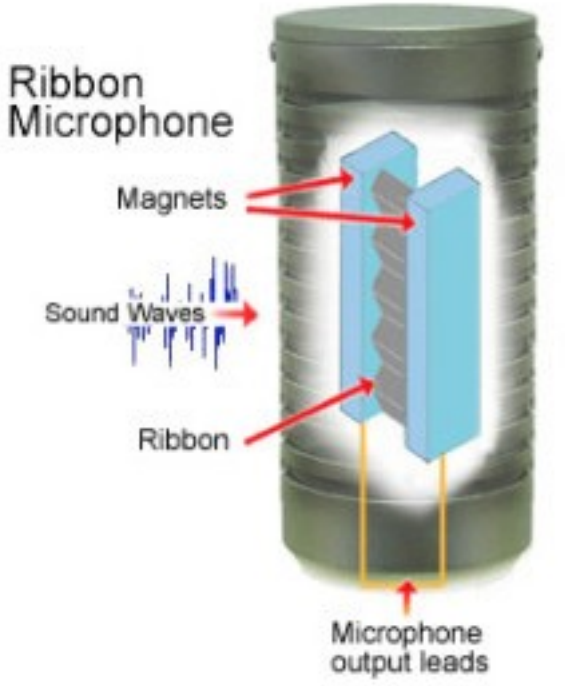
Microphones 101: Condensers, Dynamic and Ribbon…Oh My!

In the world of recording, there are few things as important as microphones. There are so many factors in the outcome of a recording that depend on the microphone. An Engineer will not only have to know where to place, what the pattern is and how the room will effect the sound, but also what type of microphone to use.

Microphones are generally broken down into three types: Condenser, Dynamic and Ribbon. So what's the difference and why do I need to know?

Microphones come in all shapes, sizes, styles and purposes. But 99% of all microphones can be categorized into these 3 categories. Each one of these categories has a different way of translating analog sound into recorded sound. This means that each microphone will create a different sound. Just as a different medium creates a different picture.



Ribbon Microphone

Ribbon mics get their name because of the thin ribbon of metal foil that sits between to magnets. The Vibration of this ribbon from sound waves is what creates the audio signal. The very delicate foil creates a very accurate and authentic sound, it can pick up very delicate frequencies and will create the most accurate recordings. However because of the delicate nature, they are very pricy and often in need of repair. Many high end studios will carry ribbon mics, but smaller or home studios probably won't.

Ribbon Mics were the first microphone created. they were modeled after telephones. This is why early recordings often sound like they were played through a telephone. Ribbon Microphones were most popular in Broadcast Media and Recording in the 30's through the 60's and are still very Prevalent today. Some Popular manufacturers are Coles, Beyer, Royer and AEA.

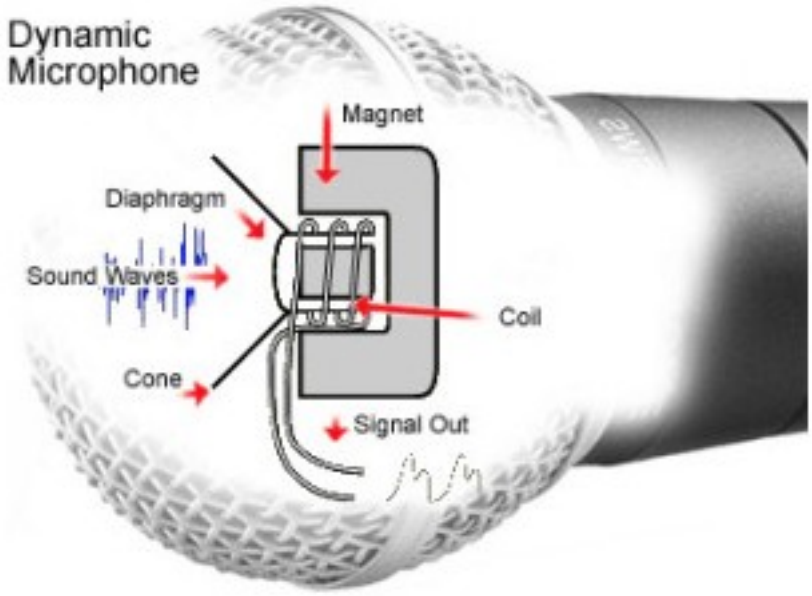
Choose a Ribbon Microphone if you want:

- To pick up a wide range of frequencies
- Extraordinarily rich representation of the original sound

- Smooth and Detailed Sound
- To capture the subtle nuances in a **recording studio**
- And expect and appreciate subtle, sensitive sound

Pros: Relatively Flat frequency response, extended high frequency response as compared to dynamics, needs no additional Power to operate.

Cons: Very Fragile, Expensive and take a lot of care when handling and operating.



Dynamic Microphone

Dynamic Microphones are probably the most recognizable and manufactured. These are the most common amoung live performers. The reason being they are very durable and can take a lot of abuse. The Shure SM58 is the most popular Dynamic mic manufactured, they say you can "Hammer nails" with a Shure SM58.

a physical cone acts like a lens to concentrate the incoming sound waves. The concentrated energy of these sound waves moves the cone and its attached coil of wire back and forth inside a magnetic field. The magnetic field induces electricity to flow through the wire to produce an electrical signal which is the microphone's output.

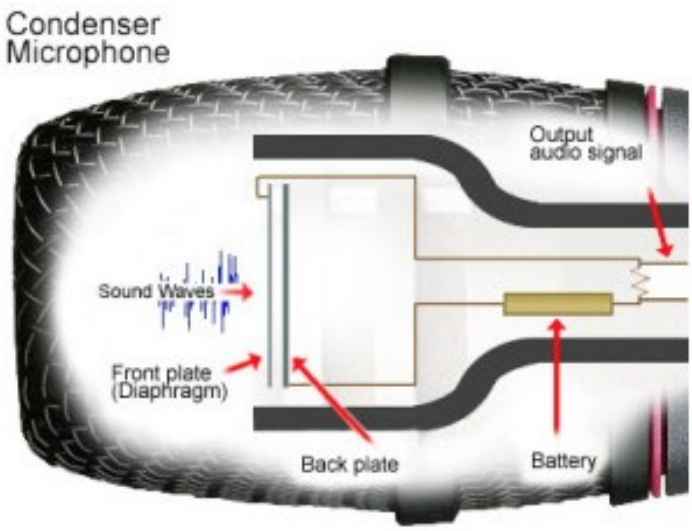
Dynamic Microphones are very affordable and durable, but are not always the best for recording in Studio. They tend to cut off High and Low End Frequencies

Choose a Dynamic Microphone if you want:

- Versatility
- To Save Money
- Durability
- To use it for live vocals and recording
- To work with relatively loud sound sources

Pros: Robust and durable, can be reletively inexpensive, insensetive to changes in humidity, needs no external or internal power to operate, can be made fairly small.

Cons:Resonant peak in the frequency response, typically weak high frequency.



Condenser Microphone

Condenser Microphones are a staple of the Recording industry. They are Accurate and more durable than a ribbon. Rather than a vibrating wire coil, condenser microphones have a thin diaphragm and solid back plate which make up an electronic component known as a capacitor. As the diaphragm vibrates, the distance from the back plate to the diaphragm varies accordingly. This is known as fluctuating capacitance. It's the fluctuation that produces an electrical current, resulting in the signal output.

Condenser Microphones are widely made for recording and can often have filters passes built in and directional Polar Pattern choices (Omni, Cardioid, Figure 8, HyperCardioid, but we will discuss these next week.) As a result of the widespread application of condenser microphones, they have evolved into a number of subcategories including electret condenser, cardioid condenser and even dynamic condenser microphones.

Some popular myths:
Larger condensers have better low end and vice versa.
Cardioid has better low end than Omni-directional.

Choose a Condenser Microphone if you:

- Need **versatility** because you work in a variety of applications for example speech as well as music
- Want accurate sound reproduction and clarity
- Like sound that is natural, clean and clear, with transparency and detail
- Need exceptionally sensitive pickup, which requires phantom power for silent audio amplification

Pros: Excellent High Frequency and upper harmonic response, can have excellent low end response.

Cons: Moderate to very expensive, requires external power (Phantom Power), Can be bulky. 2 Identical Mics may sound different. Can be effected by humidity and temperature.