What is a Microphone?

Microphones are a type of **transducer** or convertor - a device which converts energy from one form to another. Microphones convert acoustical energy (sound waves) into electrical energy (the audio signal). A Basic Look at Microphones

Different types of microphone have different ways of converting energy but they all share one thing in common: The *diaphragm*. This is a thin piece of material (such as paper, plastic or aluminium which vibrates when it is struck by sound waves. In a typical hand-held mic like the one below, the diaphragm is located in the head of the microphone.

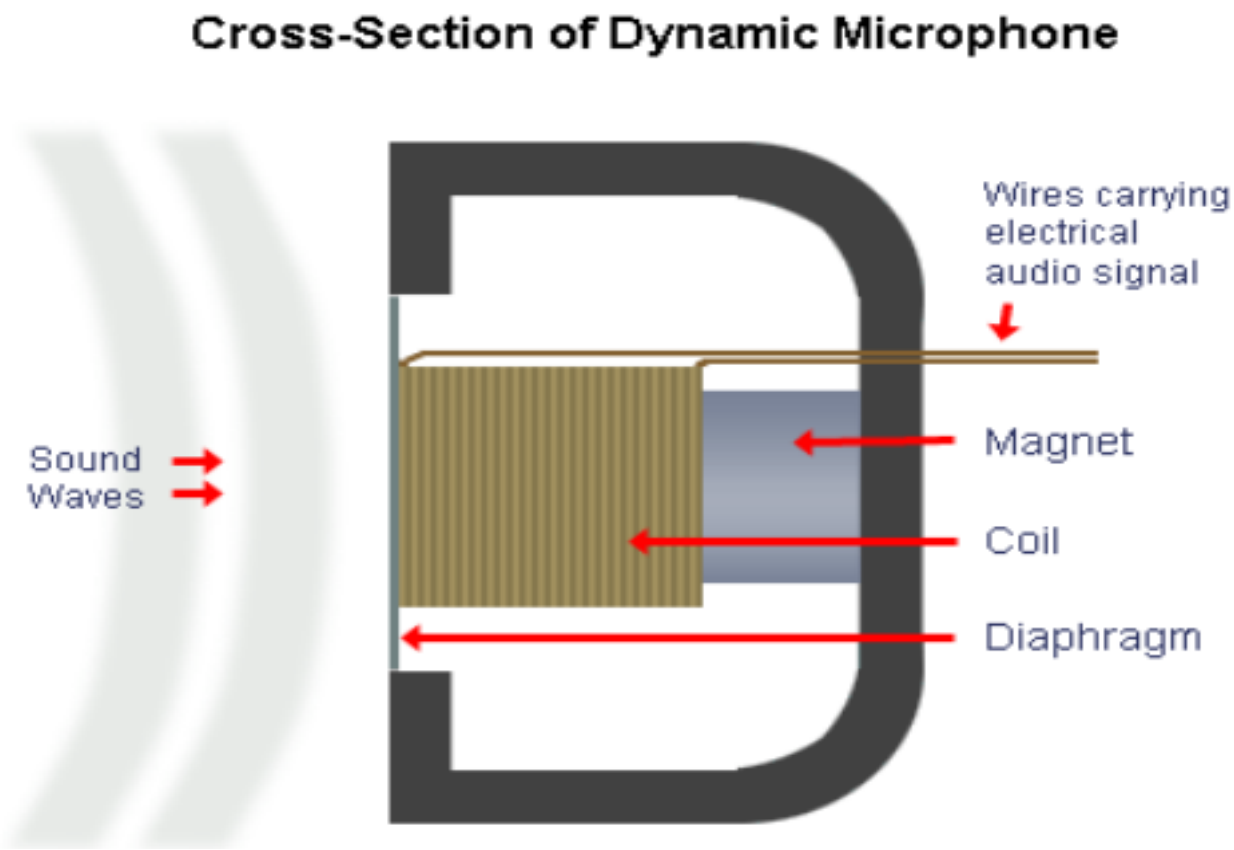
There are three common type of microphones

1. Dynamic microphone

2. Ribbon microphone

3. Condenser microphone…

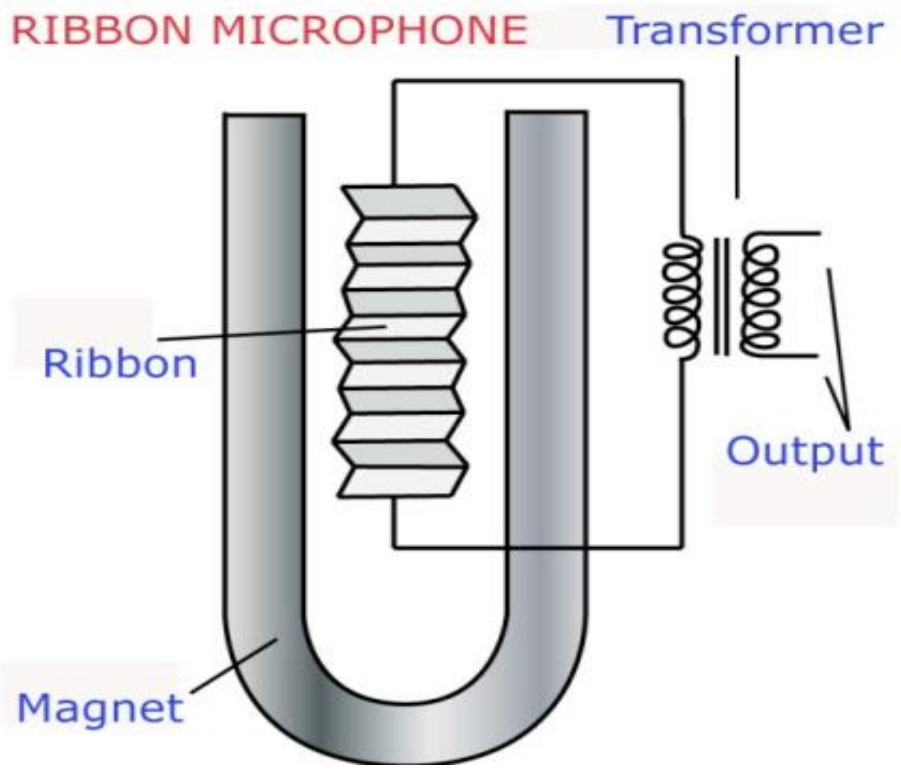
1. Dynamic Microphone



Dynamic microphone, a very thin diaphragm of Mylar or other material is attached to a coil of hair-thin copper wire. The coil is suspended in a magnetic field and, when sound vibrates the diaphragm, the coil moves up and down, creating a very small electrical current.

Note: At the other end of the audio chain, the loudspeaker is also a transducer - it converts the electrical energy back into acoustical energy.

Ribbon microphone



Principle :

A ribbon microphone is a unique type of dynamic microphone that is based around a thin, corrugated strip of metal (often aluminum) or film suspended between two magnetic poles. Unlike traditional moving-coil dynamic mics, the ribbon element responds to variations in the *velocity* of air particles, rather than the *pressure*. As the ribbon vibrates within its magnetic field, it generates a tiny voltage that corresponds to these changes in velocity. In classic ribbon designs, this level is very low compared to typical dynamic mics, and a step-up transformer boosts both the output voltage and impedance. Preamp choice is very important when using ribbon mics.

Because a ribbon mic has an extremely thin, delicate element, it is capable of capturing fast transients. Ribbons mics have a wide dynamic range, and are capable of handling high SPLs at high frequencies. (Give them a try on brass or percussion.) These mics are bidirectional by design, because the ribbon element responds to sound arriving from the front or back of the mic, and does not pick up sound arriving on its sides. This natural figure-8 pattern makes them ideal for stereo recording applications, and is useful in applications where you want to eliminate unwanted noise between two sources (i.e. in broadcast).

Ribbon mics are very sensitive, but they are often quite fragile; delicate older models can be broken by strong gusts of air, voltage spikes or even by being stored on their side.

Condenser Microphones

Condenser means *capacitor*, an electronic component which stores energy in the form of an electrostatic field. The term *condenser* is actually obsolete but has stuck as the name for this type of microphone, which uses a capacitor to convert acoustical energy into electrical energy.

How Condenser Microphones Work

A capacitor has two plates with a voltage between them. In the condenser mic, one of these plates is made of very light material and acts as the diaphragm. The diaphragm vibrates when struck by sound waves, changing the distance between the two plates and therefore changing the capacitance. Specifically, when the plates are closer together, capacitance increases and a charge current occurs. When the plates are further apart, capacitance decreases and a discharge current occurs.

A voltage is required across the capacitor for this to work. This voltage is supplied either by a battery in the mic or by external **phantom power** **(48v dc).**

Cross-Section of a Typical Condenser Microphone