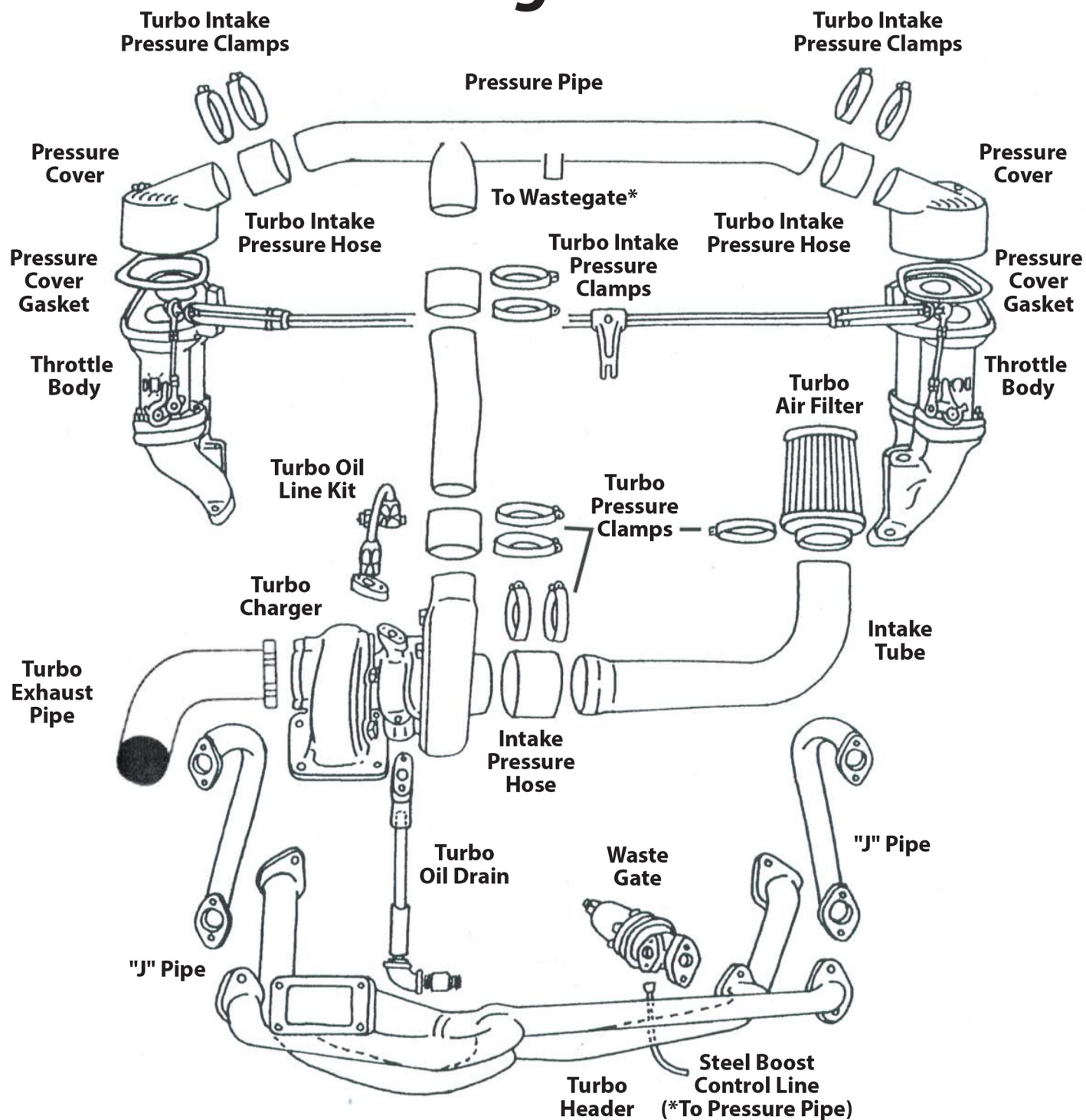
The following pictures show the proper assembly of Turbo Drain Pipe, and the next two pages feature the assembly of the entire Turbo System.



Rear Engine/Baja Turbo Diagram




Hideaway Turbo Diagram

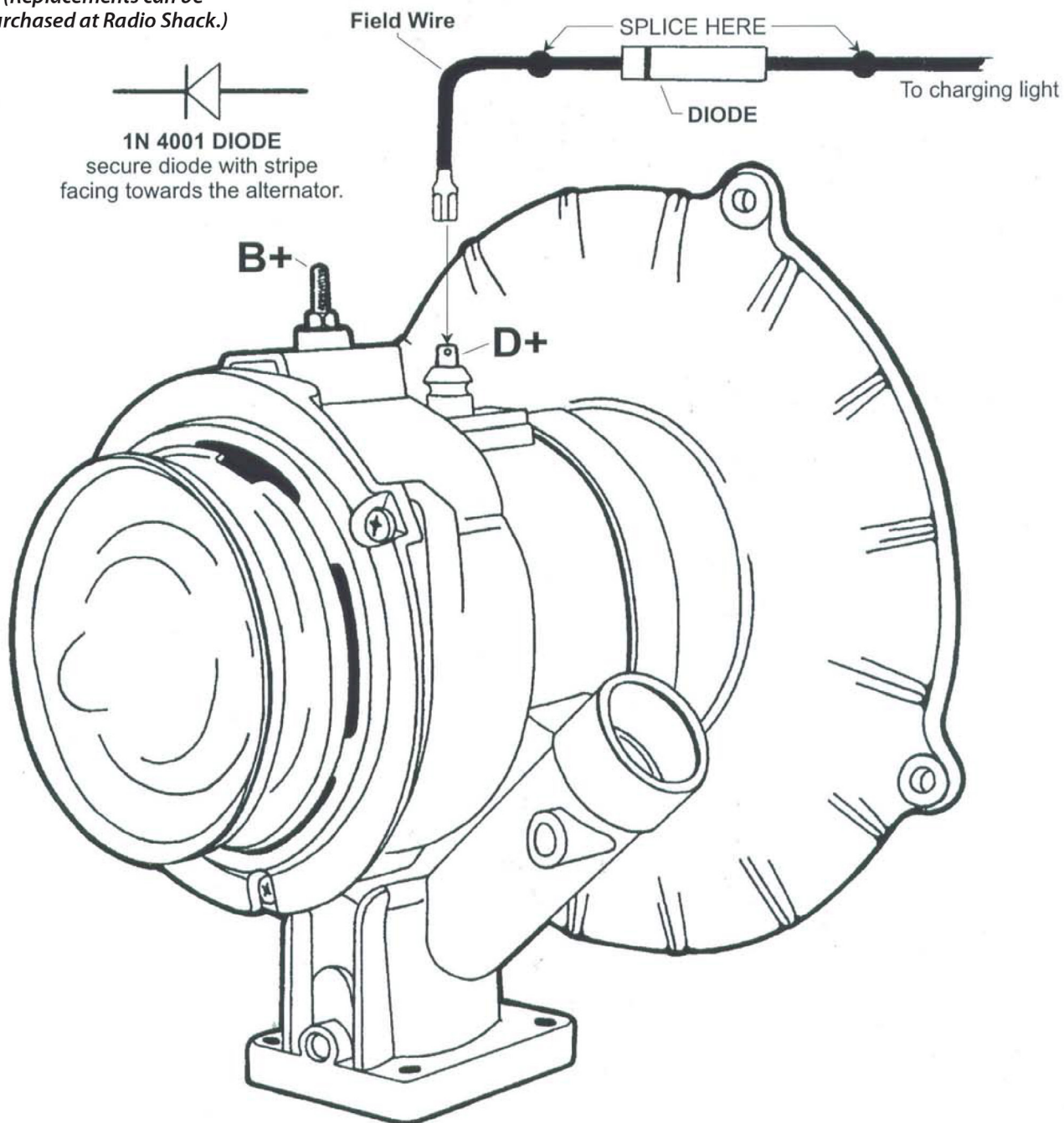


Engine Run-On

In some applications, a situation referred to as "Run-On" will occur. This is where the engine continues to run after the ignition switch is shut off. In a run on situation, a diode can be put in line with the alternator field wire. This diode will keep voltage from leaking through to the fuel injection system.

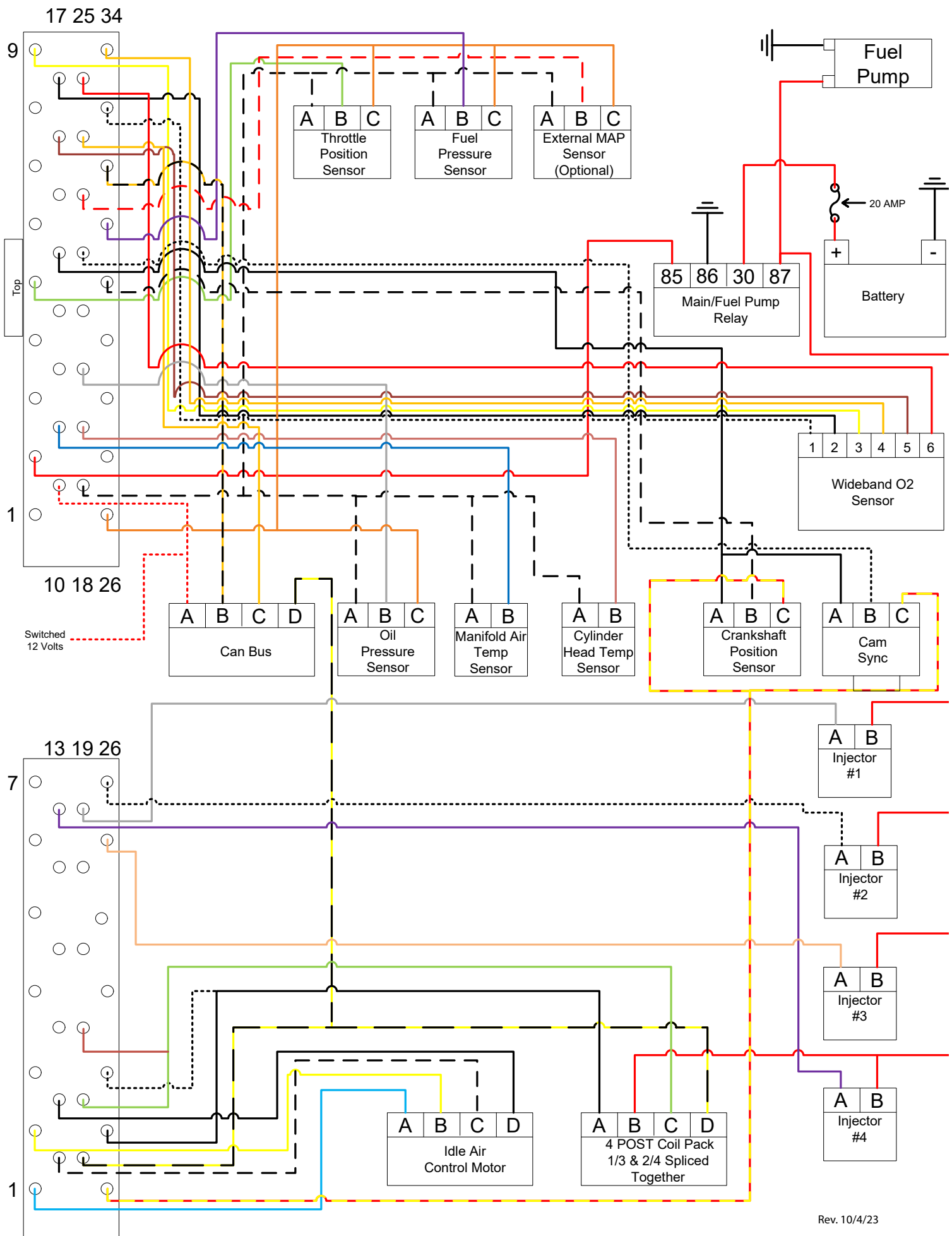
(Replacements can be purchased at Radio Shack.)


1N 4001 DIODE
secure diode with stripe
facing towards the alternator.



C3100 ECU WIRING PIN-OUT (REV 8/28/23)

Pin	Description	Wire Color
Connector P1A		
A1	Coil Negative In	Yellow
A2	Fuel/Main Relay 12V Output	Red
A3	Input #2	White/Red
A4	Input #4	White/Green
A5	TPS Signal	Green
A6	Points Output	White
A7	Not Used	
A8	Not Used	
A9	Wideband Heater	Yellow
A10	Switched 12v Input	Red/White
A11	Manifold Air Temp Input	Blue
A12	Input #1	White/Blue
A13	Input #3	White/Black
A14	Cam/Crank Sensor Ground	Black
A15	Not Used	
A16	Wideband Compressor	Brown
A17	Wideband VS IP-	Black
A18	Sensor Ground	Black/White
A19	Cylinder Head Temp Input	Brown
A20	Oil Pressure Input	Grey
A21	Not Used	
A22	Cam Sync Input	Clear Shielded
A23	Manifold Air Pressure Sensor Input	Red/Black
A24	CAN Bus Lo	Orange
A25	Wideband VS+	Red
A26	Sensor 5 Volt Reference Output	Orange
A27	Not Used	
A28	Tach Output	White
A29	Not Used	
A30	Crank Sensor Input	Clear Shielded
A31	Fuel Pressure Sensor Input	Purple
A32	CAN Bus Hi	Orange/Black
A33	Wideband IP+	White
A34	Wideband HTR+	Orange
Connector P1B		
B1	IAC A Lo	Blue
B2	IAC A Hi	Yellow
B3	Output #4	
B4	Not Used	
B5	Not Used	
B6	Not Used	
B7	Not Used	
B8	IAC B LO	White
B9	IAC B HI	Black
B10	Output #3	
B11	Output #2	
B12	Output #1	
B13	Injector #4	Purple
B14	EST Coil Ground	Black/Yellow
B15	Spark Output #2	Green
B16	Spark Output #4	Brown
B17	Not Used	
B18	Not Used	
B19	Injector #1	Grey
B20	Cam/Crank/CAN 12V Output	Red/Yellow
B21	Spark Output #1	Black
B22	Spark Output #3	White
B23	Not Used	
B24	Not Used	
B25	Injector #3	Beige
B26	Injector #2	White



Rev. 10/4/23