HYDROGEN GENERATOR HHO GAS

The Hydrogen Generator is a piece of equipment which when installed correctly can help you increase the mpg performance of a car or motorcycle, or truck.
and reduces the harmful emissions dramatically. It does this by using some current from the cars
battery and alternator to fracture water into a mixture of hydrogen and oxygen gasses called hho hydroxy gas which is then added to the air which is being drawn into the engine. The hho gas improves the quality of the fuel burn
inside the engine cylinders, this can increase the engine power, cleans old carbon deposits off the inside of an old engine,
reduces the unwanted exhaust emissions or smog and can improve the miles per gallon that your vehicle gets.
provided that the fuel computer does not try to pump excess fuel into the engine when it detects the much extra oxygen in the exhaust and the
improved quality of the exhaust.
This hydrogen generator is easy to make and the components don't cost much. The hydrogen output
the generator is very good as it produces 1.7 to 2.0 litres of hho gas per minute at a manageable amp current load
This is how to make and use it.

Caution: This is not a toy. If you make and use one of these, you do so entirely at your own risk.
Neither the designer of the booster, the author of this document. are in any way liable should you suffer any loss or damage through your own actions. While
it is believed to be entirely safe to make and use a hydrogen generator of this design, provided that the safety instructions are followed, the responsibility is yours and yours alone.

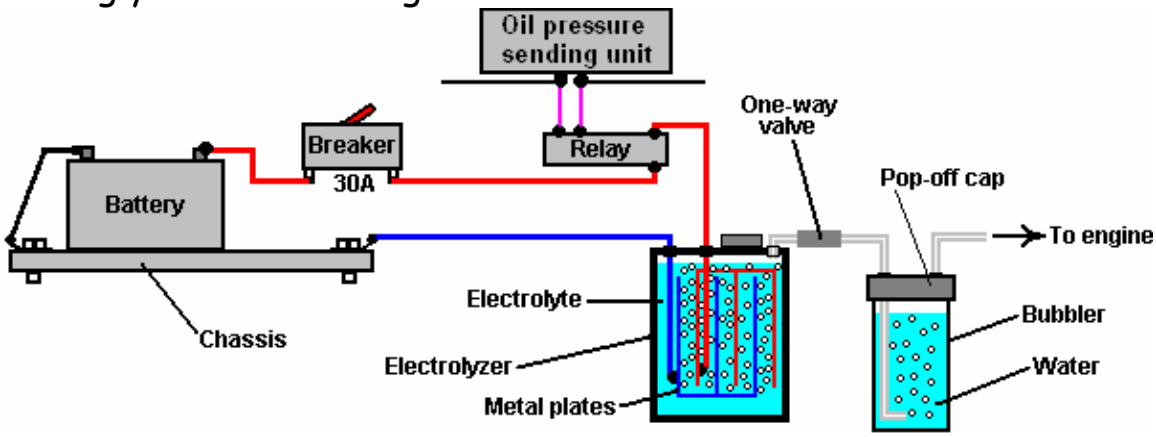
Lets talk about safety first

Before getting into the details of how to construct the booster, you must be aware of what needs to be done when using a hydrogen generator of any design. Firstly, hydroxy hho gas is highly explosive. If it wasn't, it would not be able to do it's job of improving the gas milege your vehicle is getting, Hydroxy gas needs to be treated with care and caution. It is important to make sure that it goes into the engine as designed and nowhere else. It is also important that it gets ignited inside the engine and nowhere else. To make this happen, a number of common-sense steps need to be taken. Firstly, the hydrogen generator must not make hydrogen gas when the engine is not running. The best way to arrange this is to switch off the electricity going to the booster. It is **not** enough to just have a manually-operated dashboard On/Off switch as it is almost certain to be forgotten one day. And the generator will be left on making gas while the engine is off Instead, the electrical supply to the booster is sent through the ignition switch of the car. That way, when the engine is turned off, we can be sure that the hydrogen generator is turned off.

So as not to put too much amp load through the ignition switch, and to allow for the possibility of the ignition switch being on when the engine is not running, instead of wiring the hydrogen generator directly to the switch, it is recommended that you wire a standard automotive relay across the oil pressure sending unit and then the relay carry the amp load electricity. The fuel pump is powered down automatically when the key is off, and so this will also shut off the hydrogen generator.

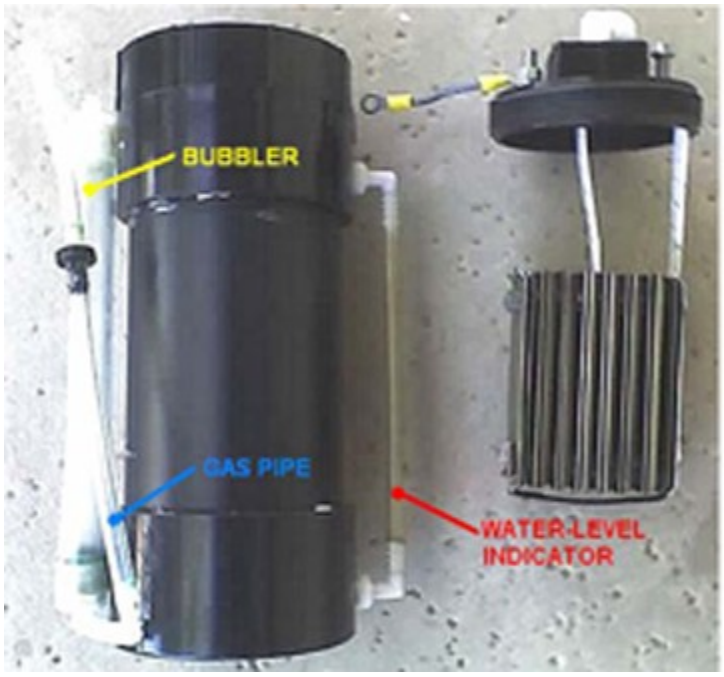
An extra safety feature is to allow for the (very unlikely) possibility of an electrical short-circuit occurring in the

Hydrogen generator or its wiring. This is done by putting a fuse or contact-breaker between the battery and the new
Wiring you are installing as shown in this sketch:



you can choose to use a contact-breaker, and a light-emitting diode ("LED") with a current limiting resistor of
, 680 ohms in series with it, this can then be wired directly across the contacts of the circuit breaker. The LED can then be mounted inside the car within view of the driver. As the contacts are normally closed, they short-circuit the LED and so no
light shows. If the circuit-breaker is tripped, the LED will light up to show that the circuit-breaker is working. The current through the LED is so low that the hydrogen generator is switched off when the
contact breaker opens.

In this first picture



, you will notice that the hydrogen generator contains a number of metal plates and the electricity passing
through the water inside the generator between the plates, causes the water to fracture
into HHO GAS. A very important safety item is the bubbler, we will be making a bubbler also, the bubbler has a
container with some water in it. The bubbler has the hho gas coming in at the bottom and bubbling up through
the water. The hho gas collects above the water surface and is then drawn into the engine through an outlet pipe
above the water surface. To prevent water being drawn into the hydrogen generator when the hydrogen generator is off and cools down, a one-way valve is placed in the pipe between the booster and the bubbler.
If the engine happens to produce a backfire, then the bubbler stops the flame fire from going back through
the tubing hose and igniting the gas being produced in the generator. If the generator is made with a tightly-fitting lid

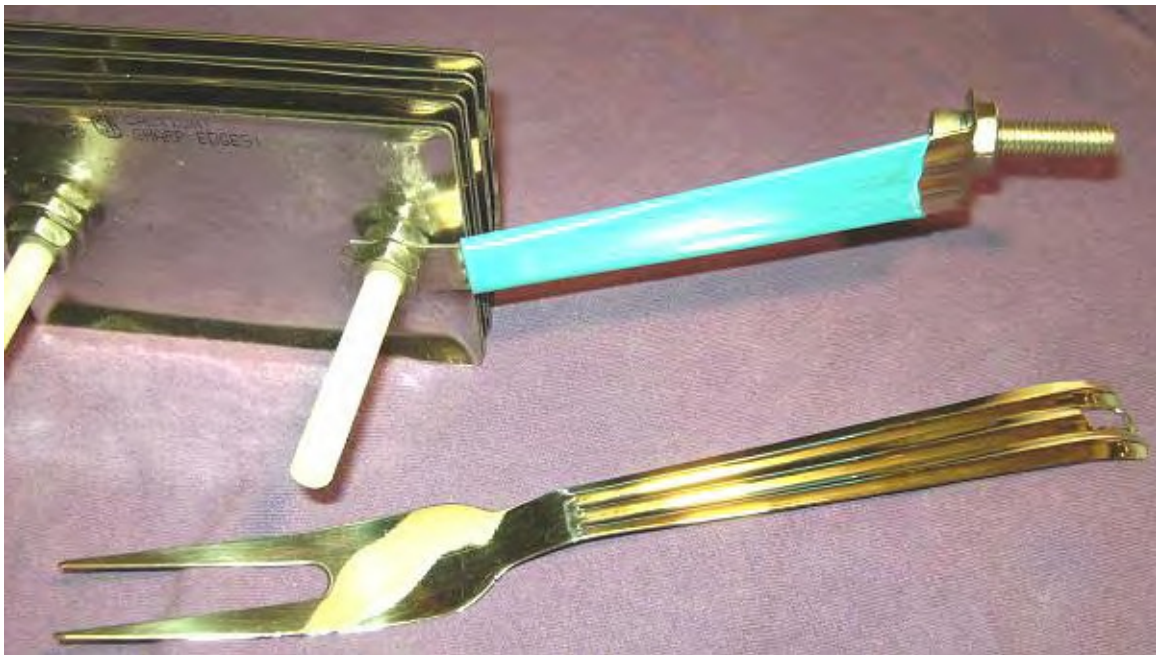
rather than a screw-on lid, then if the gas in the bubbler cathches fire and burns back thru, it will just blow the lid off the bubbler and
Stop the flame . A bubbler is a very simple, very cheap and very easy and should be installed
It also removes electrolyte fumes from the gas before it is passes into the engine.
You will notice that the wires going to the plates inside the electrolyser are both connected well below the water line inside the generator. This is to stop the possibility of a connection working loose while driving and causing a spark in the hho gas-filled region above the surface of the water, and this volume is kept as
low as possible to aid in this cause.

Design features used in the generator

The hydrogen generator is made from a length of 4-inch diameter PVC pipe, two caps, several metal plates, a couple of metal straps and some other various parts.
Assembly is fairly straight forward, and this hydrogen generator can be built by anybody. There is a plastic tube added to the outside of the hydrogen generator, to show the level of the water inside the generator, so you don't have to unscrew the cap. Another nice thing is the compact see thru bubbler which is connected to the generator side and shows the gas flow coming from the generator. The main PVC pipe length

can be adjusted to fit the space you have next to the engine.
Two different styles of bubbler are shown
Bubbler connections close up:

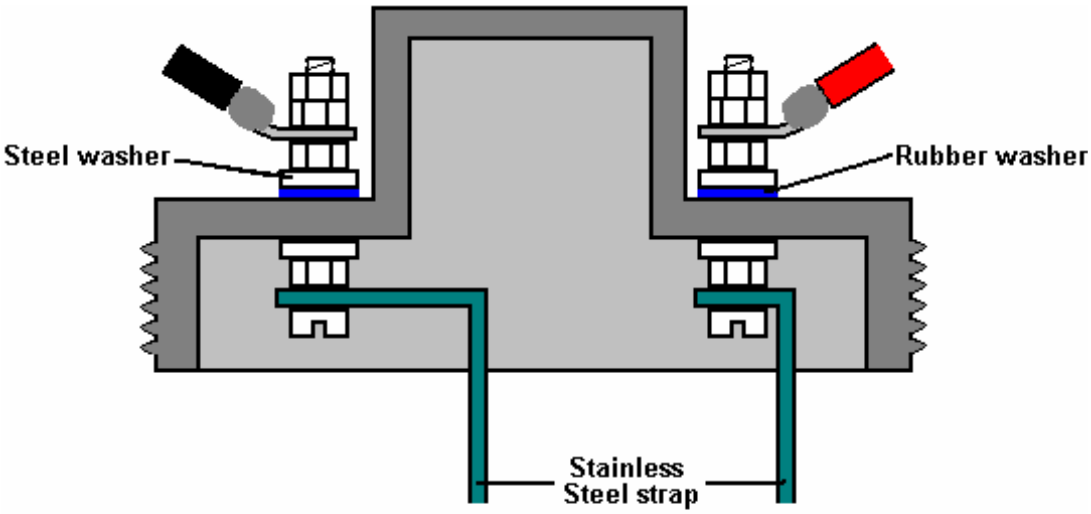
The generator uses cheap, standard electrical stainless steel wall switch plate covers from lowes or home depot or any hardware store.
and stainless steel straps, now you can cut stainless strips from sheet metal 304 or 316L works well, or you can cut from the handles stainless steel forks or spoons, buy them from any super market or kitchen supply store.



The electrical cover plates are bolted together in a group of eight closely-spaced pairs. The
You need to drill the holes out to a larger size to fit the nylon bolts, the next step is optional, its a lot of extra work for just a little more hydrogen, but you can chose to do it if you wish.
Just hold the plates down dent them using a centre-punch and hammer. These indentations bring up the
the gas output from 1.5 lpm to 1.7 lpm as the both increase the surface area of the cover plate and provide spots where
from which the gas bubbles can leave the cover more easily. The more dents the better.
The active surfaces of the plates - that is, the surfaces which are 1.6 mm apart from each other, need to be
Prepared with sand paper. To do this, these surfaces are scored in an X-pattern using 36-grade coarse sandpaper.
When you do this it creates small sharp-edged bumps covering the entire side of each of these plates. This

type of surface helps the HHO hydrogen bubbles leave the surface as soon as they are formed. It also
increases the usable surface area of the plate by about 40%. Now we have found fingerprints on the plates of any generator plates seriously slows down the gas production
this happens because youreduce the working area of the plate quite allot. You need to to either avoid all
fingerprints (by wearing clean rubber gloves) or clean the plates of all grease and dirt , use a
good solvent and then, wash that off afterwards with distilled water. Wearing
rubber gloves is the better choice, cleaning chemicals are not a good thing to be applying to these
stainless steel surfaces.

Shown above are the hand tools used to make the indentations on the stainless plates. The active plate surfaces
– that is, the plate surfaces that are 1.6 mm apart – are indented and then sanded.
The stack of the prepared stainless plates is hung inside a Tube cut from a 4-inch (100 mm) diameter
PVC pipe. The pipe is changed to a sutable container by using PVC glue to secure an end-cap on one end of the pvc pipe and a screw-cap fitting glued onto the other end. The container then has the gas-supply pipe fitting elbow fitted to the cap top, which is drilled with a pair holes to allow the connecting straps for the stainless steel plate assembly to be bolted to the cap, as shown here:



CROSS-SECTION THROUGH CAP

we need to make sure the stainless straps are tightly connected to the electric wiring, the stainless cap bolts are

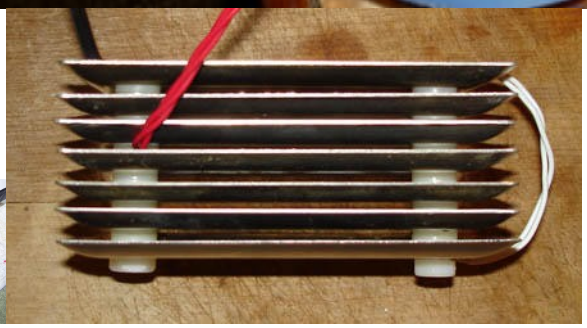
both located in the stronger thicker portion on the horizontal part of the cap, and bolted securely on both sides. A gasket from a piece of rubber or some silicone sealant is a good choice to seal the outside of the cap. If available, a steel
washer with built in rubber face will also work.

As the stainless steel strap which connects the hydrogen generator plates to the negative terminal of the power supply connects to the center section of the stainless plate assembly, it is necessary to bend it inwards slightly. The angle used for this is in not important, but the strap should be vertical when it reaches the stainless electrical plates.

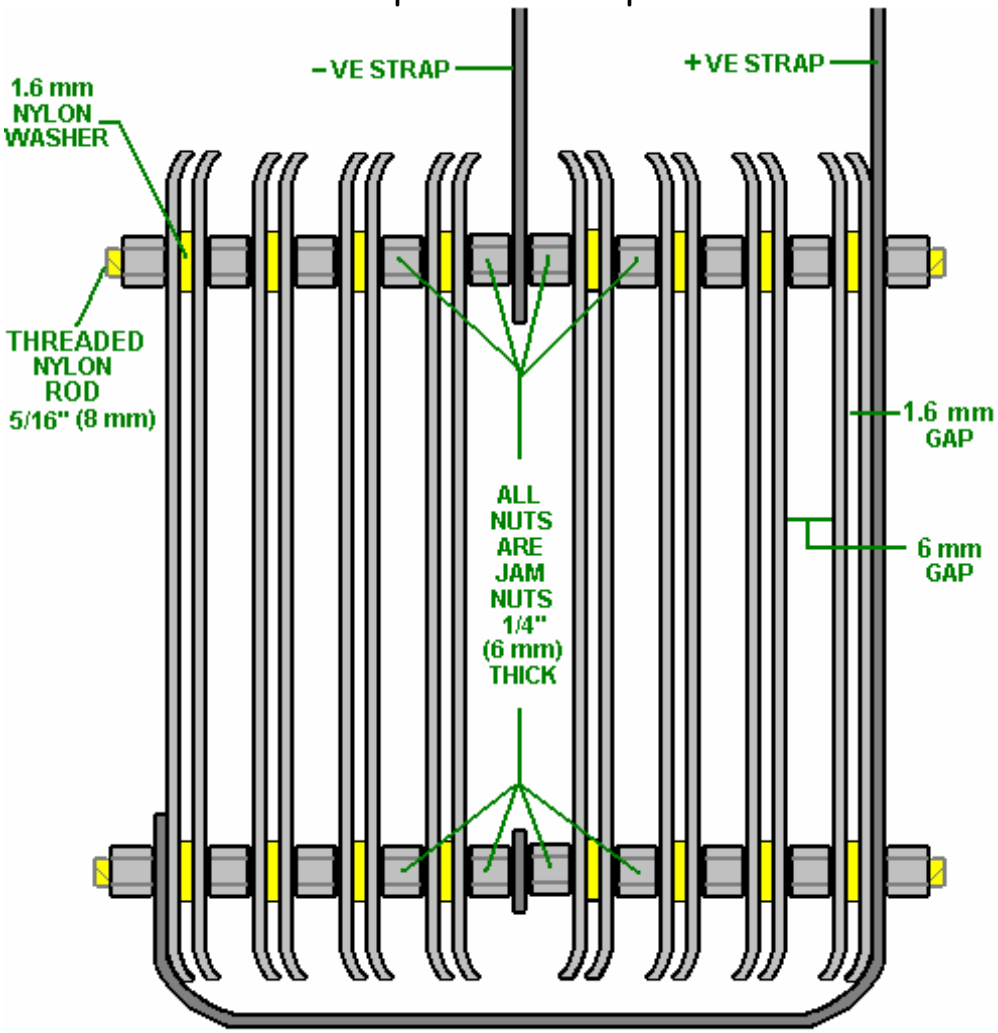
The picture above shows the stainless wall plates and how the bubbler is attached to the side of

the generator with super-glue or GOOP. It also shows the differant pipe connections. The stainless steel switch-cover plates are 2.75 inch x 4.5 inch (70 mm x 115 mm) in size and their two mounting holes need to be drilled out to
5/16 inch (8 mm) diameter in order to take the plastic bolts used to hold the plates together to make as an assembly.
After a year of constant useage, these plates are shiny and not corroded thanks to proper use of stainless parts
Two stainless steel straps that were made are used to attach the plate assembly to the screw cap of the booster. These straps are taken from the handles of cooking utensils or stainless strap steel that you cut, and they connect to three of the plates as the outside strap
travels across the bottom of the plate assembly, clear of the plates, and connects to both outside plates as can be
seen in both the above photographs and the diagram below.

The plates are bolted in position by two plastic bolts which run through the mounting holes in the stainless
plates. The arrangement is to have a small 1.6 mm gap between each of eight pairs of plates. These gaps
are created by putting plastic washers on the plastic bolts between each pair of plates.
The spacing is important is must be the 1.6 mm gap between the plates as this spacing has been found to be
The best at the electrolysis hydrogen production. The way that the battery is connected is unusual in that it leaves
most of the plate unconnected. These plate pairs are called neutral plates and they do produce gas
despite looking as if they are not electrically connected.
Stainless steel nuts are used between each pair of plates and these form an electrical connection between
Side by side plates. The plate assembly made in this way is cheap, easy to construct and both compact and robust.
You can also coustruct a plate assembly out of stainless steel flat pieces, such as stainless sheet metal, or corrugated stainless metal, you can also buy stainless plates off ebay for this, just take a look at a couple of possibilities in these pictures



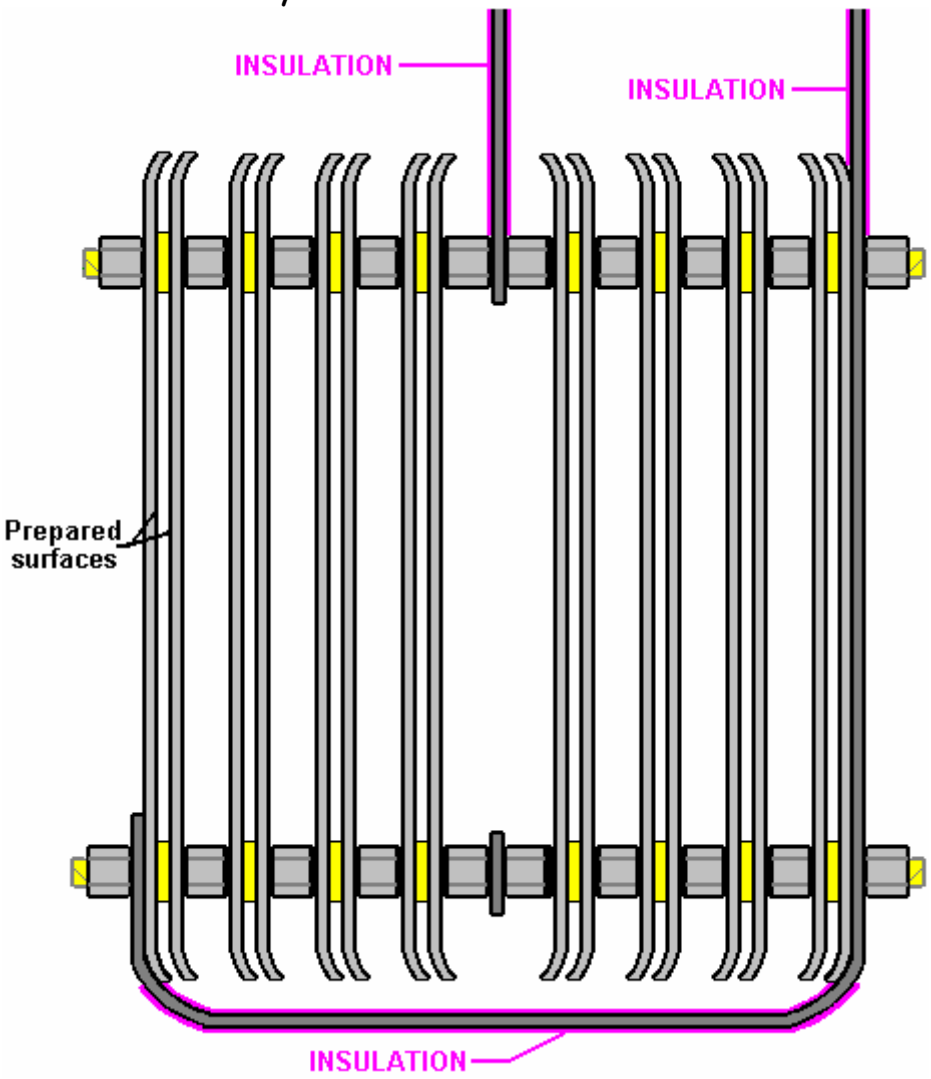
The electrical straps are bolted to the screw cap at the top of the generator and this both positions the plate assembly securely and provides electrical connection to thebolts on the outside of the cap while maintaining an airtight seal
for the holes in the top screw on cap.



SIDE VIEW OF PLATE ARRAY

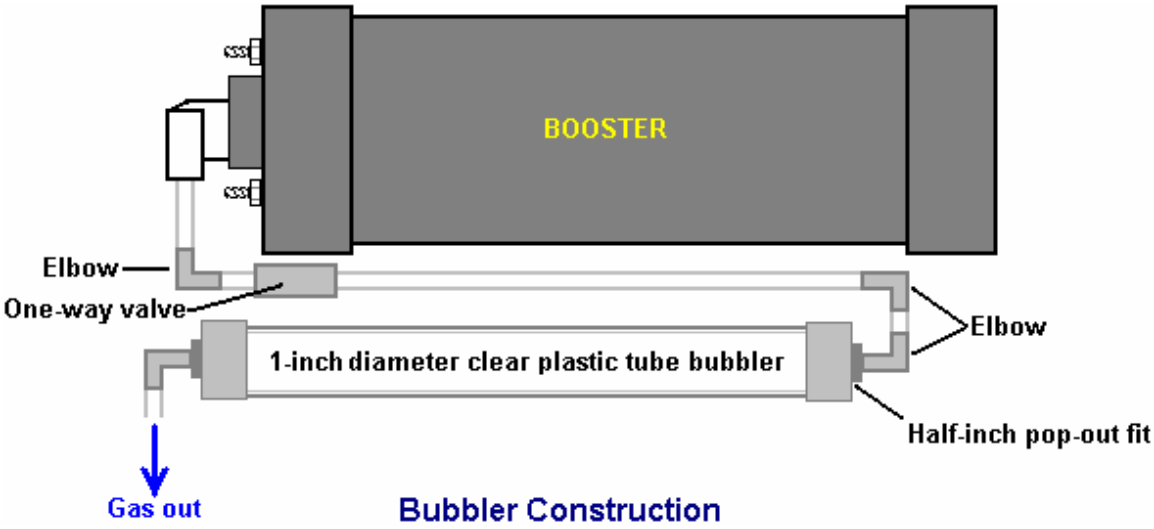
Another thing is that the stainless steel straps coming from the screw cap to the plate assembly, they
need to be insulated so that electrical current does not leak between them through the electrolyte water. The same needs to happen to the section of the strap which runs underneath the plates. This insulating is best done with shrinkwrap or tool plastic dip.

, tool dip works very well, but if neither of
these choices can be used by you, then the insulating can be done by wrapping the straps in electrical
tape. If you use this method, the tape needs to be wrapped tightly around the straps, being stretched slightly as you go along,The section running underneath the covers is insulated before the array is assembled.



The PVC housing for the generator has two small angle pipe fittings attached to it and a piece of clear
plastic tubing attached between them so that the level of the water inside can be checked without removing the

screw cap. The white tube on the other side of the generator is a bubbler which is glued or wire tied directly to
the side of the generator using super-glue or wire ties in so that a single combined generator/bubbler. If space is limited you can mount the bubbler in a sperate location The
bubbler position is shown here, spread out before gluing or tieing in place as this makes the method of
attachment a little easier to view.



Bubbler Construction

The half-inch diameter 90 degree elbows at the ends of the one-inch diameter bubbler tube have their threads coated
with silicone before being pushed into position. This allows both of them to serve as pressure-relief pop-out
fittings in the seldom seen event of the gas being ignited. This is an added safety feature of the generator.
This generator is operated with a mix of Potassium Hydroxide also called KOH or Caustic Potash. You can also use baking soda if you prefer, most people have baking soda around the house, KOH will last longer and produce less brown water.
To get the right amount in the generator, fill the generator to its normal liquid level with
distilled water and add the Hydroxide or baking soda a little at a time, until the current through the booster is about 4 amps

below the working current of 20 amps. This allows for the generator heating up when it is working and
pulling more amps because the electrolyte water is hot. The amount of KOH is typically 2 teaspoonfulls. It is
very important to use distilled water as tap water has impurities in it which make a mess which will clog up
the generator. Also, be very careful handling potassium hydroxide as it is highly caustic. If any gets on you,
wash it off immediately with large amounts of water, and if necessary, use some vinegar which is acidic and
will offset the caustic splashes. Baking soda does not have this problem,
The completed booster usually looks like this:

or

But, it can be built using different materials to give it a look all your own:

The final step is how the generator is connected to the engine. The normal mounting for the
generator is close to the carb or throttle body so that a short section of tubing can be used to connect the
generator to the intake of the vehicle engine. You can chose to connect to the air box where the air filter is, or into the intake tubing. The closer you get it to the throttle plate the better it is, because for safety concerns, we want to reduce the

volume of hho gas lingering around in the intake system. You can drill and tap a 1/4" (6 mm) NPT fitting

into the plastic inlet tubing with a barbed end for connecting the 1/4" (6 mm) hose.
The shorter the length of tubing to the air intake of the engine, the better it is. Again, for safety concerns, we want to limit the amount of unprotected hho hydrogen gas. If a long run of 3 feet (1 metre) or more must be used due to space limits, then it would be a good idea to add a second bubbler at the end of the tube, for additional fire safety. If you do this, then it is better to use a larger diameter outlet hose, chose 3/8" or 5/16" (10 mm or 8 mm).

How to power your hydrogen generator

Use wire and electrical hardware capable of handling 20 amps DC, no less. Overkill is better in this case,
It is recommended to use parts that can handle 30 amps. Run your power through the ignition circuit, so that it only powers up when the engine is on. A 30 amp relay should be used to prevent damaging the ignition circuit and or switch, the switch is not designed for an extra 20 amp load. Make sure to use a properly rated fuse, 30 amps is best. You can use a toggle switch if you like for further operational control. You can also add this safety feature, run an oil pressure switch to the relay as well, so the unit operates only when the engine is actually started and running. It is very important that everything is tight, solder is better than, crimping. Any loose connections can cause heat and this could lead to a fire, so make sure your connections are of good quality , and be sure to check them every so often to make sure they have not worked loose

Setting up the water in your generator

Fill your generator with distilled water and baking soda or KOH , you will just have to clean it more often if you use baking soda First, fill the generator with distilled water about 2" from the top. Add a teaspoon of KOH or NaOH, or baking soda to the water
and then slip the top into place. Do not tighten it up for now, leave the top loose and resting in place.
Connect your 12V power supply to the connectors and monitor the amp draw of the generator. You are striving for 16 amps flowing when the generator is cold. As the water heats up over time, the amp load draw will increase by about 4
amps until it reaches around 20 amps, and this is why you are trying for 16 amps when the generator is cold.
If the amp draw is too high, pour out some of the water inside and add just a little more distilled water. If the current is too low, add
a small amount of baking soda or koh until the 16 amps is reached. Overfilling your generator will cause
some of the electrolyte water solution to be forced up the output tube, so a water level tube was added to the outside of the generator to allow you to see the
electrolyte water solution level inside of the generator.
The generator usually needs to be topped off once a week, depending on how often you have it turned on. Add
distilled water, then check your current amp draw again. You may notice a drop in amps over the course of a
several water refills, and this is normally what happens. Some of the baking soda or koh escapes the generator suspended in water vapor droplets, so
every so often you may need to add a little more baking soda or koh. The water in the bubbler acts to clean the
contaminant out of the hho gas also, we suggest installing an amp meter so you can watch the amp current being used as

the generator is being operated.

Installing the generator

select a ventilated area in the engine compartment or around the front bumper in front of the radiator to iinstall your generator every car or truck is different so look it over well
you need to chose the best place to mount it. It must be mounted with the top
pointing upwards. Large hose clamps work very good for this, but do not over tighten them or the PVC may
lose shape or possibly crack.
Hold the weight of the generator from the bottom with a bracket made from strap metal, then use two
hose clamps to hold the generator in place, one close to the top and one close to the bottom. We don't reccomend installing the generator inside of the
car or truck for safety reasons.

Output hose and Bubbler

The bubbler on the side of the generator should be filled about 1/3 to 1/2 full of water - tap water is fine for the
bubbler. The check valve before the bubbler is there to prevent the bubbler water from being sucked back inside of the generator
into the generator when it cools and the gases inside contract. **Make sure the bubbler water level is always correct**. **Failure to do so could result in a backfire event**. That water inside the
bubbler is your water shield between the stored hho gas in the generator and the intake of your
engine. Install the output hose from the bubbler as close to the carburetor/throttle body. by making a

connection point into the intake tube/air cleaner. make the hose as short as possible to reduce the amount
of hho gas that it contains. I recommend using the same type of 1/4" poly hose that is used on the unit.
Here is a list of the parts needed to construct the booster and bubbler

Parts that you will need

Part, Quantity, Comment
4-inch diameter PVC pipe, 12-inches long 1, this Forms the body of the generator
4-inch diameter PVC pipe end-cap 1, this Closes the bottom of the generator.
4-inch diameter PVC pipe screw cap 1, this makes the top of the generator
90-degree Quick Connect Outlet fitting 1 3/8" O.D. Tube x 14" NPT from Hardware store
Level indicator Nylon barbed tube fitting 2 1/4" Tube x 1/8" NPT from your local hardware store lowes or home depot
Quarter-inch I.D. Poly sight tube 8” Water-level indicator tubing - Hardware store
Stainless steel switch covers 16 these make plate assembly components or stainless steel sheet metal flat pieces from ebay or steel yard
Stainless steel straps 12-inches long 2 The electrical connections to the plates or stainless steel untensils like spoons or forks from cooking supply stores or dept stores will work
3/4" Inside Diameter Clear poly tube 12-inch From your local hardware store or lowes home depot
5/16” stainless steel bolts 1.25” long 2 Electrical strap connection to the top cap
5/16” stainless steel nuts & washers 6 each To fit the steel bolts in the cap top

5/16” diameter nylon threaded rod 8” min. Nylon Threaded Rod 5/16"-18 Thread. 2 needed
5/16” inch nylon washers 1.6 mm thick 1-pack Nylon 6/6 Flat Washer 5/16", pack of 100
5/16”-18 s/s jam nuts (1/4" thick) 20 needed
90 degree Bubbler Fittings 2 1/4" Barbed Tube 1/2" NPT.
Check valve 1 1/4" tube, aquarium shop or
from your local Hardware store
PVC glue 1 tube Same color as the PVC pipe if possible
5/16" Neoprene sealing washer 2 needed from your
local Hardware store
Tool dip – tool coating, it’s a liquid plastic used to dip tool handles in, sold at all hardware stores,
Optional: Light Emitting Diode 1 10 mm diameter, red, with panel-mounting clip
Quarter-watt resistor 1 470 ohm (code bands: Yellow, Purple, Brown)
Now, having shown how this hydrogen generator and bubbler can be built, Now if your going to install the generator into a fuel injected car you will need a map sensor adjuster or an efie device, and true control over the computer can be gained by using both electrical devices.
You will need an efie device or oxygen sensor adjuster, also a map sensor adjuster will work well also

This is an Efie device example

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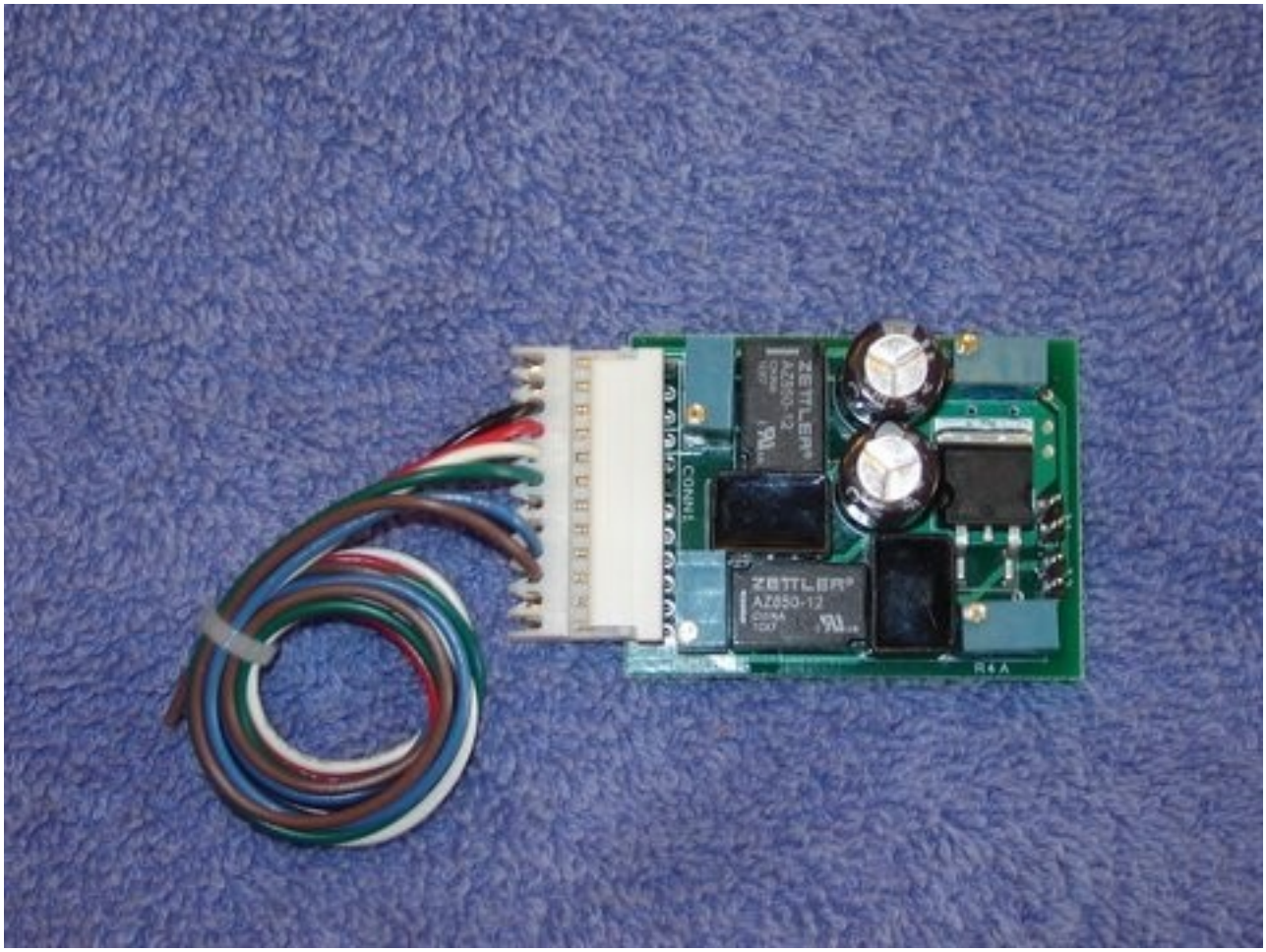
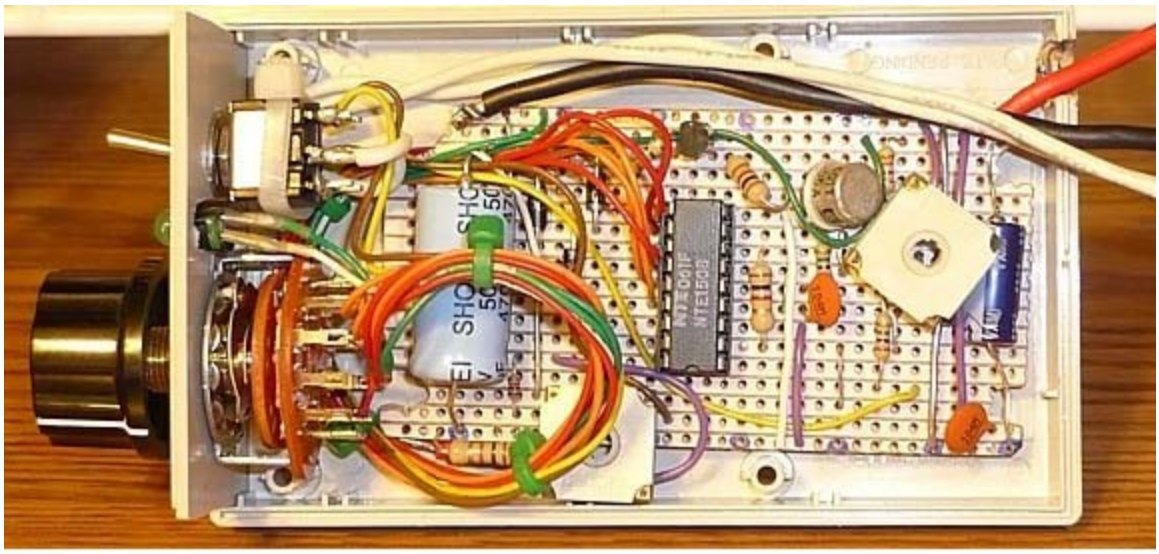
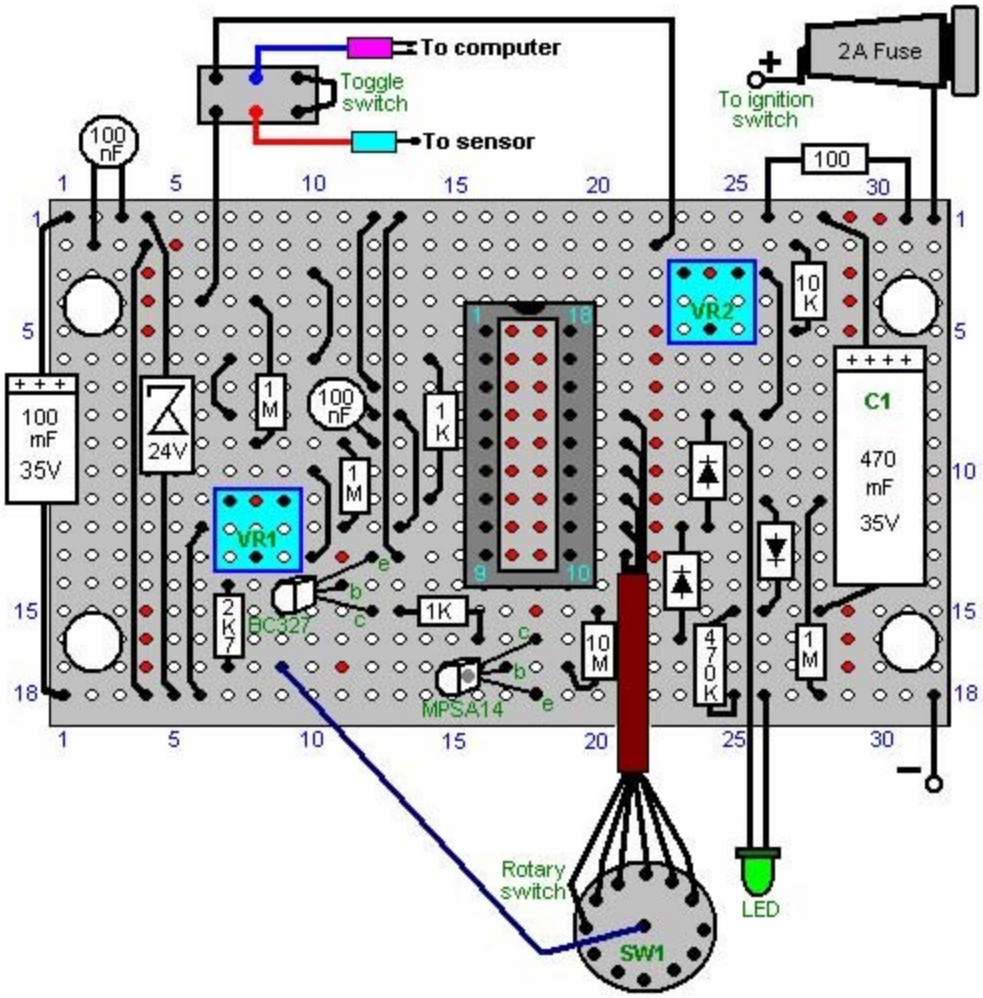


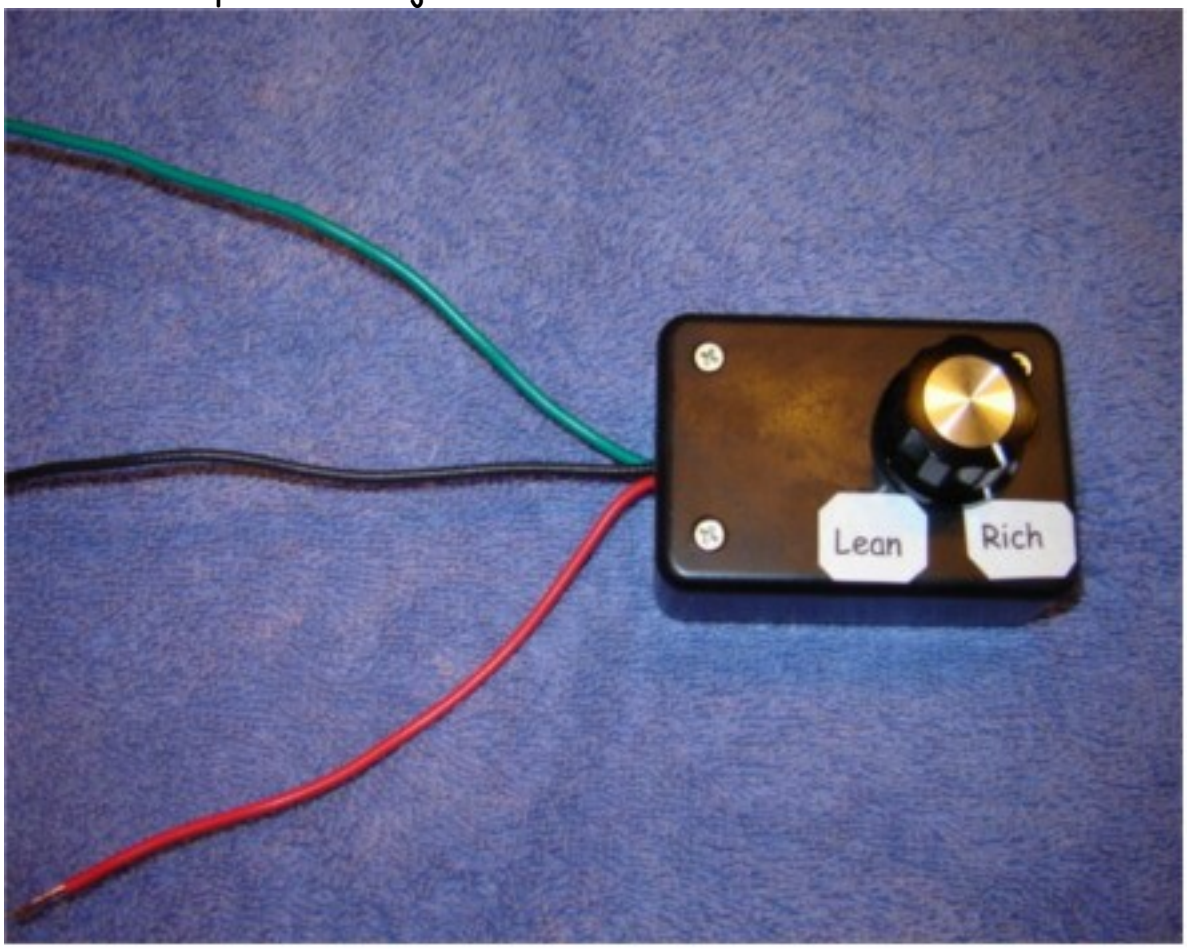
here is another efie device example



● = Track cut on underside of the board



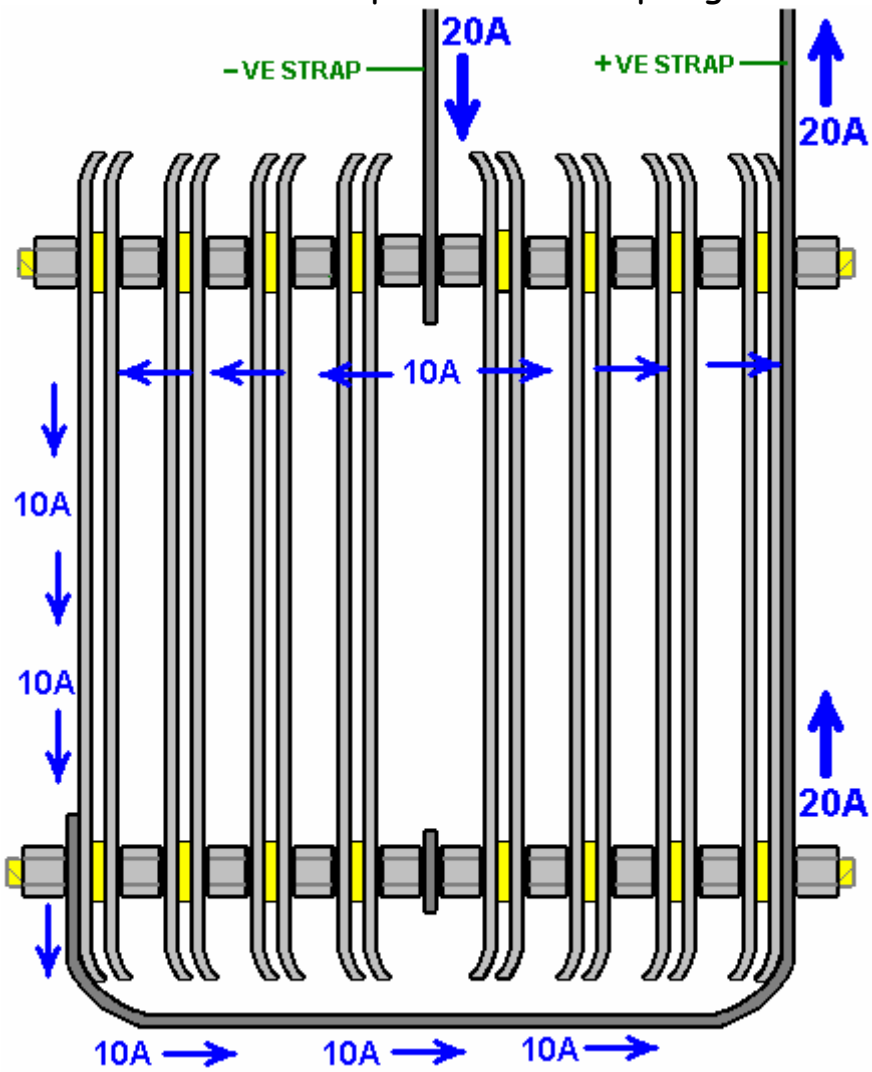
here is a map sensor adjuster



have fun with your new hydrogen generator and check our schematics for map and efie devices, and try to save some gasoline

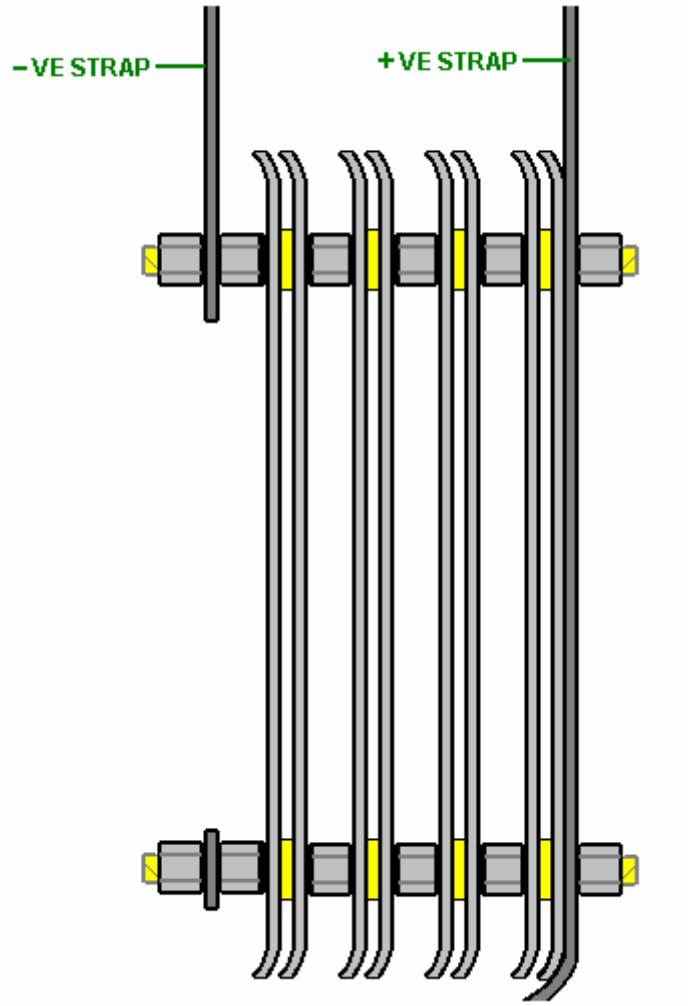
additional stuff

some people find the plate cell layout of the hydrogen Booster, rather difficult to understand, so this
additional section is just to try to explain the how it work,
The hydrogen generator plate arrangement is layed out in this way for a good reason,This is mainly because the sets are squeezed inside in this manner to create more hydrogen
two identical sets of plates into one pvc generator as shown here:

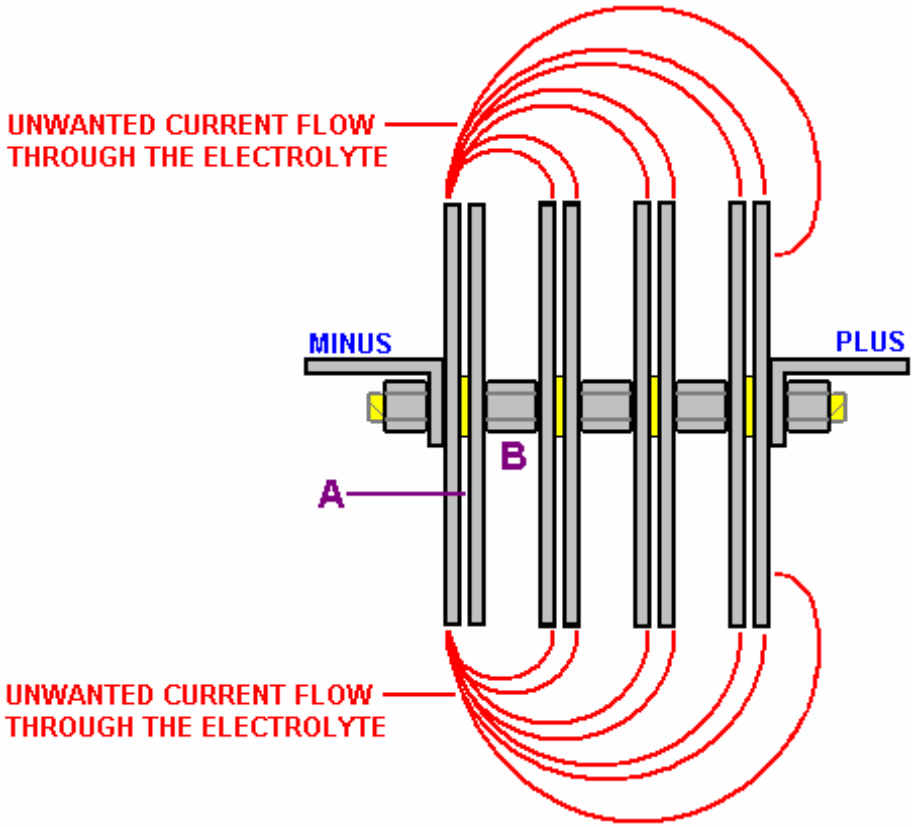


This arrangement is two identical sets of plates positioned back-to-back. let's just take a look at just one of the two sets of stainless steel plates.
Here, you have just the electrical Positive linked to the electrical negative by a set of four pairs of stainless plates in a daisy

chain (the technical term is: connected "in series" or "series-connected"). Easily the most electrically efficient way for doing this is to exclude all possible current flow paths through the electrolyte water by sealing off around the edges of all the stainless plates and forcing the current to flow through the plates and only through the plates.



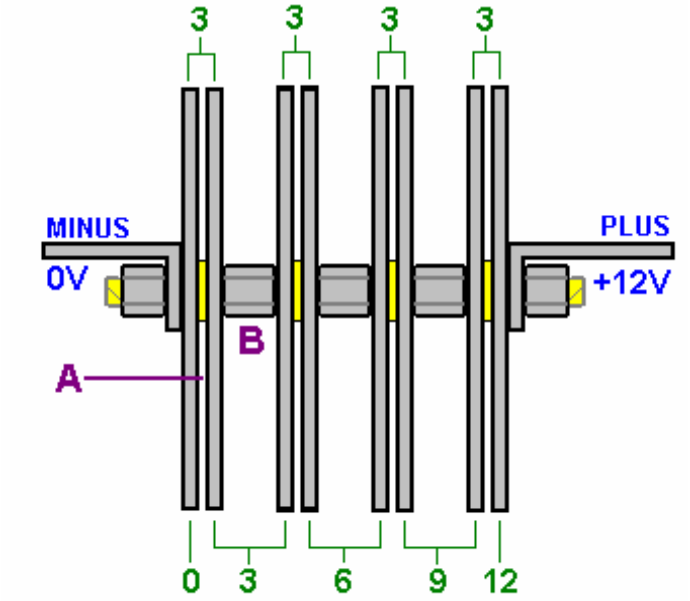
so we use a clever spacing of the stainless plates:



The picture shows how the plates are connected. The red lines show paths of unwanted current
flow which produce almost no hho gas. This lost current flow is opposed by the useful current flow across
gap "***A***" in the diagram.
To assit the flow across the 1.6 mm gap "***A***", the waste flows as long as
possible . This is done by the gap "**B**" being made as large as possible.
The voltage applied to the cell (13.8 volts when the engine is running) divides equally across the four plate
pairs, so there will be 1/4 of that voltage (3.45 volts) across each stainless plate pair.
If you look again at the original diagram, you will see that there are two of these sets of four plate pairs,

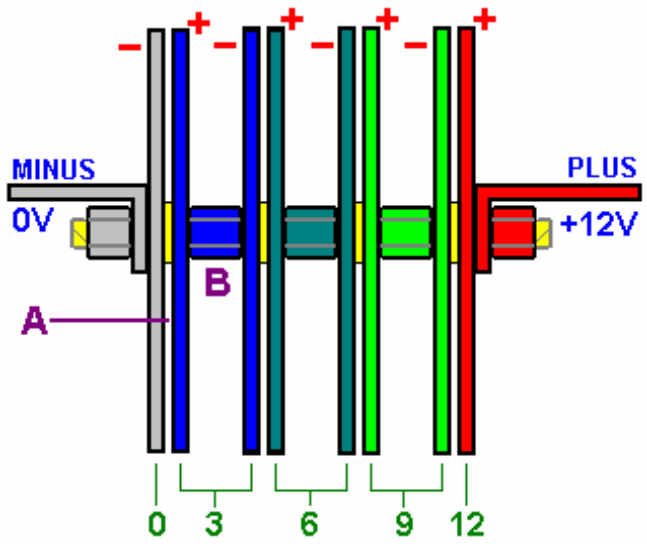
positioned back-to-back in the generator. Each of these acts separately, except for the fact that there are additional electrical current leakage paths through the electrolyte water between the stainless plates of one set and the plates of the second set.

There is a steady voltage drop across the assembly of plates. Remember that they are connected in pairs in the middle due to the metal-to-metal connection created by the steel nuts between the plates:



VOLTAGE DROPS FOR A 12-VOLT SUPPLY

It is often difficult for some to understand of how the voltage drops across a chain of resistors (or matrix of plates). The voltages are relative to each other, so each plate pair thinks that it has a negative electrical connection on one plate and a positive connection on the other plate.



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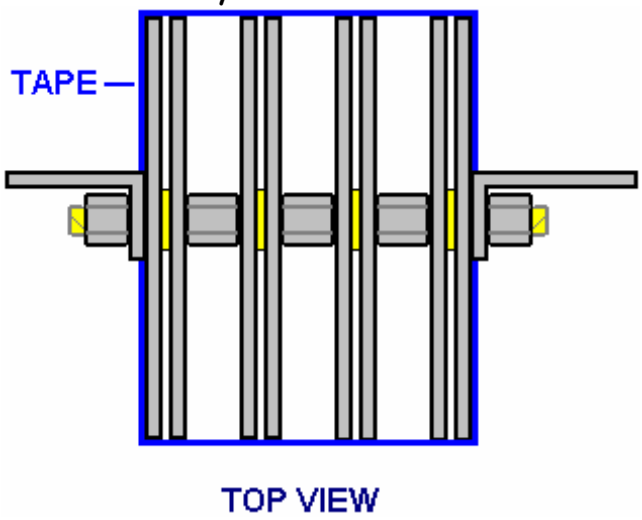
TRY THIS

You can block alot of the unwanted current by running a strip of wide tape down the
outer sides of the end plates and across the ends of the plates. This electrical tape would run down the full height of
the stainless plates, forming a box around the plates, where the box is open at the top to let the hydroxy
gas escape and open at the bottom to allow the electrolyte to flow in freely.



A Completed installation picture