

technique

bigger
bass sounds

top bass

GETTING MORE BASS IN YOUR MIX

Do you want your bass end to sound bigger, fatter, louder and meaner? **Paul White** explores some of the options.

This article was inspired by a reader who emailed me from halfway round the world to find out ways to add more bass to his mixes. He said that no matter what he did, the studio down the road



always got even more bass! This is a common problem, and one which some people approach simply by buying all the classic bass synths. However, having some appreciation for what makes a good bass sound helps enormously when it comes to editing or processing your own sounds, whatever type of music you're making.

One of the first things to realise is that not every listener has great big studio-style monitors at home, so there are two ways to go - you can either make something really deep and big that will only work over a full-range club PA system, or you can use various tricks and skills to create something that gives the impression of depth on typical domestic speakers. If you want something that will work on both, you must accept that it will be a compromise - it's important to note that you can't use the same approach in both cases. For example, cathedral organs produce bass notes down to 20Hz, or even lower, that can shake your whole body when reproduced through a full-range, high-power system, but if you try to replay these through a typical music system, you're unlikely to hear very much at all as most of the energy falls below the lowest frequency the speaker can generate. However, very low frequencies still use up system headroom, which means that they will reduce the maximum level at which those sounds you *can* hear on a domestic system can be played back.

In practical terms, this means that if you want big-sounding bass that works in a domestic listening environment, it's pretty pointless going much below 40Hz, as most hi-fi systems don't even go down that far. In fact most smaller systems start to roll off at 80Hz or even higher, so you need to make sure there's plenty of energy in the 70 to 90Hz range in order for the bass to work on pretty much all domestic systems.

Synth waveforms that are close to sine or triangle waves produce a very strong fundamental with few harmonics, so even if you have large speakers, you may end up with a bass you can feel but not actually hear very loudly. There are several things you can do if you want bass you can both feel and hear:

* Start out with a waveform that has plenty of harmonics, such as a square wave or ramp

wave, then use your synth's low-pass filter to trim away any upper harmonics you don't want. Harmonically rich sounds always appear to be louder than pure tones; however, if they're too rich, they'll eat up all the space in your mix. For this reason, it's sometimes better just to keep the high harmonics at the attack portion of the note. You can do this by getting the low-pass filter to shut down fairly quickly after the note attack, providing you have a separate envelope generator to control your filter.

* Start out with a near sinusoidal or triangular waveform, but add harmonics by distorting it. Many of the classic synths have a big sound simply because their oscillator waveforms are distorted either at source or by the subsequent synth circuitry. Guitar recording preamps are the most controllable means of reproducing this as the distortion can be added progressively, and there's usually a speaker simulator to round out the less musical high-frequency distortion components. If you don't have a speaker simulator, either go easy on the amount of distortion you add, or try to add the distortion before the signal reaches the low-pass filter. This is easiest if you have a separate filter box, though modular or semi-modular synths may allow you to interpose external processors between the oscillator and the filter. One advantage of using a distortion device is that the added harmonics follow the signal dynamics - you get most distortion where the bass sound is loudest, and because distortion usually involves an element of clipping or limiting, it may also help to control excessive peak levels.

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Replaying the bass track via a guitar amp, miking it, then adding the miked signal to the untreated DI'd signal can also help make the sound 'bigger', as the sound of a real loudspeaker cabinet often has musically useful resonances that a simulation lacks.

* Use two oscillators, one pitched an octave below the other. This ensures that you get plenty of energy at both the fundamental and an octave above. Adjust the amount of the higher oscillator until the sound has the right combination of depth and definition. And of course there's nothing to say both sounds should have the same loudness envelope, or the same basic waveform for that matter. Killing the high sound before the low one can sound less 'cheesy' than letting them play together for the full duration of the note.

A Place for Bass

When mixing a track, keep in mind that bass sounds should be panned centrally so that the low-end load is shared by both loudspeakers. It's also wise to avoid dramatic stereo effect treatments on bass sounds as these can sometimes introduce phase differences that reduce the overall low-end power. Equally, phase differences at low frequencies can cause severe cutting problems if you happen to be mixing for vinyl rather than CD.

Another point to consider is the psychoacoustic effect of playback level, and to compound this, some smaller studio monitors don't start to work effectively at low frequencies until you crank the monitoring level up. If you want your mix to sound big at low listening levels on smaller speakers, bringing down the level of the lower mid-range can help - the familiar smile curve on a graphic equaliser is often used to pull down the 200 to 300Hz region. On the other hand, if the intended listening level is high, you're better off mixing fairly loudly and not applying any special additional EQ. Be careful not to monitor too loudly for too long though - you need your hearing to last as long as possible!

* Layer a more percussive sound with your deep bass patch. This could be another synth sound (including filtered noise) or it could be a true percussion sound, such as a bass drum, deep tom or hi-hat. Experiment by adjusting the envelope of the percussive sound and juggle the balance between the two elements of the sound until you hear something you like. It may also help to lengthen the attack of the percussive sound slightly to make it less drum-like. As a rule, the deep sound can be made considerably longer than the higher, more percussive element.

* Use a piece of software such as Waves' *MaxxBass* to attenuate low fundamentals while adding 'psychoacoustically' calculated harmonics designed to increase the perception of bass over small speakers. This sounds more impressive over smaller speakers than it does over full-range systems, so is probably best for mixes designed to be replayed on a home stereo system. The system is based on proven psychoacoustic principles of the human hearing system's ability to mentally recreate missing or attenuated fundamental frequencies from the remaining harmonics.

* Use a processor such as the Dbx 120XP 'boom box' to add real subharmonics to an existing bass sound. Use this machine carefully as some of the bass frequencies generated are seismically significant! This technique is probably best reserved for mixes designed for club rather than domestic replay.



* If you have a perfectly good bass sound that just happens to have a lot of energy below the frequency a domestic hi-fi can reproduce, try using a sharp high-pass filter (such as gate side-chain filter) to attenuate everything below 50Hz or so and boost what's left at around 80Hz to compensate. This will have no detrimental effect on the audible part of the sound, but will reduce the amount of very low-frequency energy that's eating up your system headroom to no purpose.

Changing Booms

What can you do if the bass sound is generally OK, but you still can't get it loud enough relative to the rest of the mix without causing clipping? You could always turn down the rest of the mix, but there are things you can do to control the peak levels of your bass sound using processing. Perceived loudness is dependent on the harmonic structure of the waveform (including any subsequent filtering), the shape of the volume envelope applied to the note and to any dynamically changing harmonic content, such as that caused by an envelope controlled filter. It is therefore possible to change the perceived level of a bass sound by adjusting some or all of these parameters, and in the case of synthesized sounds, much of the adjustment can be done at patch level. Sounds such as electric bass guitar, on the other hand, need to be processed using compressors and equalisers to achieve a similar result.

Bass And Drums

Kick drum sounds feature fairly strongly in much of today's music, and most of the techniques that have been discussed in the context of bass instrument sounds also work with bass drums. There are lots of effective-sounding samples out there, but layering an electronic

* If you have one, use a dynamic equaliser (see Hugh Robjohns' review of the CLM Expounder on page 42 for more on the theory behind these) to produce extra bass boost just during the time bass notes are playing. Because this may increase the actual level of the bass sound significantly, use a limiter or compressor after the filter, set to a high ratio, to prevent the level of the bass signal from getting out of control. The dynamic equaliser can be particularly effective when you're

drum sample with an acoustic drum can add definition to the sound without losing impact. You can also make a kick drum sound a lot louder by limiting it and/or adding mild distortion.

treating a track that's already been mixed as you can beef up the bass without affecting the other sounds in the mix too much. If you don't have a dynamic filter, the bass control on a Vitalizer produces a similar effect.

* Adjust the envelope of the sound so that the level stays louder for longer (for example, increase the sustain level of the patch, then lengthen the note itself). However, don't go so far that you lose the musical feel of the bass line. With a bass guitar sound, use a compressor to maintain a higher average level. You can also compress synthesized sounds, but in either case, it's wise to use a separate limiter (or a compressor with an independent limiter section) to control the peak level. Because the compressor increases the average signal level, the perceived volume will be greater.

* Even though the sound may appear right in isolation, you could still try adding mild distortion, because as well as making deep sounds seem more punchy, distortion also tends to make things sound louder. Often a limp bass guitar can be revived by adding a little amp-style overdrive. If you don't have a guitar preamp or a tube processor that can be overdriven, see if there's a software processor equivalent that you could use.

* Use a filter sweep to give your synth bass notes attack and definition. For example, start with the filter closed, but arrange for it to open as quickly as possible as soon as the note is played. You can then leave the filter open, partially open, or have it close down again fairly briskly to create the familiar percussive 'thwip' sound.

* Don't feel that you're admitting defeat by using a ready-made sample of a bass sound if it works. Most of the classic bass synths are available on sample CD or CD-ROM (as well as on certain synth expander cards) and you can still use your sampler/synth's envelope and filter controls to fine-tune it if you feel it needs further modification. You may also find that layering together two different bass synth samples gives you an even bigger sound that's more distinctive than using the individual samples separately. Tuning one sample a few cents sharp and the other a few cents flat can also result in a supremely fat sound similar to a dual-oscillator patch or single oscillator with pulse-width modulation.

And Finally. . .


Much can be achieved at the mastering stage, and a professional mastering engineer will be able to reduce the level of excess deep bass without affecting the way the mix will sound over a typical hi-fi. Compression (particularly multi-band systems), dynamic EQ and more selective para metric equalisation may be brought to bear during mastering, to adjust the relative spectral balance without messing up the mix itself. As recent reviews have shown, you can undertake this type of work at home with a reasonable degree of success by using one of the newer all-in-one mastering processors from TC Electronic, Drawmer or Dbx, but you do need good monitors (in a suitable room) and good ears. You can also do a reasonable job using an enhancer that offers both high and low-end control; it's no secret that I still think the SPL Vitalizer is one of the best tools for doing this job affordably.

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If you are using one of the Vitalizer models, note that the bass control has a centre-off position and that you can move in either direction from there to

produce a soft or hard bass enhancement. The soft bass setting brings up a lot of very low-frequency energy, so may be best for mixes that are either bass-light to start with or that need to sound massive in a club. The tight bass setting has less depth, but provides tighter control and more definition, which may sometimes work better in a domestic environment.

a small transistor radio..."

As you can see, there's a lot more to getting a big bass sound than simply choosing a low-pitched bass sound and then turning it up loud, especially when you're mixing for replay over a domestic hi-fi system. The choice of the source sound, its volume envelope, compression and equalisation/filtering all play a part, but having some idea of the psychoacoustics of bass perception helps. The human ear can be fooled into perceiving a fundamental that is completely absent if the higher harmonics are present in the correct proportions - that's why you can still get an impression of bass from a small transistor radio - but if you want bass you can feel over a large club system, the fundamental needs to be present as well as the harmonics. It is important, therefore, that if you're mixing with clubs in mind, you either have a full-range monitoring system or access to a club sound system to check out your mixes. If you rely on nearfield monitors, you'll know what to expect on a domestic hi-fi, but you'll be completely in the dark as to what the bass end will do over a club system. Getting the best results will involve a degree of experimentation, especially if you want a compromise mix that will sound good in both clubs and homes, but experimentation is a good thing as it drives progress and makes it more likely that you will come up with a distinctive sound of your own. 

SOUND ON SOUND

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