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# ER HyZor (Basic) Kit~Version C

## Assembly • Installation • Operation

### INTRO TO ER HYZOR TECHNOLOGY

The ER HyZor is an 'on-board' electrolyzer that turns water into a high-energy mixture called 'Brown's Gas' (BG).

BG significantly raises the combustion efficiency of carbon-based fuels like methane, natural gas, gasoline, diesel, crude and coal by acting like a catalyst. As a result, power, performance & fuel economy are increased. At the same time, pollution is reduced.

### PROJECT SUCCESS

Read through this instruction booklet and watch the Version-C DVD before beginning. It is highly recommended that at least 2 tanks of fuel mileage be recorded prior to installing the ER HyZor. Use Fuel Saver Log to accurately record your gains.

For rest of the parts, tools and supplies needed to complete the ER HyZor, see sidebar pgs. 1 & 8. Expect to spend about 6 hours building your device and another 6 hours installing it.

### PARTS CUTTING

A hacksaw is recommended. If using a powered saw, go slowly to prevent the saw from grabbing the plastic.

Following the HyZor Cut Chart, (fig.1) cut 14 spacer rings  $\frac{3}{8}$ " (9 mm) wide and 2 cell tubes  $2\frac{3}{4}$ " (7 cm) long from each of the two 2" x 7  $\frac{1}{2}$ " pipes.

It's okay for the edges of the cuts to show 'saw marks'. Scrape off plastic residue.

Cut a  $1\frac{1}{4}$ " (32 mm) 'gap' out of each ring, so they can be compressed to slide neatly into the cell tubes. (pic. 1)

Cut fluid equalization grooves in the side of the rings (pic. 2). The grooves can be cut with a hacksaw and only need to be  $\frac{1}{16}$ " (1 mm) deep. Make the grooves horizontal when rings are *inside* the pipe (pic. 3). Use a peice of pipe as a jig to hold the rings as you cut them (pic. 4).

### END CAP ASSEMBLY

Put an O-ring on the terminal-plate bolts. (pic. 5) Fill the threads of the bolts next to the O-ring, with hot glue for a length of  $\frac{1}{4}$ " (6mm).

Taking care not to cross-thread the plastic threads, start screwing one terminal-plate into an end cap. Once the bolt is just through the plastic, use hot air to heat the end plate to re-melt the glue. When the bolt tip is hot to the touch, continue screwing it into the end cap. Glue will flow into the threads for a liquid-tight seal.

When you feel resistance, the O-ring has made contact. Put a nut on and hold it with a wrench while tightening the bolt *about 1/2 to 1 full turn. The nut is needed to prevent hot plastic threads from stripping.* Finish the other end cap the same way.

### ASSEMBLY TOOLS NEEDED

- hacksaw
- $\frac{3}{8}$ " drill
- $11/32$ " drill bit,   $3/16$ " drill bit
- 2 x 4 gluing jigs (diy)
- 2 x 2 x 6" stuffing jig (diy)
- hot glue gun
- hot air blower (or hair dryer)
- terminal crimper
- multimeter (A,  $\Omega$ , V, Hz)
- test light (probe)
- soldering iron
- needle-nose pliers
- metal spoon
- glass 'lye mixing' container
- metal pick
- knife
- side cutters
- box wrenches ( $3/8$ ",  $5/16$ ")

### ASSEMBLY SUPPLIES ~ not included

- PVC primer and glue
- rosin core solder
- isopropyl alcohol
- teflon tape
- Sodium Hydroxide NaOH (lye)

### PARTS ~ not included

- 5 amp fuse & fuse holder
- 5 of #10 ring terminal ends
- 5 of  $1/4$ " female terminals
- 3 of 16-14 ins. butt splice
- 2 of full ins. 22-18 fem. discon.
- 2 of full ins. 22-18 male discon.
- 1 of 5-Amp gauge
- 1 of 30 amp relay
- #16 red & black stranded wire
- 22 gauge wires (various colors)
- metal pipe strapping
- plastic wire ties
- $1/4$ " ID clear PVC hose

parts included ~ on pg 8

## Assembly Skills Needed

- use a hacksaw
  - use drill
  - use hot glue gun
  - prime & glue PVC pipe
  - wrap threads with teflon tape
  - use multi-meter
  - use test light (probe)
  - use soldering iron
  - mix Lye
- Taking the time to measure, cut, glue and assemble with precision is essential to achieving the best performance from your ER HyZor.
- PVC glue hardens in seconds. Test the parts before you glue them so you know exactly what to do. Take small steps and work quickly.
- If you are inexperienced with HyZor skills, get FREE lessons online. (see HyZor Resources)
- The HyZor Resources is a special section of the Eagle-Research website that is only available to ER HyZor Kit buyers.
- **Register your ER HyZor serial number to receive the URL, a username, and password for the HyZor Resources.**

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Once the caps have cooled, remove the nuts. Make a circle of hot glue around the bolts on the surface of the caps. (pic. 6) Install a washer and a nut.

### TEE ASSEMBLY

Put 2 of the #10 washer on the (+) bolt. Fill it's threads with hot glue for ¼" (6mm) toward the 'head' end. *Don't get glue on the head of the bolt or the washers.* (pic. 10)

From the inside of the tube, screw the bolt into the tube until the threads are even with the outside wall of the tube.

Make sure the (+) bolt points toward one of the legs of the Tee, glue the HyZor Tower Assembly onto the Tee. (pic. 7)

### FLOAT STEM ASSEMBLY

Glue the 1/2" cap onto the 1/2" stem. (pic. 8)

Glue the float stem tube through the cap, up from the bottom, until it is even with the surface of the 2" cap.

Wrap teflon tape twice (may need more to seal) around the float switch threads. Hold the tape tightly against the threads and turn the float stem as if you were threading it into its hole. Make sure the trailing end of the tape is pulled taught as you turn. (pic. 9)

Taking care not to strip the plastic threads, screw the float switch onto the stem. ***The float wires must be free to move or they may twist and break.***

*A multi-meter should read continuity between the wires when the float is up, and no continuity when it is down.*

Wrap teflon tape around the fittings and install in the 2" cap. *Vary number of wraps to have fitting pointing the correct direction when tight.*

### NEUTRAL-ZONE INSERTION

Bend the neutral-zone-assembly 90° at two points. Make sure the (+) terminal

wire is on the inside of the bend (pic.11). Use pliers to get a tight bend at the very end of each side of the connecting strip. *It is better to under-bend slightly then to over-bend.*

You should end up with two small tabs protruding **beyond** the bottom of one side of the assembly. (pic. 12) *This larger end is intended to stop at the lip inside the Tee.*

Put the neutral zone assembly into the center of the Tee. Route the wire toward the positive bolt.

Trim the neutral-zone wire ¾" above (+) bolt. Wrap the neutral-zone wire tightly around the bolt (pic. 13). *The wire must be between the washers.*

Reheat the glue with hot air. Tighten the (+) bolt using a 5/16" wrench. *Again, a nut on the outside will prevent plastic threads from stripping.*

### CELL TUBE ASSEMBLY

Glue one 'cell tube' at a time, into the Tee.

Insert 7 rings and 6 plates (fig. 2) into the 2 cell tubes (pic. 14) using a plunger made from a 2x2.

Start with a ring, then a plate. Tightly pack each ring down so the plates will not shift. Position a ring at each end.

*To prevent shifting, it is okay to put a bit of PVC glue on the **bottom** of the cell tube, between each ring and plate.*

Insert the rings so that the fluid equalization grooves allow the fluid to travel past the rings and around the flat edge of the plates.

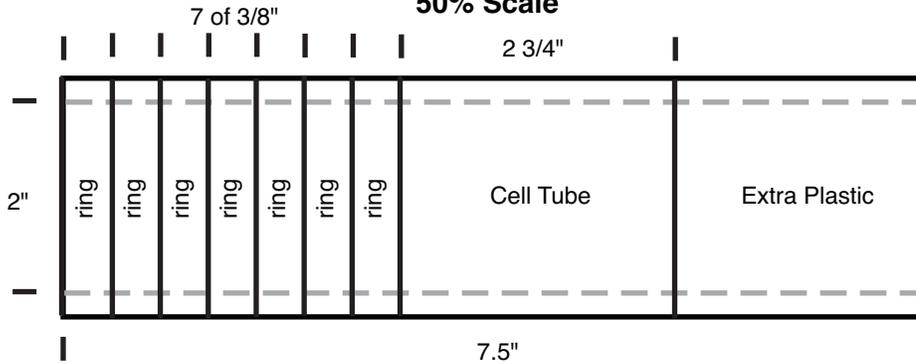
***Make sure the 1/8th inch gas holes, at the top of the plates, line up with the neutral-zone gas holes.***

Glue the end caps onto the cell packs. *A supporting roll of tape will prevent pressure on the negative (-) bolts.*

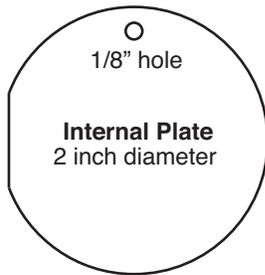
# Cut Chart ONLY

Does NOT Refer To Assembly

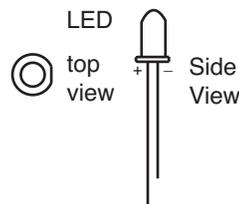
**50% Scale**



**fig. 1**



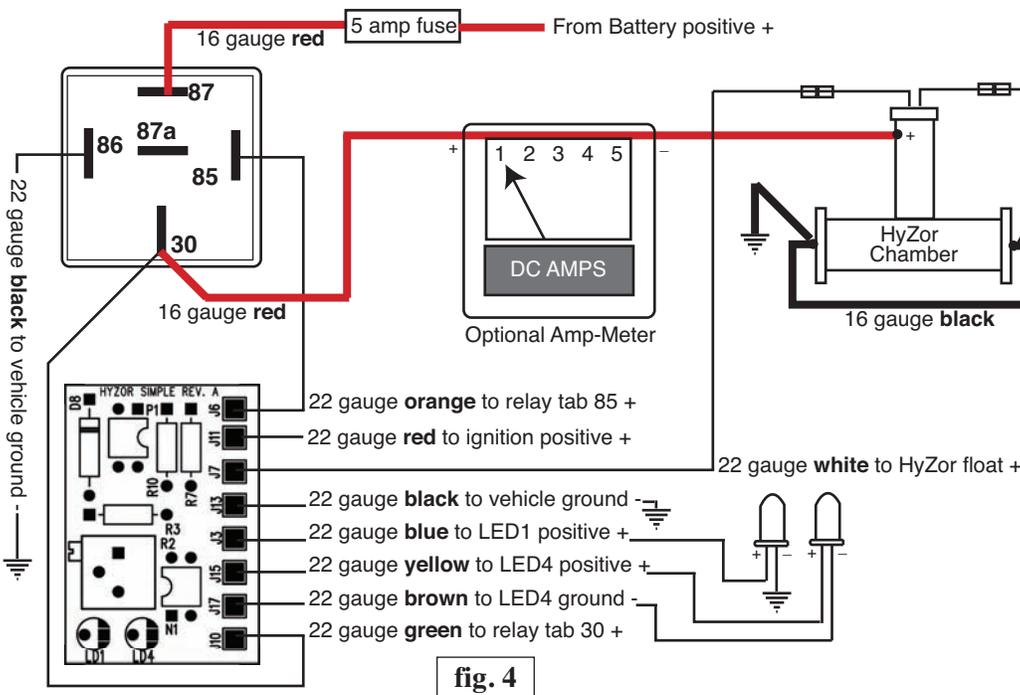
**fig. 2**



**fig. 3**

## Light Emitting Diodes

LEDs are polarity sensitive. Both the flat spot on the edge ring and the short lead indicate the (-).  
(fig. 3)



**fig. 4**

## Wiring Harness Upgrade

- 5 amp fuse & fuse holder
- 5 of #10 ring terminal ends
- 5 of 1/4" female terminals
- 3 of 16-14 ins. butt splice
- 2 of full ins. 22-18 fem. discon.
- 2 of full ins. 22-18 male discon.
- 1 of 5-Amp gauge
- 1 of 30 amp relay
- #16 red & black stranded wire
- 22 gauge wires (various colors)



### Lye Handling Safety Tips

- Use ONLY pure Lye
- Use ONLY teflon tape for thread sealant. No other sealant is compatible with the Lye solution.
- Have a safety spray bottle filled with lemon or vinegar; to neutralize Lye spills. Use safety glasses and rubber gloves.
- Never pour water into Lye or it might explode
- Always pour Lye into water *slowly while stirring*.
- Mix Lye in well ventilated area.
- Clean any Lye spills with lots of water until the slippery feeling is gone.
- A plastic pop/soda bottle can be cut to make a funnel for pouring the Lye into your ER HyZor.
- When filled, the 4 oz bottle, included with the kit, contains the correct quantity of lye.

### Ensure well done soldering

- Clean and tin the soldering iron before use.
- Hold the iron's tip on both the board and wire simultaneously and allow solder to flow into joints.
- To melt solder, apply solder only to the wire, not the iron.
- Don't allow solder to bridge or puddle to other wire.

*continued on pg. 5*

Wrap the teflon tape 6 times around the top 3-5 threads of the HyZor tower.

*You may have to vary the wraps of teflon tape in order to have your 'water-fill' and your 'vapor out' fittings line up where you want them.*

### PLANNING TO INSTALL THE ER HYZOR

- Under the hood is recommended for quick & easy access. Be careful not to interfere with any of the vehicles moving components.
- The ER HyZor container is plastic. It must not exceed 100°C (212°F). *However the ER HyZor operates most efficiently at about 170°F.*
- The (+) bolt must not touch any electrically conductive surfaces.
- The ER HyZor chamber needs to be mounted in an upright position.
- Space is needed to close the vehicle's hood without touching the ER HyZor.
- A favorite place is behind the grill in front of the radiator.

### CHAMBER INSTALLATION

Connect a  black 16 gauge wire between the two terminal bolts located on the ER HyZor end caps (*fig. 4*). *Hold terminal when tightening outer nut to prevent inner nut from turning.*

Make the water-fill easy to reach and use. *Sometimes the HyZor is so remote that it is easier to run a hose up to a fitting that you use for the water-fill.*

Mount the ER HyZor securely in your chosen location (*can use plastic wire ties, and/or pipe strapping*).

Make sure everything touching the chamber is secure. *Loose objects (even hoses) can vibrate grooves-holes into the plastic.*

### Routing Wires & Hoses

Decide how the electrical wires and gas hose (to air filter) will be routed. *If you route the wires through metal, be sure to use a grommet to protect the wires from sharp edges of metal.*

Connect a **black**, 16 gauge, wire from the end caps, to a bare metal part of the vehicle to ground the ER HyZor. (*fig. 4*)

### Mixing Electrolyte

Mix 150 grams of sodium hydroxide (lye) into 350 gms of warm, distilled water. (*See Lye Safety Tips Sidebar.*)

Because the electrolyte mixture is corrosive, use caution when pouring the lye solution into the ER HyZor. *Wash away any spills immediately with lots of water, until the slippery feeling is gone.*

Hand tighten the float-switch-assembly onto the tower. Do not allow the wires to twist or the float may be damaged.

### INSTALLING THE 'GAS OUT' HOSE

Drill a hole in the air filter housing, in such a way that the BG must travel through the air filter before going into the engine. *The air filter will act as a backfire arrester and lye filter.* Make the hole a bit smaller than the hose you chose for the gas-out, so it's a tight fit. *Example: Drill an 11/32" hole for using with 3/8"  OD vinyl tubing.*

Route the gas-out hose to the air filter. Use a sharp knife to taper the tip of the hose. Insert the hose into the hole so that it fits snugly. Fasten the hose along its route with wire ties.

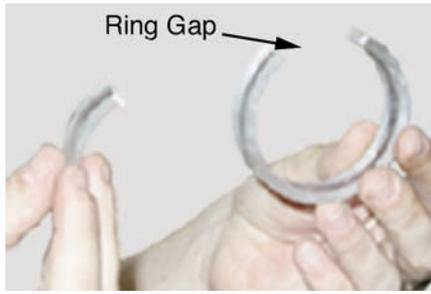
Put the rubber cap on the water-fill fitting.

### ELECTRICAL WIRE INSTALLATION

Use a multi-meter or test probe to locate a battery power source. It will have power when the ignition is off. *Example: A spare prong in your fuse box or direct from the battery +.*

Locate a 12 volt ignition (+) signal that shuts off when the *engine* ignition is off and is on only when the key is in the ignition position. *Preferably you do not want ignition power when the key is in the accessory position.*

Disconnect the vehicle's positive battery terminal. (*cont. on page 7*)



pic. 1



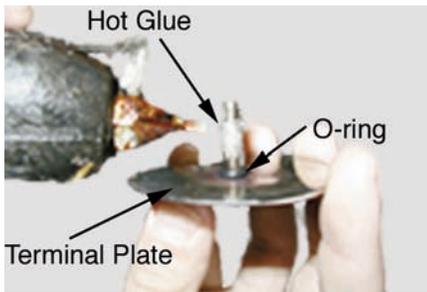
pic. 2



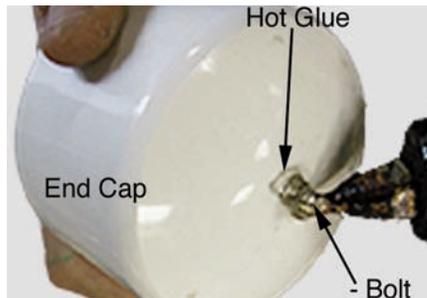
pic. 3



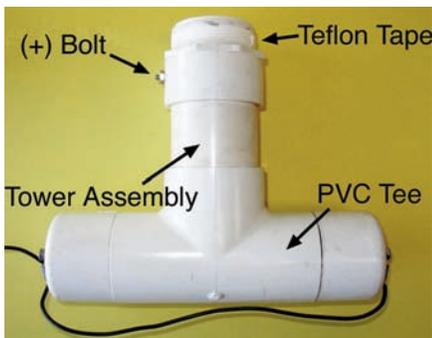
pic. 4



pic. 5



pic. 6



pic. 7



pic. 8

continued from pg. 4

**Notes**

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**Guarantee**

All Eagle-Research products are sold with a money back guarantee. If you are dissatisfied for any reason, return the product(s) within 60 days of receipt of the product(s) for a full refund of the product(s) price.

**HyZor RESOURCES**

Will include:

- resistor color chart
  - component specifications
  - courses for skills needed
  - where to get supplies needed
  - where to get parts needed
- (registration info. on page 8)**

If you want additional information on ER HyZor Technology and technology related to the HyZor; see books:

- HyZor Technology,
- Super Gas Saver Secrets,
- EFIE manual,
- Carburetor Enhancer Manual.
- Brown's Gas Book 1
- Brown's Gas Book 2

## 🍏 GLOSSARY

**bushing** = an adapter that allows one size pipe to fit into a pipe of another size

**diy** = Do-It-Yourself

**drill bits** = are described in fractional, numeric & letter sizes

**FIP** = female (threads) in pipe

**flux** = the residue of the rosin

**ID** = Inside Diameter

**NPT** = National Pipe Taper

**OD** = Outside Diameter

**PVC** = Poly Vinyl Chloride

**rosin** = the substance that takes away oxidization so that the solder will stick

**tap** = to create threads for a bolt

**tin** = to put a coating of solder on the tip of the soldering iron to insure good heat transfer

### Circuit Board

**bottom** = solder side

**top** = component side

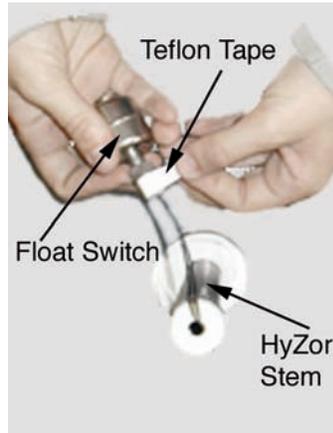
### Wire Color Codes

**black** = vehicle ground

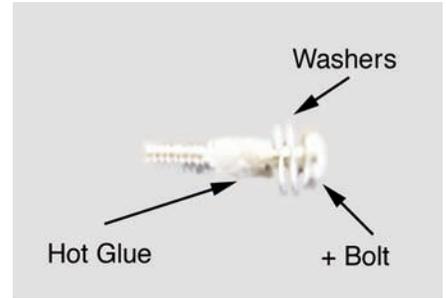
**red** = power

**LED** = Light Emitting Diode

**vehicle ground** = all your vehicle's metal parts are the same as battery negative (must have continuity and zero voltage)



pic. 9



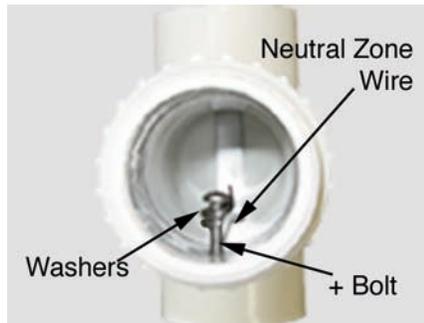
pic. 10



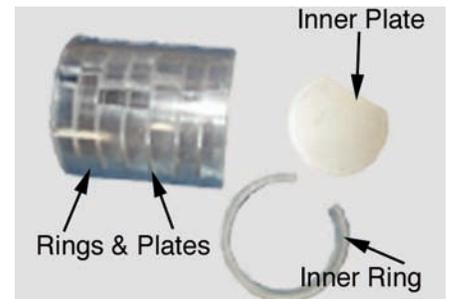
pic. 11



pic. 12



pic. 13



pic. 14

Note: These assembly instructions are interim (because we needed to expedite the production of the 'C' version kits) and some of the pictures do not exactly match the actual ER HyZor 'C' version components.

However the information needed to properly assemble the 'C' version ER HyZor is clearly indicated.

Connect a red 16 gauge wire to battery power. Run it through a 5 amp fuse holder and connect it to 87 on the relay.

Connect a **red** 16 gauge wire from tab 30 on the relay, through the (optional) amp gauge to the positive (+) bolt on your ER HyZor tower.

From the tab 30 on the relay (*or anywhere on the way to the ER HyZor*), connect a 22 gauge **green** wire to J10 on your circuit board. *This provides power to the blue LED only when there is voltage going to the ER HyZor.*

Connect an **orange** 22 gauge wire to J6 on the circuit board. Connect the other end to tab 85 on the relay.

Connect a **black** 22 gauge wire from relay tab 86 to vehicle ground.

Connect a **red** 22 gauge wire from the ignition signal to J11 on the board.

Connect a **white** 22 gauge wire from J7 on the circuit board to one of your two float switch wires. Connect the other float switch wire to vehicle ground. *The float switch wires are not polarity sensitive. Use insulated connectors.*

### Mounting The LEDs

LEDs can be board or remote mounted. When remote mounting, choose a location that can be seen by the driver.

When remote mounting the blue LED1 (*Optional*), connect the output J3 to the (+) lead with a 22 gauge **blue** wire. The (-) lead of LED1 goes to the vehicle ground using 22 gauge **black** wire.

When remote mounting the yellow LED4 (*Recommended*), connect output J15 to the (+) lead with 22 gauge **yellow** wire. Connect (-) lead of LED4 to J17 with **brown** 22 gauge wire.

Use a 3/16" drill bit to make LED hole(s). Drill in a location that you can access from the back. Hot glue the

LEDs in place, making sure their leads do not touch any metal behind the dash.

Connect J13 to vehicle ground.

After all soldering is done on the circuit board, remove the flux to prevent corrosion. Use isopropyl alcohol and a tooth brush, then rub dry with tissue.

Seal the electronics against moisture and shorting with your choice of enclosure, tape or tool dip.

Reconnect the positive battery terminal

### INITIAL START-UP OF THE ER HYZOR

Turn on your key. A lit yellow LED confirms the ER HyZor has low liquid level. Add distilled water to the ER HyZor, using the syringe provided. It may need up to 150mL of water before the yellow light goes out. *The water level should be near the middle of the clear section of the Tower.*

When the yellow LED turns off, the blue LED turns on, indicating that gas is being produced. *The brightness of the blue LED can be adjusted with R2.*

### OPERATING THE ER HYZOR

The yellow LED indicates when water needs to be added. When the yellow LED turns on, the ER HyZor power automatically turns off. *The blue light (if you've installed it) also shuts off.*

Whenever the yellow LED turns on, add a minimum of 10mL of water. *You do not need to immediately stop to add the water. The ER HyZor shuts off and will wait until water is added.*

You can add up to 50mL of water when the yellow LED comes on. *Adding 50mL reduces the frequency of refills.*

### Combustion Enhancement Interface Technology (CEIT)

Our earliest CEIT was the Carburetor Enhancer (CE) which is designed to efficiently and automatically cut back on the fuel from the carburetor when

### FAQs

- Q.** How much gas does the ER HyZor make?
- A.** About 4.5 liters per hour per amp of current. *The ER HyZor makes very high quality gas and gets about the same gains as 'other' designs that use ten times the amperage.*
- Q.** What kind of water should be used in the ER HyZor?
- A.** Distilled water will extend ER HyZor life. Do NOT use tap water or deionized water.
- All water has some impurities. Only the pure water comes out as Brown's Gas. The ER HyZor will gradually fill up with sludge as the impurities are left behind.
- Once full of sludge, the ER HyZor would need to be rebuilt.
- Q.** Will the ER HyZor freeze in the winter?
- A.** In really cold weather (<-40°) the solution will turn to slush. When the ER HyZor turns on, the electric current will thaw the slush and the ER HyZor will operate normally.

*Note: Many people try to 'benchmark' the ER HyZor. This works okay if you provide 13.5 - 14.0 VDC as the vehicle would when running. 12 VDC is not enough voltage to move amperage through a cold ER HyZor.*

*Note: Heating the ER HyZor to about 170°F, with hoses Tee'd into engine coolant, will increase gas production by lowering the electrolyte resistance. See 'HyZor Technology' book for instructions on how to do this.*

