

Tips for better bass

Armed with this, the route to a better sound becomes a matter of habit rather than one of attempting to fix a confused mix.

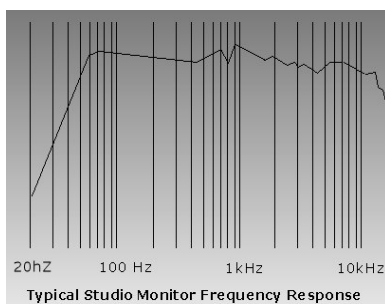
Getting the bass sounding right can be one of the more challenging aspects of modern music production, especially for the project studio or home enthusiast, where a lack of full range monitoring and full acoustic treatment can make the task of correctly identifying and solving problems all the more difficult. Even with all the equipment to hand it is important to have an understanding of how bass works in a mix and how the ears and playback system respond. Armed with this information and taking a systematic approach, common pitfalls can be avoided and the route to a better sound becomes a matter of habit rather than one of attempting to fix a confused mix.

If your audio is not destined for a club sound system, begin rolling off the bass in the 35-40Hz range

Before you start. Before you begin your production it can be useful to think about your plans for the finished mix. Different systems have different frequency ranges and it is entirely possible that you could be focussing attention and building energy in the mix with frequencies that will not be heard by the eventual consumer. A laptop speaker, for instance may only have the capacity to produce frequencies down to 200Hz. The table below gives a rough guide. The bass in many systems will start to roll off long before these minimum figures.

Speaker	Guide to minimum frequency
Laptop	200Hz
Standard TV	90Hz
Average Hi-Fi	50Hz
Good Hi-Fi	35Hz
Club PA	20Hz

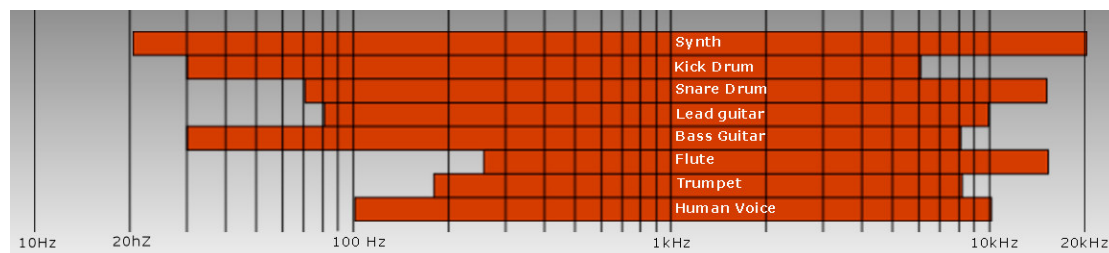
Generally, if your audio is not destined for a club sound system, it is fairly safe to begin rolling off the bass in the 35-40Hz range. This has several advantages. Sounds at these frequencies are difficult to hear and are not produced accurately (or at all) on most systems, but they take up headroom in your recording, leaving less room for the rest of the mix. In a worse case scenario, leaving them in will do nothing other than make your mix sound quieter to the listener. These frequencies also make the speakers work very hard when they try to reproduce



them, especially if there is no dedicated sub woofer, reducing efficiency and clarity of reproduction. If you are recording for the club environment and wish to leave your mix 'full range', it would be a good idea to monitor the low frequencies using an audio analyser, as many studio monitors have a hard time accurately reproducing the very low frequencies. A/B tests with well-produced club tracks will also give you vital information about level control and frequency spread.

Something else worth considering before you begin is where the meaningful frequencies are in the sounds you wish to record. If you are recording a choral arrangement, you can roll off the bass somewhere below 100Hz, as the human voice does not usually extend below this. Recordings can contain noises that are not part of the sound you wish to capture. Low-level rumble traffic noise in microphone recordings for instance. Double bass recordings can have very loud, low thumps that come from the performer hitting the body of the instrument. Some careful eq can free up these frequencies for other sounds.

Space. Mixing bass is about space. If you want to avoid a muddy sound, and produce a tight, punchy mix, each component needs to have it's own space. The table below shows typical frequency ranges for some common instruments.



As can be seen, synths, bass guitar and kick drums all have the potential to occupy the same frequencies. This can lead to a cyclic volume war as you adjust each in turn so it can be heard more clearly. Further up the frequency range we can solve some of these issues by panning sounds into different part of the stereo spectrum. Unfortunately, this is not advisable when dealing with bass frequencies for several reasons. As mentioned above, bass frequencies are difficult, high-energy sounds for speakers to produce, this energy is best shared between the speakers. When mastering tracks for vinyl, stereo sounds in the bass frequencies are best avoided, as this can cause severe problems for the cutting plant and may result in your master being rejected. Another problem is that low frequencies are perceived by the human ear as being omni-directional – we can't tell very well which direction they are coming from. Panning bass sounds does not clear things up, it just adds to the confusion as the ear tries to work out what is going on. To deal with bass masking we need to utilise different techniques.

Discovering where the most important harmonics are gives you more freedom to deal with the remaining frequencies.

Choosing sounds that do not conflict in the first place is the most straightforward approach. Using a Spectrum Analyser you can look at the spectrum your sounds occupy and make sure that there are no unhelpful clashes between the kick drum and bass line for example.

If you do have problems, deft use of eq and sound layering can help to reduce clashes. Listen carefully to the kick and work out where the main character of the sound is in the frequency spectrum. Other frequencies can be adjusted more brutally, whilst still retaining the original character of the sound. Bass synths often have multi-layered sounds covering a very wide frequency range. Using the synths internal filters, this can often be tamed to reside within the space around the kick drum. Most sounds are not pure sine waves, they have a fundamental frequency (perceived as the pitch) and harmonics, which give the timbre to the note. There may well be other resonances and noises going on as well, adding up into a multi-layered frequency spread, covering far more than the fundamental note. Discovering where the most important harmonics are gives you more freedom to deal with the remaining frequencies firmly.

A second way to find space in the mix is to avoid triggering similar sounds at the same time. Trance music is a classic example – it is no accident that the bass line runs on the offbeat to the kick drum. This avoids masking and means that both sounds can be mixed at a higher level. You don't need to be as obvious with the rhythm as this 'taking turns' approach, often a few tweaks here and there can bring the clarity and opening up you need.

Finally, have a think about the key frequencies of other instruments in the recording. Is the overall sound benefiting from the low overtones of the rest of the drum kit for instance, or would they be better rolled off to give the kick and bass more room to breathe? Check other sounds with an audio analyser to make sure there are no unwanted artefacts in there that you don't really notice in the mix, but are taking up headroom and causing confusion in the bottom end. You may be surprised how much low shelf filtering you can do without changing the essential nature of a sound very much at all in the context of the track as a whole.

What if your bass needs some life support?

Character. Taming harmonically rich sounds is one method for getting instruments to sit together in the mix, but what if your bass seems lifeless and flat? Trimming out frequencies may make things worse. If you are dealing with a dull sampled bass or an innocuous synth you need to a different approach. This is where effects come in. Adding or enlivening existing frequencies and looking at the dynamics of the sound are the keys to success.

First we will look at effects. If your bass sounds flat, and doesn't cut through the mix, it could be because it has a limited harmonic content. The smoothness of the sound can give the ear little to latch onto. Adding low levels of distortion or overdrive to your sound can begin to add some presence to the sound in the higher frequencies. Vintage valve simulators act in a similar, yet often more subtle way. Distortion can add 'bite' and 'crunch' to the sound, valve effects are more usually associated with 'warmth', 'depth' and 'richness'.

A heavy sine wave sub-bass may sound huge in a club, but can all but disappear on a domestic hi-fi.

Sounds lacking in any higher frequency content however, will not benefit much from this technique, as there is little there to harmonically enrich. A heavy sine wave sub-bass may sound huge in a club, but can all but disappear on a domestic hi-fi. In this kind of situation, it is often worth layering another sound over the bass line, say an octave higher, running through a high pass filter to avoid adding to the low end. Careful balancing and eqing these sounds against the rest of the track can often make a composite track that sits well into the mix and still cuts through even when mixed at a lower level. Some harmonic enhancers and sub-harmonic generators can be used to create a similar effect, generating additional frequency content from the existing bass sound itself. It is worth taking care to check what is happening here with an audio analyser, as it can be difficult to hear what is being added in the lower frequency ranges. Some of these effects also realign the phase of certain frequencies – worth testing with a mono button to make sure it's not too extreme.

Adding other types of effect to bass sounds is less routine. Chorus, reverb and even delay, whilst seeming to make things sound richer can also have the unwanted side effect of making them seem further away, somehow robbing the bass of any impact. Stereo effects also tend to muddy up the stereo image, with

all the resulting problems mentioned above. This can be avoided by either using mono effects (and losing the sense of space in the higher frequencies) or by using a plugin to reduce the width as you enter the lower frequencies.

When engaging with any of these techniques it is important to keep an eye on the bigger picture, to make sure you are aware of any potential masking problems you may be encountering as you tweak your sound.

Dynamics. The dynamic envelope of a sound can greatly affect how 'loud' it appears to be. A sound with a sharp attack and rapid decay, much like a typical kick drum, will appear to be quieter than a sound that reaches the same level, but sustains for longer. With synths, adjusting the amplitude envelope of a sound can be a good way to start increasing the overall energy, without changing it's timbre. With sampled sounds and drum tracks, this is not always possible - this is where dynamics processing comes in. Dynamics processing can be used to alter the amplitude dynamic of pre-recorded material, reducing the dynamic range of a sound, and then boosting the volume by that reduction to give an overall increase in energy. The effect can be quite dramatic, and at the same time, if you wish, it can also be strangely subliminal, making things seem louder and more solid and yet otherwise unaffected. Of course, heavy settings can dramatically change the nature of the sound, something that is often very desirable when you are attempting to rescue weak source material. Compression is routinely used with drum parts and bass lines to increase the impression of solidity and energy. Transient designers can also be used. These work on the rate of change in level rather than the level itself, and can be used where traditional compression might fail to respond in quieter sections or begin to interfere with desirable dynamic changes in the performance. Limiting is similar to compression, except that, as the name implies, it limits the overall level sharply, rather than gently squashing (compressing) it. Limiting is generally used in the mastering stages of production to increase the perceived level of the whole mix.

References:

<http://en.wikipedia.org/wiki/Speakers>

<http://www.soundonsound.com/sos/jun01/articles/dancemixing.asp>