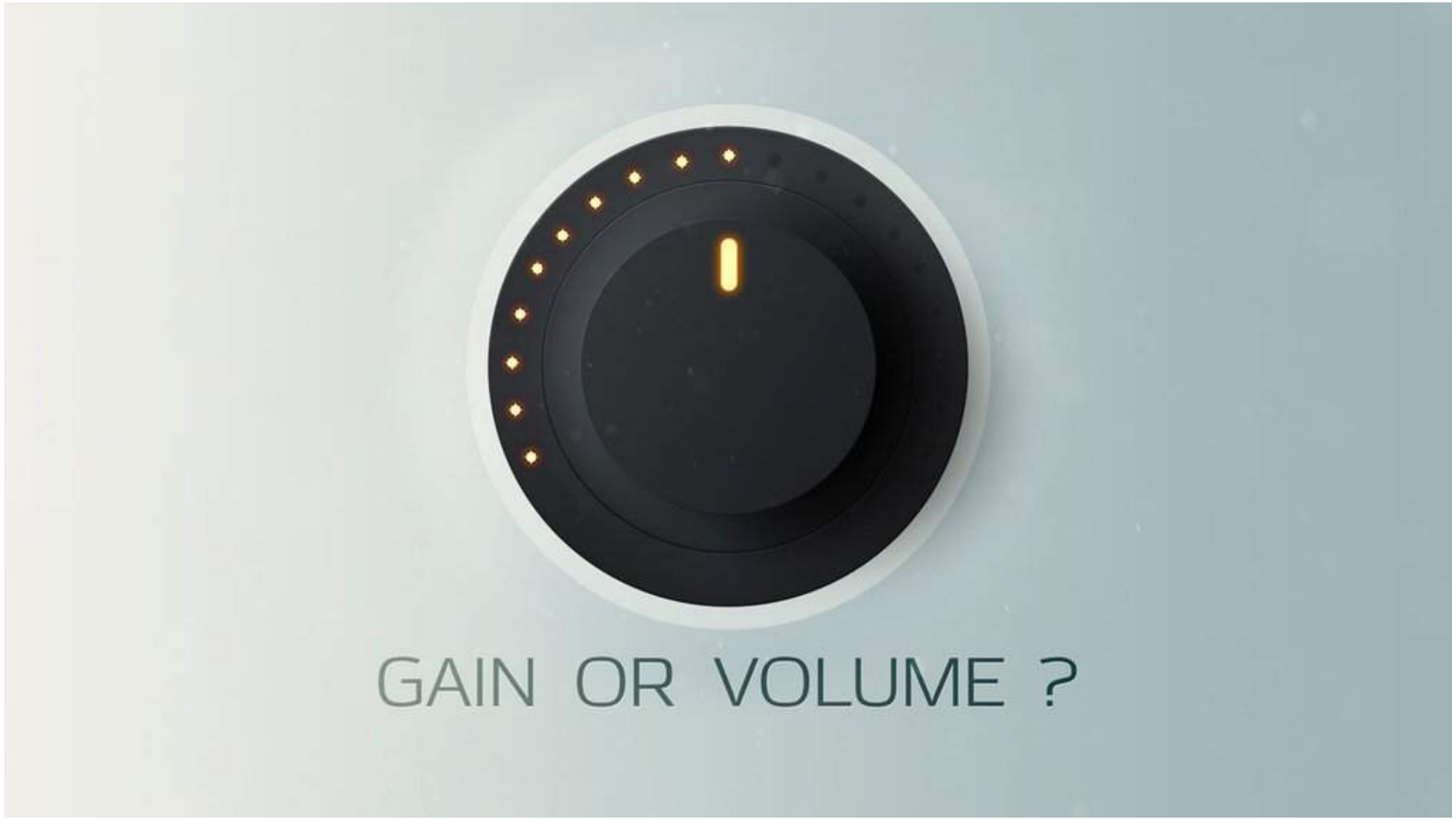

GAIN OR VOLUME ?

# Gain / Volume


Gain :How loud the INPUT level of the channel or an Amplifier



Volume: How loud the OUTPUT of the channel or amp is. It controls loudness.

Gain refers to the level of something at the *input* stage, before it's been processed

A microphone preamp's gain or "trim" control, for example, turns up the *input* signal of the microphone to a recordable level.

On a compressor plugin, for example, the "makeup gain" function is really just an output volume knob by another name.

If gain is reserved to describe the input level on a source, then volume is the measurable *output* level of a signal, after processing.

# Compression

Compression can be used to subtly balance a track to make it more natural sounding and intelligible without adding distortion, resulting in a song that's more “comfortable” to listen to.

Additionally, many compressors — both hardware and software — will have a signature sound that can be used to inject wonderful coloration and tone into otherwise lifeless tracks.


## Connecting the compressor

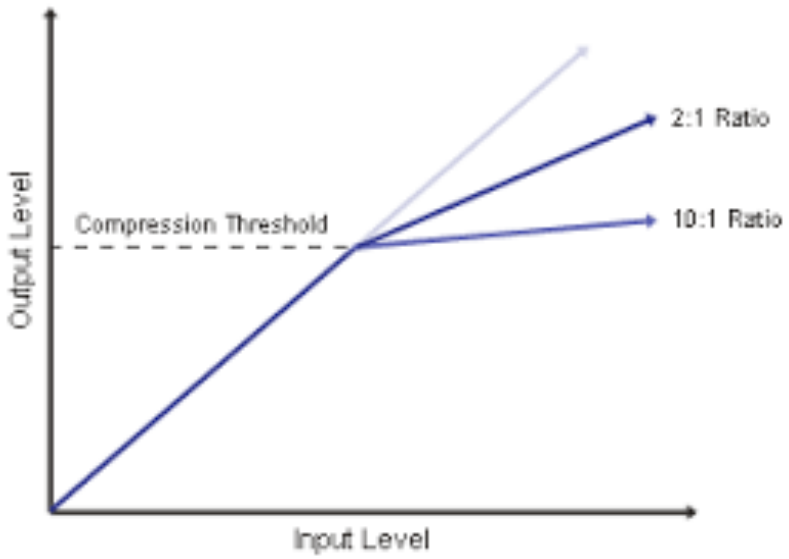
There are a number of ways in which a compressor can be used...

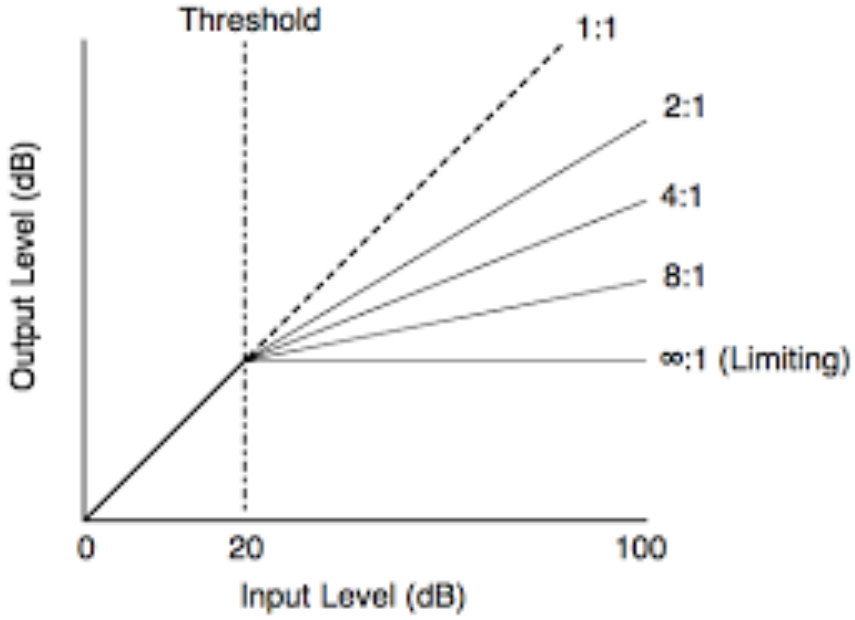
- To compress an individual signal as it is being recorded.
- To compress an individual signal as it is being mixed.
- To compress the entire stereo mix during the mixing process.

Depending which compressor you're using, and whether it’s a hardware unit or a plug-in, there are some common parameters and controls that you will be using to dictate the behaviour of the compression effect.

**Threshold**

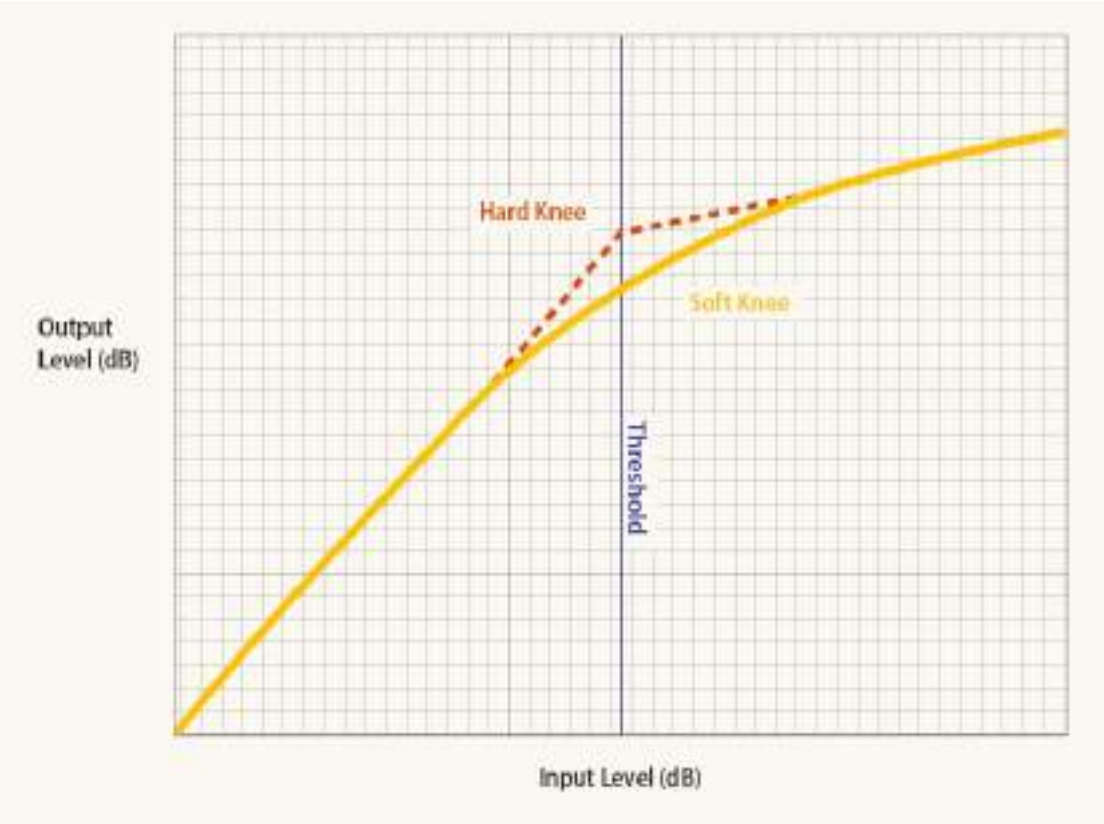
The threshold control sets the level at which the compression effect is engaged. Only when a level passes above the threshold will it be compressed. If the threshold level is set at say -10 dB, only signal peaks that extend above that level will be compressed. The rest of the time, no compression will be taking place.



## Knee

The “knee” refers to how the compressor transitions between the non-compressed and compressed states of an audio signal running through it. Typically, compressors will offer one, or in some instances a switchable choice between both, a "soft knee” and a "hard knee” setting. Some compressors will even allow you to control the selection of any position between the two types of knees. As you can see in the diagram, a “soft knee” allows for a smoother and more gradual compression than a “hard knee.”




A “soft knee” allows for a smoother and more gradual compression than a “hard knee.”

## Attack Time

This refers to the time it takes for the signal to become fully compressed after exceeding the threshold level.

The attack setting is essentially the reaction time of the compressor. It’s responsible for how much of the initial impact or transient gets passed the compressor without getting squished.

**Slow Attack**
+ More impact and punchiness
– Can make uneven performance dynamics worse

**Fast Attack**
+ Tightens up initial transient, adds control, more processed sound
– Can pull life out of a sound

**Release**

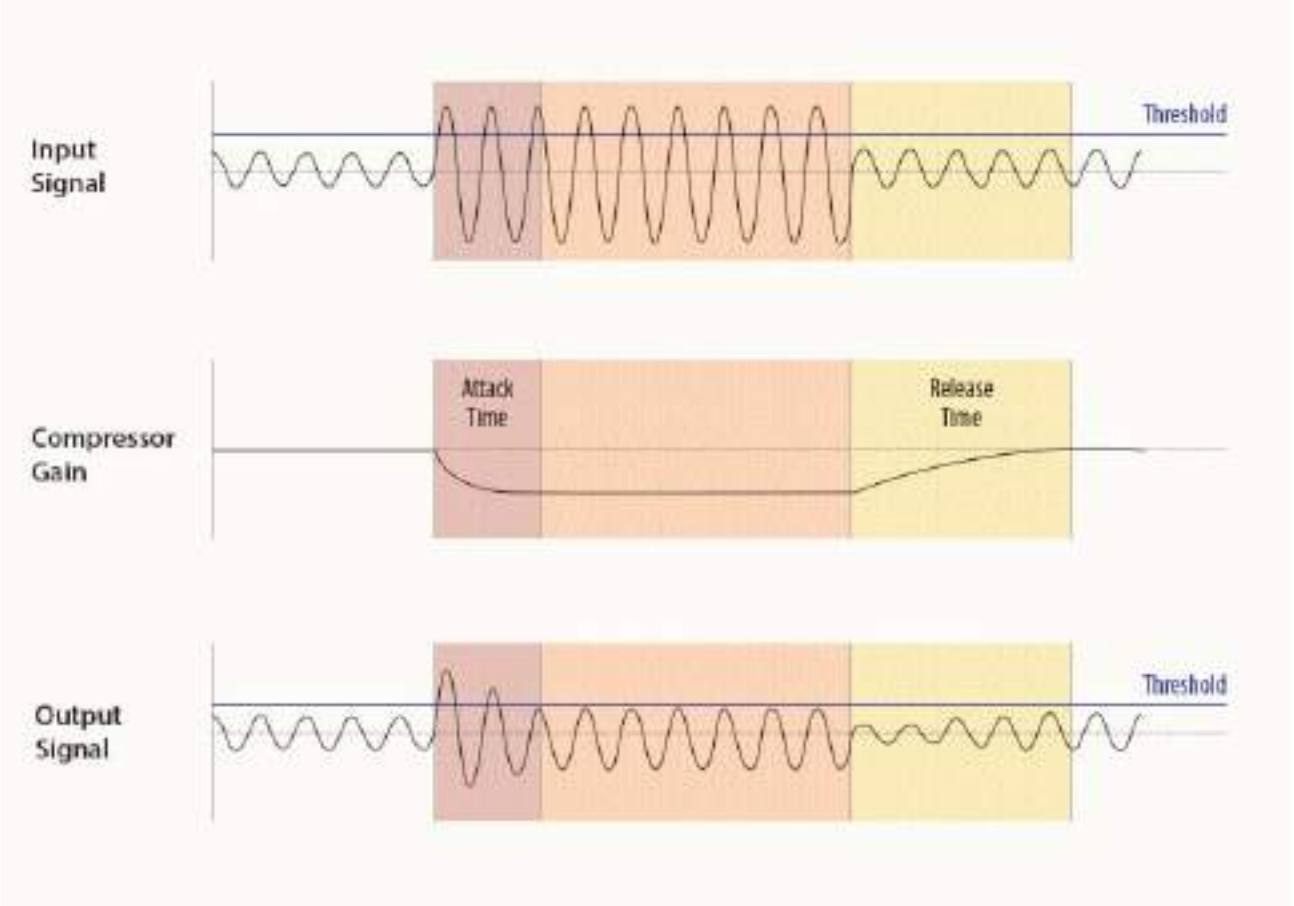
The release control sets the length of time it takes the compressor to respond when the signal changes from loud to quiet.

This is literally the opposite of attack time, it is the time it takes for the signal to go from the compressed — or attenuated — state back to the original non-compressed signal.

Lowering the signal level using a fader is not compression because all the various levels of the signal have been reduced by the same amount.

When it is loud, reduce the level. When it is quiet, bring the level back up again.

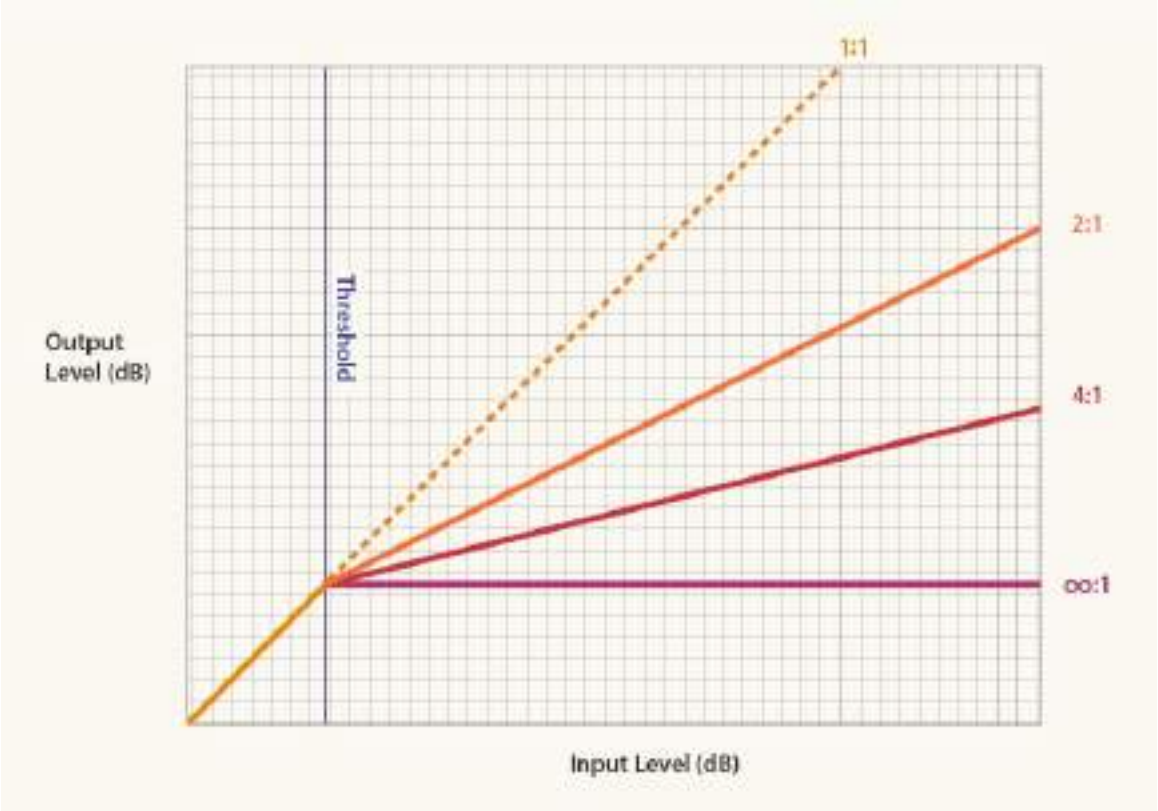
Compression only takes place when the loud sections of the signal are reduced in level more than the quiet sections.



**Compression Ratio or Input/output ratio**

ratio simply specifies the amount of attenuation to be applied to the signal. You will find a wide range of ratios available depending on the type and manufacturer of the compressor you are using. A ratio of 1:1 (one to one) is the lowest and it represents “unity gain”, or in other words, no attenuation. These compression ratios are expressed in decibels, so that a ratio of 2:1 indicates that a signal exceeding the threshold by 2 dB will be attenuated down to 1 dB above the threshold, or a signal exceeding the threshold by 8 dB will be attenuated down to 4 dB above it, etc.

A ratio of around 3:1 can be considered moderate compression, 5:1 would be medium compression, 8:1 starts getting into strong compression and 20:1 (twenty to one) thru ∞:1 (infinity to one) would be considered “limiting”



**Side chain**

In addition to the normal signal input, a compressor has a side chain input. In normal use, the amount of compression is related to the dynamics of the input signal. The side chain allows the signal passing through the unit to be controlled by the dynamics of another separate signal:

# Microphone Polar Pattern

Polar patterns are the representation of 3D space around the microphone capsule, which shows the most sensitive area of the arriving sound to the microphone. They are often represented graphically.

The three most common patterns are as follows:

- Omnidirectional, meaning all or every direction.
- Unidirectional, of one direction, including Cardioid and Hypercardioid.
- Bidirectional, from two directions, commonly known as Figure-of-8.

**Omnidirectional**

Omnidirectional microphone is sensitive to sound from all directions, or from a 360° radius.

It is not necessary to point these microphones in any specific direction, as they capture sound from everywhere, equally.

They are great for picking up ambient sound, such as large room acoustics, or a big sound source such as an orchestra or choir.

However, Omnis can also produce a lot of feedback if used in a live situation, since they take in a fair amount of background noise.

Their sound can be described as open, airy and natural.

**FIGURE-OF-EIGHT**

Bi-directional microphone polar pattern, captures sound from the front and back at 0° and 180°.

The sides are null, and microphones with this pattern are good for instrumentalists or vocalists facing each other.

They are also used frequently with one source as well. Because of the 180° rear angle.

Figure-of-Eight microphones are also described as open and natural sounding like Omnidirectional microphones, though technically they pick up the same amount of ambient sound as the Cardioid pattern.

It is important to note that all ribbon microphones utilize the Figure-of-8 pattern.

**CARDIOID**

This heart-shaped microphone polar pattern is unidirectional, known as the Cardioid pattern.

It picks up sound from the front and the sides but is acoustically dead from the rear.

This makes Cardioid mics ideal for a live situation, in which sound that may come from behind the microphone (such as the monitors) will not cause feedback.

This pattern is also good for studio sound, used frequently on guitars, vocals, and drums.

Proximity effect, which causes the bass response to increase the closer the microphone is moved to the source, is evident with the Cardioid pattern.

Cardioid microphones can produce highly intimate, dry and detailed direct sound transmission when close miked.

**SUPERCARDIOID**

Also included in the unidirectional family is the Supercardioid pattern.

This pattern shape is similar to Hypercardioid and Cardioid with a few differences.

Super cardioid microphones cover a slightly wider angle than Hypercardioid (115° as opposed to 105°) while featuring less sensitivity in the rear.

Super cardioid could be thought of as somewhere in between Cardioid and Hypercardioid.

It provides better ambient noise rejection than Cardioid, resisting feedback and maintaining high directionality from the front.

Positioning mics with this pattern must be done exactly because of their directional characteristics.

These mics are also used for lectures and conferences, as well as close miked instruments such as violins, violas, cellos and mandolins, as an alternative to pickups.

**HYPERCARDIOID**

Also Unidirectional, Hypercardioid microphones receive sound from the front and sides, as well some sensitivity in the rear.

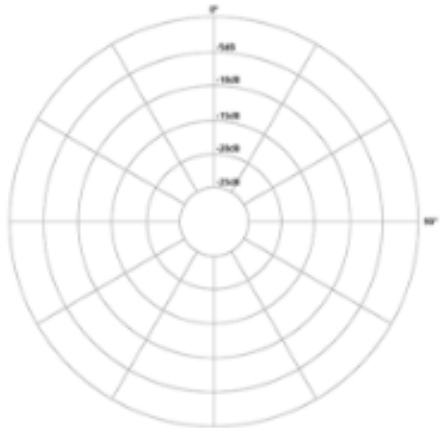
Though similar to Cardioids, they feature a narrower pickup range on the sides.

The most common application for Hypercardioid microphones is their use as Shotgun microphones, used for sports games, conferences, and lectures.

This pattern is highly directional, good for pointing at sources from great distances, and can be sensitive to small movements from the source. For example, it is not recommended to use a Hypercardioid mic in front of a highly mobile singer, as the sound may fade as they move from side to side. Although resistant to feedback for live situations, any monitor signal should be placed off to the side and not directly behind the microphone.

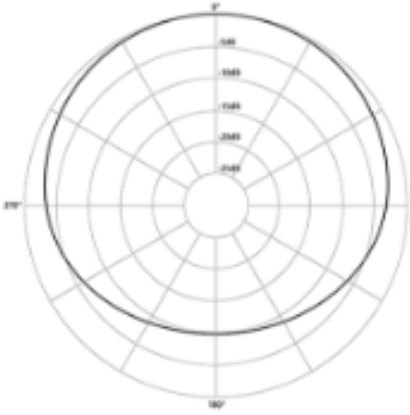
Microphones are designed to capture sound fields within a certain radius, and knowing how they work gives way to a cumulative knowledge base in order to craft great recordings. While understanding these microphone polar patterns is crucial, many other factors play a part, such as microphone placement.

# Polar Patterns

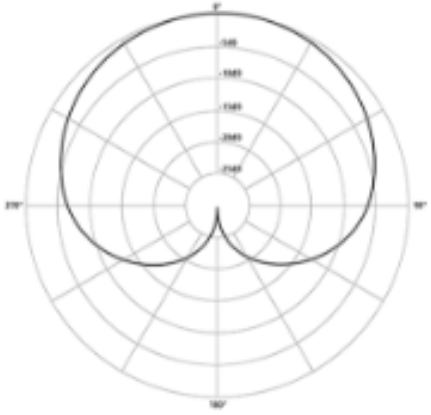


Empty

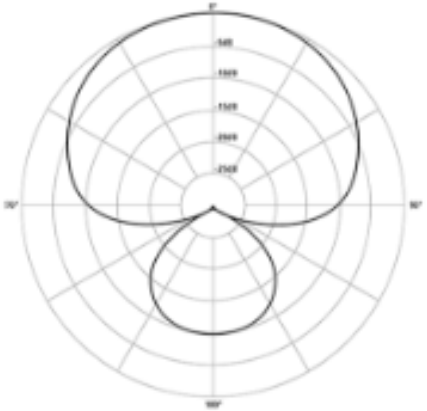
Omnidirectional



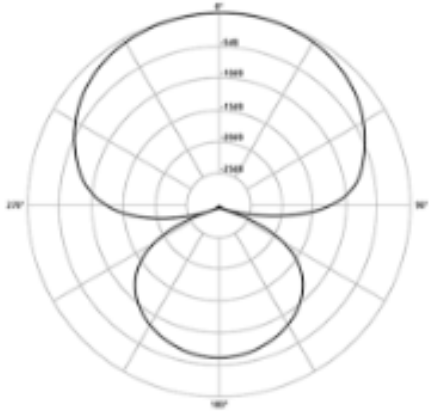
Subcardioid



Cardioid



Supercardioid



Hypercardioid

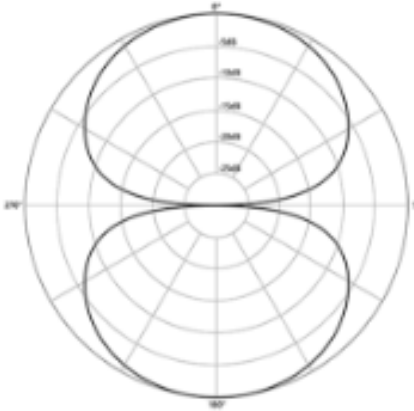
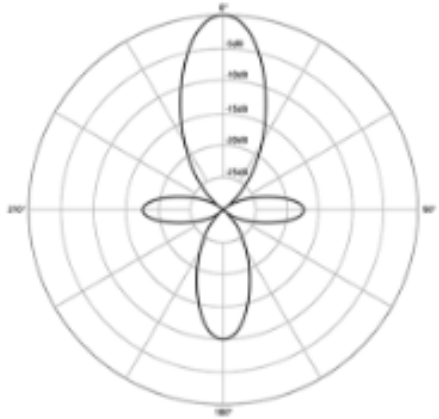


Figure 8



Shotgun