

# Low End Mixing Checklist

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A complete guide to a low end  
that doesn't suck



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# In this guide,

you'll be walked through a series of steps to achieve the perfect low end of your track. I'll go with you through each element of the low end and how to set them properly so you have a low end that is actually powerful and big. The guide will be split in two sections: Explanations and Checklist.

First, you'll be taught about the Kick, Sub and what I call the Second Octave or "mid low." Later, I'll talk about the roles they play in the track, along with the importance of looking at your low end strategically in the break and drops. Lastly, you'll have a checklist to use with all your tracks and that will help you make sure that your low end is perfect.

**The only requirement for this ebook to work** is that you must use a good spectrum analyzer for it to work properly. Ableton's stock spectrum is the one I'll be using for this analysis, but if you're on another DAW, I recommend any spectrum that has a high refresh rate (mine is at 40ms) and can get the block size up to 16384 blocks. Although I don't use these since I only use Ableton's, you can also utilize [Melda MAnalyzer](#) or [Voxengo Span](#). They will give you these options and they are both free.

In addition, you will need a plugin that automates volume. My plugin of choice is [Xfer LFOTOOL](#), but you can also do the same with [Devious Machine Duck](#) or [Cableguys Volumeshaper](#). [Nicky Romero Kickstart](#) could be possible, although it's not ideal due to the lack of tools.

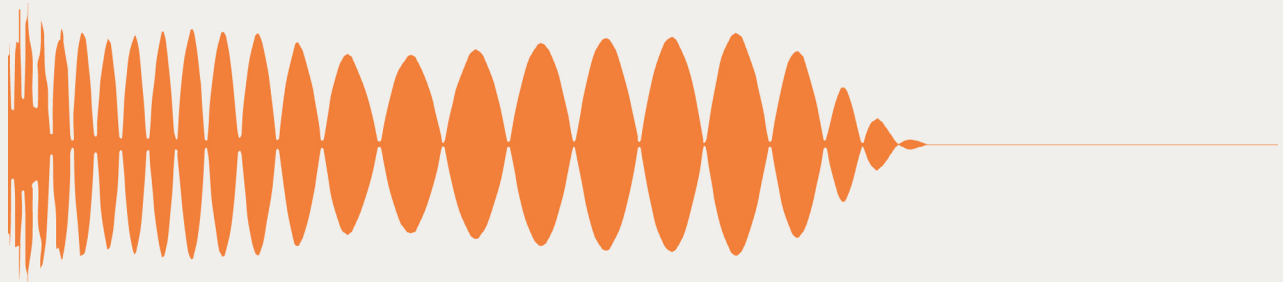
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## Choosing/Building the Right Sample

One of the most important elements of your track, the kick is the element that can enhance a track vastly if chosen right. At the same time, choose a wrong kick sample and you could be looking at some problems that no other element may be able to solve.

Four main alternatives come to mind when selecting a kick: Creating them, sampling from other tracks, sampling from sample packs and combining samples.



## Creating Kicks

Creating your kicks is an effective way to choose your kicks if you have familiarity with its synthesis. Not only does it give you more control to make slight alterations for your next tracks but it also helps you have more flexibility with the length and power that you want. A good example of this is [Au5's video](#) on how to make snares and kicks. The best plugin to make this, in my opinion, is [Kick 2, by Sonic Academy](#), although you can achieve amazing results with Serum and Operator (if you use Ableton).

The problem with creating kicks is the sound designing. It does take a lot of expertise to create a kick that works. Not only will you have to understand how kicks are designed in terms of frequencies, but also you'll have to understand them in terms of length and how to design a nice click to the kick. Lastly, the process can be lengthy and take a lot of time out of you since most sound designing techniques require hard work and time to achieve good results.



## Sampling From Other Tracks

Sampling kicks from other tracks is my favorite way of choosing kicks. This technique consists of finding kicks that you like in other tracks and ripping them to your track. You might wonder if it's ok to use a kick that was already mixed and mastered since you'll do your mix and your master later, or even if you can rip a kick from an MP3 file. The answer? Trust your ears! If it sounds nice, then you have your answer.

There are several processes of ripping kicks, and one of my favorites is what you can do with [VolumeShaper](#), which is quite similar to the technique that I use for extracting Kicks. I do a more thorough extraction to get a better result, which does take a bit more time. There is also the technique [Dyro](#) first taught, which involves a multiband compressor, but I don't find it very accurate.

## Sampling From Sample Packs

This is the easiest way because it simply involves finding a sample that you like and you drag it to your project. It can be a tedious process, however, due to the amount of kicks available out there and if you don't go in with something in mind, it may cause you to overthink things.



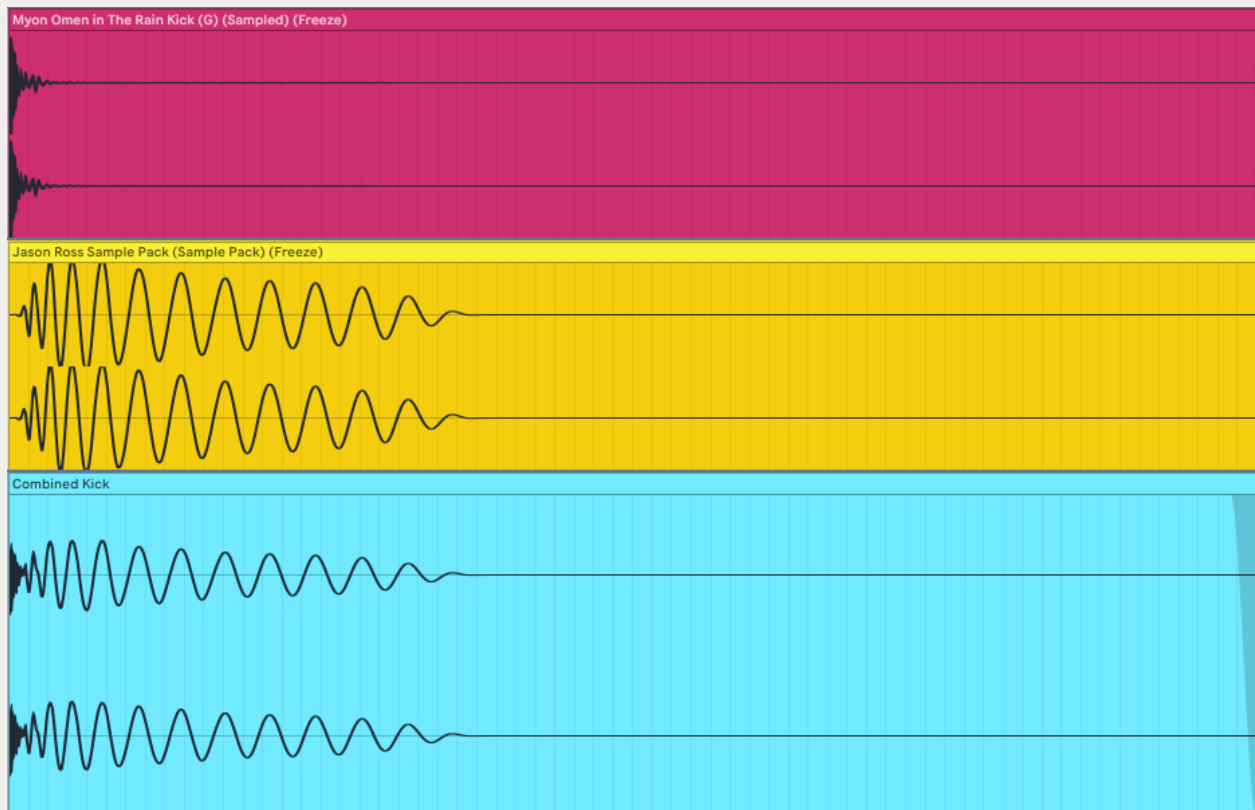
My favorite sample pack for kicks is [Vengeance Electroshock Vol. 2](#), and I've used SEVERAL kicks from this sample pack in my tracks. Not only have I used them, but I've identified kicks being used by Dubvision, Avicii, Martin Garrix and Hardwell in this same pack.

One small recommendation though: You must find a kick that you like in a reference track and then search for something similar. There are an amazing amount of kicks out there and if you don't go in with something in mind, it may cause you to overthing this choosing process. Therefore, it's better to look for something knowing exactly what you want in a kick.

## Combining Samples

Combining samples can be a mix of these three methods and comes a little closer to creating your own sample. Basically, let's say you like the attack from Kick A and the low punch from Kick B. Why not combine them?

For example, I sampled Myon's kick from [Omen in The Rain](#), but I don't like it's low end that much. In addition, I picked a sample from Jason Ross' sample pack that I like the low end. In the end, I combined them both, and got a totally new sample that grabs what I like from these two kicks.



## Do You Need a New Kick for Every Track?

Some people tend to repeat their kicks. Deniz Koyu, Myon, and lots of other producers don't change their kicks that much, sticking to a selection of 4 to 6 kicks in their tracks. If you have a kick that works, why bother changing it especially considering that you're probably looking for a kick that sounds as good as the one you've used? Therefore, I wouldn't make it a necessity to have a new kick for every track since it's perfectly fine to find a selection of 5 kicks you really like and sticking to them.

## Finding the Right Level of Your Kick

Now that you know how to find the best kick sample, it's time to find the right volume for your kick, and my process is pretty methodical. You don't have to apply this or stick to the volume that this guide sets your kick at, but it is a good way to find an anchor point for it.

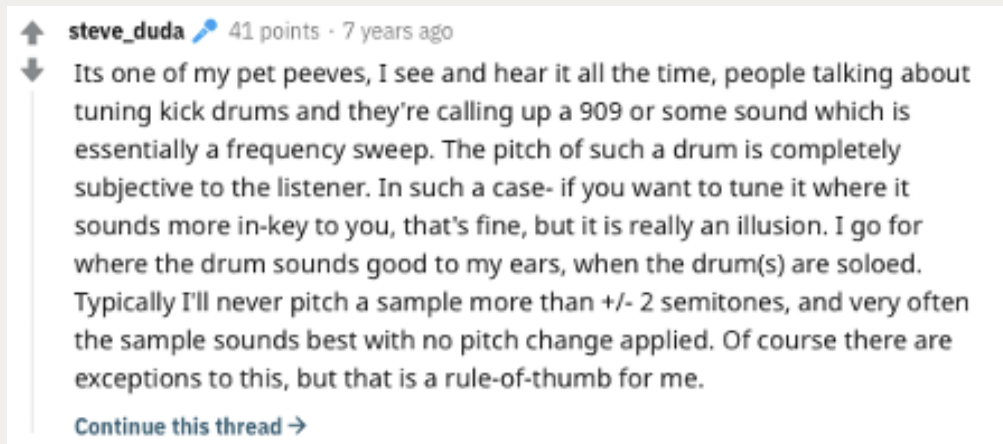
1. Find two tracks you like and match the volume of your track to the others with your ears. For that, only use your ears and avoid metering tools. In addition, this stage can happen regardless of your mastering chain, so you may need to lower the volume of your reference tracks until they match your current track.
2. Grab a spectrum analyzer, as mentioned before, and put it in the master bus after your limiter. Set it with 16384 blocks and the lowest refresh rate possible.
3. Now that they sound like they are at the same perceived level, open the spectrum and check how loud the kick of the other track is hitting. Let's say the reference track's kick is hitting at -12db.
4. Boom! Now you have a way of finding the anchor point of your kicks.

Using this process, you'll be able to put your kicks in a position in your mix that you've liked before in other tracks. In addition, you won't be stuck with any rule that fixes your kick in a certain DB level and you'll be able to mix your track relative to how loud your kick is, regardless if it's -6db or -15db.

Lastly, feel free to raise or lower the kick afterwards, but use this point you've found as anchor for the future.

## How Important Is That the Kick Is in Key With the Track?

As with any music tip, it depends.



Think about a band. They have one bass drum (kick) which is tuned in a specific note and with every hit, it becomes a tiny bit off from its original note. In addition, during a show, the drummer would tune the bass drum initially to one note, but then the band could play tracks where the kick is in key and tracks where it isn't. So, can you really argue it needs to be in key? My suggestion is as follows:

1. Pick 5 tracks you like in the key of the track that you're making
2. With a spectrum, analyze which note their kicks are playing. Let's say 3 are in A and 2 are in G. You can do that but look at which frequency the kick is hitting in any spectrum out there. For example, in this track, the kick hits at A0. Beware that it kicks don't normally hit sharply in A0, so you need to understand what the main note is to then tag it accordingly.



3. Bam! You now have a selection of notes that you can safely go to. Since you've liked how they sound in other tracks, you'll probably like this kick in your track as well. For example, I prefer to have kicks in A or G# because I like this tone in other tracks and, therefore, I apply it to my tracks as well.



## Do You Need to Mono Your Kick?

Again, as with everything in music, it depends. Listening to multiple bands across multiple genres, my personal recommendation to you is to mono the kick because it feels weird to me to have the kick in stereo. However, sky is the limit.

This could differ greatly across other non-electronic genres, so it's important to point out that this works mainly for electronic music.

“Ok, but I have a kick in stereo and it sounds pretty awesome because the attack has some stereo transients. Can I keep it in stereo?” If it sounds nice to you in stereo, keep it as you like it.



The second most important element in the low end is the **Sub**.

Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz		
CO	32,7	C1	65,4	C2	130,8	C3	261,6	C4	523,2	C5	1.046,5	C6	2.093,0	C7	4.186,0	C8	8.372,0	C9	16.743,9
CH0	34,6	CH1	69,3	CH2	138,6	CH3	277,2	CH4	554,4	CH5	1.108,8	CH6	2.217,5	CH7	4.435,1	CH8	8.870,1	CH9	17.740,2
DO	36,7	D1	73,4	D2	146,8	D3	293,7	D4	587,3	D5	1.174,7	D6	2.349,4	D7	4.698,8	D8	9.397,5	D9	18.795,1
D#0	38,9	D#1	77,8	D#2	155,6	D#3	311,1	D#4	622,2	D#5	1.244,5	D#6	2.489,0	D#7	4.978,0	D#8	9.955,9	D#9	19.911,9
EO	41,2	E1	82,4	E2	164,8	E3	329,6	E4	659,2	E5	1.318,5	E6	2.637,0	E7	5.273,9	E8	10.547,8	E9	21.095,7
FO	43,7	F1	87,3	F2	174,6	F3	349,2	F4	698,4	F5	1.396,9	F6	2.793,7	F7	5.587,5	F8	11.174,9	F9	22.349,8
F#0	46,2	F#1	92,5	F#2	185,0	F#3	370,0	F#4	740,0	F#5	1.480,0	F#6	2.959,9	F#7	5.919,8	F#8	11.839,6	F#9	23.679,3
GO	49,0	G1	98,0	G2	196,0	G3	392,0	G4	784,0	G5	1.568,0	G6	3.135,9	G7	6.271,9	G8	12.543,7	G9	25.087,4
G#0	51,9	G#1	103,8	G#2	207,7	G#3	415,3	G#4	830,6	G#5	1.661,2	G#6	3.322,4	G#7	6.644,8	G#8	13.289,7	G#9	26.579,3
AO	55,0	A1	110,0	A2	220,0	A3	440,0	A4	880,0	A5	1.760,0	A6	3.520,0	A7	7.040,0	A8	14.080,0	A9	28.160,0
A#0	58,3	A#1	116,5	A#2	233,1	A#3	466,2	A#4	932,3	A#5	1.864,6	A#6	3.729,3	A#7	7.458,6	A#8	14.917,2	A#9	29.834,3
BO	61,8	B1	123,6	B2	247,2	B3	494,4	B4	988,8	B5	1.977,6	B6	3.955,1	B7	7.910,3	B8	15.820,5	B9	31.641,0

The **sub** is the first octave of your track's melody, which will probably sit around 35-85hz, possibly going higher or lower depending on the track's key. It doesn't matter if your MIDI says you're playing A5, what matters are the frequencies in a spectrum that you'll play. I would not recommend going as far as D0 in your sub since this starts to get barely listenable. Therefore, try to stay the most you can within D0 (36,7hz) and E1 (82,4hz) with your sub.

Then, we have the second octave, which would follow the same frequency range of the sub times two. Therefore, we're looking for something within D1 and E2 for your second octave, which normally corresponds to a frequency range around 70-170hz. This depends on your melody, but we'll get there later.

After the second octave comes the mid bass, but that's not going to be covered in this eBook.

## Sub Synthesis

For the synthesis of a sub, I ALWAYS go to a sine wave without any effects, and I have a couple reasons for that.

**What about Saws or Squares?** Yeah, they work, but they have a lot of harmonics, and that's something you would prefer in your second octave and not in your sub. Not only will using a sine will give you better control, in that frequency range, but also it is barely listenable at these frequencies.

**What if I'm hitting my sub and the frequency is above E1?** Move your midi an octave down.

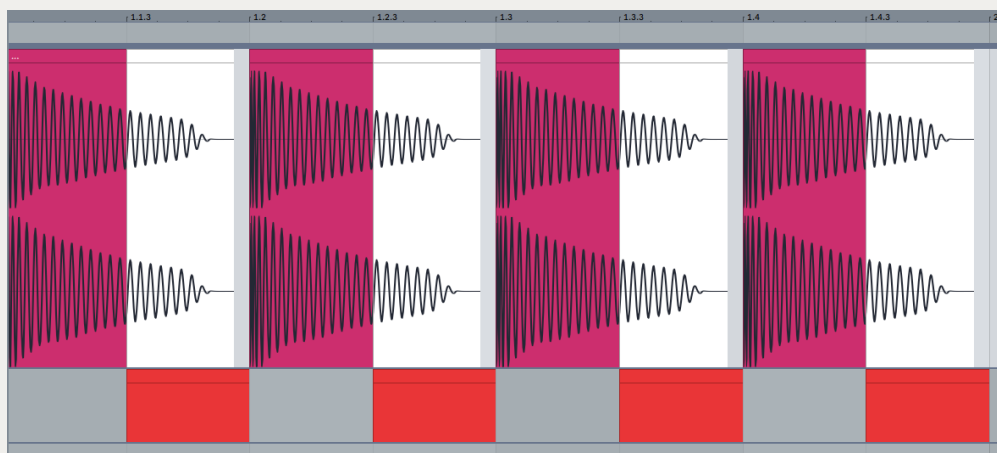
**I want a Saw, can I use it?** As with anything in music, if it sounds nice, go for it!

## Sub Relationship With the Kick

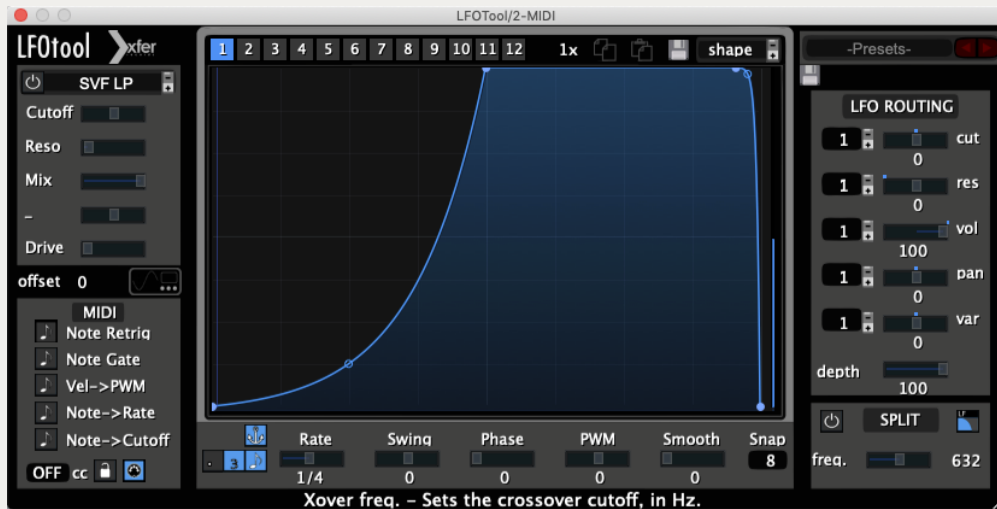
If you think that your kick's frequency is going to play around 43-58Hz and your sub is going to play around 35-85Hz, we will most likely have some problems if we don't deal with both channels correctly. Some possible scenarios are both playing at the same time and stacking up, possibly causing low overall volume issues in your master or distortion in your low end. Another issue could be phase cancellation, when the elements would cancel each other out, leaving you with the sound in that region. Therefore, proper sidechaining is crucial to a good low end.

When you use sidechaining, you're creating space for your kick and sub, so when kick/sub plays, the sub/kick doesn't, respectively. A couple things I suggest you to do are:

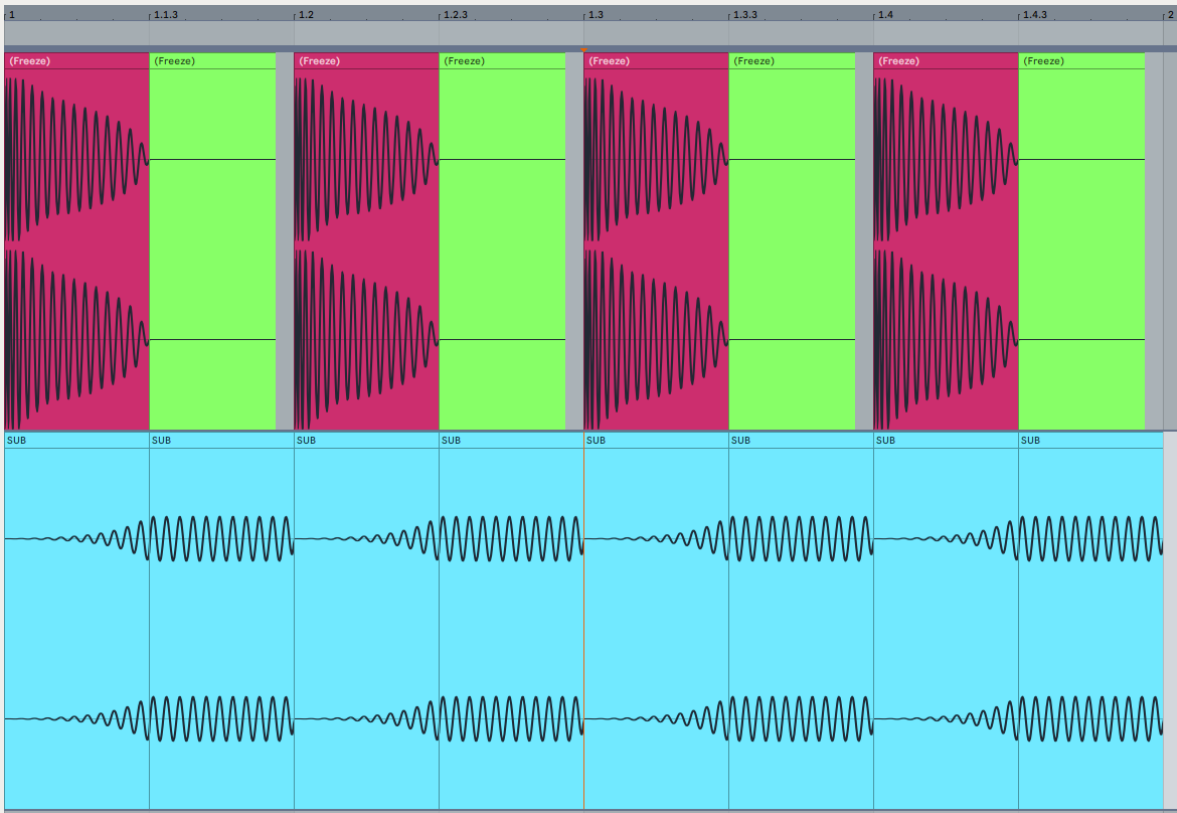
1. Leave space for your sub. If you have a long kick, like the one below, I recommend you to only leave it playing for half a bar. For that, I use LFOTOOL, but any volume shaper works, including simply chopping the sample.



2. Think about the design of your kick and then shape your kick accordingly so the transition to the bass is smooth. For this kick, considering that I chopped half of it, this is how I would do my sidechain curve.



3. In the end, you'll have room for your bass, room for your kick and a transition that is smooth and fluid.



## Gain Staging

Now that you know how to design your sidechain and your sub, it's time to find the right volume for it, and you must be as methodical as you were with the kick. You don't have to apply this and stick to the volume that this guide set to you, but it is a good way to find a reference point to your kick and anchor it accordingly.



1. Find two tracks you like and match the volume of your track to the others with your ears. For that, only use your ears and avoid metering tools. In addition, this stage can happen regardless of your mastering chain, so you may need to lower the volume of your reference tracks until they match your current track.
2. Grab a spectrum analyzer, as mentioned before, and put it in the master bus after your limiter. Set it with 16384 blocks and the lowest refresh rate possible.
3. Now that they sound like they are at the same level, open the spectrum and check how loud the sub of the other track is hitting. Let's say it's playing at -14db while your kick is playing at -12db.
4. Boom! You now have my way of finding the anchor point of your subs.
5. Find the "equation" from the other tracks and write it down. In this example,  $\text{SubDB} = \text{KickDB} - 2\text{db}$ .

Again, you'll be able to put your subs in a position in your mix that you've liked before. Feel free to raise or lower the sub afterwards, but use this point you've found as an anchor for the future.





# Second Octave

The second octave is, as the name says, the second layer of bass, which plays exactly on top of the sub.

Let's say you have a simple sub progression that plays F (43.7hz), C (65.4hz), G# (51.9hz), A# (58.3hz). Then, your second octave would play the same notes, but an octave up, F (85.3hz), C (130.4hz), G# (103.8hz) and A# (116.5hz). Look at the picture below and see the sub notes in red and the second octave in blue:

Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz	Note	Hz		
C0	32,7	C1	65,4	C2	130,8	C3	261,6	C4	523,2	C5	1.046,5	C6	2.093,0	C7	4.186,0	C8	8.372,0	C9	16.743,9
C#0	34,6	C#1	69,3	C#2	138,6	C#3	277,2	C#4	554,4	C#5	1.108,8	C#6	2.217,5	C#7	4.435,1	C#8	8.870,1	C#9	17.740,2
D0	36,7	D1	73,4	D2	146,8	D3	293,7	D4	587,3	D5	1.174,7	D6	2.349,4	D7	4.698,8	D8	9.397,5	D9	18.795,1
D#0	38,9	D#1	77,8	D#2	155,6	D#3	311,1	D#4	622,2	D#5	1.244,5	D#6	2.489,0	D#7	4.978,0	D#8	9.955,9	D#9	19.911,9
E0	41,2	E1	82,4	E2	164,8	E3	329,6	E4	659,2	E5	1.318,5	E6	2.637,0	E7	5.273,9	E8	10.547,8	E9	21.095,7
F0	43,7	F1	87,3	F2	174,6	F3	349,2	F4	698,4	F5	1.396,9	F6	2.793,7	F7	5.587,5	F8	11.174,9	F9	22.349,8
F#0	46,2	F#1	92,5	F#2	185,0	F#3	370,0	F#4	740,0	F#5	1.480,0	F#6	2.959,9	F#7	5.919,8	F#8	11.839,6	F#9	23.679,3
G0	49,0	G1	98,0	G2	196,0	G3	392,0	G4	784,0	G5	1.568,0	G6	3.135,9	G7	6.271,9	G8	12.543,7	G9	25.087,4
G#0	51,9	G#1	103,8	G#2	207,7	G#3	415,3	G#4	830,6	G#5	1.661,2	G#6	3.322,4	G#7	6.644,8	G#8	13.289,7	G#9	26.579,3
A0	55,0	A1	110,0	A2	220,0	A3	440,0	A4	880,0	A5	1.760,0	A6	3.520,0	A7	7.040,0	A8	14.080,0	A9	28.160,0
A#0	58,3	A#1	116,5	A#2	233,1	A#3	466,2	A#4	932,3	A#5	1.864,6	A#6	3.729,3	A#7	7.458,6	A#8	14.917,2	A#9	29.834,3
B0	61,8	B1	123,6	B2	247,2	B3	494,4	B4	988,8	B5	1.977,6	B6	3.955,1	B7	7.910,3	B8	15.820,5	B9	31.641,0

## Synthesis

Different from the sub, I recommend you to try different kinds of waves for the Second Octave, but avoid the SINE wave. The purpose of this layer is to give you the richness that the sub is not giving you. I normally go with a sawtooth wave, but I've used a square multiple times for the same purpose.

In terms of choosing what octave you play in your VST (-1, -2, 0, etc), I normally set my second octave to generate waves in the same frequency that my sub is generating. However, after doing this, I separate the sub and second octave with EQs.

In the same example that I gave above, the highest note of the sub is C and the lowest is F. In frequencies, the highest is 65.4hz and the lowest is 43.7hz. Therefore, if I make a low cut at 75hz, I'm cutting all of the sub in my second octave. At the same time, if I'm making a high cut at 75hz in my sub, I'm cutting all my second octave from the sub so I don't overdo this region.

Lastly, since I don't want any mid bass in my Second Octave, I double this cutting frequency that I previously set up, and do a high cut on my Second Octave at 150hz. The end result is the following:



What about after 150hz? That's my mid bass, and that's something for another eBook.

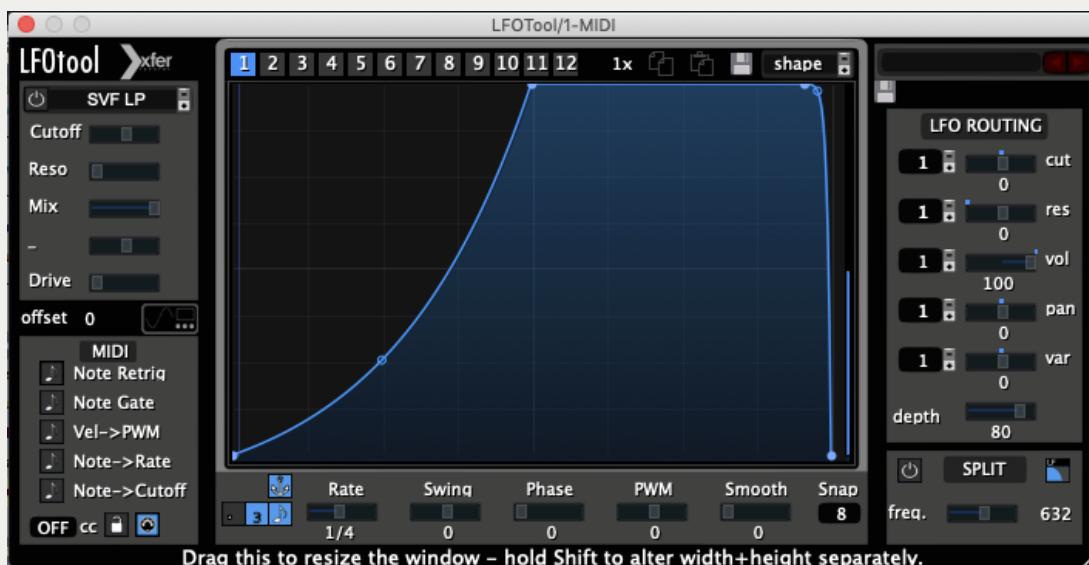
## Why Separate This Layer From the Sub?

It's simple: Control. Let's say you need to lower the volume of the sub, and only of the sub. If you have two separate layers, you can just use the volume knob to raise it or lower it, and the same applies to the Second Octave. If these were not separate, you'd have to use a bell curves in an EQ plugin, which can make the volume of your sub and/or second octave uneven...

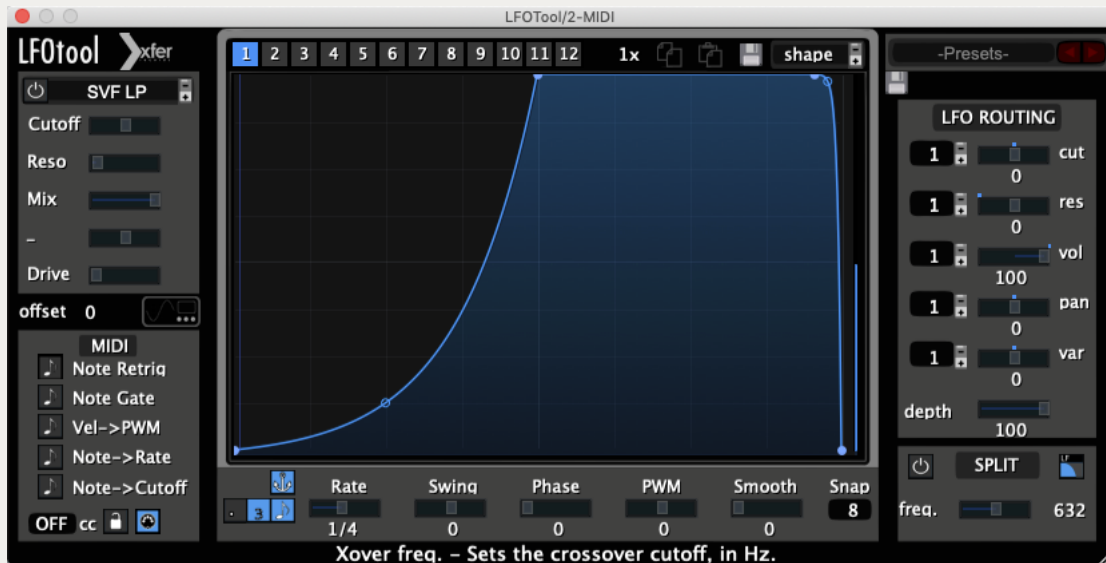
## Relationship With the Kick

Here is the top reason why you should separate your sub from your second octave. What's the common thing between a sub and a kick? They both share the same frequencies while they are playing. However, this doesn't apply to the Second Octave.

While your kick will be playing along with your sub, your Second Octave has a low-end cut that eliminates this conflict. Therefore, your sidechain doesn't have to be that aggressive as it would be in your SUB. One quick example: when your sidechain dry/wet is at 100% with your sub, you could leave it (I do it all the time) at 80% in your second octave since there are no frequency conflicts with your kick.



Second Octave Sidechain



Sub Sidechain

## Gain Staging

As with the sub, follow these steps:

1. Find two tracks you like and match the volume of your track to the others with your ears. For that, only use your ears and avoid metering tools. In addition, this stage can happen regardless of your mastering chain, so you may need to lower the volume of your reference tracks until they match your current track.
2. Grab a spectrum analyzer, as mentioned before, and put it in the master bus after your limiter. Set it with 16384 blocks and the lowest refresh rate possible. Now that they sound like they are at the same level, open the spectrum and check how loud the second octave of the other track is hitting.
3. Boom! You now have my way of finding the anchor point of your second octave.
4. Find the Second Octave “equation” from the other tracks and write it down (e.g., S.O. = Kick - 1db; S.O. = Kick - 3db).

Again, you’ll be able to put your second octaves at a position in your mix that you’ve liked before. Feel free to raise or lower the second octave afterwards, but use this point you’ve found as an anchor for the future.

# Break

Everything that has been said applies to the whole track, but I do some other tricks in the break to make it more interesting. Instead of using a saw wave for the second octave and performing that high cut on 150hz, I use a Reese Bass (Drone Bass), which is a distorted and detuned saw wave with a lot of voices. This creates a wobbly effect caused by phase cancellation (a good phase cancellation effect) within the different voices of your saw wave that creates dynamism and depth to your break.

## Gain Staging

There are two ways you can set the volume of your break basses:

1. The same step that you've taken to finding the gain staging for the drop should be done here as well.
2. You want your drop to be the heaviest part of your track. So, after finding the volume where your bass is playing in the drop, you will set your break basses 2-3 db lower than your drop. This way, when comparing the heaviness of the break and the drop, your drop will always be the heaviest part of the track.



# Checklist

1. Get a good kick by Creating, Sampling or Combining kick samples. Avoid long kicks or sidechain them to leave room for your sub afterwards;
2. Find the kick's volume by referencing other tracks and discover where they position their kicks in the mix with a spectrum analyzer;
3. Generate your sub synthesis with a SINE wave;
4. Find the Sub's volume by referencing other tracks and discover where they position their subs in the mix with a spectrum analyzer;
5. Sidechain your Sub according to your kick by looking to the shape of your kick;
6. Generate your Second Octave synthesis (avoid SINE waves);
7. Find the Second Octave's volume by referencing other tracks and discover where they position their Second Octaves in the mix with a spectrum analyzer;
8. Sidechain your Second Octave according to your sub's sidechain. You can be more flexible with it or you can have the same exact sidechain;
9. For your break bass, either reference other tracks or reference your drops to set up their volume.

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