

ROOM ACOUSTICS:

STUDIO MONITORS - WHAT NOT TO DO

Because monitoring mistakes are very common, we have compiled a “how not to monitor” guide rather than how to do it properly, so you can quickly see if you are making any silly mistakes, as well as find answers on how to fix them.

Setting a budget and choosing our studio monitors should be up there as a ‘high priority task’ for our home studio. Producers often overlook the setup of the monitors; every single decision we make will be reliant on the sound of the speakers in our room. So it's absolutely vital that you get the best speakers we possibly can for our price range; however, having the best quality studio monitors counts for absolutely nothing if we have a problematic room setup.

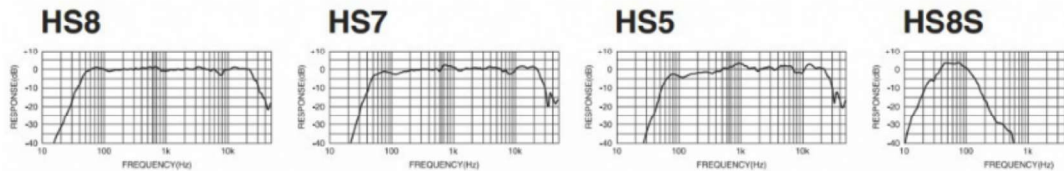
SPEAKER SELECTION

Research speaker's carefully before buying. Some speakers lend themselves to certain types of music. An important specification to look at is the frequency response of our speakers.

We want this to be as neutral as possible, whilst still extending low into the sub range.

This means that the speaker should give us a true sound and level at any given frequency, whereas consumer speakers, such as Hifi's often have a non-linear response, which will accentuate high and low frequencies to make the signal warmer & louder. Also pay attention to the type of drivers in our speakers. A general rule of thumb is that the larger the driver size, the better our speakers will be able to reproduce the low-end frequencies.

Performance Graph



The Yamaha HS series Frequency Response. A good set of monitors should have a flat, non-biased frequency response. The bigger the drivers, the lower the speakers will be able to go in reproducing bass frequencies. The HS8S is a sub-woofer designed to aid nearfield monitors with drivers of less than 8"

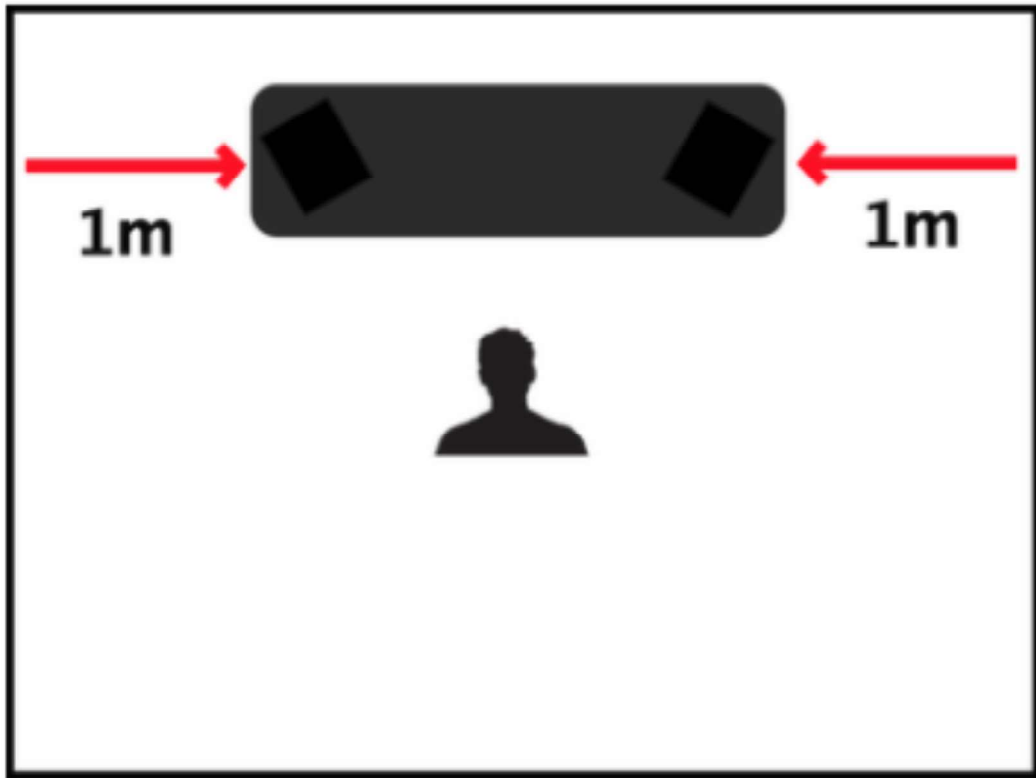
KEEP THINGS SYMMETRICAL

This can be a hard task if we have unusual room dimensions, but it's important that our speakers are in symmetry with the dimensions of our room. This means that ideally we want our desk in the middle of a rectangular room, with our speakers on either side, in an equilateral triangle shape from each other to our head.

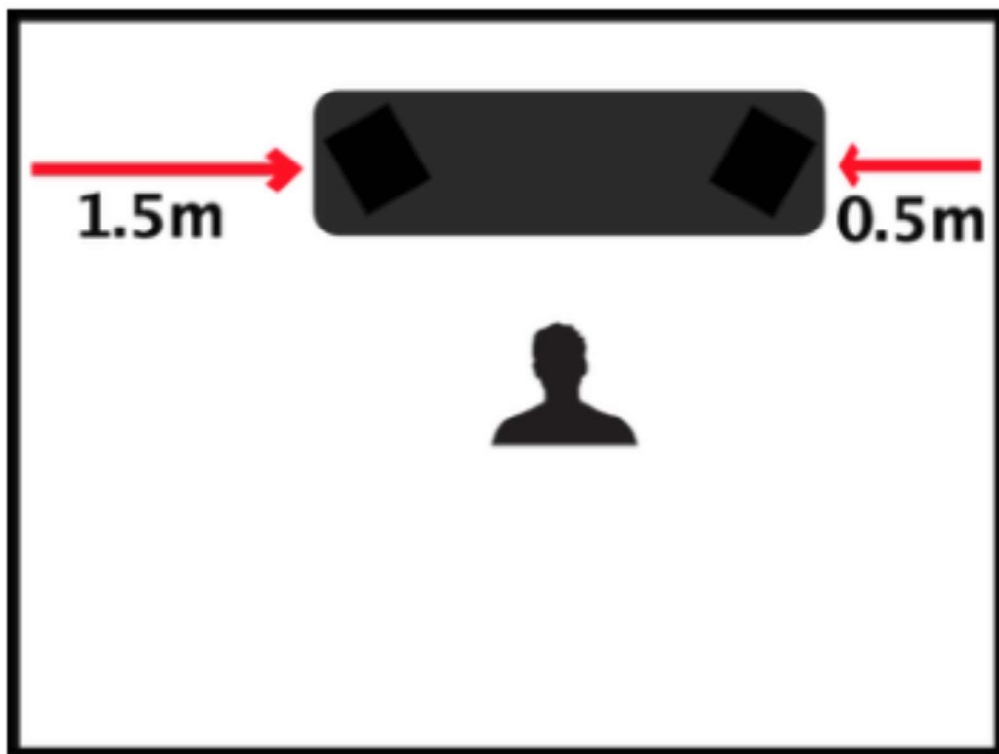
If the left speaker is 1m from the left hand wall, then the right speaker should be exactly the same. This is also the case for the back wall.

If our studio is in the corner of a room then we can still achieve the same symmetry by angling off diagonally from the corner of the room. The reason we do this is because no matter where we place the speakers in the room, they will always be affected by the room's boundaries to some degree.

By positioning the speakers so that they are symmetrical, any effect on the left-hand speakers' audio should be very similar to the right speakers audio. This means that when we make adjustments we won't be doing it in a lopsided manner, due to compensating for one side of our room sounding different to the other.



Correct: Symmetrical alignment of the speakers in your room

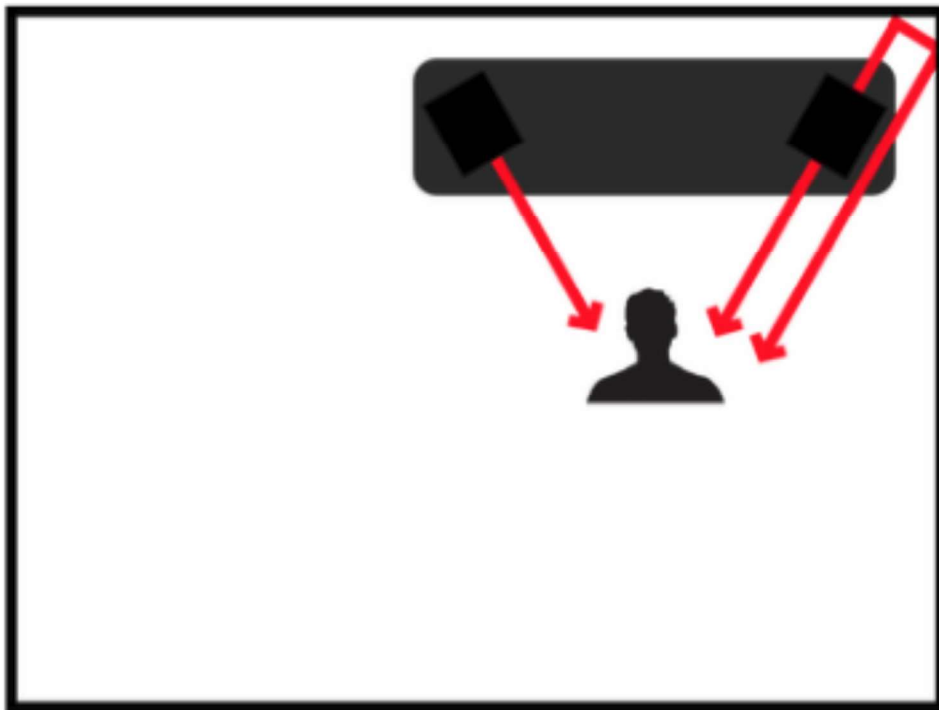


Incorrect: This alignment will cause the speakers signals to be heard differently as they are blended with the reverberated signal of the room in different ways before reaching the ear.

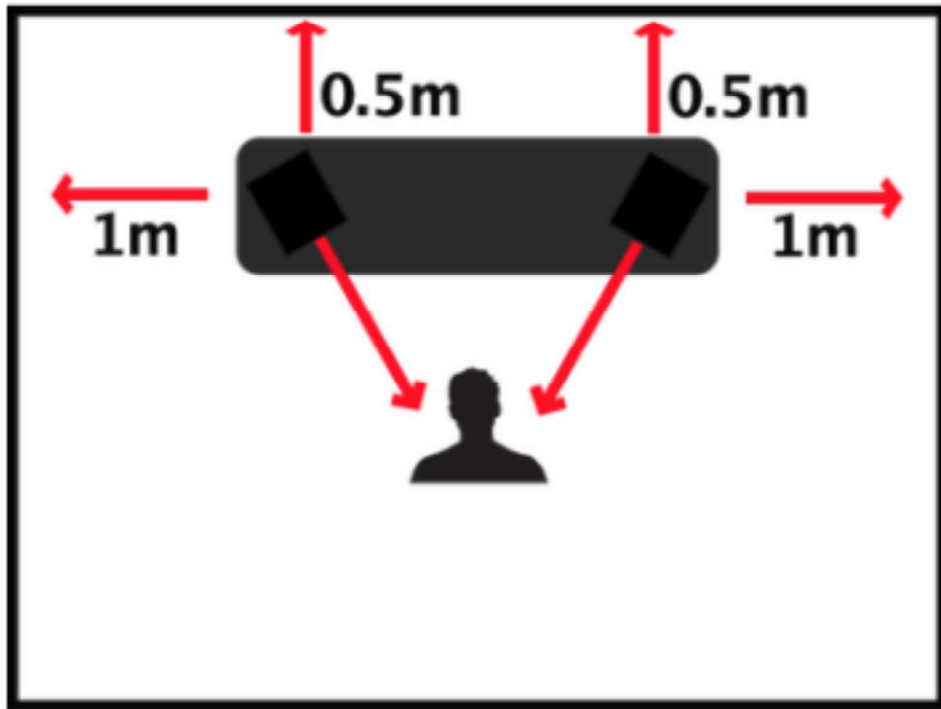
AVOID WALLS

Placing a speaker near a wall will usually cause the bass of the speaker to get louder. This is because of standing waves.

We suggest making sure the speakers are at least a foot away from any wall. Avoid corners at all costs, as they will make our bass response very inconsistent across the low frequency range, due to most speakers' sub ports usually being located on the back of the speaker. If this can't be avoided, then try to dampen the effect using some acoustic treatment in the corners, to try and eliminate the reverberated standing waves.



Standing waves causing a rise in volume in the corners of the room & an uneven frequency response due to being too close to the walls.



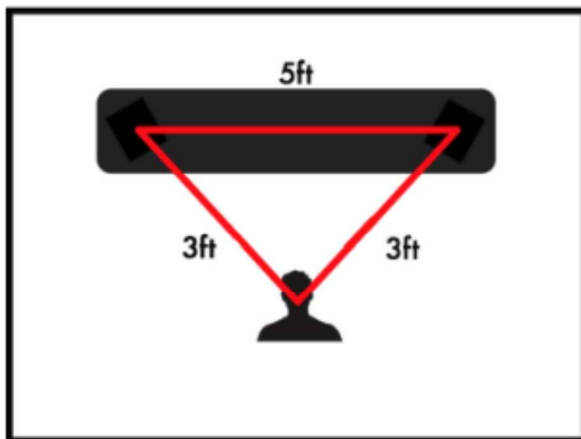
An ideal situation, keeping symmetry with the shape of the room whilst also staying away from any walls. Think about investing in some speaker stands & acoustic treatment if you need to keep your speakers away from corners.

AVOID POOR ANGLES

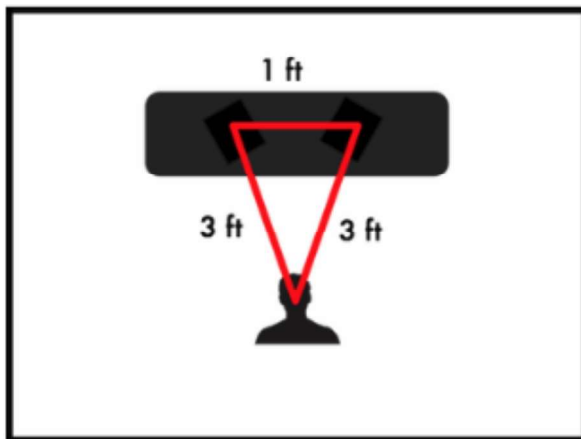
Our speakers ideally want to be positioned in the shape of an equilateral triangle, roughly 3 feet from each other, and 3 feet from the listener. This creates the least amount of high and low frequency interference, and also positions the listener's head nicely in the sweet spot.

If our speakers are placed too far apart, this will create a hole in the centre of the mix, which will cause a producer to over compensate by creating a narrow mix-down. Likewise, having the speakers too close together, means that when the producer listens to the audio, it will all be coming directly from the front, so the tendency will be to pan extremely wide, which will make the mix very unfocused and can cause problems when summed to mono.

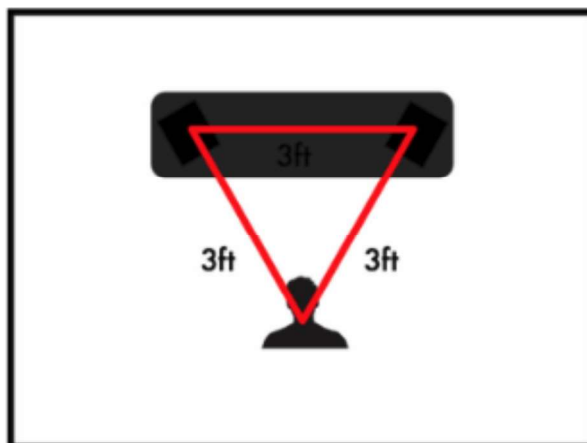
A further point is to ensure that the speaker's tweeters are at eye level and are facing the listener directly. Some OCD producers will want their studio speakers aligned to the wall, however not only will this drastically effect the bass response, but it will also cause the mix to sound duller and less detailed than it actually is.



Incorrect: speaker placement too wide causing a hole in the mix, the producer will over-compensate by panning his instruments more central which will relate to an overly narrow mix.



Incorrect: speaker placement too narrow causing the producer to over-compensate by panning his instruments to the extreme. This will result in a wide & unfocused mix



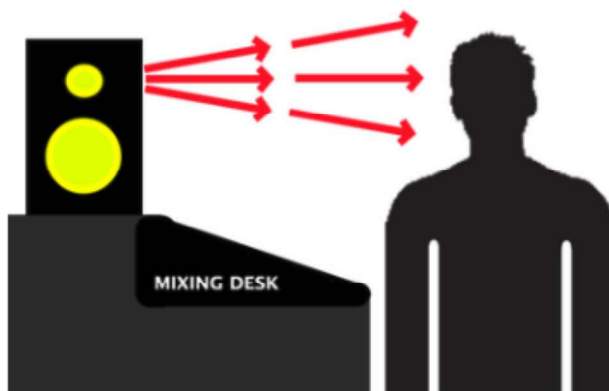
Correct: Speaker placement in an equilateral triangle between the listener and the two speakers. The recommended distance is 3ft apart. Symmetrical with the room and at least a foot away from walls.

AVOID PROBLEMATIC REFLECTIONS

As well as our main room walls. We will also get reflections off of surfaces within the room. The main surfaces to be aware of are the surfaces between the listener and the speakers, this could be a computer monitor, mixing consoles, keyboards, desks or racks.

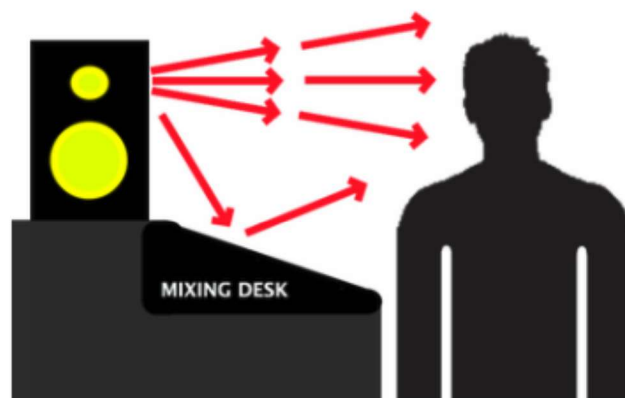
Try to keep these bits of equipment out of the way of the speaker's projection area. Clearly not all of these items can be removed, but some producers have even gone as far as to add acoustic foam around the main areas of their desk to try and reduce these early reflections.

This is also why having the tweeters at eye level is so important, as this ensures that the audio from the speakers will travel directly to the listener, instead of bouncing off other surfaces first.



Speakers tweeter set at eye height. different speakers have different dispersal angles. Typically monitors are designed to travel directly to the listener with a narrow dispersion.

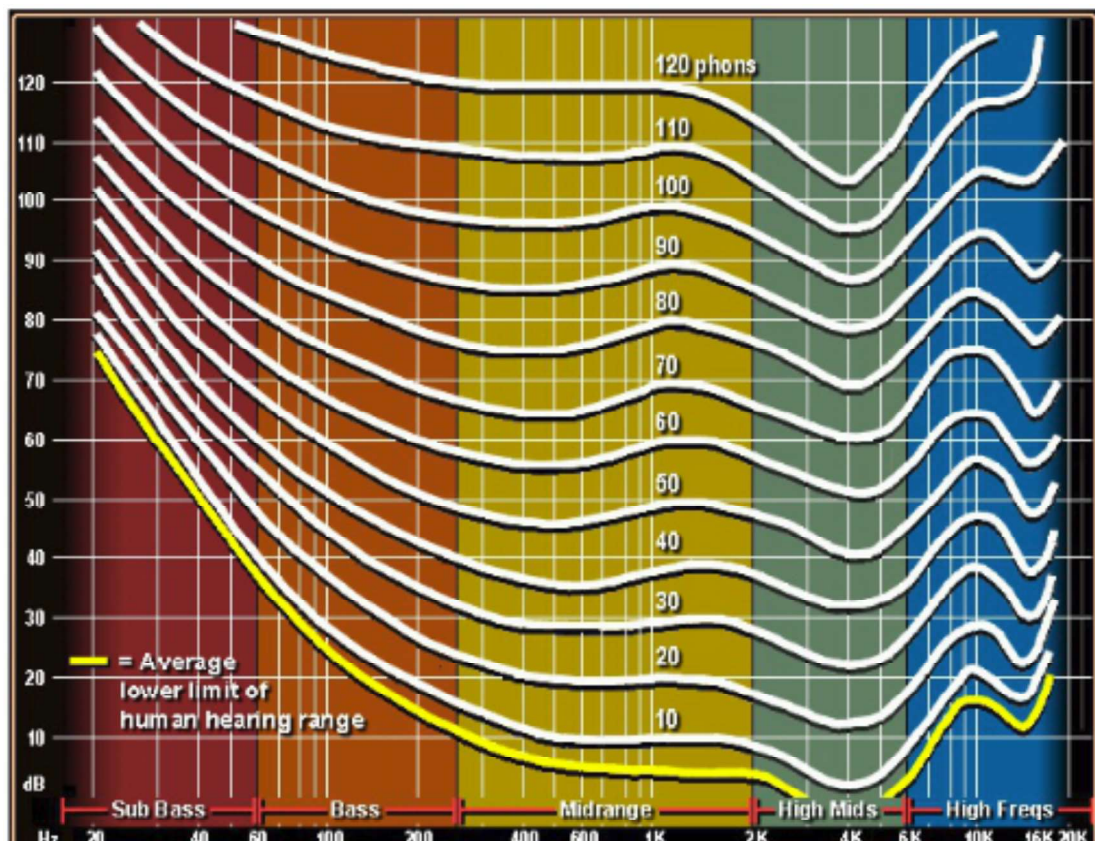
Reflective surfaces in between the listener and monitor can cause interference. Try to remove any clutter or objects to keep this interference to a minimum



EQUAL LOUDNESS AND LEVELS

Our ears do not perceive the loudness of sound in a linear way. This has been proved by equal loudness, or fletcher-Munson curves. The basic theory is that human ears are more sensitive to the high and low frequencies of the spectrum at higher dB SPL. (Decibels sound pressure level.)

Within the studio, this equates to the producer thinking that their bass is really loud because they are monitoring at 100+ dB SPL, when in fact, if they reduced the volume to 80 dB SPL, they would realise that their mix is actually lacking in low and high frequency volume. It also goes without saying that monitoring at loud volumes will increase the onset of ear fatigue, tinnitus and hearing loss.



A graph showing the equal loudness curves and main frequency ranges.

TOO MUCH LOW END

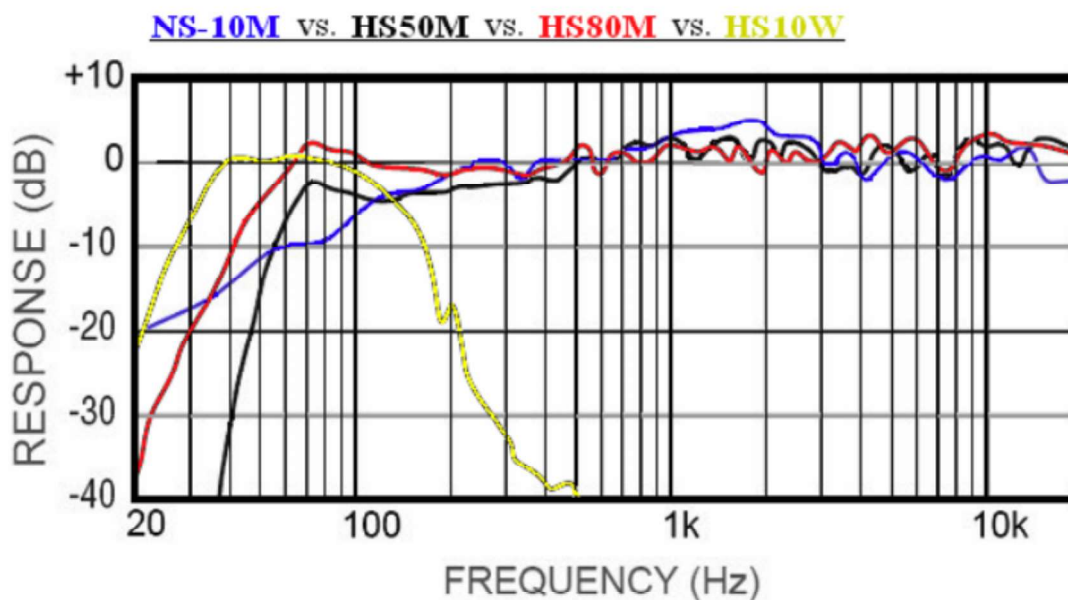
If our monitors have small drivers, which are less than 8" then we can consider adding a sub-woofer to our setup. The sub-woofer isn't going to be used like many car sub woofers are; which is to add a mass amount of bass volume.

The subwoofer is simply there to extend the low-frequency response of our studio, due to our small monitor drivers not being able to reproduce the low signal. This means that when we set up the subwoofer, it shouldn't actually add any extra volume. This can be checked with a sound pressure level (SPL) reader.

We want to get the level as close as we can to the level of the rest of the sound system without the sub. This sub should also be set up so that it's only receiving the necessary frequencies it needs (the crossover) which will usually be set at around 80Hz.

If you follow these few basic rules when setting up your speakers then you will be well on your way to a lovely sounding studio.

WildClay Mixing



Using a Sub-Woofer (HS10W) marked in yellow to enhance the low end frequency response of a monitor such as the HS50M

STUDIO MONITORS SUMMARY & KEY POINTS

- Hifi's and docking stations use psychoacoustics to colour and warm up a signal
- The monitors should be a true representation of the signal
- Larger driver sizes will be better at reproducing the bass frequencies
- Keep symmetry when placing speakers between walls
- Avoid close proximity to walls and corners, especially rear mounted speaker ports
- Use acoustic treatment such as bass traps to improve a room's frequency response
- Avoid poor speaker angles
- If the speakers are too far apart, the mix-engineer may accidentally produce a mix which is too narrow
- If the speakers are too narrow, the mix-engineer may compensate by producing a wider mix
- Avoid placing things between the speaker and the listener that may cause the sound to be affected in any way
- Extreme high and low frequencies will need to be much higher in energy to be perceived as the same loudness as other parts
- Ensure the sub-woofer is set up to match the volume and improve the low-end reproduction, rather than just boosting the bass volume