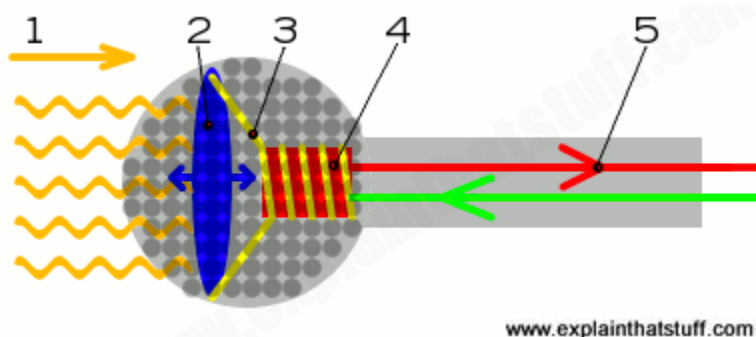


Exploring Sound 11: Microphones and Speakers

Sound is a type of energy. Light, electricity, magnetism and motion are also types of energy. When humans learned how to make and control electricity it opened up a huge range of technological possibilities. Being able to transfer electric energy to light and sound and heat has made a tremendous impact on human life.

Microphones transfer sound energy to electricity

- 1 Sound travels towards the microphone
- 2 A thin skin (often plastic) gets shaken back and forth by the sound
- 3 A wire coil attached to the skin (membrane) gets moved back and forth by the moving skin

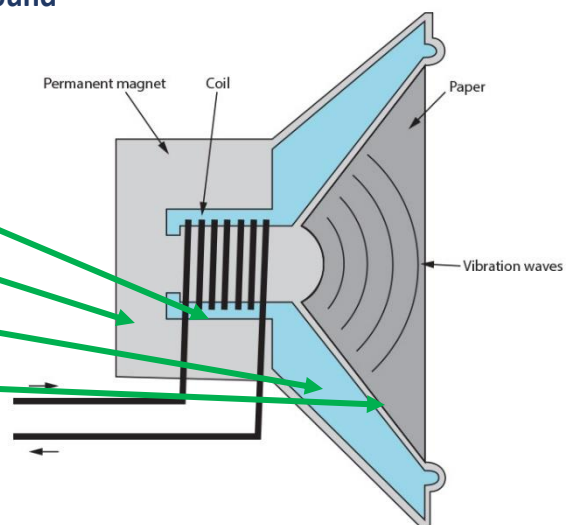


- 4 A magnet is fixed inside the microphone so that it sits inside the coil (but doesn't touch it.) As the coil moves back and forth around the magnet, electricity is generated.
- 5 Electric energy moves in pulses that are generated by the pulses of sound energy

Speakers transfer electric energy to sound

Speakers work the opposite way

- 1 Electrical pulses travel through the wire coil
- 2 The flowing electricity causes the magnet to move back and forth
- 3 The magnet is connected to a thin cone that moves as the magnet moves
- 4 The moving cone creates sound waves



Exploring Sound 11: Microphones and Speakers

A **transducer** is a device that transfers one type of energy to another. In the types of **microphones** and **speakers** we looked at **sound** is transferred to **electricity** (and back) through an **electromagnetic transducer**.

This website describes many types of transducers and lists some of their applications

<https://physicsabout.com/types-of-transducers/>

This website briefly discusses different types of microphones

<https://electronics.howstuffworks.com/gadgets/audio-music/question3099.htm>

This video shows an experiment with a copper tube and a magnet to demonstrate

electromagnetism <https://www.youtube.com/watch?v=NqdOyxJZj0U>

This animated video shows some of the basic experiments with magnets and coils of wire

<https://www.youtube.com/watch?v=yA8gZM3fghc>

These two Crash Course Physics videos look at magnetism and induction

<https://www.youtube.com/watch?v=s94suB5uLWw>

https://www.youtube.com/watch?v=pQp6bmJPU_0

Here's a fun video that uses the principles of electromagnetism to make a "train" with a battery, 2

magnets and a coil of wire <https://www.youtube.com/watch?v=J9b0J29OzAU>