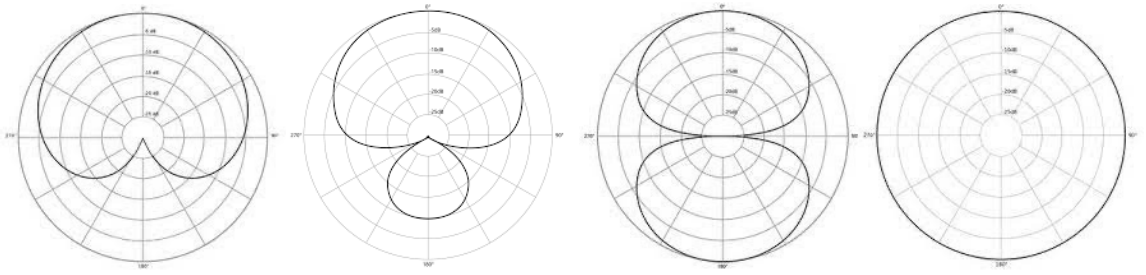

SUITABLITY OF MICROPHONES
SUITABILITY AND CHARACTERISTICS OF MICROPHONES

Polar Patterns



Cardioid	Hyper Cardioid	Figure - 8	Omnidirectional
Rejects sound from behind the capsule	Captures sound from in front of the capsule with some capture behind	Captures sound from in front of and behind the capsule	Captures sound from all around the capsule
Minimises the amount of ambience captured	Good at providing partial isolation from other instruments	Strongly reject sound from the sides of the capsule	Captures room ambience
Used for close-mic work	Captures some ambience in the room	Used in M/S recording techniques to create a stereo image	Little isolation provided which can lead to spill

A microphone's polar pattern tells you how it will capture sound at different angles around the capsule (3D despite 2D representation in diagram)

Almost all dynamic mics use cardioid polar patterns

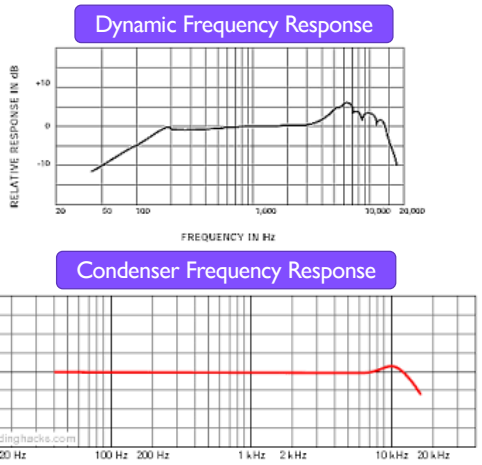
Almost all ribbon mics use figure 8 polar patterns

Most large diaphragm mics have a pattern switch offering 3-5 different polar patterns (cardioid, omni, figure 8)

M/S = Mid-Side

Frequency Response

- Shows the frequencies that a microphone will pick up in relation to the human hearing range
- The closer the graph is to being flat, the closer the sound capture will be to the 'true' sound source
- Peaks = colouration
  - Frequencies will be captured louder than they are in real life



The difference in dB either side of 0 on the y-axis shows how much louder or quieter they are being captured

Condenser microphones:
- Largely flat up until around 10k Hz to record signal true to real life

Dynamic microphones:
- Presence peak between 3k and 10k Hz to help signal cut through a mix and give clarity and brightness
- Boost is reduced around 8k Hz to help reduce intrusive high frequencies and sibilance
- Roll off after 10k Hz results in limited detail for high frequency capture

Transient Response

- The speed at which the diaphragm of a microphone can move when disturbed by a vibration
- **Small diaphragm** condensers usually have the fastest transient response
  - Their diaphragms are the lightest and therefore easiest to move
  - This results in a better **high frequency response**
- Diaphragms in **dynamic microphones** are attached to heavy coils
  - This stops them from moving as fast

- Particularly for large diaphragm dynamic mics used on instruments such as kick drums
  - It can introduce a form of acoustic compression

Microphone Switches

- **Polar Pattern**
  - Switches the polar patterns used by the microphone
- **High Pass Filter/Rumble Filter**
  - Removes all frequencies below the cut-off
- **Pad**
  - Changes the sensitivity of the microphone

- HPF: Cut of off 80Hz or 40Hz
- Pad: Reduce sensitivity by 10dB or 5dB

Microphone Accessories

- **Shock mounts** are used to reduce the amount of vibrations captured by the microphone
  - These vibrations travel up the microphone stand
- **Pop-shields** are used to limit the intensity of the capture of plosives by the microphone

- Shock mounts/cradles work by using elastic suspension to isolate the microphone from vibrations

- Pop-shields work by dispersing the flow of air so that the displacement of the diaphragm is lessened

The Proximity Effect

- The closer a microphone is to a sound source, the more the lower frequency content is emphasised
- Can be used to create a warmer timbre
  - Good for instruments like Kick Drums and Bass Guitars
- Can be fixed by physically moving the microphone back, switching the HPF/rumble filter on on the mic or with EQ when mixing

Directional polar patterns (all but omni-directional) exhibit the proximity effect

Properties: Dynamic vs Condenser

Dynamic		Condenser	
Pros	Cons	Pros	Cons
Generally inexpensive	Low output volume	Sensitive, allowing for effective capture of quiet sounds	Requires an external power source
Durable/Robust	Limited high frequency response	Flat and accurate frequency response	Expensive
Can withstand high SPL		Can capture a wide frequency range	Fragile
Moisture resistant		Good signal-to-noise ratio	
Doesn't require an external power source		Wide dynamic range	

- SPL = Sound Pressure Level