

## Kit Packing C7 Vette

PAC controller

Pump w/4 Feet shielded cable

4 Feet 7/16 split loom

6 Feet 1/4 split loom

2 long wire ties

PAC wiring + DS tape

7 inch hose -6 -6

28 inch hose -4 -4

28 inch hose -4 -4

Methanol Filter

90' 3/8 -6 fitting

90' 3/8 -4 fitting

MAP Sensor w/regulator

Brass T for MAP

Bracket to mount pump

Cap w/vent

Filter clamp + Fuse attach wire

Motor Plug C5 style

Tank 90 w/seal

Nozzle w/washers + adapter

Check valve

Relay Assembly 12ft red wire

Nozzle document

PAC document

MAP document

C7 install document

Custom Dual nozzle

M10 nozzle

1/8 T fitting

4 inch -4-4 hose 6 inch -4-4 hose

Large check valve

### **General Disclaimer:**

**The use of this system is for Off-Road use only. It is intended for racing on a closed course under supervision. Under no circumstance will Alkycontrol INC be liable for any damages stemming from the use of this product. Use at your own risk. Observe posted speed limit signs. Use common sense. Handle fluids being used with the system with care.**

### **What fluid to use?**

**The tuner will setup what is the best fluid given the particular goals trying to be achieved. It is important to follow they're recommendation and whatever fluid the engine was tuned at, must be used as it can affect air fuel ratios the engine operates at under load.**

### **Service..**

**The pumps are re-buildable. The higher the concentration of methanol used with the system, the shorter its life. Water should last 15 years. Straight methanol 2-3 years typically. Before seals harden and a rebuild is necessitated. Typically the turn-on LED will degrade in the way it switches from Red to Green. Meaning delayed in building pressure.**

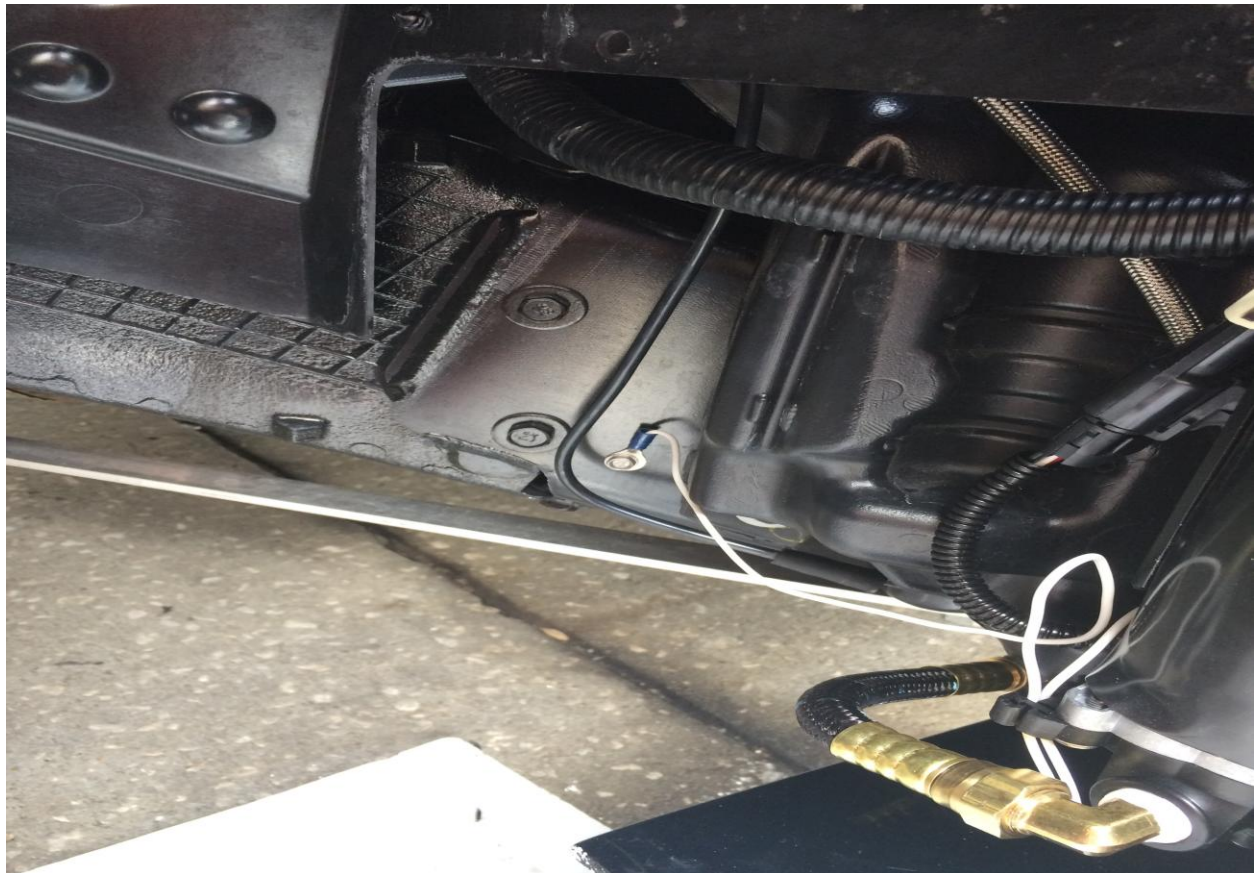
### **Questions..**

**If you have any question on the operation of the system, please consult the shop that installed and tuned the system. Or you can call us for any concern.**



### **Alky Pump install**

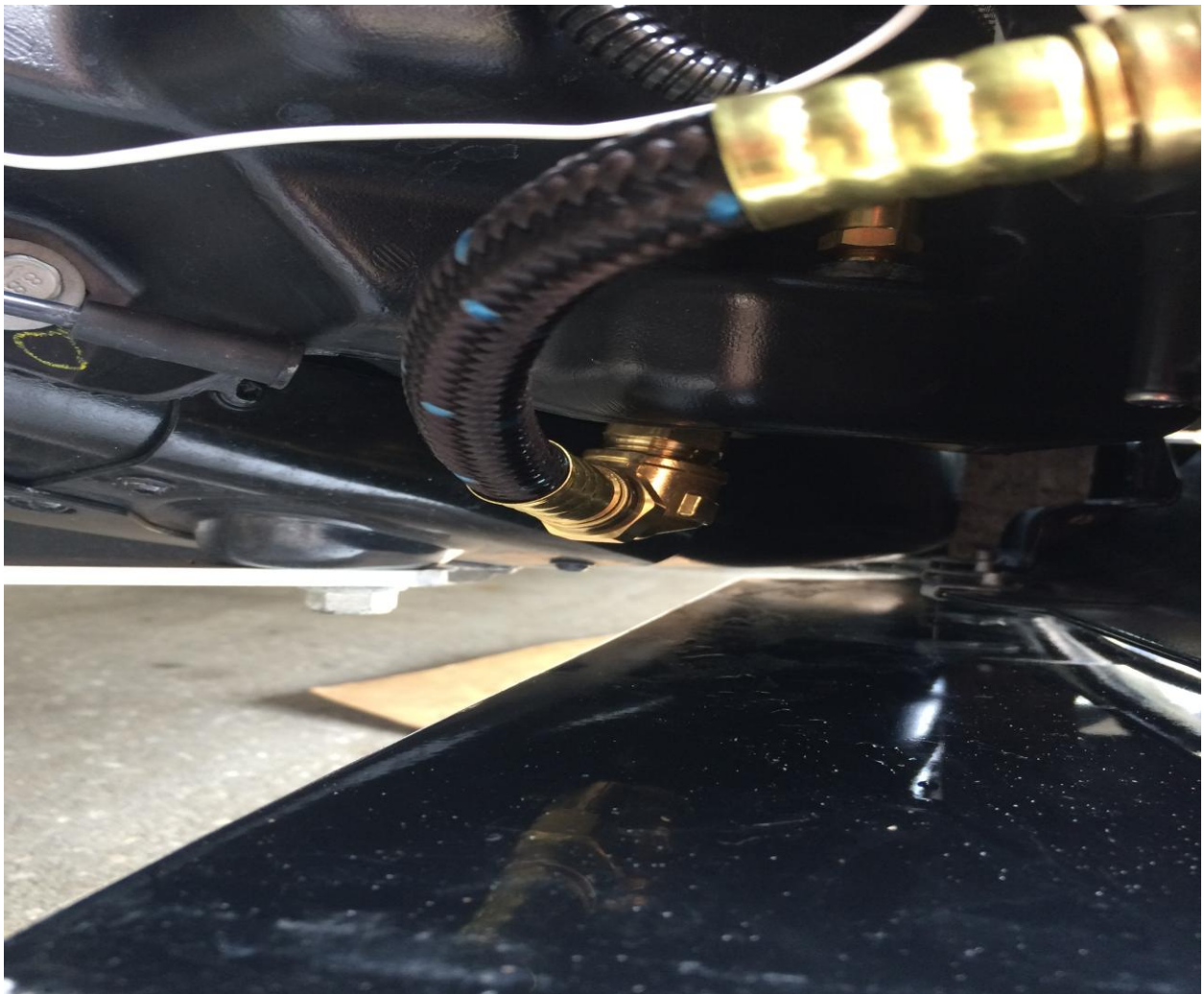
**Important notes... Do Not Mount pump with head facing upwards as this will allow water to collect inside sleeve and ruin motor. Please install as pictured, It can also be installed horizontally as long as the pitch does not allow water to collect in sleeve. Any question.. please call 813-265-1400 Julio**



## C7 Corvette installation instructions

### 1) The pump installation

You first need to gain access to the tank by dropping the drivers side inner fender. There are some clips you need to remove using a flat screwdriver, you will also need to unsnap a molding on the drivers side fender to gain access to a few T15 torx fasteners. Once the inner fender liner is removed, you will note the factory reservoir. Next I pull the motor out from the reservoir and unsnap its electrical connector. Water will come out of reservoir. Once the tank has drained, I drill a 7/8 diameter hole into the bottom of the reservoir behind where the factory motor was installed.





I use a Uni-Bit that its largest size is 7/8. These are available from most hardware stores. Harbor Freight as well. Try and get any slivers of plastic as the hole is drilled. Then put grommet into hole, lube WD40 the grommet and push the barb in facing forward. At this point install the grommet into the washer motor hole, and push the barb in to seal it.

Next is we need to get the pump cable into the cockpit of the car. On the drivers side kick panel there is a rubber grommet which provides perfect access.



I used an Xacto knife and put a small slit into the rubber to run wires through it.

At this point a fish or coat hanger wire works great, run the fish out through the lubed grommet and attach end of pump cable to it using electrical tape. You'll note the plastic tubing I also ran on this install for the boost reference. Once you have the pump cable and boost source situated under the dash, we can get back to mounting the pump.

Reason I ran the wire first was access. With the pump in place, there is less space to fish the pump cable.

Now the pump we need to attach the supplied steel bracket and get rid of the mounting plate it has. Once the bracket is mounted to pump, install the 90 degree pump fittings in by hand. Note the inlet fitting will face towards the frame and the outlet fitting will point straight up. I feed the 28 inch hose from the top of the drivers fender by the brake booster and now thread it onto the outlet fitting. Tighten it as access will be hard once pump is set in place. Now pull wire loom off and use the supplied  $\frac{1}{4}$  bolt to bolt the pump to the wire loom hole. Next is install the feed hose and tighten its fittings. Remember these fittings are soft brass. Don't force them more than needed.





Next is attach the white wire to a chassis ground. A simple 5/16 self tapping screw to the plate handles this. Plug the pump harness into the pump. We are done with the inner fender portion of the install.

## **2) Filter and Nozzle**

The filter has an arrow. It indicates flow direction. It goes in the pressure side between the 2 28 inch supplied hoses. And uses the clamp to mount to a suitable location.



The nozzle goes installed in the charge pipe after the MAF sensor. Not before. \*Note this particular picture shows an IAT Breakout Kit added.



To do so, first is mark where the hole will be before removing the charge pipe. Next is drill hole into charge tube 3/8 diameter and clean up the hole from debris. The nozzle has two washers included. If nozzles are going into aluminum, the rubber washers help seal the nozzle.

First step is you must have a washer on the inside. Period. Next is insert threads from the inside out and by hand attach the elbow. This will pull threads out more. Remove elbow, next is install washer on the outside so it creates a sandwich with the mounting surface. Start to tighten.. once some threads are now in the elbow, back it out and use red/blue Loctite on the threads and install elbow again until it is snug. The trick is you don't want the nozzle tip to bottom out on the elbow.

Next is put some Loctite on the threads of the check valve supplied (single nozzle), and apply some Loctite to the adapter that threads into the check valve. Attach 28 inch hose from filter to nozzle. Your done with this part. Next is install cap onto reservoir



and fill tank with liquid being used. IE methanol. Check for leaks. If none.. you may go ahead and install the inner fender and put the wheel back on the car.

Only other under-hood issue you may have is attaching the boost line reference. This concludes the under-hood portion.

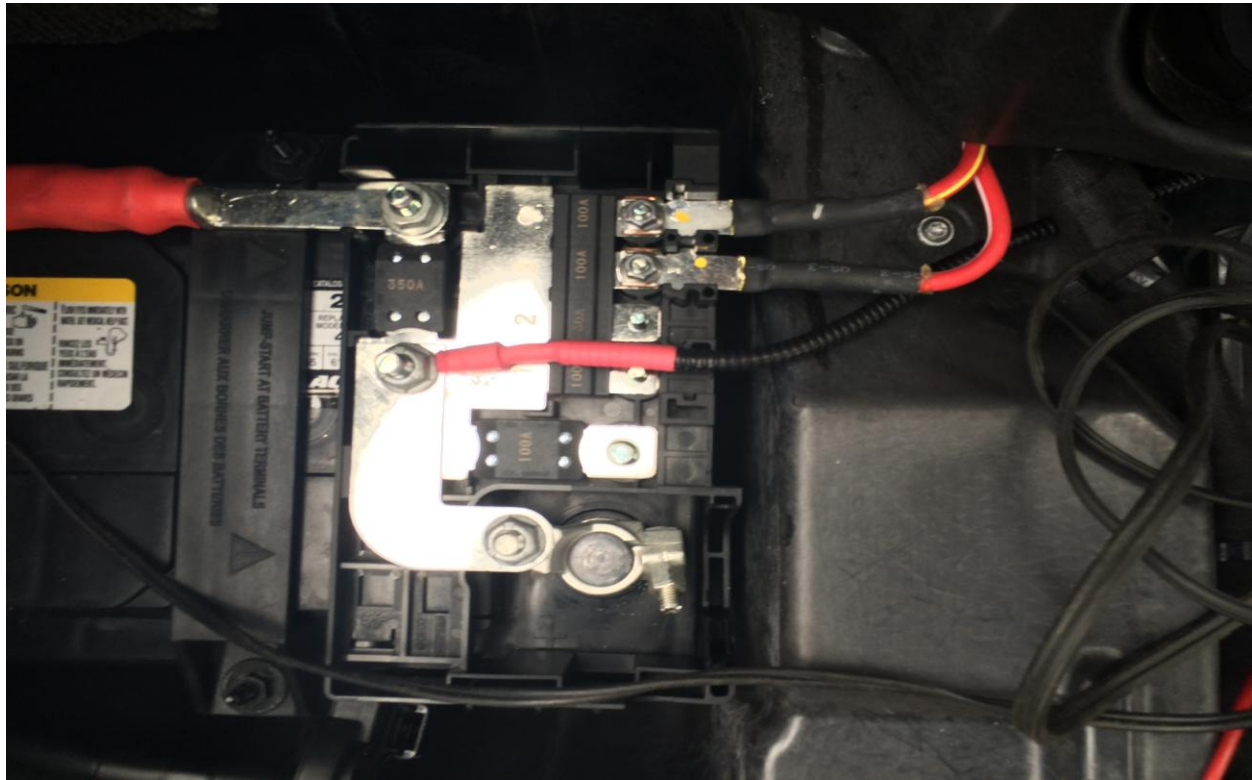
### 3) Relay

The relay will be installed in the rear of the car by the fuse box. It has 4 wires, red with an O-ring goes to the power lug, long red wire goes to red spade terminal on controller. Gray goes to trigger on fuse box. And black goes to ground. I used one of the subwoofer box studs to secure it in place.

Gray attaches to the yellow fuse using the supplied "tap" with gray wire. Some shops will prefer to install the PAC controller in the rear of the car, in my example I installed it under the drivers side dash. This is personal preference. These instructions pertain to doing the install under the drivers side dash. Wiring is the same.

At this point relay is now wired and the red wire is run through the back drivers side and down the rocker panel. The panels simply unsnap on the C7 making it easy.





#### 4) PAC wiring

Under the drivers side sill plate you will note the main grounds. Perfect place to attach the black wire from the PAC controller<sup>4</sup>. I also used this ground for the black wire from the 2 bar MAP sensor.





The LED for turnon must be mounted in a visible location, one option is drilling a small hole using a 1/4 drill and mounting in in the dash.



A less intrusive location is to use some heat shrink and mount it right above the vent as shown below.



At this point I have the pump cable under the dash, the LED wires, the map sensor, and the controller.

## 5) Under Dash wiring

This maybe a good time to take a break, wash hands, the easy part begins.

This is just guidelines from numerous installations I have done. The sky is the limit on creativity, and this should only be used as reference for what I have done, has been easy, and has worked.

Important note: The Turn-on LED is not resistor protected. Do not connect to 12v. Not even for a split second.

The first thing I always do is visually place where the location of the "turn-on" LED will be located. Typically this will be near your boost gauge or wideband gauge. The purpose of this LED is to indicate when the system has reached its turn-on threshold based on the signal from the MAP sensor(Red). And when the pump switch has moved indicating pressure (Green)( $<50$  PSI). It must be somewhere easily seen.

The red wire coming from the relay will go the larger red wire with spade terminal on the PAC. Simply cut the spade off and splice the wires together. Solder and heat shrink recommended.

Next is attach the **orange wire from the turn-on led to the orange wire coming from the controller, brown wire to brown wire.**

Attach the red and green wire from the MAP to the red and green wire on the PAC controller. The violet/gray wire leave alone until latter.

And finally the pump connections. Cut the wire to length and strip approx 3-4 inches of insulation from the wire. Remove foil. Then strip about  $\frac{1}{2}$  inch of insulation on the red and black wires that lead to the pump.





## **PAC terminal wiring instructions**

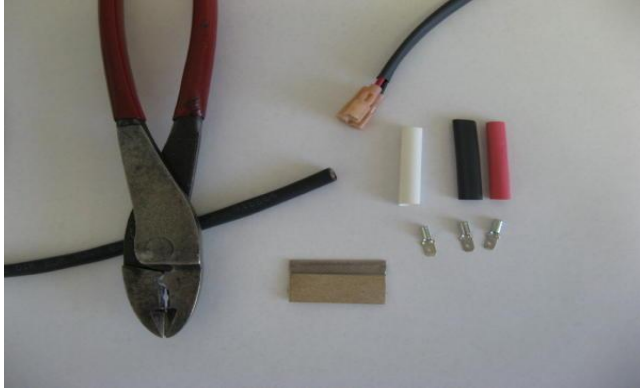
The following pictures show how to connect the pump cable wiring to the PAC controller.

Tools needed

1) Heavy duty set of crimpers (available through Home Depot, NAPA, Sears, Klein, Blue-Point, etc.) Do Not Use Cheap made in China crimpers....

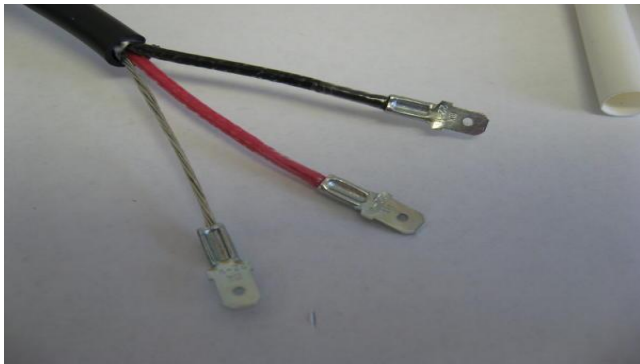
2) Razor blade

3) Heat gun or lighter



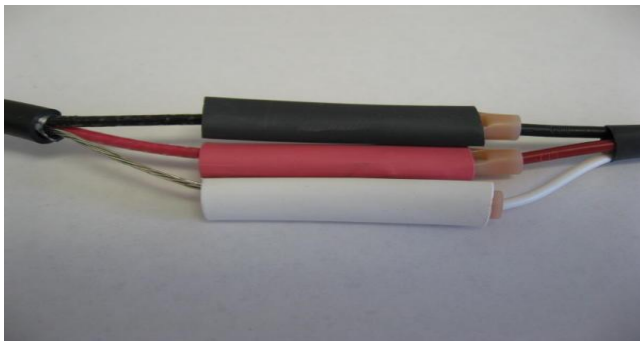
### Step 1

Strip insulation from end of pump cable and separate wires. Note there are three wires. Red, Black, bare wire. Strip insulation Red and black wires. About  $\frac{1}{4}$  inch is fine. And use the small supplied Male spade terminals. Crimp the terminals from the bottom as shown.



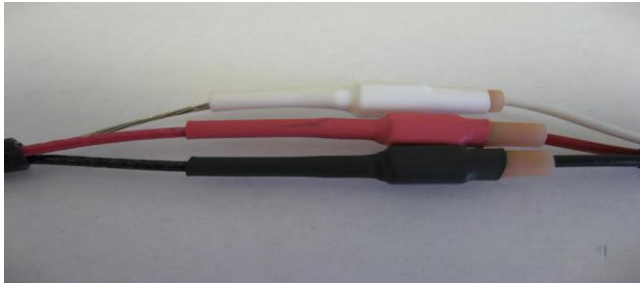
### Step 2

Slide large black heat-shrink over terminals and cable. Next is slide white heat-shrink over Bare wire, slide Red heat-shrink over Red wire. Slide Black heat-shrink over Black wire. Then push male spades into their respective colored female connectors as shown. Next is slide heat-shrink over terminals.



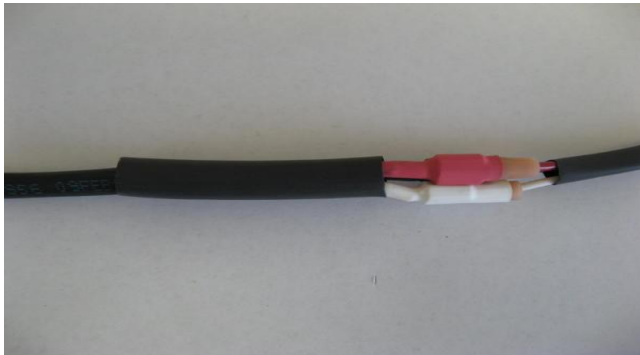
### Step 3

Apply heat to the heat-shrink.



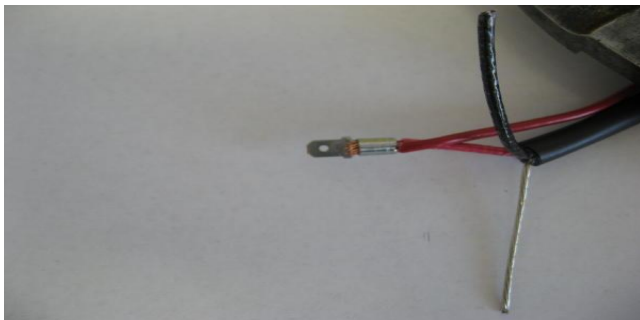
### Step 4

Slide large heat-shrink over entire connections



### Step 5

In the event more than one wire will be attached to the Red wire. Example Map sensor regulator, use the larger supplied Male spade that can accommodate larger wire and assemble as stated above.



I mounted the PAC controller up and behind the dash above the hood release cables. The MAP sensor in my case also was installed there. In my particular case I connected the hose on the MAP sensor to the plastic tube I ran earlier with the pump cable.



## 7) The gray/violet wire

**Be careful on how this wire is to be used, most applications will not benefit from it being connected. Here's the principle and connectivity.** The violet wire while a ground is applied will limit the pressure output of the system. And its only use is to help assist with spool-up while brake torque is applied to spool the turbo in a racing application. So here are some ideas and methods to connect the wire for this feature to be present.

Simplest method is a momentary toggle switch in the ashtray whereby one leg of the switch goes to ground, the other to the violet wire. While staging the car, depress the switch and build boost.. As soon as the car launches release the switch and the system goes back to normal.

Next is to wire a relay to activate while the brake is being depressed. To do so, wire the Bosch 30 amp automotive relay as follows. Terminal 85 to the blue wire with stripe on the brake pedal switch. Terminal 86 on the relay and terminal 87 on the relay to chassis ground. Terminal 30 to violet. When the brakes are applied, the relay "clicks" thus applying a ground to the violet wire.

The gray wire can be used to trigger an auxillary system. In case a solenoid or other device requires a signal once the system activates.

Typically these wires are not used.

## 8) Final

At this point you've concluded the installation, first thing to do is before putting alcohol/water into the tank, is start engine and set the blue gain knob to the middle position. Next depress the black test button and observe the turn-on LED next to the boost gauge lights up red. At this point observe the low washer fluid lamp, which should also be lit if the tank is empty. If everything checks ok, fill the tank with alcohol/water, and check for leaks coming from fittings that may have not been tightened. Start the vehicle, place gain on position 8, and push and hold the test button. Observe the turn-on LED illuminates red, then goes green since pressure now has been established. Motor should also stumble. NOTE>>> on twin nozzle systems LED will not go GREEN on TEST.

If these tests are passed, then your ready for a road check. And on your maiden voyage bring the boost up slowly and as the gauge goes past 4 PSI boost, the turn-on LED will illuminate. If it doesn't, do not continue the test and see why the MAP sensor isn't working. **This is very important.**

If it does work correctly, then proceed to increase the boost level observing how the engine feels and assure there is no surging when the system is spraying. If this part is passed, watch your knock readings, and roll into the throttle to your desired boost level. Stabbing the throttle on some cars can induce false knock. Just trying to make sure what you see is real or false. Also observe the turn-on LED and it will change color from red to green when initial pressure is developed. This can be changed via the adjusting screw on top of the pump. Outward decreases activation pressure, inward.. increases it. Typically I will set so it comes on early on. You may find our setting to be acceptable. Adjusting this screw has no affect on the system or its delivery. Its for changing when the LED indicator flips color.

From this point fine tuning of the system can be performed.

## 9) **Fine tuning**

Although most cars will work with the system setup as is from factory default settings, this is just a guideline. With the gain knob(blue) turned to minimum, you should see some knock but not a whole lot. Typically less than 2 degrees at WOT. Increasing the gain knob should make the motor go to zero knock. If your setting is at minimum and you don't see any knock, you may have too much alcohol being sprayed. The adjustment that affects this is the knob inside the PAC controller labeled "INITIAL". Turning this screw counterclockwise reduces the ramp and puts less alcohol/water into the motor. Small adjustments make big changes. Repeat the procedure until the motor just has enough alcohol to curb the detonation, but not too much.

On certain applications, whereby chip/fueling is adjustable, it may be beneficial to increase the initial and lower the fueling whereby upping the flow of alcohol through the motor.

Individual results may vary, enjoy the product.

## 10) **Contact**

**If any part of this procedure is unclear, or issue arises, please contact me or the vendor for assistance. Also note there are installation pictures available on my web site [www.alkycontrol.com](http://www.alkycontrol.com) . It would be my pleasure in helping you make the car go fast and stay together.**

**Julio Don 1-813-265-1400**

**email: [idoxlr8\\_70@yahoo.com](mailto:idoxlr8_70@yahoo.com)**

## **PAC- Progressive Alcohol Controller**

### **Introduction**

The PAC is a versatile electronic motor controller using pulse width modulation technology. It allows the user to custom tailor voltage output to the injection pump being used so that it increases pressure with the increase in voltage output coming from the vehicle MAP sensor. Recommended that vehicle have a 3 bar map sensor for better voltage control. Will support any injection pump rated up to 15 amps.

### **Features**

Added flexibility to the control of an injection pump to overcome boost pressure in intake tract, ability to run higher pressures from an injection pump without inducing flooding or transitional knock, input terminal for pressure reduction(brake input), ability to custom tailor installation, ease of use, and flexibility. Built in fuse.

### **Unpacking**

Included in the kit should be enough wiring and connectors to do a full install. This is a list of what is included. Controller, 12 feet 16 gauge shielded cable, 12 feet ¼ inch loom, 4 red splices, 8 wire ties, 3 spade terminals, one LED, solder, and some heat shrink tubing.

### **Tools Required/Recommended**

Connector crimper.. Klein, Blue point, etc. , soldering iron or gun with 60/40 solder, drill with unibit drill bit, 12V test lite, heat gun, basic hand tools, and a digital voltmeter.

6

### **Installation**

These are general guidelines for component installation. The kit comprises of two individual modules. They are the main controller, and the remote controller. A RED and a Black weather pack connector is used to supply power to the main controller. The Red goes to a switched ignition source capable of handling 15 amps. I use the IGN terminal on a GM fuse block. Or this can be routed from a relay activated by the ignition switch. Black goes to chassis ground. The connections to the injection pump are the Red/Black/White wires coming from the main controller. Connections to these using the supplied spade connectors. Red wire to from the pump to Red wire from main controller. Black wire from pump to Black wire from main controller. There is a “drain/silver/bare” wire for the pressure sensing, this will be connected to the White terminal. It is highly recommended that these connections be soldered to assure reliable connections.

IMPORTANT NOTE: The “Black Pump Wire” on the main controller is not a ground.

Main controller wiring, green-violet-gray-orange-brown.



Green is connected to the MAP sensor signal wire. On in the case of Ford vehicles.. MAF

Gray is an auxillary output that will switch + voltage when system activates. Examples to run a solenoid driver relay module, input to external boost controller, etc.. typically not used

Orange/Brown twisted go to the Turn-on LED. These wires will flip polarity when pressure is developed. Suggestion is to place turn-on LED near boost gauge to indicate system has activated.

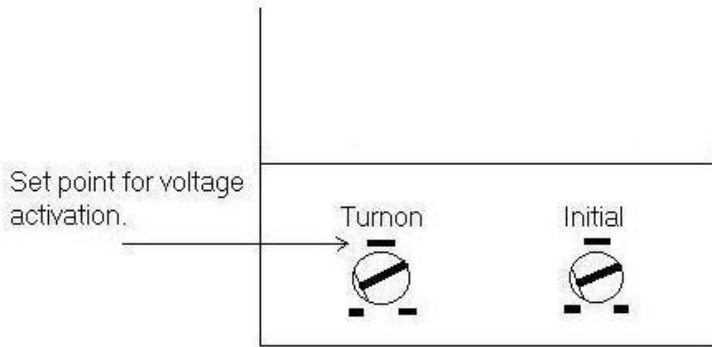
Violet wire is the negative trigger input terminal for pump speed reduction. Grounding this wire reduces injection pump speed to initial pump pressure for staging applications while drag racing. Intended application are E-brake switches.

The remote controller affords the user the flexibility of custom installing controls with dash panels of vehicles or attaching control box as is. For custom installation, simply remove screws from box and relocate controls and LED. A small jewelers screwdriver will be required to remove knob assembly. Unibit drill bit makes graduated drilling holes a snap.

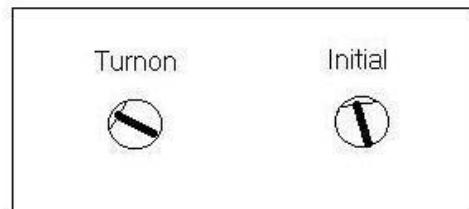
## **Setup and Use**

The remote controller features a knob that controls ON/OFF and GAIN. The LED next to it indicates system is armed and the push button applies “initial” pump speed to the pump for testing operation.

On the main controller is an access door. Opening the access door reveals two controls internally labeled “TURN-ON” and “INITIAL”. The turn-on control allows the user to set a turn-on voltage from 1.7volts to 5volts. Clockwise rotation increases the voltage needed to trigger system. The “INITIAL” control determines how much voltage is sent to the pump when the system is triggered. Typical settings are factory preset for 4 PSI turn-on with a 2 volt output to the pump. These can be recalibrated by the user by simply turning the controls clockwise to increase, counter clockwise to reduce. A LITTLE AT A TIME. Use fingers or small flat screwdriver. An electronic voltmeter can be used for initial pump setup as well. Procedure involves placing voltmeter across terminals on power distribution block and pressing the push button on remote controller. Typical setting is 1-3 volts. Next is the “Pump Gain Control” on the remote controller. This control interacts with the initial pump speed control. Usual and typical settings place this knob in the 12-2 o’clock position. It is used to ramp the voltage gain to the pump as the signal from the MAP sensor increases. Turning this knob clockwise will increase output voltage multiplication and slightly increase the initial pump speed. Only way to know what is best suited for your particular application is trial and error.



Turnon control will adjust from 1.7 volts DC to 4.9 volts DC. Full CCW is 1.7. Full CW is 4.9. Voltage can be adjusted by probing center terminal on Turnon control and adjusting to desired level. 3 bar GM sensor 5 PSI ~2.15 volts DC, 2 bar 4 PSI is 2.9 volts DC



This is typical factory preset for a GM 3 bar application. IE, Turbo Buick 2.2 volts DC



This is typical factory preset for a GM 2 bar application. IE Corvette 2.7 volts DC

## Tuning suggestions

First, best place to tune an alcohol system is the race track under closed track conditions. I do not recommend hi-speed testing of products on public roadways where you or others may be in-danger. Also no expressed liability is expressed with the use of this product. USE AT YOUR OWN RISK.

Ok, we're ready. Set pump gain knob to 6 and bring turbo up to your initial PSI setting(recommend ½ half of factory boost setting) see if LED illuminates, if not re-calibrate setting in main controller. Once this is done, monitoring engine knock, race car.... If knock retard is encountered, ascertain if the knock is occurring as the boost increases(transitional) or is occurring at due to high boost levels.

Adding gain to the knob(clockwise) increases pump pressure output. If the knock is occurring due to transitional, increasing initial pump speed or decreasing turn-on point will aid these conditions. Again every vehicle is different, the initial and turn-on will more than likely never be recalibrated once system is setup. They will not correct a tuning problem and/or engine fault.

Timing suggestions, Low timing and high boost. Setting up the fueling, timing, coupled with the alcohol output requires time and patience. Do small steps at a time and enjoy the product and its technology.

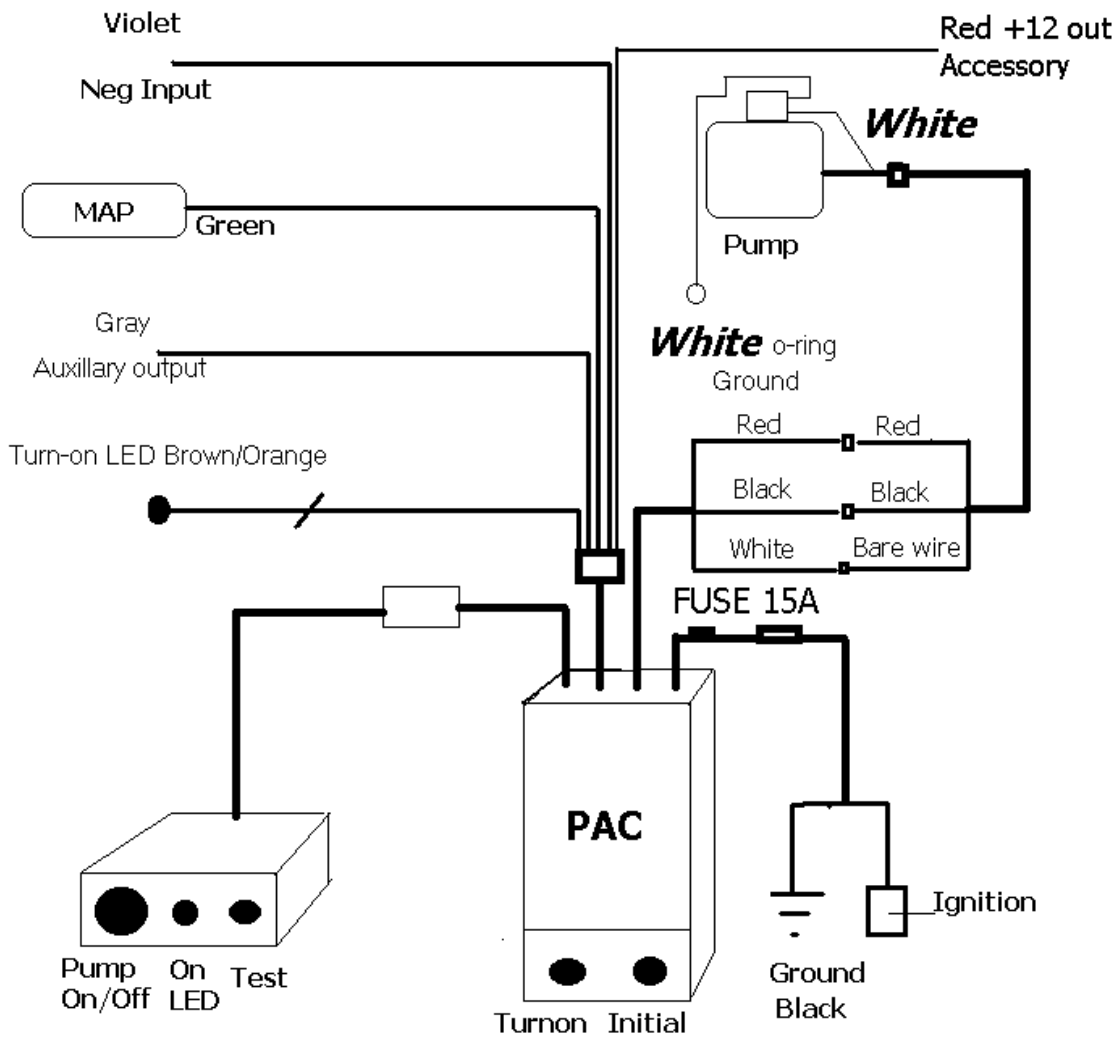
The pump features an allen screw to adjust pressure activation. Every vehicle is different, as will be the setting of this screw. Suggestion is to have it sense pressure early on. If there ever is an issue with the system(empty tank, tank leak, clogged feed line, etc) this will advise of a problem. Although it can be set to activate under higher pressures. This is a personal preference. And the brown wire can be used for triggering boost controllers as well. No pressure=no Hi Boost

## **TIPS**

On applications like the Buick Grand National, I wire a 12 volt bulb across the pump output terminals ( +, - ) . This allows me to see the bulb brightness increase as the boost level increases. And light dimly when the initial pushbutton is depressed. Other options are the use of an electric pressure gauge (optional) or mechanical pressure gauge (optional) to setup pressure. It is not needed, but can be handy for initially setting up controls. Other options are the use of a voltmeter across those terminals.

Most if not all street applications, once the knobs are set, they rarely get changed. Minor changes to the gain knob is all that will usually be required. Keep an eye on the road at all times...and if an unreasonable amount of knock is encountered, take your foot of the pedal and diagnose problem.





Auxiliary Intake Air Temperature Sensor (Optional):



IAT Breakout: Both wires on the IAT sensor harness are reverse polarity. On the MAF sensor locate and cut the White/Light-Blue wire in pin #1 on the MAF sensor and the Black/Violet wire in pin #3 on the MAF and connect those to the wires from the IAT sensor harness using the supplied connectors.



Install IAT rubber grommet by drilling a 5/8" hole in the charge pipe AFTER the Alky nozzle so when the methanol sprays it hits and reads the IAT sensor. Install and plug IAT sensor and re-plug MAF sensor.



Complete.