Sound/Signal/Sound

- A basic microphone is built to cause a wire to move in a magnetic field. Each time the wire moves, it carries an electrical charge - by the principle of Faraday's Induction.

- Sound waves will jiggle a wire, but not very efficiently. So microphone designers attach the wire to a thin film of plastic stretched tightly. Sound pressure waves are pretty good at moving such a diaphragm.

- A simple wire suspended near a magnet will carry a charge when moved, but not a very strong one. So microphone designers strengthen the charge by coiling the wire – by wrapping it around (but not touching) the magnet.

- So, a sound wave at 400Hz, for example, causes the diaphragm to move 400 times per second. This causes the coiled wire to jiggle 400 times per second. And that causes an electrical charge to flow in the wire – 400 times per second. Sound goes in one end of the microphone, and electrical signal comes out the other.

- A loudspeaker is built to cause a wire to carry an electrical charge near a magnet. Each time the electrical charge surges, a magnetic field is created around the wire. But because the wire already is within a magnetic field, the second magnetic field would be either attracted to it or repelled from it. So the wire would be either pushed away or pulled toward the magnet.

- A simple wire moving back and forth will stir up the air it contacts, of course, but won't create a nice clean shock wave. So loudspeaker designers glue the wire to the back of a paper cone. When the paper cone is moved back and forth (because the wire which is glued to it is caused to move back and forth), it creates shock waves in the air. Shock waves move out from the loudspeaker, which we hear as sound.

- Transduction. "Converting" energy from one form to another. In this case, sound pressure waves into pulses of electrical current, and then back to sound pressure waves.