CHAPTER 3

EQ Points of Interest. Frequencies Made Easy

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EQUALIZATION (EQ) AND FREQUENCY

Equalization, or EQ, can be used to describe the action of equalizing a sound, a control to change the tone, or a reference to the tone of a sound. More than likely you have already equalized something in your life. If you have ever changed the bass or treble settings on your car or home stereo, then you have performed this basic engineering function. In audio production, there are a variety of equalizer controls at your disposal, to change the tone of a recording. Equalizers, also called EQs, are available as standalone rack units, as part of a channel strip, and as software plug-ins.

What actually happens when a sound is equalized? The tone of an overall sound is altered by increasing or decreasing the amplitude of a particular frequency or a range of frequencies, such as bass. Remember the terms frequency and amplitude, found in Chapters 1 and 2? They are two essential elements in understanding audio, especially when we are discussing equalization.

Understanding the different frequency ranges and how to describe them is a necessary skill before you can begin to equalize. It is important to be familiar with specific frequencies and how they are often described and reproduced. This will make it much easier for you, as an engineer, to create or re-create a sound the client may be describing.
Although there are exceptions, most musicians do not communicate using technical terms like “boost 100 Hz 3 dB on my bass.” They are more likely to describe something in layman’s terms. “I wish my bass sounded ‘fatter,’” or “My bass sounds too ‘thin’.” While there is no universal language to describe sound, there are many helpful ways to communicate with musicians who may describe sound quality in their own ways.

In this chapter we will discuss common EQ properties to help you identify frequencies quickly and communication tips for talking with musicians who often speak in layman’s terms.

For example, the two outer frequency ranges, the Low and High, sit on the opposite sides of the frequency spectrum and are simplified in Table 3.1.

<table>
<thead>
<tr>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–200 Hz</td>
<td>5–20 kHz</td>
</tr>
<tr>
<td>Bass</td>
<td>Treble</td>
</tr>
<tr>
<td>Fat</td>
<td>Thin</td>
</tr>
<tr>
<td>Dark</td>
<td>Bright</td>
</tr>
<tr>
<td>Big</td>
<td>Small</td>
</tr>
<tr>
<td>Powerful</td>
<td>Weak</td>
</tr>
<tr>
<td>On the ground</td>
<td>In the air</td>
</tr>
<tr>
<td>Huge</td>
<td>Tiny</td>
</tr>
<tr>
<td>Black</td>
<td>White</td>
</tr>
<tr>
<td>Sad</td>
<td>Happy</td>
</tr>
</tbody>
</table>

As you can see from the table, the low-frequency range and the high-frequency range produce sounds that are opposite in description. Low-frequency areas may be described as big, fat, dark, and having power. High-frequency areas are commonly described as small, thin, bright, and sounding weak.

**Boost or Cut**

As previously stated, equalization is boosting or cutting a frequency or a range of frequencies by using an equalizer. Boosting a frequency increases the amplitude (volume) of a particular tone or pitch. Cutting a frequency subtracts amplitude from a particular tone or pitch. If a frequency is neither boosted nor cut, it is said to be “flat.” In music production, a flat frequency response does not have a negative connotation, like a “flat note” or “flat performance” does. It simply means no particular frequency range is added or subtracted from the sound.
Slope

When a sound is equalized, the frequency that has been boosted or cut may be referred to as the “peak” frequency. Typically, this will be the frequency that is boosted or cut the most. Other frequencies are affected on either side of the peak. This area is known as the slope, or Q.

A graphic equalizer has a preset Q that cannot be changed, while a parametric equalizer gives the user the ability to change Q, if needed. A parametric EQ is a much more precise equalizer than most other EQs, because you can control amplitude, frequency, and Q.

Low-Cut or High-Pass Filters

A button or switch often located on a console, preamp, or mic, when selected, cuts low frequencies and passes high frequencies at a predetermined setting. It does not allow you to control Q. These EQs also come in a high-cut or low-pass filter. A low cut is great to clear up any “mud” in a mix (see muddy, below). Try applying
a low cut to instruments that don’t have lows (electric guitar and snare drum) and a high cut to instruments that don’t have highs (bass/kick drum). These filters can help eliminate any extraneous or unwanted frequencies in the instruments, leaving only the desired sound. Applying high and low cuts for clearing recordings of unwanted frequencies also helps in reducing the overall headroom of a track, allowing it to be louder overall without clipping (distorting).

**Subtractive Equalization Is Your Friend!**

Subtractive equalization is a technique used by most professional engineers to create clearer, more defined mixes. In order to have a clear mix where all instruments are heard, space will need to be made. Two sounds cannot occupy the same tone or frequency range and maintain clarity. If two sounds do occupy the same frequency range, the louder sound may mask, or hide, the quieter sound. Ultimately, mixing is about “crowd control.” Space must be created for a sound to be heard. Many inexperienced engineers tend to add what they want to hear first. For instance, if the goal is a bigger, bassier kick drum, a novice may add more bass to the mix. A better solution is to take away from one of the other frequency areas that are dominating the sound, for example, reducing the amplitude around 600 Hz. The result will be more bass on the kick without adding destructive low-end. When mids or highs in the kick drum are cut, more bass will be present. Also, the area that has just been cut opens up more space in the mix for other instruments to be heard. This is the subtraction in subtractive equalization. This doesn’t mean that frequencies should never be boosted. Start by subtracting first, and then add frequencies only as needed.

**GENERAL EQ AREAS**

Frequency recognition is crucial to being successful in audio production. One of the easiest ways to become familiar with the different frequency ranges and the number that goes with them is to initially divide them up in the following manner:

- 100 Hz – makes things bigger, fatter (kick drum).
- 1 kHz – adds attack, makes the sound more “In Your Face” (snare drum).
- 10 kHz – makes a sound airy, breathy, or brighter (hi-hat or cymbals).

**AUDIO CLIP 3.0**

These are great EQ starting points. After you have taken out any unwanted frequencies (applied subtractive EQ’ing techniques), ask yourself, “Do I want the sound to be fatter, more up front, or brighter?” If the answer is “fatter,” start at 100 Hz and adjust from there. If the answer is “more up front” or “more aggressive,” boost 1 kHz. It may turn out that the correct equalization is another frequency like 2 kHz or 900 Hz. Whatever the adjustment, the key is in getting to the general area. If the answer is brighter, breathier, or airy, try boosting 10 kHz. Ultimately, a different frequency may be boosted, but adding 10 kHz should get you started.
With some generalization and through communication with the client, it will be much easier to recognize the frequency that needs to be adjusted. Locating and equalizing something quickly will hopefully keep a client happy and coming back for more!

The following are seven common EQ points of interest: subs, big/fat, muddy, boxy/hollow, in your face!, presence/clarity, and airy. Becoming familiar with these seven areas can help you locate a specific EQ point quickly. Following this section are even more terms to help you describe and communicate audio frequencies and sounds.

**EQ POINTS OF INTEREST**

**Subs (Below 80 Hz), Low Frequencies**
Frequencies below 80 Hz can make sounds huge and are referred to as “subs.” Subs are often accentuated in various dance, electronic, rap, R&B, and reggae styles of music. This is the frequency area that is represented by a subwoofer. Pay close attention to this frequency area. Too much sub information can dominate a mix and make the other instruments appear weak and hidden.

**AUDIO CLIP 3.1**

**Big/Fat (20–200 Hz), Low Frequencies**
The low-frequency area generally makes sounds appear bigger and fatter. The human ear doesn’t hear bass as well at lower volumes. But when we do crank it up here, terms such as big, fat, beefy, huge, and thumping are used to describe these powerful wavelengths. Too much sound here can blanket a mix, and not enough could make a mix sound weak.

**AUDIO CLIP 3.2**

**Muddy (100–300 Hz), Low – Low-Mid Frequencies**
Too much of the low and low-mid frequencies can muddy an instrument or mix. If a sound isn’t very clear, or muddy, try subtracting between 100 and 300 Hz. This is especially helpful with vocals, acoustic guitars, and piano. Because close miking can cause proximity effect, a low-end boost of around 100 Hz, it is often unnecessarily present, and will likely need to be rolled off.

**AUDIO CLIP 3.3**

**Boxy/Hollow (300–700 Hz), Low-Mid Frequencies**
The frequency range 300–700 Hz is often described as boxy or hollow. This is typically an area where subtractive EQ is applied, although there are always exceptions. Kick drum mics are often designed to cut frequencies from this area. Subtracting low-mids can clean up a sound and make it more distinct, but it can also leave a sound hollow and colorless. This is not the most flattering frequency area on many instruments. An electric guitar tone, if described as boxy, has too much of this
frequency range. A boxy sound can also be the result of overly compressed audio with a very fast attack setting, especially with a snare drum or tom.

**AUDIO CLIP 3.4**

*In Your Face (1.5–4 kHz), Mid-Mid – Upper-Mid Frequencies*

Sounds in the midrange area, especially in the mid-mid and upper midrange are best heard by the human ear. This is the area between 1.5 and 4 kHz. This also happens to be the same frequency area as a baby crying. Because we hear best in this area, sounds often appear “In Your Face.” 1.5–4 kHz is often described with aggressive terms such as slap, bite, crunch, edge, and attack. Punk rock music accentuates this frequency range. Some country, folk, and acoustic music might also have more sounds in the midrange. Too much here can cause ear fatigue, whereas not enough here can make a mix or sound appear dark and distant.

**AUDIO CLIP 3.5**

*Presence And Clarity (4–10 kHz), Upper-Mid – High Frequencies*

The frequency area between 4 and 10 kHz is an area that can add presence and clarity to a mix. Often vocals are emphasized in this range to help them cut through or sit on top of a track without making the vocal sound too edgy. Note that sibilance is also in this area. Sibilance is associated with the “s” sound and this frequency area may need to be carefully managed with some singers. A de-esser is often used to help remove or soften sibilance. Inclusion of just enough information here makes a mix have presence and clarity.

**AUDIO CLIP 3.6**

*Airy (Above 10 kHz), High frequencies*

Frequencies above 10 kHz make sounds appear higher in the mix. Make sure to highlight this area to make a vocal, string, tambourine, or any other sound appear airy, breathy, thin, or bright. Transients and harmonics dominate this range. Terms associated with the sky are often used to describe this area: airy, sunny, bright, light, angelic, clouds, sparkle, and feathery. This frequency range often helps differentiate what is considered high fidelity (hi-fi) and low fidelity (lo-fi). A lo-fi recording will likely have very little, if any, frequency information above 10 kHz.

**AUDIO CLIP 3.7**

**TIP**

Pay special attention to the range of frequencies below 80 Hz. This is the most destructive frequency range and too much here can negatively affect a mix. On the other hand, just enough of this frequency range can make a mix sound huge and powerful!
ADJECTIVES: SPEAKING ABOUT AUDIO USING
PLAIN ENGLISH

Additional adjectives are needed by nonengineers to describe a tone, sound, or the physical space that surrounds a sound. Although professional engineers typically use more technical descriptions, particularly in discussing frequency ranges, most engineers are familiar with interpreting a musician’s request. It is likely that not all engineers will agree on the definitions used here, because of the subjective nature of describing sound, but I have full confidence that these terms, in most cases, will help you communicate and interpret ideas related to music production.

**Angelic**  – Usually a sound buried in a large reverb and with the high-frequency range accentuated. Try applying a “cathedral” or “church” reverb and boost the extreme highs.

**Beefy**  – Probably a sound with a lot of low and low-mid frequencies. May also be described as “thick.” Guitarists often request a beefy guitar tone. When the term beefy comes up, think of a sound with a solid low-end that probably isn’t too quiet in the mix.

**Big**  – Contains a lot of low-end. Associated with the frequency range 20–200 Hz. A large room can make a big sound seem even bigger if miked from a distance. Applying certain reverb may also make a sound appear bigger. Some musicians may also say that they want a bigger sound and all they really want you to do is turn it up!

**Bite**  – A sound emphasized in the midrange area. If a snare is described as having bite, imagine the snare being tight and in your face. It would sit somewhere between 1 kHz and 3 kHz. Some guitar tones are often described as having bite.

**Body**  – Depending on the frequency range of the instrument or voice, the lower frequency area would need to be dominant. Often people want to hear the body of an acoustic instrument, such as an acoustic guitar or snare drum. This request would require plenty of 100–250 Hz present in the sound.

**Boomy**  – A sound that is boomy resides in the low and low-mid frequency range. Similar to body but is generally more of a negative term. Try cutting between 100 and 400 Hz to reduce boominess.

**Brittle**  – As the word suggests, it means “about to break.” This is seldom a flattering term. A brittle sound lacks low frequencies and highlights the upper midrange and high-frequency area above 3 kHz. Cheap digital equipment can make the high frequencies sound brittle.

**Breathy**  – A term often associated with a vocal tone. A breathy tone would be dominated by high frequencies. Try boosting 10 kHz and up for a breathy vocal. This can be achieved by EQ and/or compression.

**Chimey**  – Contains mostly high frequencies in the sound and would accentuate an instrument’s upper harmonics. Can be found in the 10 kHz and up range. Similar to glassy.

**Chunky**  – A chunky vocal or guitar tone would have a lot of low-mids and would likely have emphasis in the 100–300 Hz area. Similar to a thick sound.
Crispy — Think of sizzling bacon. A crispy sound would emphasize the upper-mids and highs above about 4 kHz. A crispy sound may even have some distortion present. Not usually a flattering term.

Crunchy — A crunchy sound often involves some degree of distortion or overdrive. The emphasis is in the midrange area between 1 and 4 kHz. Crunchy may be used to describe a certain guitar tone.

Deep — A sound that has a lot of depth to it from front to back, or enhanced low frequencies under 250 Hz. An example would be a deep bass tone.

Dirty — The opposite of a clean, clear sound. A dirty tone would have some amount of distortion, noise, or overdrive in the signal. Similar to fuzzy.

Distant — If a sound lacks midrange and high frequencies, it will appear further back in the sound field. Add upper-mids or high frequencies to make a sound less distant. A distant sound could also mean that it is too low in the mix or has way too much reverb.

Dry — A sound with little or no FX can be described as dry. A dry sound would not have reverb or other obvious effects present. A dry sound is most common with folk, bluegrass, and acoustic styles of music.

Dull — A sound can appear dull if it is lacking energy, highs, or is overly compressed. Add upper-mids or highs to a dull sound, or slow the attack setting on a compressor to make a sound less dull.

Edgy — Describes a sound that accentuates where we hear best, in the 1–4 kHz range. An edgy sound can make the listener feel uncomfortable like nails scratching on a chalkboard. Definitely in your face!

Fat — A fat sound accentuates the lower frequency range. A fat guitar tone, a fat vocal, a fat kick, and a fat snare sound are common requests. The fat frequency range would be around 20–250 Hz.

Fuzzy — Describes a tone that is not clear and likely has a substantial amount of overdrive or distortion associated with it.

Glassy — A glassy sound is a very thin sound with lots of apparent highs. Definitely not bassy! A clean, electric guitar tone that is extremely bright could be described as glassy.

Hard — A hard sound has a lot of midrange and accentuates the attack part of a sound’s envelope. Harder frequencies are found between approximately 1 and 4 kHz.

Hollow — A hollow sound lacks a portion of its frequency range. This can be caused by phase cancellations due to room acoustics or other variances.

Hot — A sound described as hot may mean that it is turned up too loud, or the high frequency range is more noticeable. Try turning the amplitude down or rolling off some higher frequencies.

Huge — Describes a sound with excessive lows or one that is recorded in a big space.

Loose — A loose sound would lack the harder mid-mid frequency area. Loose could also describe a space or environment that has very little treatment and results in a less focused sound.

Mellow — A sound lacking upper-mids and highs is often described as mellow. A mellow guitar tone would be a darker, tubey sound as opposed...
to a distorted, in your face tone with a lot of 2 kHz present. Also, reverb can mellow a harder sound.

**Muffled**  – A muffled sound would be dominated by low and low-mid frequencies in the 100–250 Hz range, resulting in a tone with less presence and clarity. Imagine singing with a blanket over your head.

**Nasally**  – Often used to describe a vocal tone. Try cutting between 500 Hz and 3 kHz. People may also describe this same area as telephone-like, honky, or tinny.

**Ringy**  – A ringy tone will be dominated by the mid frequencies. Snare drums are often described as ringy. A ringy tone is produced when the mic is placed close to the drum rim and both heads are tuned extremely tight. Taking away frequencies between 900 Hz and 3 kHz will likely reduce a ringy tone.

**Shimmering**  – A sound dominated by extreme highs. A shimmering sound is in the 10 kHz and up range. To create a shimmering sound boost the upper highs.

**Shiny**  – Similar to shimmering. A shiny sound has plenty of highs.

**Sizzly**  – Rarely a flattering term, sizzly describes a tone with a great deal of treble. Something referred to as sizzly can also be called glassy or crispy.

**Slap(py)**  – Usually associated with the neck of a guitar or bass, or the kick pedal striking the head of a drum. More slap would be in the 500 Hz–3 kHz range. It can also describe a sound reflecting back, as in a slap echo.

**Small**  – A small sound would either be overly compressed or a sound with little low or low-mid frequencies. It is likely that a small sound wouldn’t have frequencies below 200 Hz. Close miking produces a smaller sound versus room miking. A snare or guitar amp may appear smaller when mic is extremely close.

**Smooth**  – A smooth tone generally has a flatter frequency response. No frequency range would be emphasized over another. It can also be described as easy on the ears.

**Soft**  – A soft tone typically lacks the harder midrange frequencies. Therefore, it is safe to say that extreme lows, extreme highs, or a combination, creates a softer sound. It could also refer to volume. If it is too soft, turn it up. If it’s not soft enough, turn it down.

**Thick**  – See beefy. A sound that is thick has plenty of lows and low-mids. The thick area is between 20 and 300 Hz.

**Thin**  – A sound that is not very fat or deep. A thin sound is dominated by upper-mids and high frequencies above 4 kHz.

**Tight**  – Tight sounds have very little reverb or environment in the sound. Close miking an instrument or voice will result in a tight sound. A tight sound is dominated by the direct signal instead of the early reflections or reverberant field. Any frequency range can be considered tight, but it is often used to describe a bass or kick drum sound that is too boomy or resonant.

**Tinny**  – A tinny sound is a thin sound dominated by the mid-mid and upper midrange. If the vocals are described as tinny, it is not a compliment. Try cutting between 2 and 7 kHz or adding some low or low-mid frequencies.
Tiny  – A sound with extreme highs and almost no lows will likely sound tiny. Not enough volume may also make a sound tiny.

Tubby – An unflattering term that describes too much low or low-mids in a sound. Try cutting between 100 and 400 Hz.

Warm  – A warm tone accentuates the low and low-mid frequency range. Analog tape and tube amps are often described as warm. The opposite of a warm sound would be a cold or brittle sound.

Wet  – A wet sound or wet mix would have an obvious amount of FX present. The opposite of a wet sound is a dry sound. If the vocals are drenched in reverb and the guitar sounds like it is floating in space, then you have achieved this adjective.

Here are some more helpful terms when communicating with others about the quality of sound:

If a sound lacks highs, it may be described as dark, distant, or dull.
If a sound lacks midrange, it may be described as mellow, soft, or unclear.
If a sound lacks lows, it may be described as thin, small, or bright.
If a sound has too little reverb, it may be described as dry, dead, flat, or lifeless.
If a sound has too much reverb, it may be described as wet, muddy, washy, distant, or cavernous.
If something is too loud in a mix, it may be described as in your face, up front, on top, forward, masking, dominating, hot, or separate.
If something is too quiet in a mix, it may be described as buried, masked, hidden, lost, in the background or distant.

People communicate differently when referring to the quality of sound. By learning to describe sounds in a descriptive manner, you will be able to identify and execute a sound change much more quickly than randomly searching for an unknown frequency or sound. These terms offer a starting point when equalizing, applying reverb, or executing other audio engineering functions. Without this starting point, much time will be wasted turning knobs without direction.