

Using Bass Traps

The bass response in my room is quite variable, with some notes appearing boomy and others being quite weak, but the overall amount of bass seems about right. I've been told that I need to install bass traps to cure the 'lumpiness', but won't that just remove bass from the room rather than smooth it out?

SOS Technical Editor Hugh Robjohns replies:

It's a very common fallacy to think that bass traps will remove bass, and the way bass traps work isn't entirely intuitive. But, in fact, effective bass trapping allows the room to support all of the bass that the speakers produce, so you'll normally get more bass, overall, not less.

Bass traps don't 'remove' bass from a room; instead, they should support the bass that is produced by the speakers, often making it louder and more consistent.

In a room without effective bass trapping, the low frequencies produced by your speakers head out into the room and reflect back off the walls and other boundary surfaces. Since low frequencies have very long wavelengths (in the order of many metres) and most home studios are in relatively small rooms, the reflected low-frequency sound meets the direct bass still coming from the speaker. The phase relationship between the two is, therefore, critically important, because if they meet in nearly opposite polarities, they'll cancel each other out to some extent, and you'll end up with a significant dip in level. This is why some bass notes are often missing or very weak. On the other hand, if the direct and reflected sound waves meet nearly in the same polarity, they'll add and you'll get a peak in level and a boomy note. The different length, width and height dimensions of the room will determine the specific wavelengths and/or frequencies of the boosts and dips in level.

The idea of bass trapping is to soak up the low-frequency sound-wave energy at the room boundary as it reaches and enters the trap. With that sound energy absorbed, it can't reflect back into the room, and so it can't interfere with the wanted direct sound from the speaker. The result is that you hear only the bass that the speaker produces and not the room effects, and that generally means that you end up with more bass and, more importantly, a substantially more even bass response both at the listening position and throughout the room.

However, the practical problems associated with effective bass trapping are that, firstly, simple absorptive bass trapping has to be physically deep so that it 'sees' a significant portion of the low-frequency sound wavelength, and that can be difficult to integrate into a small room because of the space it takes up. The common alternative is to use some form of tuned resonant trap but, because that is inherently only effective over a very narrow band of frequencies, it requires sophisticated acoustic measuring tools to design and optimise correctly for the specific situation, and so it can be expensive.

Nevertheless, any amount of bass trapping is always helpful; unlike broadband absorbers, it's practically impossible to overdo it; and it certainly won't remove bass from your room!

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