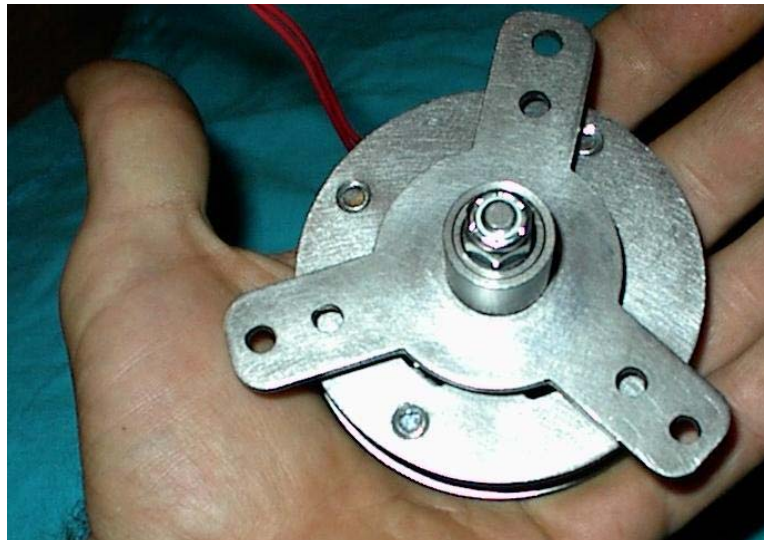
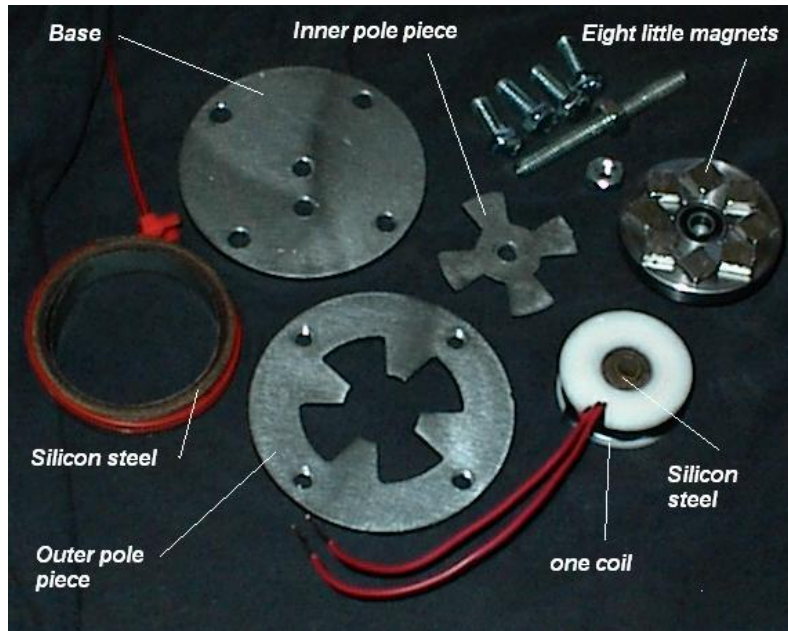


# Mini-Gen assembly

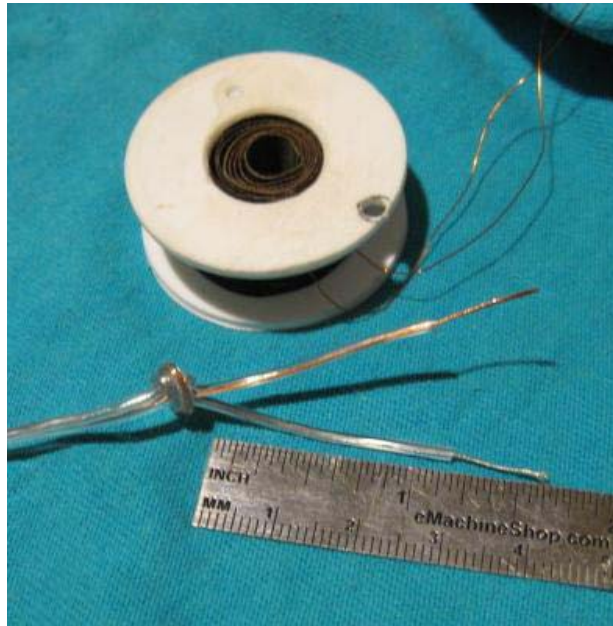
## Getting started

You can paint the parts before assembly or simply put it together, play with it then disassemble it and paint it later. I sometimes get a bit anxious and like to play with a new toy first then finish it later... well that's just me and you can decide how you want to approach it...

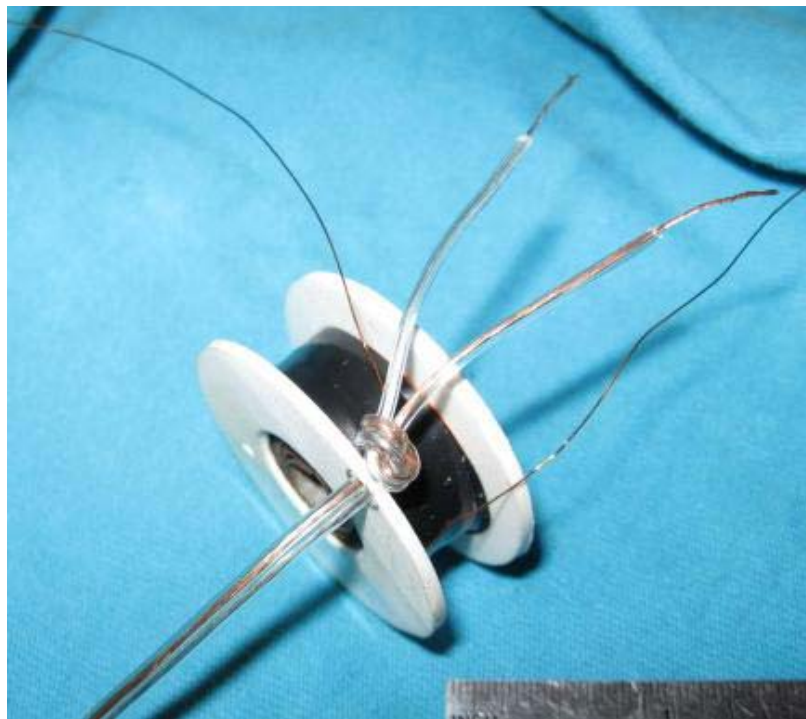
Below shows a picture of the complete parts kit as well as the completed unit



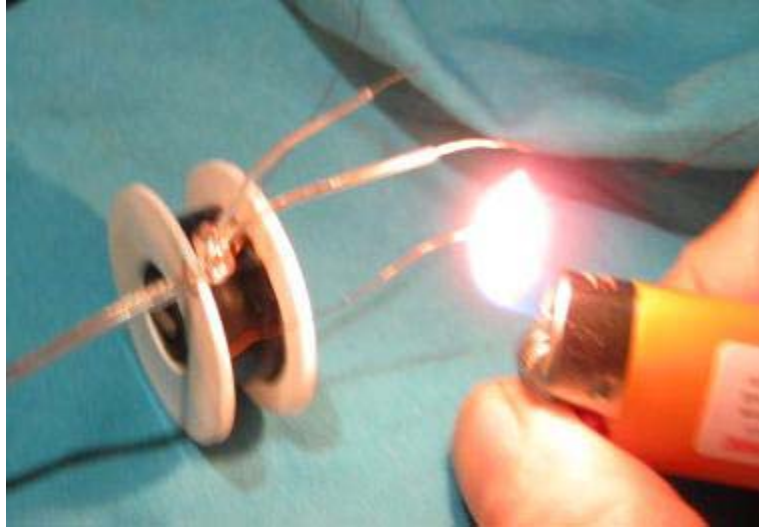
We'll start with the coil, you'll need to have the coil assembly and the length of pigtail wire shown below...



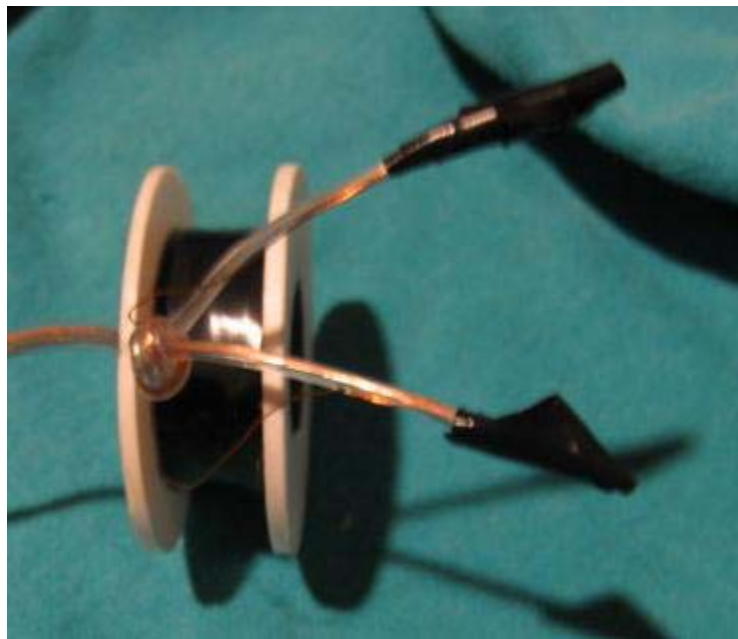
Tie a knot in one end of the pigtail about an inch or so down from the end. Split the two wires and strip the insulation from the ends about 3/8" or so. Do the same to the other end but it doesn't get a knot. Slide the wire through the hole of the coil plastic as shown below...



Note: Magnet wire has a thin flexible enamel coating over the wire that will need to be removed before connecting it to the pigtail wires. I usually use a bic lighter to burn off the area I need to work with then use fine sandpaper to clean up the bare copper wire for connecting.



Once the magnet wire has been prepared twist each wire around its pigtail counterpart. Make sure you have a good tight connection. You can solder these together for a more permanent connection or simply use them in their tight twisted form. Cut off any excess coil wire dangling from each pigtail wire. Either soldered or unsoldered you'll need to tape these connections to make sure they don't short out against each other. Electrical tape over the ends works fine shown below...



Split a piece of electrical tape length wise to fit in the slot of the coil. These pieces will be used to hold the wire connections inside the spool. Tape one down in one direction then the other in the opposite direction shown in the next picture...



Well, that is about the most complicated part of the kit and the rest should go pretty smoothly...

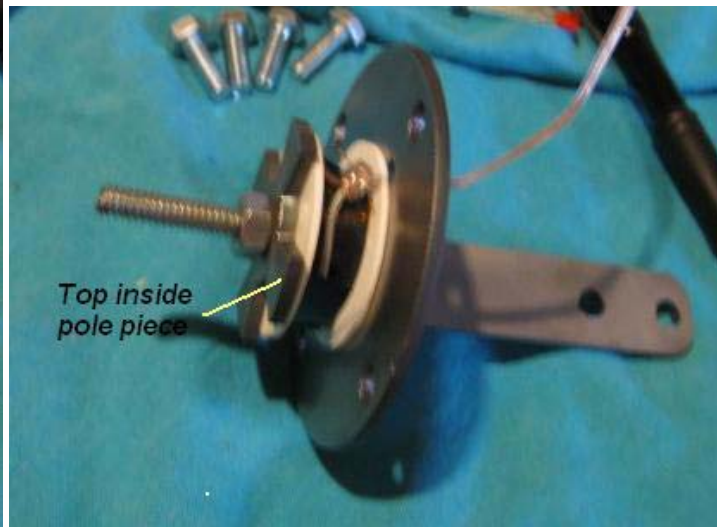
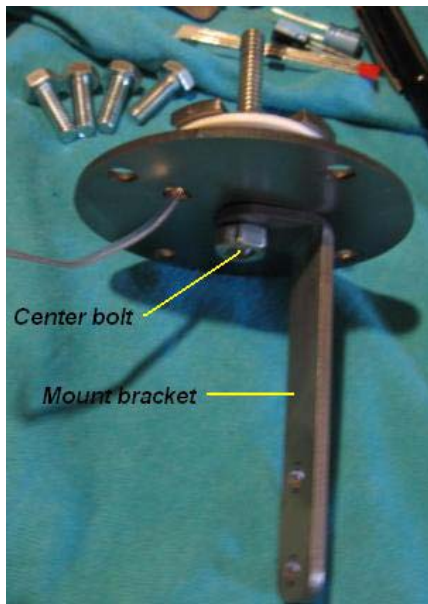
Next we'll put the coil housing together. Locate the parts shown below... and keep the coil assembly handy...



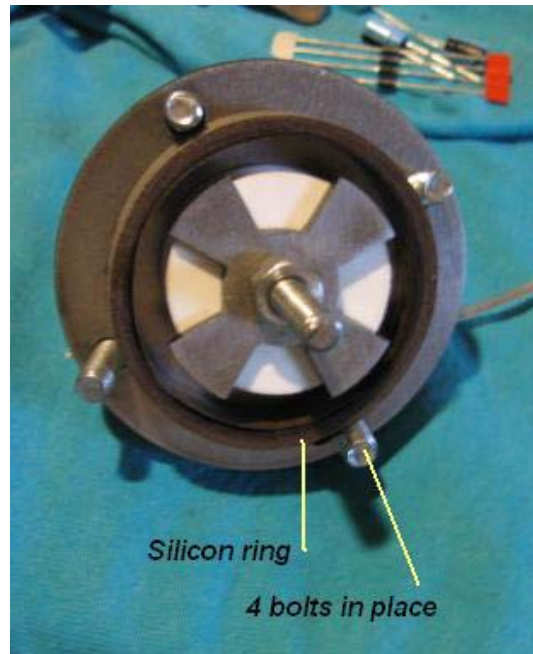
Take the base plate and slide the pigtail wire through the wire hole and line up the center holes of each. Shown below...



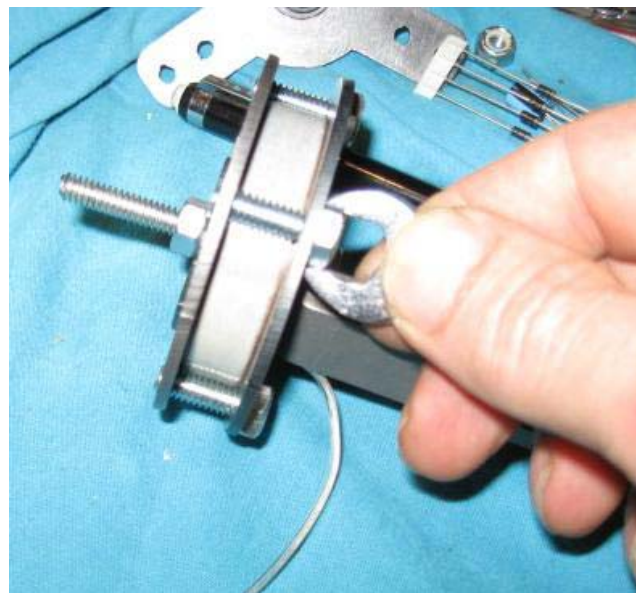
Put a  $\frac{1}{4}$ " nut on the  $\frac{1}{4}$ " x 2.5" threaded rod so it's about halfway on the rod. Slide the Top Inner pole piece onto the shaft, then down through the coil center and through the base plate. Install the mounting bracket ( L bracket ) and install the second  $\frac{1}{4}$ " nut. Adjust the L bracket nut side to it's flush with the rod end then finger tighten the coil side nut. Finger tighten only at this point as you'll need a little freedom to adjust the top inside pole piece to align it with the outer pole piece later. Assembly so far should look like this...



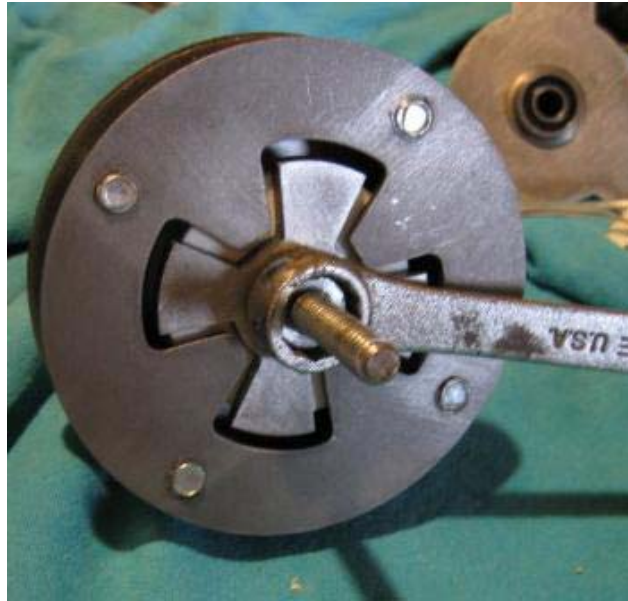
Take the large silicone steel ring and place it over the coil and put the 4 – 1/4" x 3/4" bolts through the holes in the base to center it up...



Install the top pole piece so all the threaded bolt holes line up with the bolts and adjust the inner pole piece to line up with the opening in the top pole piece. Screw the bolts into the top pole piece just finger tight for now. Take a 7/16" wrench and hold it by the open end and snug all the bolts a little at a time. Make sure the plate is going down against the silicon ring evenly. Snug all the bolts in place using the end of the wrench method so you don't over tighten them and/or strip the threads from the plate. **DO NOT USE THE WRENCH AT FULL LEVERAGE AND TORQUE THEM IN PLACE THIS COULD DAMAGE THE THREADS.** Below shows the proper way to tighten the bolts...



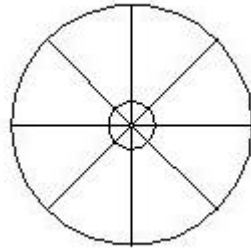
Line up the center pole piece so it is evenly spaced all the way around and tighten the center bolt. This can be torqued but not overly torqued. This needs to be tight to the center silicon coil inside the coil bobbin.



Now it's time to finish up the assembly with the bearing/prop mounting assembly by installing the magnets.  
Find the hub assembly and 8 magnets...



The template on the next page can be used as a guide to mark the magnet placement on the hub assembly.  
Simply print it and cut it out ....



Place the template on the hub, center it up with the bearing center hole. An easy way to center it is to place the template over the hub and point it towards a light. The light will shine through and will show on the back side of the template. Center the light on the center of the template and you have it.



Once centered, use a marker to add extensions to the lines on the hub. Remove the template and connect the lines using a ruler and marker. A fine point marker works well for this.



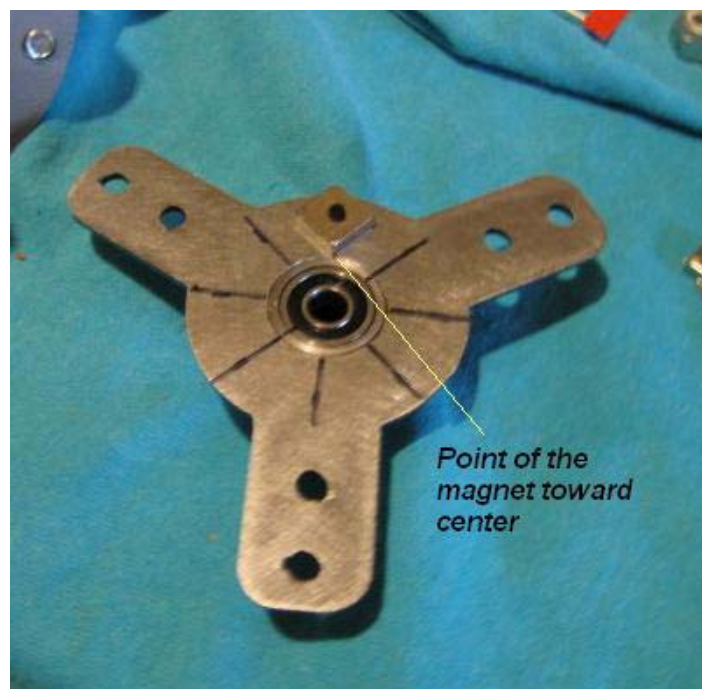


The magnets will be placed on these lines in an alternating pattern. That is to say each magnetic pole will be opposite each other all the way around (i.e. N-S-N-S etc ). The actual north or south pole really doesn't matter as long as their placed in an alternating pattern.

The easiest way to determine one pole or the other is to mark them as they come off the stack with a dot. Mark the top one in the stack remove it and place it on a steel ruler or something magnetic, mark the next and proceed until all are marked.

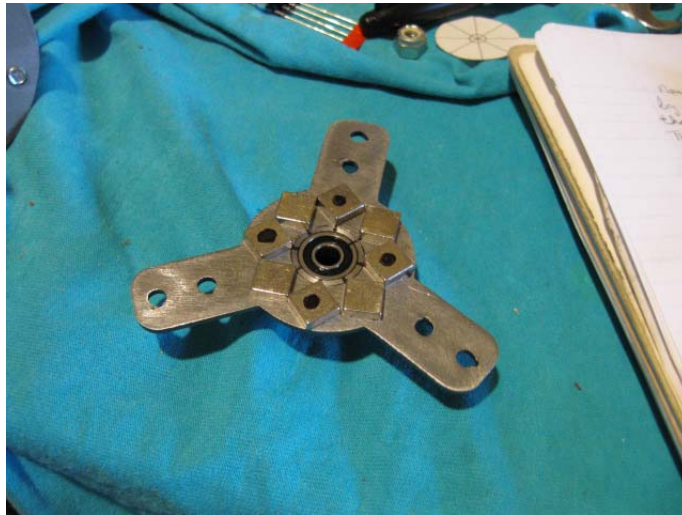


Place the first one with the dot up on the hub. Line up the corner of the magnet with one if its points toward the center as shown below...



This can get tricky and takes a bit of patience moving them around as you go. The next magnet will be placed with the dot down, lining it up the same way. The next dot up then dot down, dot up, dot down etc. The last magnet can be used to double check that they are in an alternating pattern all the way around by holding it in one position at a distance and checking each one in place. Once should attract the next repel, attract, repel all the way to the end. The last one in place should actually repel both beside it.

Below shows the magnets in place...



Looks like a strange star pattern when completed.

The reason they placed this way is to reduce the amount of “cogging” that may occur from changing polarity of the pole pieces as it rotates. Each time the magnets cross to the next pole on the pole piece there is a resistance because the pole pieces match the pole of the magnet over it. The next magnet, as it is rotated has to overcome the force of that pole and re-magnetize the steel to the new pole. This is simply one way of defeating those forces.

Now, if you painted the parts before assembling the unit you can use an epoxy around the magnets to glue them in place permanently. If you put it together to play with it first, it's probably best to leave them unglued at this time ( although you can paint over them – either way ).

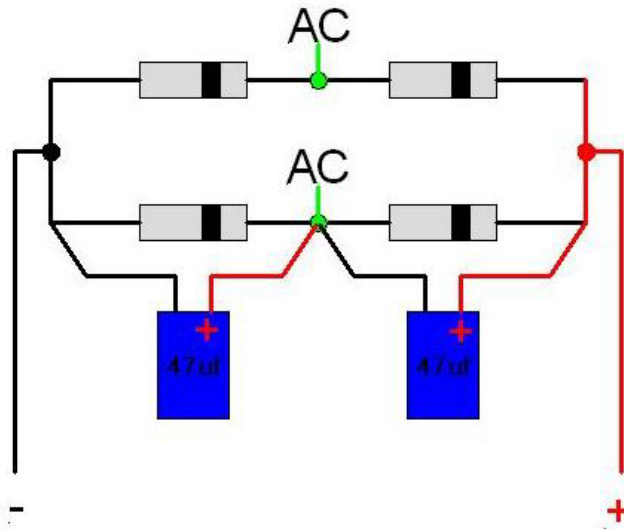
The magnets will hold quite well for experimenting without glue.

Slide the hub assembly over the threaded rod, magnets toward the pole pieces and when it gets close it will snap together. You're ready for an initial test...

Connect the pigtail wires to a meter and set the meter to AC. You should see 3-4 volts with a simple hand spin which will easily light up LED's and the like. After changing the AC to DC through the rectifier it will easily do 7-12 volts with a hand spin and if you use the voltage doubler circuit it will kick out 24 volts+ with a hand spin.

Next we'll assemble the rectifier and voltage doubler.

Below is a diagram of the circuit...

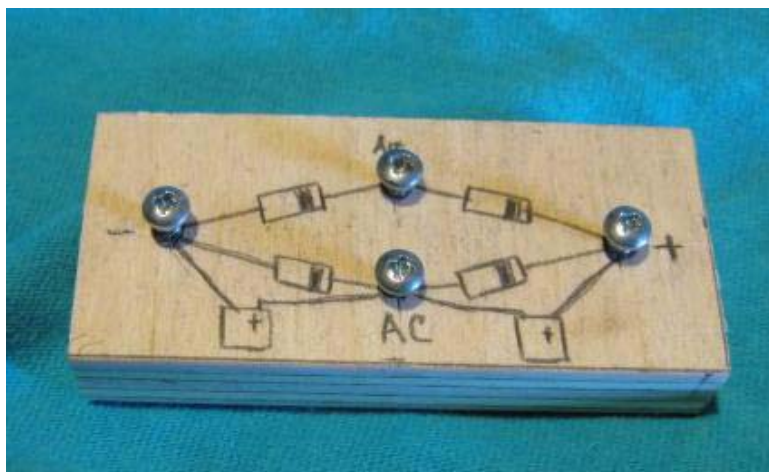


The diodes are basically one way valves for electricity. The green lines labeled AC are wires from the minigen. It doesn't matter which wire since its AC ( alternating current) from each. The capacitors are polarity sensitive and have to be installed as such.

The rectifier/voltage double can be assembled in many different ways. Point to point connections as they did it way back when – that is making connections and twisting or soldering the leads together. You can use a cardboard, wood or plastic base and drill holes for the connections to go into or use a perf board to place components and solder them together or an experimental perf board. Any way you decide to do it will work fine as long as the connections are as in the graphic above.

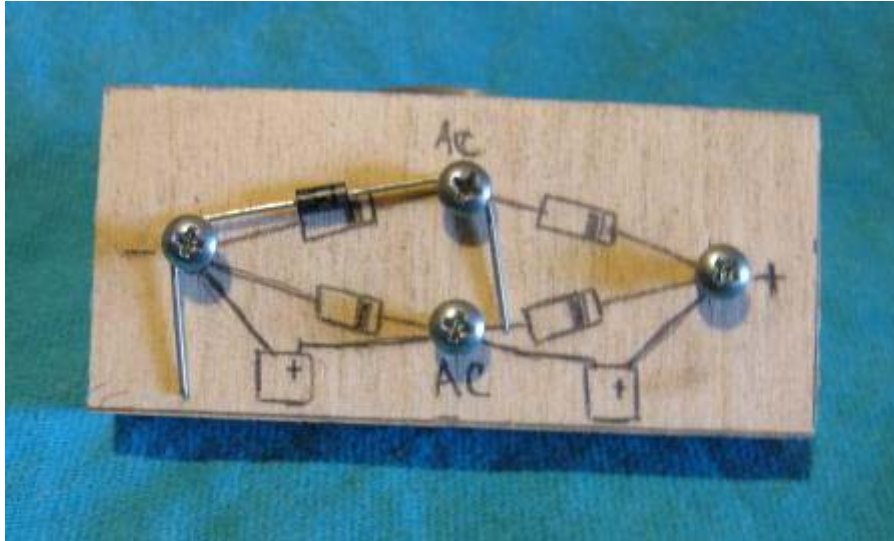
I will use a small scrap of plywood and some screws as a quick example for the rectifier/voltage doubler...

To make it easier you can draw the schematic on the board to make placing the components easier...



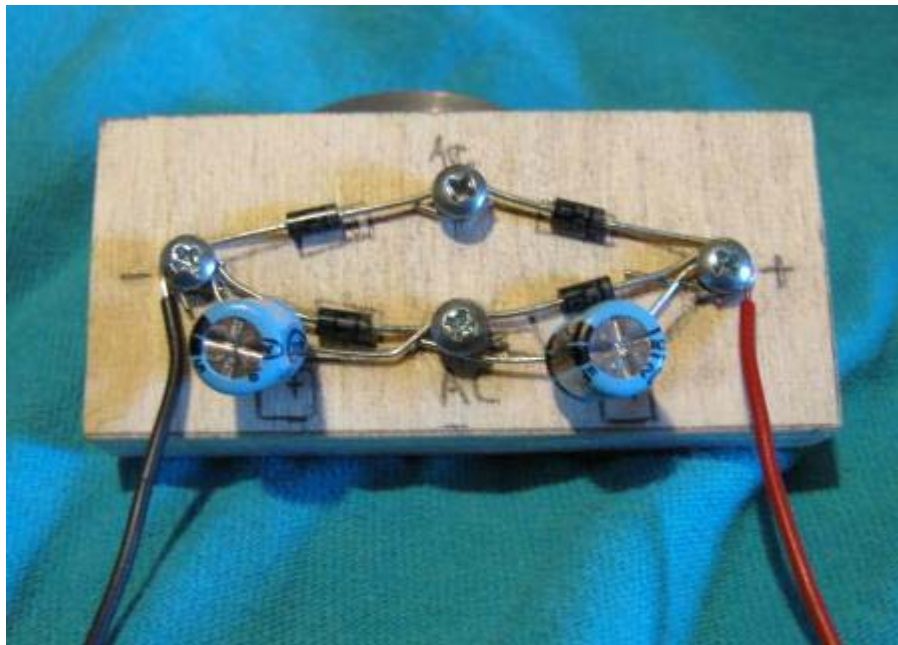
I used the diodes as a measure to place the screws in the board and labeled the connections. Notice the diodes have a “band” on one end of the cylinder, this is the positive side or the direction the electric will flow. The capacitors are marked with a black stripe on the negative (-) side the other side being positive of course.

Start out by laying the diode in place and bending the ends around the screws...



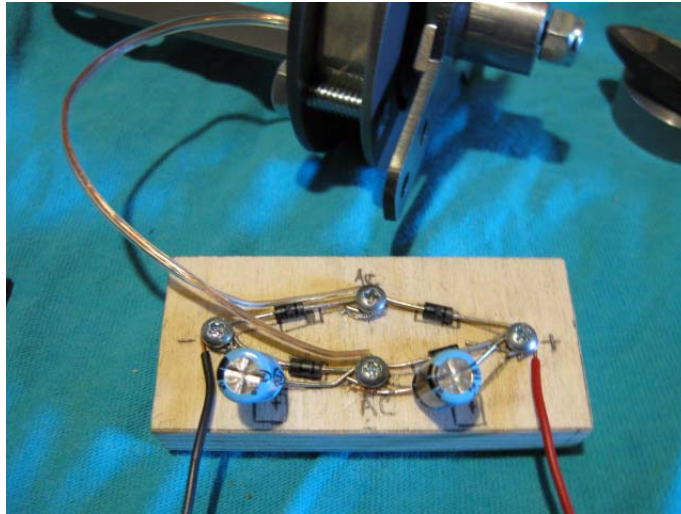
Complete the bend around the screw forming a loop then snip off the excess wire. Continue putting the parts in their appropriate place completing the circuit as in the diagram above.

The circuit should look similar to the one below when completed...

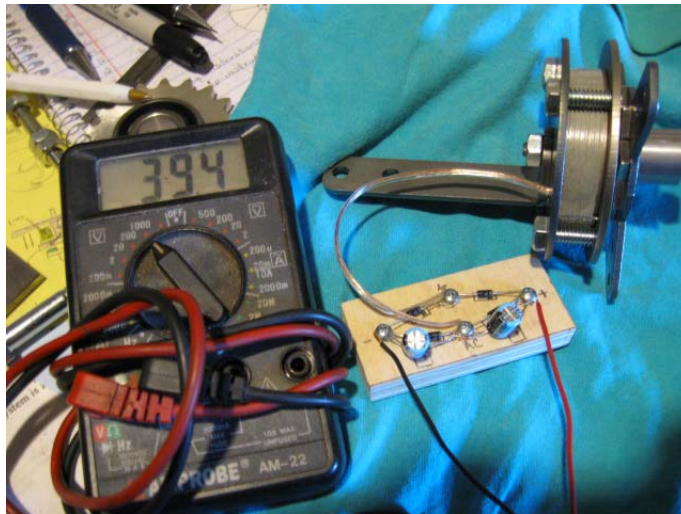


The (+) and (-) wires can be any color as long as you remember which is which when making a connection to a rechargeable battery, LED or other load.

The pigtail wires from the minigen are connected to the AC leads on the rectifier. This completes the connections and it's ready to go...



Connect a meter to the DC output leads of your rectifier and give it a spin !



I spun it pretty quick and you can see the voltage reading at 39.4 volts. The capacitors will hold the voltage for a short amount of time which gave me a bit of time to take the above shot.

Lastly, the universal mount on the back of the genny can be used to mount it on a board for a Vertical wind turbine or for a Horizontal turbine with a tail.

Below shows the mini Lenz2 wind turbine on a minigen , the only difference is the Lenz2 uses the wing arm as the bearing hub and magnet plate. Also, it can use one on top and one on bottom mounted in a frame.



Simple blades for a Horizontal turbine can be made from flat sheet as shown below...

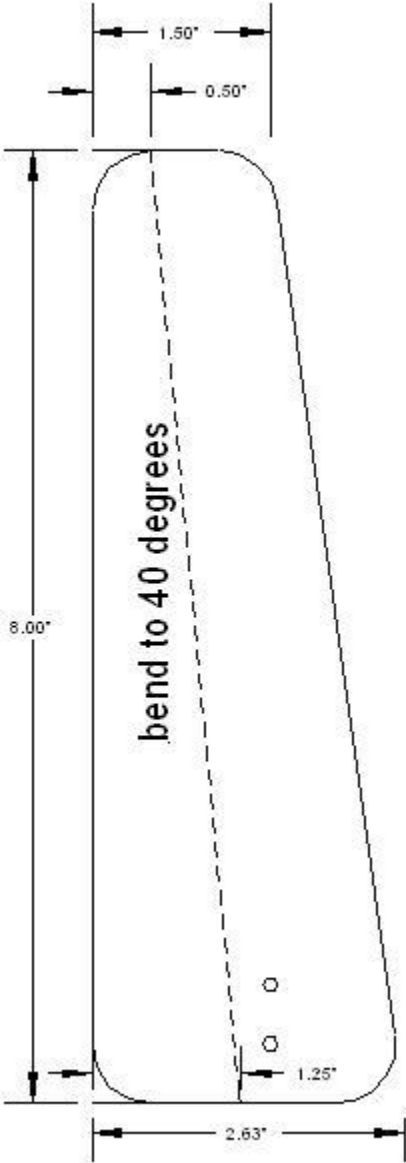


These were made from thin flat aluminum sheet then bent to form the airfoil. Also, by bending them makes them quite strong as well. Below shows a closer look at a single blade...



These are 8 inches long,  $2 \frac{5}{8}$ " at the root ( attached to the hub ) and  $1 \frac{1}{2}$ " at the tip. Measured from the trailing edge the bend at the root would be  $1 \frac{1}{2}$ " in and the tip would be 1" in. These are inexpensive and quick to make. **NOTE: Metal blades spinning fast can be dangerous if you'r not watching what you'r doing. You are, of course, responsible for your own actions when using these or any other spinning attachments with this generator. Safety is your responsibility.**

Blade dimensions shown below....



Also PVC pipe can be used to make blades for the minigen as well as wood or any other creative idea you can come up with... the sky isn't the limit !

Most of all ... Have Fun !