



Department of Electrical and Computer Engineering

CONSTRUCTION OF THE SPEAKER

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Components to build:

For each speaker we must create (in any order):

Voice coil

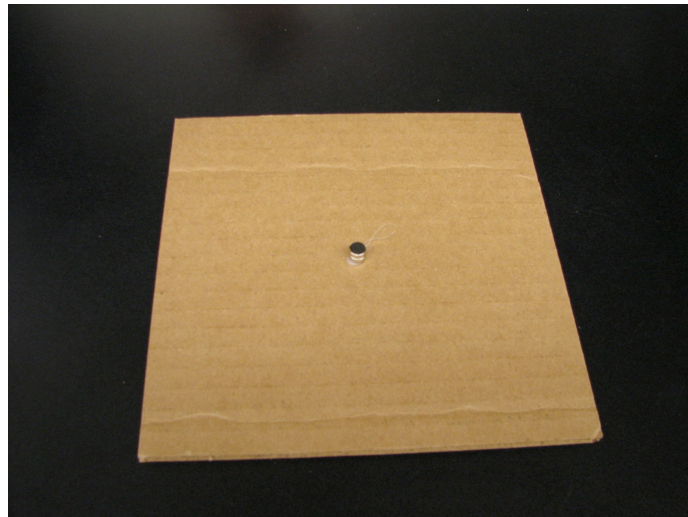
Diaphragm

Base with electro magnets

The voice coil is then attached to the diaphragm, and the entire assembly is suspended over the magnets.

Base:

- Hot glue the two magnets to the center of the cardboard.



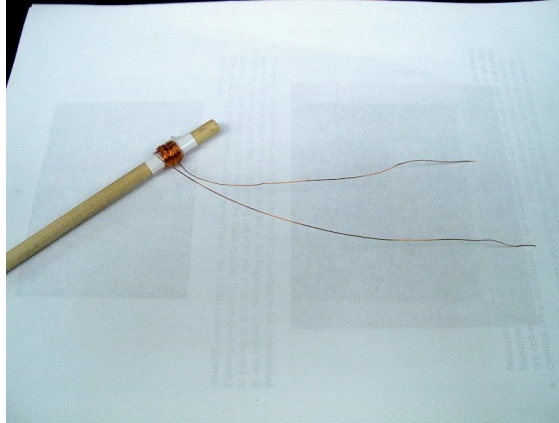
Voice Coil:

We need a cylindrical base to create the coil. We will use a short length of wooden dowel as the mold, and a section of drinking straw as the base.

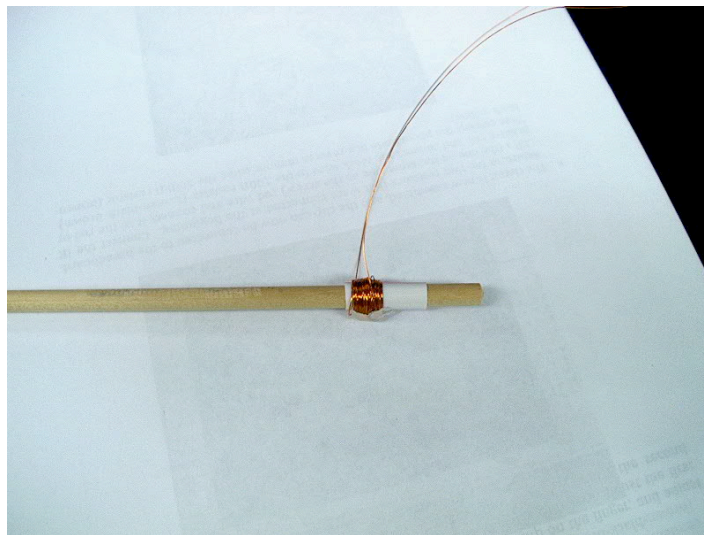
- Slide the piece of drinking straw over the dowel.



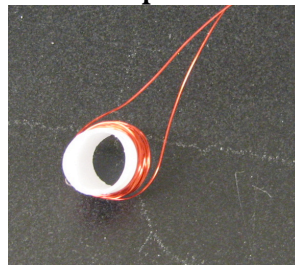
- Wrap the coil
 - In order to run an electrical current through the wire we'll need two ends, about 8" each. *Leave 8" of wire (approximately the smaller side of this paper) and coil the remaining wire around the drinking straw base until there are only 8" remaining.*
 - **OVERLAP** the wire **AS MUCH AS POSSIBLE**. It is not important to cover the straw, it is important to have a short coil with much overlap.
 - Make sure all the coils are on the straw and not spilling over onto the dowel.



- Slide the coil to one end of the straw.



- Hot glue the voice coil at each wire end (“lead” in electrical terms) so that it does not unravel.
- Remove straw and voice coil together from the dowel. The dowel is not part of the speaker.



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- Remove insulation from wire ends
 - Using a match or lighter, burn off and half inch of the insulation from the ends of the two wires.
 - OR use sandpaper to remove the insulation.

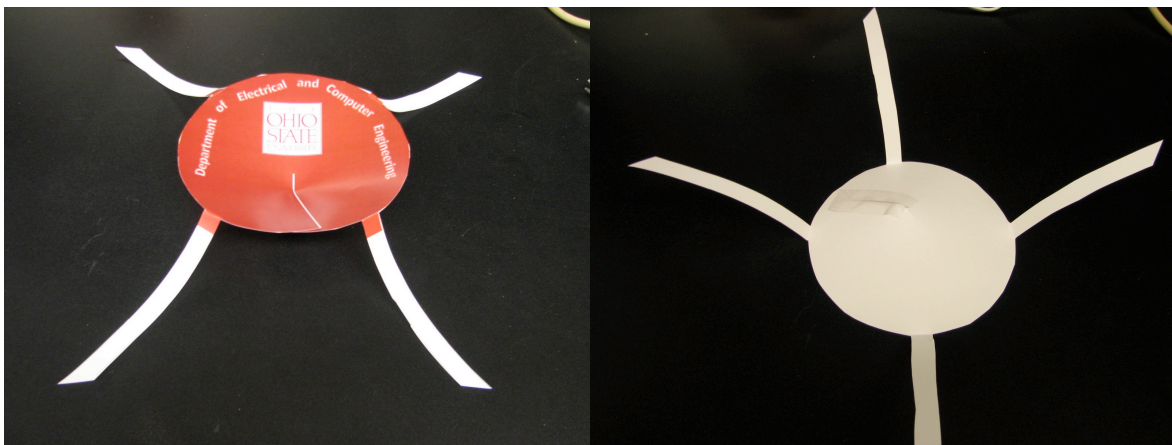
Diaphragm:

We need a diaphragm to create the sound waves. It must be cone shaped and, for our purposes, have “legs” that we can use to attach it to the base, and suspend the coil over the magnets.

- Draw “legs” on the paper template provided. That is, extend each square tab to the end of the paper.

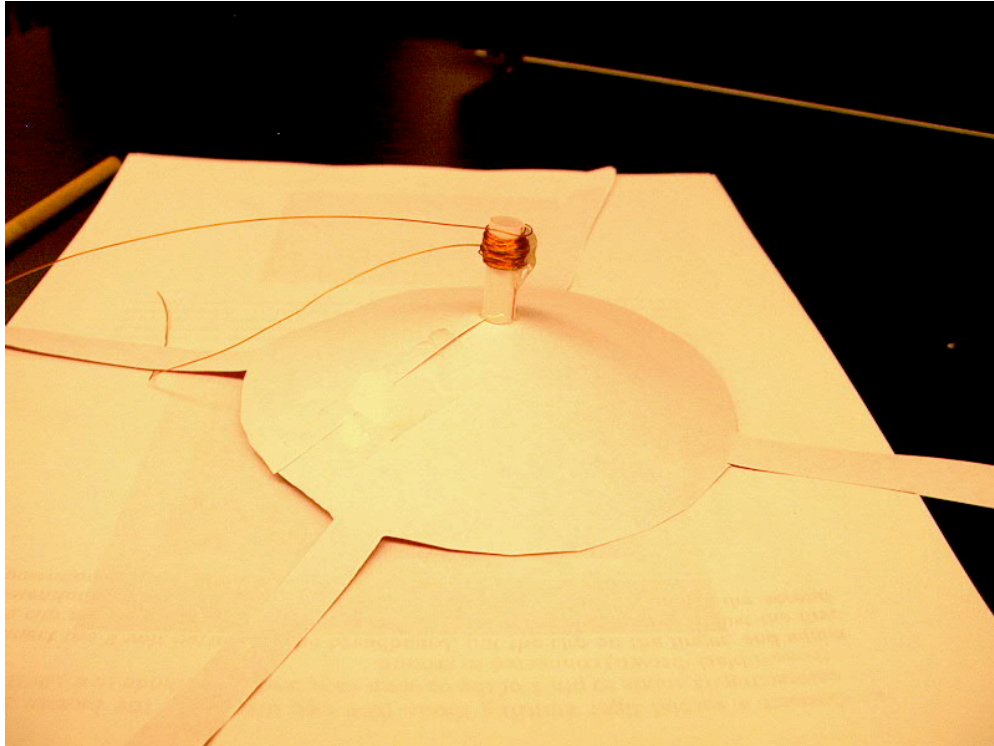


- Cut out the paper template WITH these legs.
- Cut the marked line (radius) in the template.
- SLIGHTLY overlap the circle to create a shallow cone and tape it in place
- Fold the legs down.

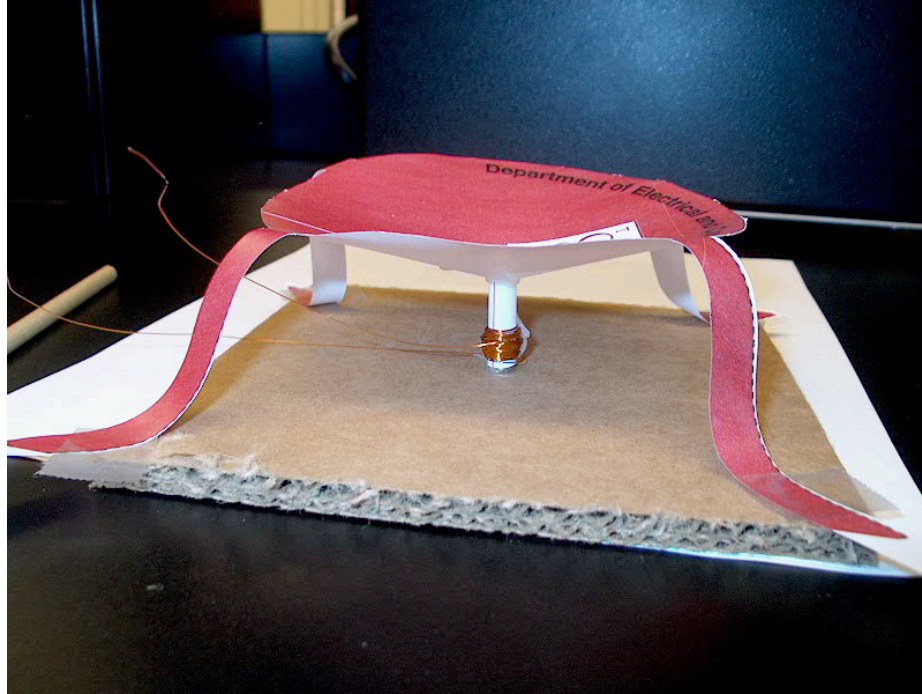


ASSEMBLY:

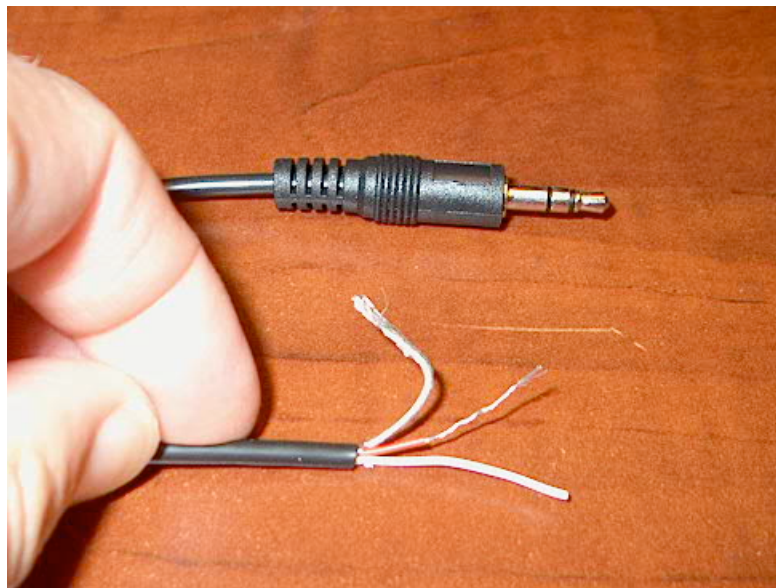
- Attach the voice coil to the cone peak of the diaphragm, as shown below. This can be done by either gluing or taping the inner paper coil to the paper diaphragm.
- **MAKE SURE THE COIL IS ON THE END OF THE STRAW AWAY FROM THE DIAPHRAGM.**



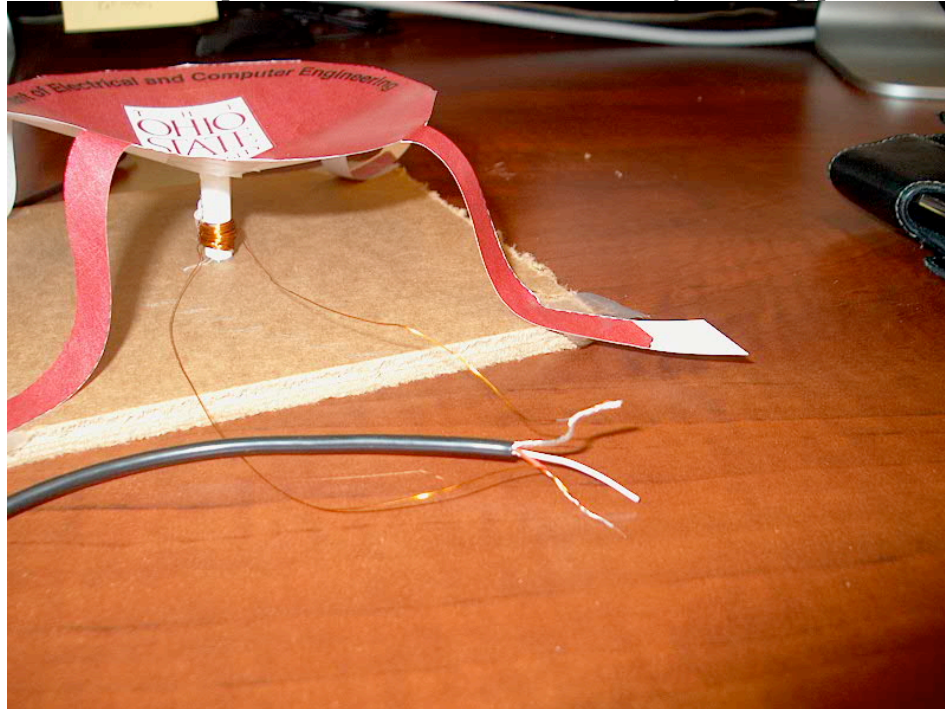
- Place, but do not glue, the diaphragm with coil over the magnets on the base. The magnet should move freely inside the coil.
- Fold the legs down and tape or glue them loosely to the base. You should be able to easily wiggle the diaphragm up and down over the magnet.



- Prepare the audio cable
 - If you have a brand new male-to-male cable, use wire cutters to cut it in half.
 - With wire strippers, strip the black insulation back about an inch, exposing the wires inside.
 - If you have a stereo cable, there will be three wires, one plain metal, one with red insulation and one with white insulation.
 - If you have a mono cable, there will be just two wires.
 - Strip about a half inch of insulation from EITHER the red wire or the white wire. Leave the other one alone.



- Twist the end of one of your speaker wires (either one) to the metal wire of the audio cable.
- Twist the other speaker wire to the wire that you stripped.



- Now attach your MP3 player and make music!
 - Plug the audio cable into the microphone jack of your Mp3 player.
 - Play! You might have to put your ear close to hear it at first

Trouble shooting:

Make sure coil is not glued to magnet. Coil should move easily over magnet.

Make sure legs are not pulling diaphragm down too tightly over the magnet. Coil should move easily over magnet.

Make sure magnet is inside coil so its magnetic field can interact with the current in the coil.

Make sure you remembered to burn the insulation off the ends of the speaker wires.

Make sure speaker wires are not touching each other.