

## **Humdinger's "Windbelts™ for Dummies and Rocket Scientists" Technical Brief**

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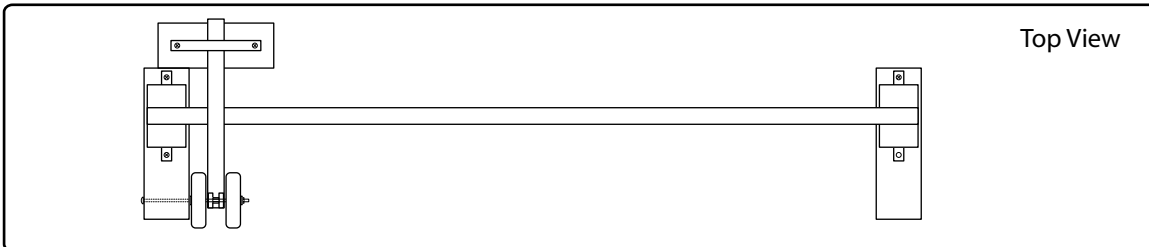
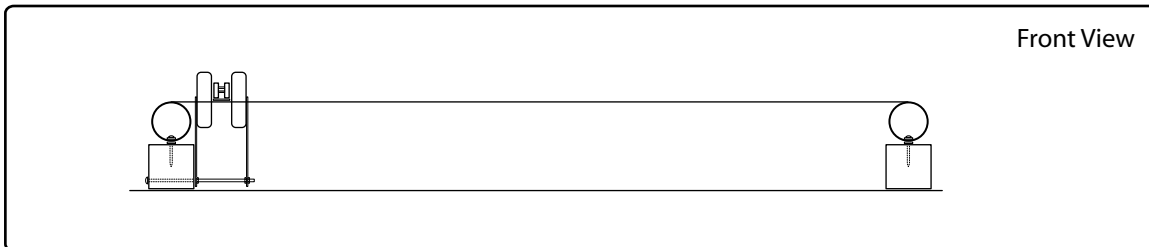
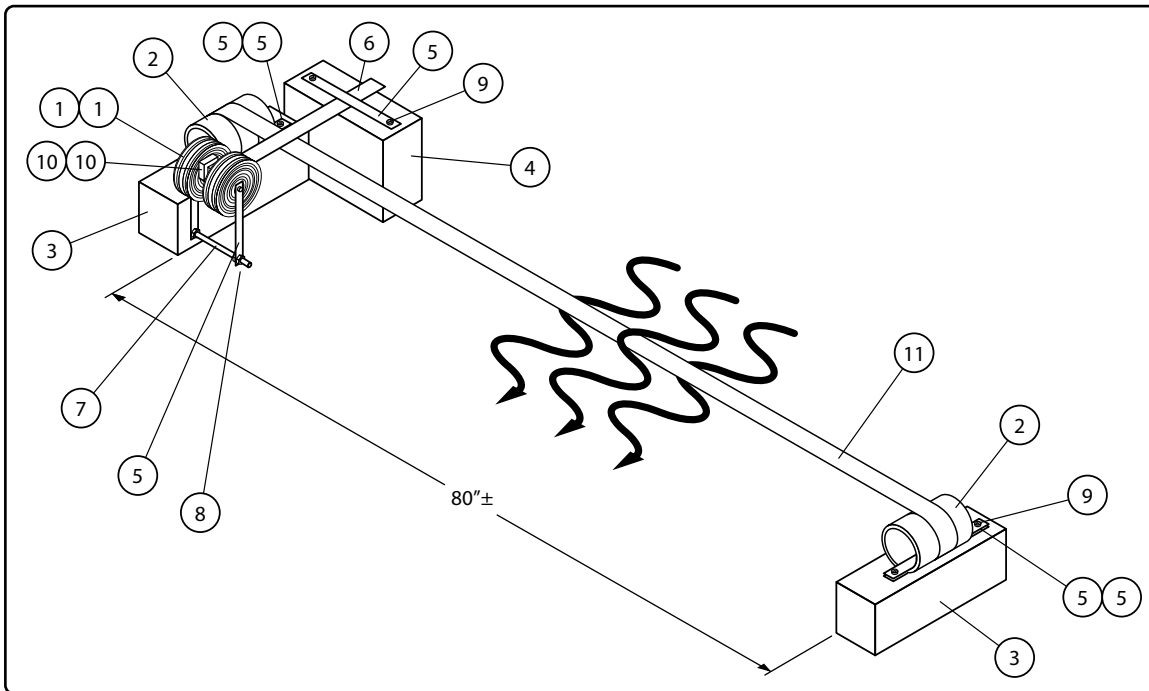
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|--|--|--|--|
| 1. Coil (2)<br>1.4" OD x 3/8" ID<br>x 3/8" thk.<br>28 Ga. wire (~ 38 Ohms) |  | 7. Carriage Bolt<br>1/4-20 x 4.0" L                                      |  |
| 2. PVC Pipe (2)<br>1.5" D x 2.0" L   |  | 8. Nuts (3)<br>1/4-20  |  |
| 3. Wood Block (2)<br>2.0" x 2.0" x 5.0"                                    |  | 9. Wood Screws<br>#10 x 1-1/2  |  |
| 4. Wood Block<br>2.0" x 3.5" x 4.0"  |  | 10. NdFeB Magnet (2)<br>1/2" x 1/2" x 1/8"                               |  |
| 5. Bracket (7)<br>Alum 4" x 0.7" x 1/8"<br>w/ 0.275" thru holes            |  | 11. Belt Material<br>Mylar coated<br>taffeta tape<br>1/2" x 0.005" x 96" |  |
| 6. Saw Blade<br>6.5" x 0.35" x 0.05"                                       |  | 12. Duck   |  |
- ▲ Warning! Saw blade is sharp.

## Build Instructions

Note: The following build instructions are meant to simply provide a model for experimenters and educators. Results will vary.

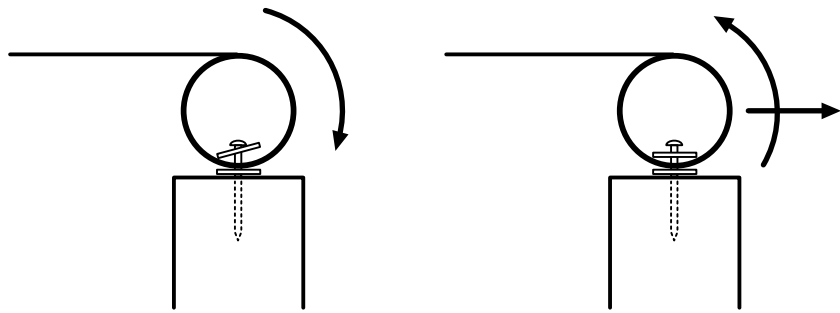
- Assemble the two belt mounts with parts (2), (3), (5), and (9). The straps (5) should be loose enough to turn the PVC pipe (2)
- Anchor the belt mounts approximately 80" apart.
- Load the belt onto each belt mount with tape; turn PVC pipe to tension - See Tensioning Mechanism Diagram.
- Assemble the cantilever with parts (4), (5), (6), (8) (9), and (10).  
Note: Grind down the teeth on the saw blade or cover with tape.
- Anchor the cantilever assembly such that the saw (5) lays across the belt and the magnets (4) are cantilevered 2" from the belt. Tape the cantilever securely to the belt.
- Assemble the coils with parts (1), (3), (5), (7), and (8). Double sided tape can be used to fix (1) to (5). Lockite (CA glue) can be used secure (8) to (7).
- You now have a Windbelt! - See Adjustment Notes.

## Adjustment Notes

"Like a fine instrument, the Windbelt must be tuned!!" - Some old guy.

## How to Tune the Windbelt

- Adjust the belt tension, higher tension = increased frequency
- "Tune" the cantilever by sliding the magnets up and down the cantilever until it resonates with the belt.
- Change the width and/or length of the belt
- Experiment with various belt materials.
- Add scotch tape to increase linear density of membrane and/or add additional surface area for increased lift. This helps a lot if powering the Windbelt with a house fan.
- Look for configurations that produce very little noise.
- Vary the size of the magnets.
- Alternative resonance matching (various cantilevers)
- Use ferromagnetic cores (iron or steel, these can be found in transformers).
- Vary coil sizing (for higher voltages increase gauge of the coil).



### Tensioning Mechanism

#### Tensing

Turn PVC pipe away from the belt

#### Release

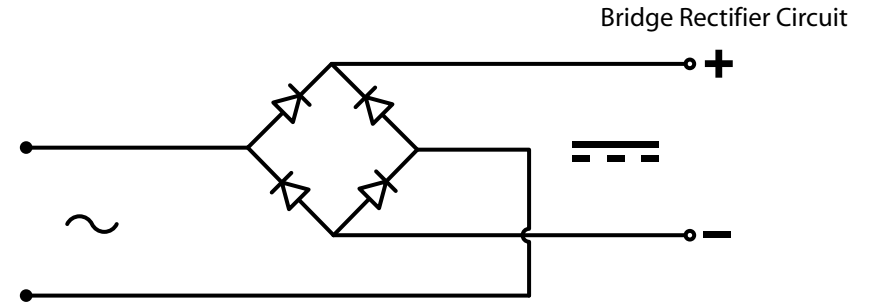
Pull PVC pipe away from the belt and turn towards the belt

#### To Tension

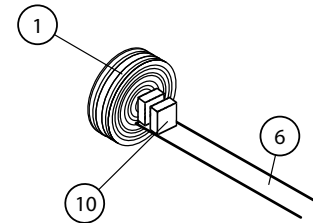
The tension in the belt pulls the PVC pipe forward and causes the inner bracket to angle and dig into the inside of the pipe. This acts somewhat like a ratchet. Turn the pipe clockwise to tension the belt. Let go and the bracket digs into the pipe locking it into place.

#### To Release

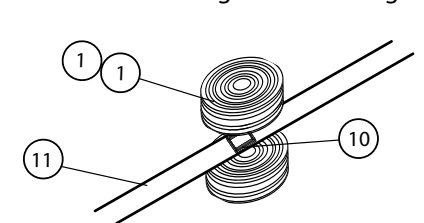
To release, pull the pipe back to disengages the inner bracket. While holding the pipe in this position, twist it counterclockwise to release the tension on the belt.



### Bridge Rectifier Circuit



Cantilever with Coil In Front

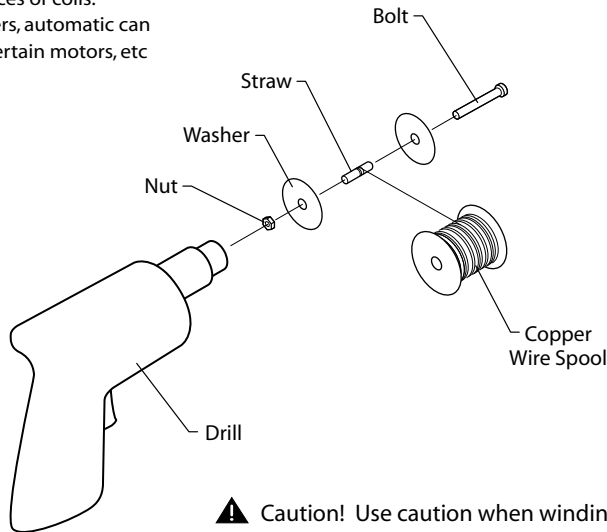


Magnet on the Belt

### Alternate Magnet/Coil Configurations

Good sources of coils:  
transformers, automatic can  
openers, certain motors, etc

### Coil Winding



⚠ Caution! Use caution when winding the coil.

⚠ Warning! Use protective eye wear when winding the coil.

### Windbelt Challenge

- Wind Input: 18" 3 blade house fan, approx 10 mph
- Coil Resistance: 75 Ohms (both coils)
- Open Voltage: 4 V
- Can power an LED? YES
- Can charge a cell phone? YES
- Can power small Radio? YES

### Resources

Almost all parts listed should be easy to find, but here are few links to get you started and/or if you get stuck.

Disclaimer: In no way do we endorse any of these companies nor are they affiliated with Humdinger Wind Energy LLC.

- Magnets  
<http://www.kjmagmetics.com>
- Mylar coated taffeta  
<http://ecom.citystar.com/hang-em-high/ushop/index.cgi?ID=FZPHD4&task=show&cat=FABRIC&pgidx=23>.
- Coils - ask for Des, and tell him you're looking for the Windbelt beginner coils.  
[www.coilwinding.us](http://www.coilwinding.us)
- Wire  
<http://forcefieldmagnets.com/catalog/>

### Advice

Ask the duck (12). If the duck fails you, check online resources. Many different Windbelts have been made across the world. These instructions are just to get you started and thinking!