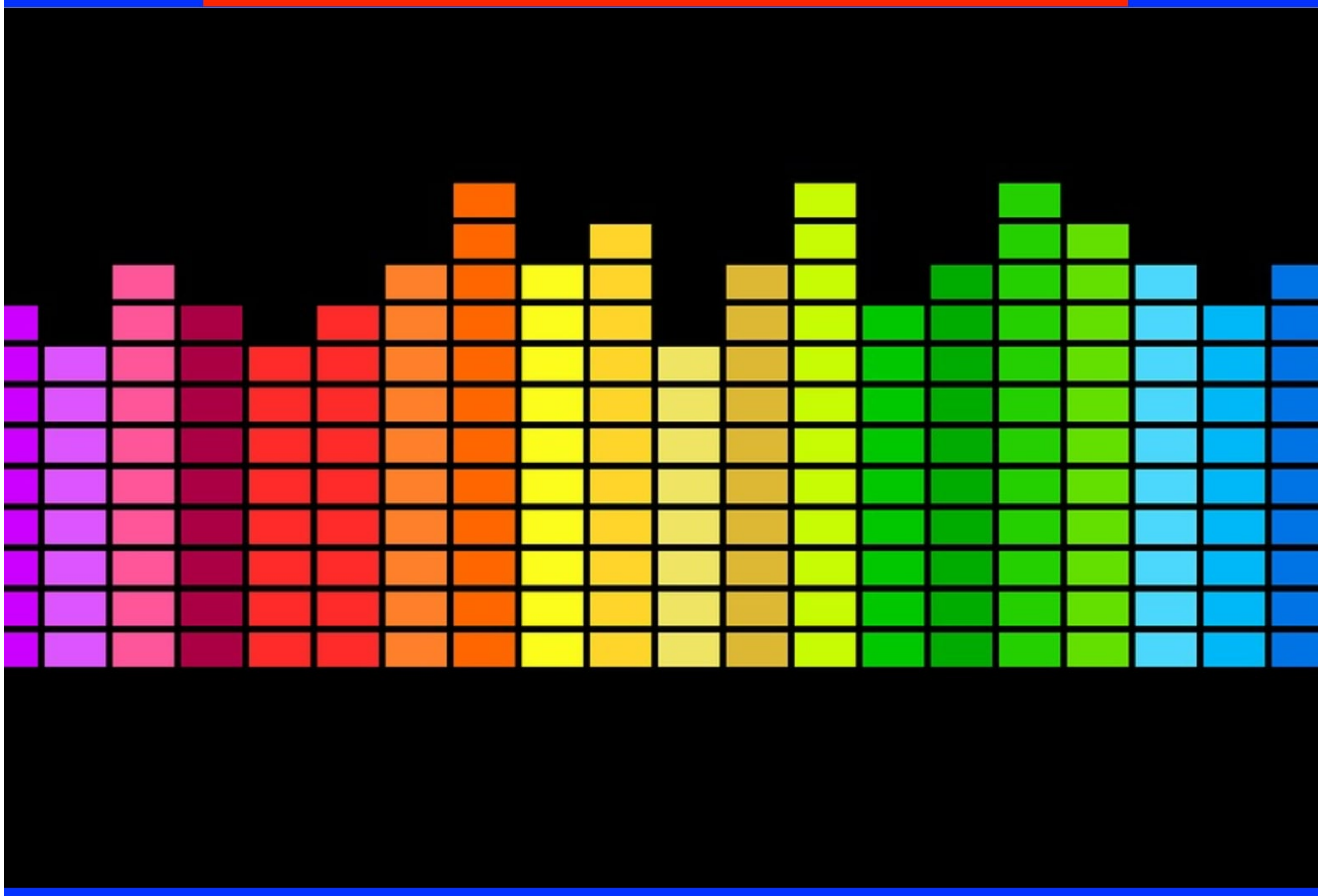
Magic EQ Frequencies

Every Engineer Should Know

Predominant Frequences
For Every Mix Element



BOBBY OWSINSKI

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Introduction

When it comes to EQing, there are certain frequencies that seem predominant for every instrument. Many call them the magic frequencies, because they do tend to work most of the time.

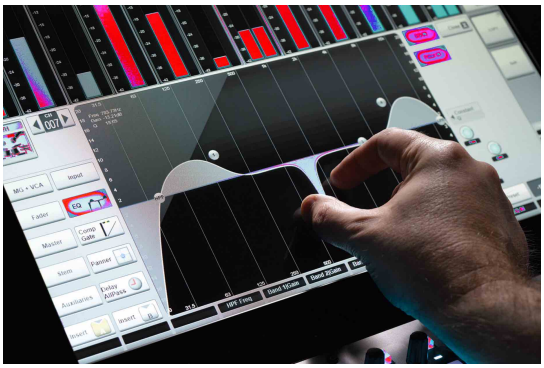
Here's a chart of those frequencies from the latest edition of my *Mixing Engineer's Handbook*.

Remember that using the magic frequencies might make an instrument or voice sound dynamite on its own when soloed, but then it might not fit in the mix properly.

That's why it's best to listen against other instruments when adding or subtracting EQ.

Also remember that every song is different because the players, arrangement, recording environment, players and feel is different, which will greatly influence your EQ decisions.

Bass Guitar



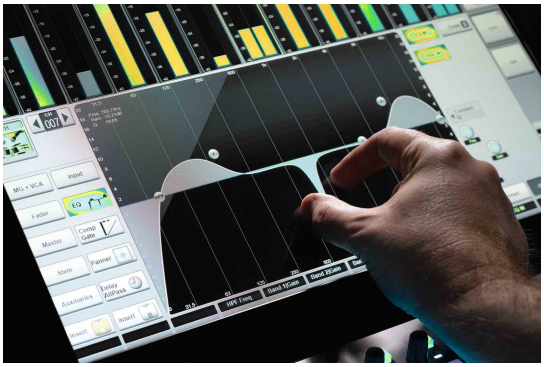
The difficulty with EQing the bass guitar lies in the fact that it's usually EQed too low (below 100Hz) leading to conflicts with the kick while not being heard on small speakers.

TIP: Look to the upper bass area (120 to 320Hz) for the bottom end with definition.

Magic Frequencies

Girth - 50 to 80Hz
Bass - 120 to 320Hz
Attack - 700Hz
Snap - 2.5kHz

Kick Drum



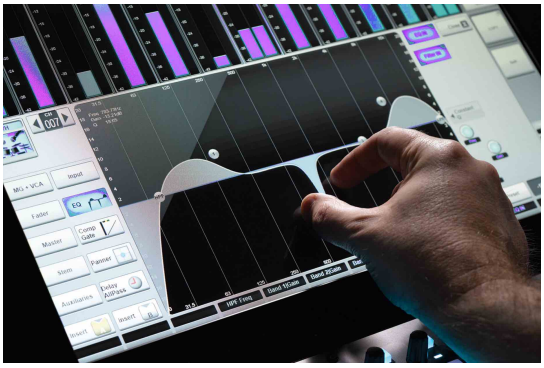
Again this is easy to EQ too low, masking the bass guitar while not being heard on small speakers.

TIP: Don't confuse the girth frequencies with the resonant frequency of the drum, which is higher (usually 80 to 100Hz).

Magic Frequencies

Girth - 40 to 60Hz
Bottom - 80 to 100Hz
Hollowness - 400Hz
Point - 3k to 5kHz

Snare



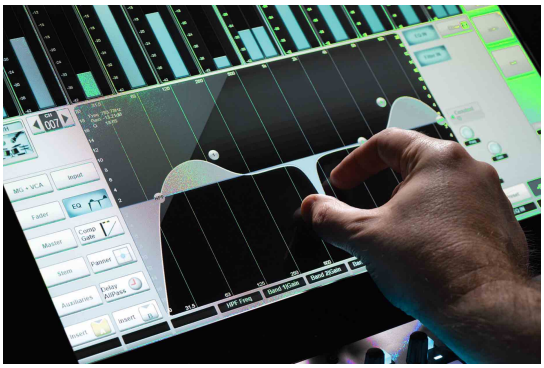
EQing a snare depends on the track and how it fits with the other instruments more than most mix elements. It's the heartbeat of the song so it can't be masked yet it's easy to mask other instruments when it's heard clearly.

TIP: To find the "point," boost the midrange at 1kHz by 6dB and sweep the frequencies until the snare jumps out. Decrease the boost to taste.

Magic Frequencies

Fatness - 120 to 240Hz
Point - 900Hz
Crispness - 5kHz
Snap - 10kHz

Rack Toms



Rack toms that sound good with the rest of the kit contribute to the kit's overall sound.

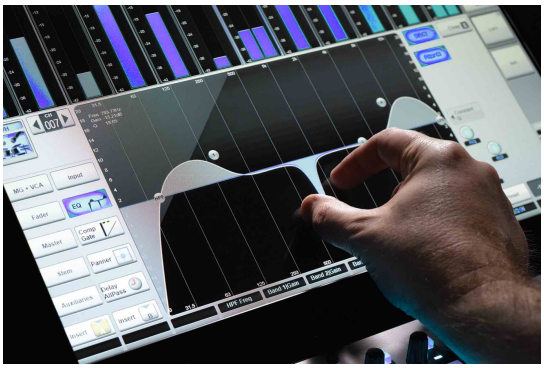
That said, sometimes toms that sound great on their own can detract from it, meaning that the toms must be muted until they're played.

TIP: Listen with rest of the kit first. Mute or automate as necessary for a clean drum sound.

Magic Frequencies

Fullness - 240 to 500Hz
Attack - 4k to 7kHz

Floor Tom



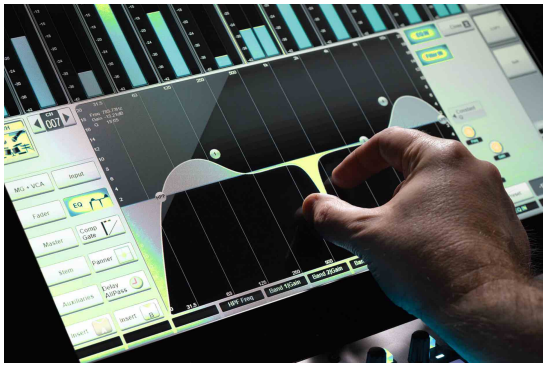
Like the rack toms, the sound of the floor toms can add to the sound of the overall kit, or get in the way.

TIP: Make sure that the predominant frequency that's EQed is not the same as the kick or bass unless attenuated.

Magic Frequencies

Fullness - 80Hz
Attack - 5kHz

High Hat and Cymbals



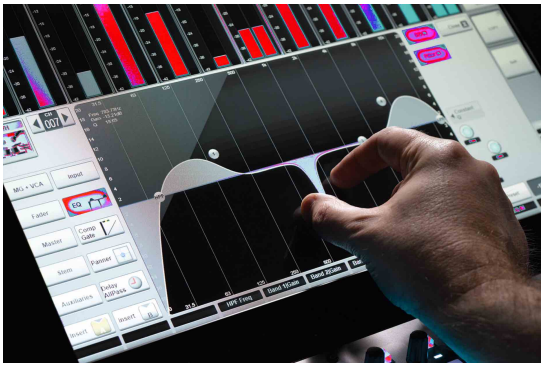
So much of the sound of the cymbals is dependent on the cymbals themselves. If a player uses gigging cymbals they're usually heavier, which provides more "clang" than thinner cymbals.

TIP: A high-pass filter can be very effective in eliminating frequencies that clash with other instruments while adding nothing to the sound. Set it anywhere from 100 to 500Hz.

Magic Frequencies

Clang - 200Hz
Sparkle - 8k to 10kHz

Electric Guitar



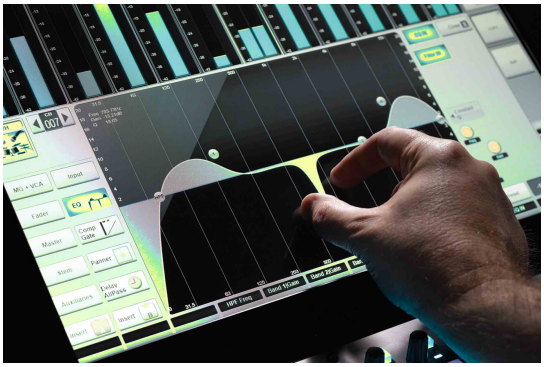
The more distorted the electric guitar, the more difficult it is to fit into the track, especially if doubled or with multiple guitar parts in the mix.

TIP: Both high-pass and low-pass filters can be very effective in eliminating frequencies that clash with other instruments. Set the high-pass anywhere from 100 to 400Hz. Set low-pass anywhere from 6k to 8kHz.

Magic Frequencies

Fullness - 240 to 500Hz
Presence - 1.5k to 2.5Hz
Attenuate - 1kHz for 4 x 12 cabinet sound

Acoustic Guitar



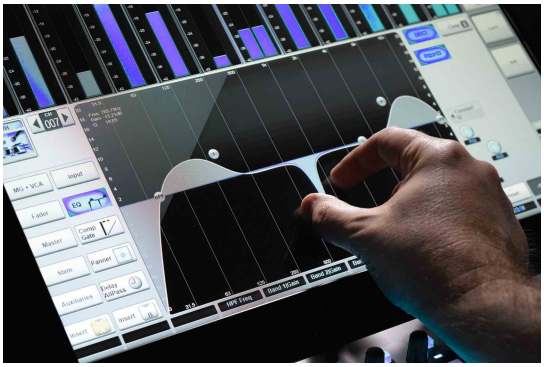
Acoustic guitar sounds vary widely because of the style of guitar used and its purpose in the mix, making it one of the more difficult mix elements to equalize.

TIP: An acoustic guitar playing rhythm to add motion to the song will usually sound best with fewer low frequencies.

Magic Frequencies

Fullness - 80Hz
Body - 240Hz
Presence - 2k to 5kHz
Finger noise - 10kHz

Piano



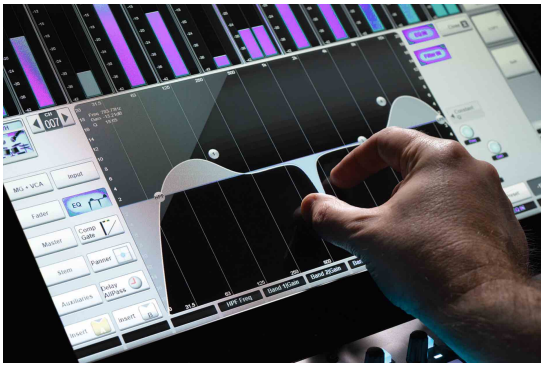
Like acoustic guitars, the sound of acoustic pianos can vary wildly, but most lean heavily on the mid-range frequencies.

TIP: The fewer instruments in the mix, the more fullness the piano needs. The more instruments in the mix, the thinner (fewer low frequencies) it needs to be.

Magic Frequencies

Fullness - 80Hz
Presence - 3k to 5kHz
Honky Tonk - 2.5kHz

Organ



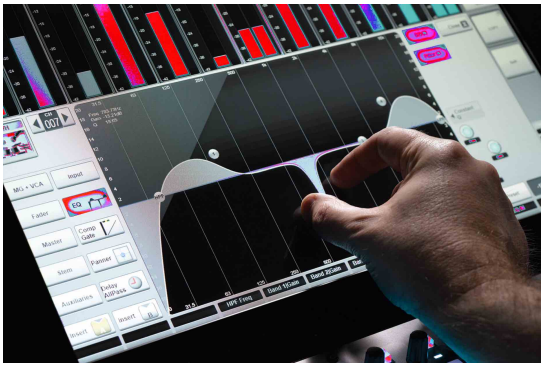
A real organ or organ simulation is the perfect pad instrument, and usually added to the mix to glue it together rather than stand out.

TIP: In the case of a real organ miked through a Leslie speaker, the fullness depends on whether the lower rotor is miked or not.

Magic Frequencies

Fullness - 80Hz
Body - 240Hz
Presence - 2k to 5Hz

Horns



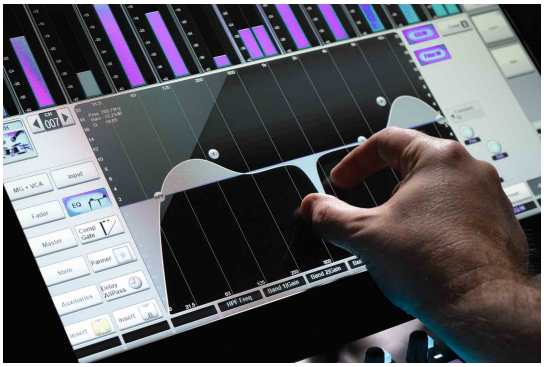
The type of horns will determine the EQ usually needed. Brass instruments are made to be piercing, so fewer high frequencies need to be added. Woodwinds like saxophones are mellower by nature and can use some additional EQ to rise above a mix.

Magic Frequencies

Fullness - 120Hz (brass)
Piercing - 5kHz (brass)

Warmth - 200Hz (saxophone)
Boxiness - 400 to 500Hz (saxophone)
Nasal - 1.2kHz (saxophone)
Presence - 5k to 6kHz (saxophone)

Vocal



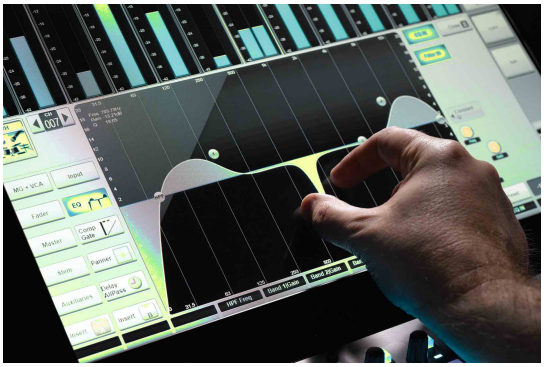
The vocal sound is sometimes determined by how loud the vocal is in the mix. For genres where the vocals are in the front of the music, like pop, vocals tend to be fuller sounding than genres like rock where the vocal is pulled back in the mix to give the music more power.

TIP: Male and female vocals are different and require a different EQ approach. Generally the EQ points are a little higher for women.

Magic Frequencies

Fullness - 120Hz
Boomy - 240Hz
Presence - 2k to 5Hz
Sibilance - 4k to 7kHz
Air - 10k to 15kHz

Strings



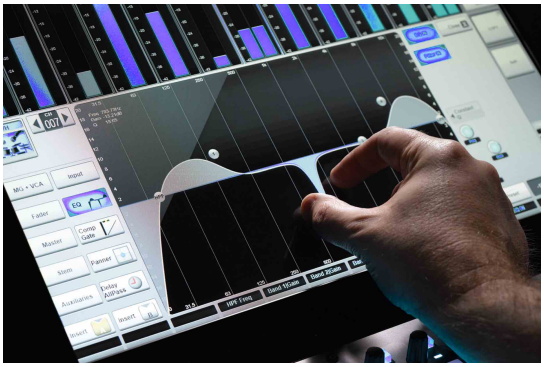
In most popular music today strings are a complimentary instrument used as a pad and to fill in between vocal lines. This usually means that care is given to how they fit with the vocal.

TIP: You can generally cut a lot of the low frequencies and still have plenty of tone left. High-pass filter from 40 to 100Hz.

Magic Frequencies

Fullness - 240Hz
Boxy - 400Hz
Move Forward - 3kHz
Scratchy - 7k to 10kHz

Conga



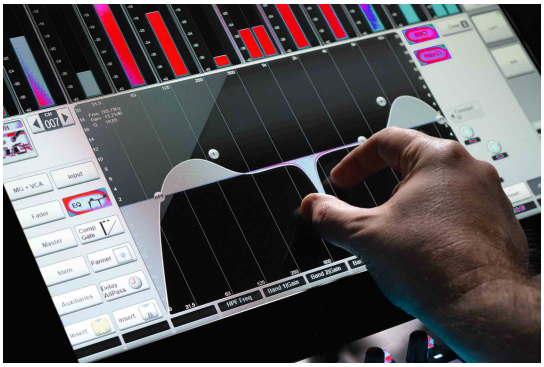
Congas add motion to a track and by their very nature can easily take it over without some EQ adjustments.

TIP: The resonant frequency of the drum can sometimes be overwhelming. Boost 6dB and sweep the frequencies between 200 to 400Hz to find it, then cut to taste.

Magic Frequencies

Ring - 200 to 300Hz
Attack - 1.5kHz
Slap - 5kHz

Hand Percussion



Like the congas, hand percussion like shakers and tambourine are used to add motion to a song. The trick is to get them to fit in without sticking out.

TIP: There are few low frequencies coming from hand percussion instruments so a high-pass filter set to between 100 and 400Hz can clean the track up considerably.

Magic Frequencies

Fullness - 200 to 400Hz
Harshness - 2k to 3kHz
Air - 6k to 7kHz

Magic Frequencies In Chart Form

Instrument	Magic Frequencies
Bass guitar	Bottom at 50 to 80Hz, attack at 700Hz, snap at 2.5kHz
Kick drum	Bottom at 80 to 100Hz, hollowness at 400Hz, point at 3k to 5kHz
Snare	Fatness at 120 to 240Hz, point at 900Hz, crispness at 5kHz, snap at 10kHz
Rack Toms	Fullness at 240 to 500Hz, attack at 5k to 7kHz
Floor Toms	Fullness at 80Hz, attack at 5kHz
Hi-hat and cymbals	Clang at 200Hz, sparkle at 8k to 10kHz
Electric guitar	Fullness at 240 to 500Hz, presence at 1.5k to 2.5kHz, attenuate at 1kHz for 4 × 12 cabinet sound
Acoustic guitar	Fullness at 80Hz, body at 240Hz, presence at 2k to 5kHz
Organ	Fullness at 80Hz, body at 240Hz, presence at 2k to 5kHz
Piano	Fullness at 80Hz, presence at 3k to 5kHz, honky tonk at 2.5kHz
Horns	Fullness at 120Hz, piercing at 5kHz
Voice	Fullness at 120Hz, boomy at 240Hz, presence at 5kHz, sibilance at 4k to 7kHz, air at 10k to 15kHz
Strings	Fullness at 240Hz, scratchy at 7k to 10kHz
Conga	Ring at 200Hz, slap at 5kHz
Percussion	Fullness at 200Hz, harshness at 3kHz, air at 7kHz

About Bobby Owsinski

Bobby Owsinski started his career as a guitar and keyboard player, eventually becoming an in-demand producer/engineer working not only with a variety of recording artists, but on commercials, television shows and motion pictures as well. Living in Los Angeles and always on the cusp of the latest technology, he was one of the first to delve into surround sound music mixing, and eventually worked on over a hundred 5.1 surround projects and DVD productions for a variety of legendary superstar performers including The Who, Willie Nelson, Neil Young, Iron Maiden, The Ramones, and Chicago, among many others.

Most recently, Bobby has produced and mixed records that made it to #2 on the Billboard Blues Chart and #5 on the iTunes Rock Chart.

Bobby is also one of the best selling authors in the music industry with 23 books that are now staples in audio recording, music, and music business programs in colleges around the world, including *The Mixing Engineer's Handbook*, *Social Media Promotion For Musicians*, *Music 4.0: A Survival Guide For Making Music In The Internet Age* and more.

He's also a contributor to Forbes writing on the new music business, his popular blogs are nearing 8 million visits, and he's appeared on CNN and ABC News as a music branding and audio expert.

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