

# Home Studio Setup: How to Design and Build Your Ideal Studio



Setting up a home studio isn't easy.

It takes a bit of time and money to get going.

But when you get it right... *wow, is it worth it.*

When you have a properly setup home studio, you can produce music at home that sounds professional. You can produce music that's worthy for the radio.

In fact, numerous musicians have produced hit singles and albums in home studios. People now *choose* to record at home rather than in an expensive studio.

One of my favourite low-budget albums, 'For Emma, Forever Ago' by Bon Iver was recorded in a cabin – with only a cheap Shure SM57 microphone.

The Black Keys produced their first two albums in Patrick Carney's basement.

The White Stripes record 'De Stijl' on an eight-track in Jack White's living room.

Foo Fighters recorded 'Wasting Light' in Dave Grohl's garage. The list goes on...

## How to Build a Home Studio That Works

This isn't just an article about the basic equipment needed to record at home.

This is about building a fully-functioning home studio capable of producing #1 hits.

Don't get me wrong – it's perfectly possible to produce an high-quality album with just a cheap microphone and a pair of headphones if you have the skills.

But considering things like room choice, studio design and affordable acoustic treatment will make recording and mixing at home far easier.

You might already have all of the basic equipment needed to setup a home studio (in which case, you can skip to the section on home studio design).

But for those who don't, let's start with the basics...

## Home Studio Setup: What Equipment You Need

There are 8 key pieces of equipment that you need to start a successful home studio:

1. Laptop or Computer
2. Audio Interface
3. Microphone (or two)
4. Microphone Cables
5. Microphone Stand
6. Pop Shield
7. Headphones
8. Monitor Speakers
9. External HDD

With this home recording studio equipment, you can produce great music at home.

But even then, some of these items are optional. You don't necessarily need speakers, and a lot of people learn to mix on headphones. An external HDD will help, but you can still record without one.

Let's look at each item in a bit more detail.

## Laptop or computer

Any modern computer will be sufficient for recording.

But, if you want to run large projects with a high number of channels, a computer with a powerful CPU and 8GB+ of ram will help.

You also need to consider the operating system. Personally, I have found that Mac computers are far more reliable and stable when working with audio.

## Audio Interface



*(Image courtesy of [Wikimedia](#))*

Most people chose to use a USB audio interface. This piece of equipment allows you to connect the microphone, speakers and headphones to your computer.

Something like the Focusrite 2i2 or PreSonus AUdiobox will work well for most applications.

If you need more channels, you will need a larger interface. Eventually you might also want to upgrade to something with better preamps and converters, like the Apollo Twin or Apogee Duet.

## Microphones



Start off with a cardioid large diaphragm condenser microphone.

Let me break that down...

You want to give preference to *cardioid* microphones when recording at home. They reject sound from the rear, so are useful for less-than-perfect rooms.

And the perfect type of microphone for your first mic is a *large diaphragm condenser*.

This mic type sounds great on vocals, acoustic guitars and other acoustic sources.

The sE Electronics sE2200a is my favorite affordable microphone. The Rode NT1 and Audio-Technica AT2020 are two other solid options.

Then, if you want to add another microphone to your arsenal, I recommend purchasing a cardioid *dynamic* microphone.

These mics sound better on guitar cabs, percussion and sometimes vocals too.

Here, I would recommend the Shure SM58 or SM57.

## Microphone Cables

Yep, pretty boring, but essential!

Don't spend too much here. If the cable works, it works. You need a balanced XLR cable.

I find that the middle ground is usually best with accessories.

Don't go for the most expensive option – but don't go for the cheapest either. You want things to last.

## Microphone Stand

The same goes here. Go for the middle ground.

You need one stand per microphone.

## Pop Shield

If you ever record vocals, you *need* a pop shield.

They aren't expensive, and will stop plosives from ruining your vocal recordings.

## Headphones



You have two options here: closed-back or open-back headphones.

Closed-back headphones are for monitoring when recording (or mixing on the fly in public places).

Open-back headphones are for mixing.

For your first pair, go for closed-back headphones. You can still mix on them (just remember to mix at a low volume and use a reference track).

I love the Sennheiser HD 280 headphones for an affordable first pair.

## Monitor Speakers



It's difficult to learn how to mix without a set of proper studio monitors.

These speakers have a flat response, so you hear the mix as it really is. Normal hi-fi speakers color the sound – not good.

You *can* mix on headphones alone. But only after a lot of practice and experience.

Even then, it's always worth checking your mix on monitors.

I love the affordable Yamaha monitors, such as the HS5's or HS8's.

For smaller rooms, opt for 5" speakers. For larger rooms, or acoustically treated rooms, opt for 8" speakers.

It doesn't really matter which speakers you chose, though – just buy a pair and stick with them for a long time. Learn how they sound.

It's also worth investing in a set of monitor stands or monitor pads.

You need to be careful how you set your monitors up – we are going to look into this in much more depth later in this guide.

## External HDD

If you start recording lots of music, you are going to run out of hard drive space pretty quickly.

Purchase a dedicated external HDD and backup your projects there.

Your DAW will probably run smoother if you record straight to the external disk too.

*That's all of the basic recording equipment you need to build a home studio!* Now we can move onto recording studio design.

## Home Studio Design: The Perfect Room Setup

You might have the best equipment in the world...

But if you don't set it up properly, your mixes will never improve.

You don't NEED to do any of this. But choosing the right room, setting it up properly and adding some affordable acoustic treatment will make your job 10X easier.

I can remember the first time I re-organized my room and added acoustic treatment. It was a *breakthrough* for me.

Suddenly I could hear every detail of the mix, every subtle EQ move and all of the low end.

In this guide, I want to show you how to do the same.

But don't get obsessed with this stuff. No room is perfect.

It's highly unlikely that you will be able to find the perfect room, put the speakers in the perfect position and treat the room perfectly.

Even professional designed and built studios make various compromises.

Just try to meet as many of the following suggestions as possible.

If you can't, you will still be able to produce good mixes.

My room is FAR from ideal. But I can still mix in it.

Don't get too caught up in the science. Do your best, and then learn to mix with what you have.

Now, let's dig in...

## Choose the Right Room

There are 5 vital things you must consider when choosing a room:

1. The size of the room
2. The dimensions of the room
3. The surfaces within the room
4. The height of the ceiling
5. Noise level within the room

## Room Size

Avoid small rooms. They're an acoustical nightmare.

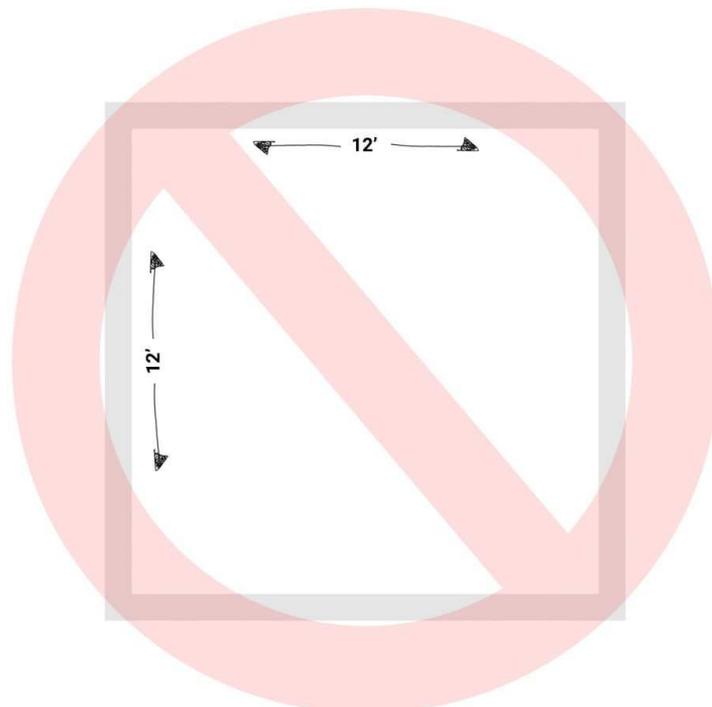
The bigger the room, the better. Plus, that means more space for recording (and possibly a drum kit).

## Room Dimensions

Avoid rooms with equal width and length dimensions.

If the room is an exact square, avoid it like the plague.

This creates an immense buildup of standing waves (which are bad).



## Room Surfaces

Try to avoid rooms with too many reflective, hard surfaces.

A kitchen would be the worst place for a home studio. But why would you want to do that, anyway?

A room with a floor length window or mirror along a whole wall would be a bad choice.

A concrete basement would be a VERY bad choice.

Wooden floors are desirable as carpet only absorbs high frequencies, which can make the room sound muffled.

But windows, mirrors, bare concrete, marble etc. are highly undesirable.

## Ceiling Height

If the ceiling is too low, vertical reflections are going to become much more of an issue.

When you record vocals, for example, a strong reflection from the ceiling can cause comb filtering – which is very bad.

As for mixing, a low ceiling can be equally destructive.

## Noise Level

Can you hear passing traffic in the room? Is it next to an A/C unit? Or a boiler?

You want the room to be as quiet as possible.

## Don't Have a Choice?

Quite often you will only have one room available to you. Or maybe you have a temporary setup in a bedroom or living room.

This is where acoustic treatment becomes vital.

If you suffer from any of the problems mentioned above, there are ways to reduce the negative effects with acoustic treatment. This will be discussed later in the guide.

## Room Setup and Speaker Placement

Before you consider acoustic treatment, you need to make sure organize your room in the right way.

It's easier to start with an empty room. This gives you a blank canvas to work with.

The main thing to consider when designing the layout of your room is the position of the speakers.

When recording, you are mobile (in most cases). You can move the microphone around the room.

But once you set up your speakers, they're gonna stay there.

Here's the ideal way to set up your room...

### Position the Speakers Away From the Wall

Many monitor speakers have bass ports on the back. If you position them right up against a wall, they won't work properly.

Check the manufacturers guidelines for the minimum distance between the speaker and the wall.

Contrary to popular belief, positioning your speakers a foot or two (30-60cm) away from the wall [doesn't always result in a more even bass response.](#)

In fact, sometimes it can even be detrimental. The reflection from the wall can cause more issues than the bass buildup that comes from having your speakers near a wall.

The solution?

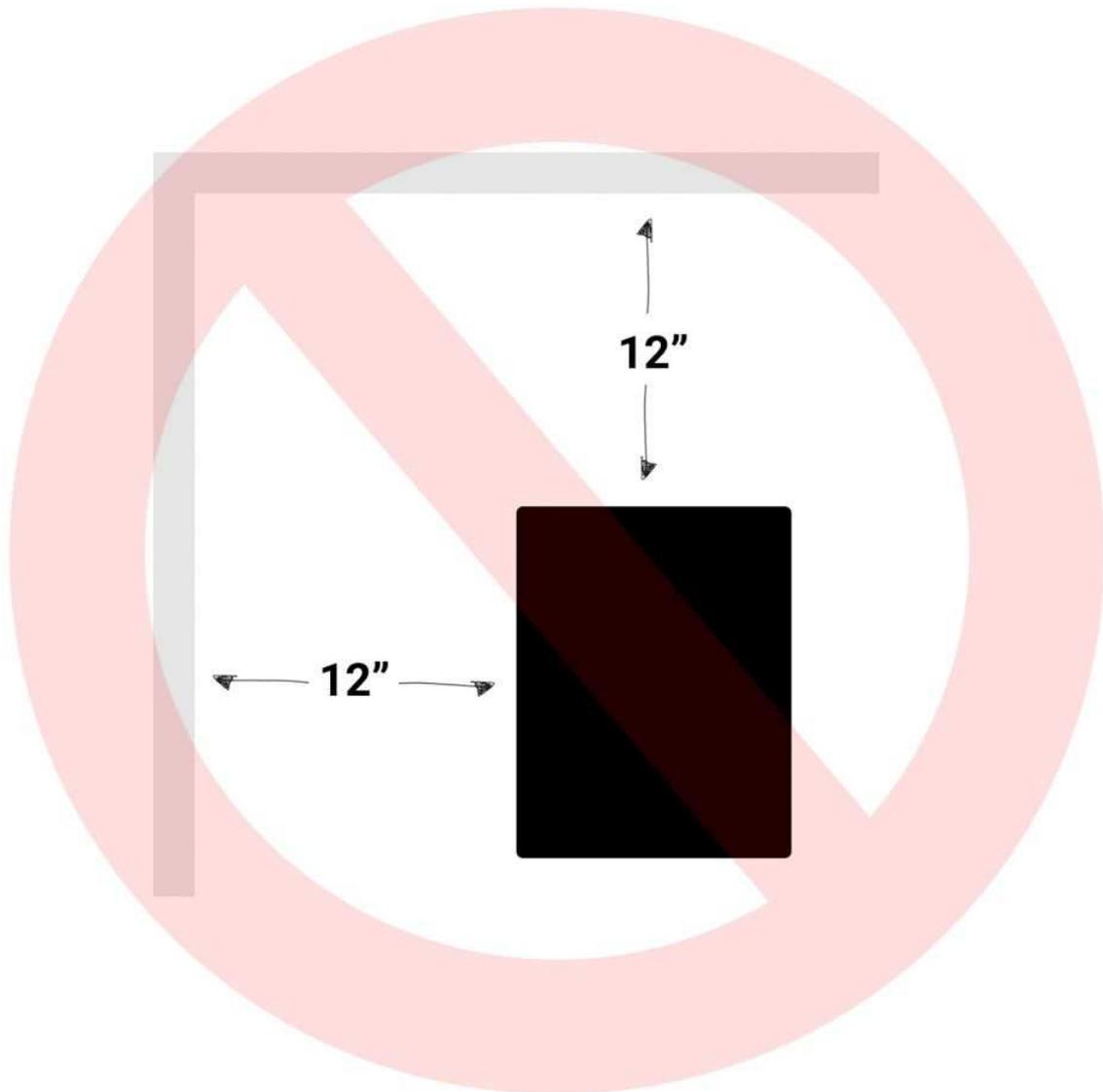
Position your speakers the minimum distance from the wall (according to the manual). Then, if you can, reduce the bass on your speakers.

### Distance to the Rear Wall and Side Walls Should Be Unequal

If the speakers are the same distance from the back wall as the side walls, move them.

This can result in a [buildup of standing waves.](#)

For example, if each speaker is 12" from the rear wall AND 12" from the side wall, they should be moved.



## Position the Speakers Along the Longest Wall

This ONLY applies if you have a larger room.

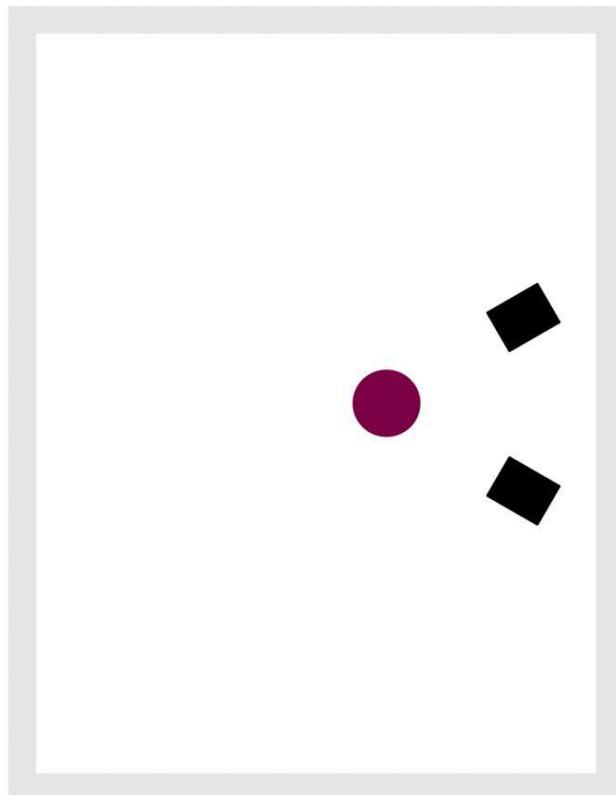
Your aim here is to reduce the volume of the first reflections from the speakers into your ears.

Strong reflections from can cause comb filtering and a range of other issues. These come from the nearest walls to the left and right of the speakers.

You don't need to know *all* the details – just know that the first reflections are highly problematic.

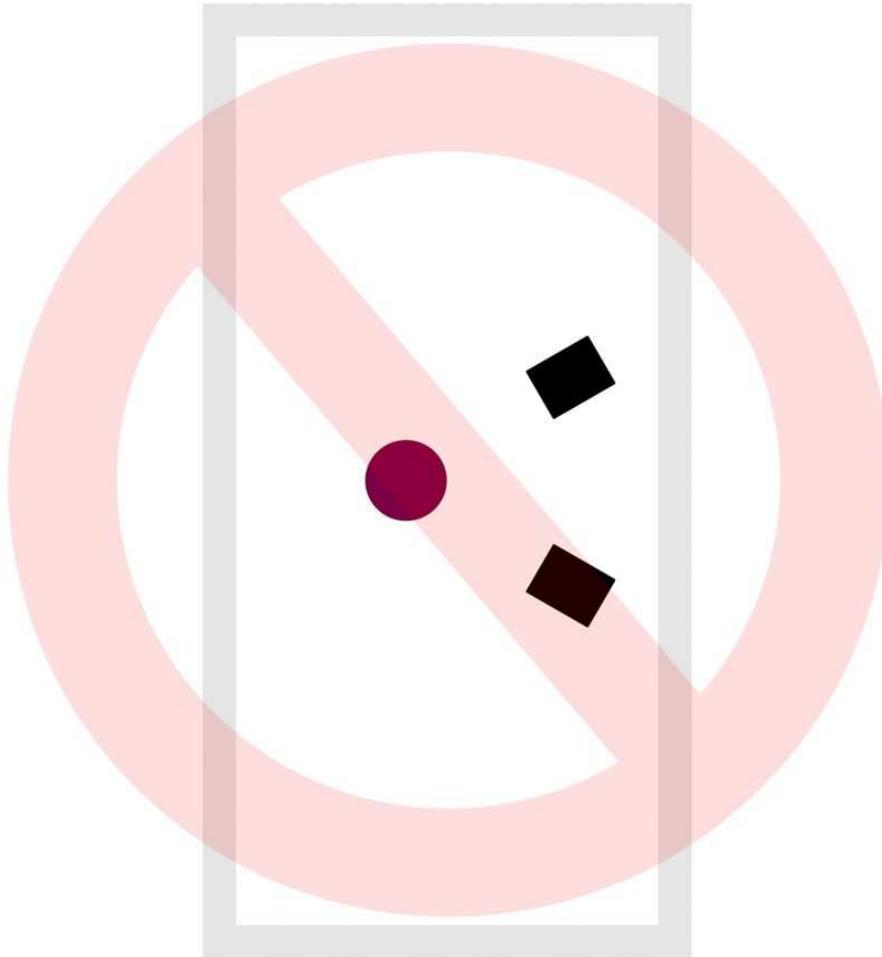
By positioning the speakers along the longest wall, you are moving that reflection point further away from the speakers. This reduces their volume, as they must now travel further before reaching your ears.

To maintain a symmetrical stereo image, it's best to position the speakers in the middle of the wall.



BUT, if you have a small room, this would be a bad idea.

If positioning the speakers along the longest wall causes the listening position to be over halfway across the width of the room... don't do it.



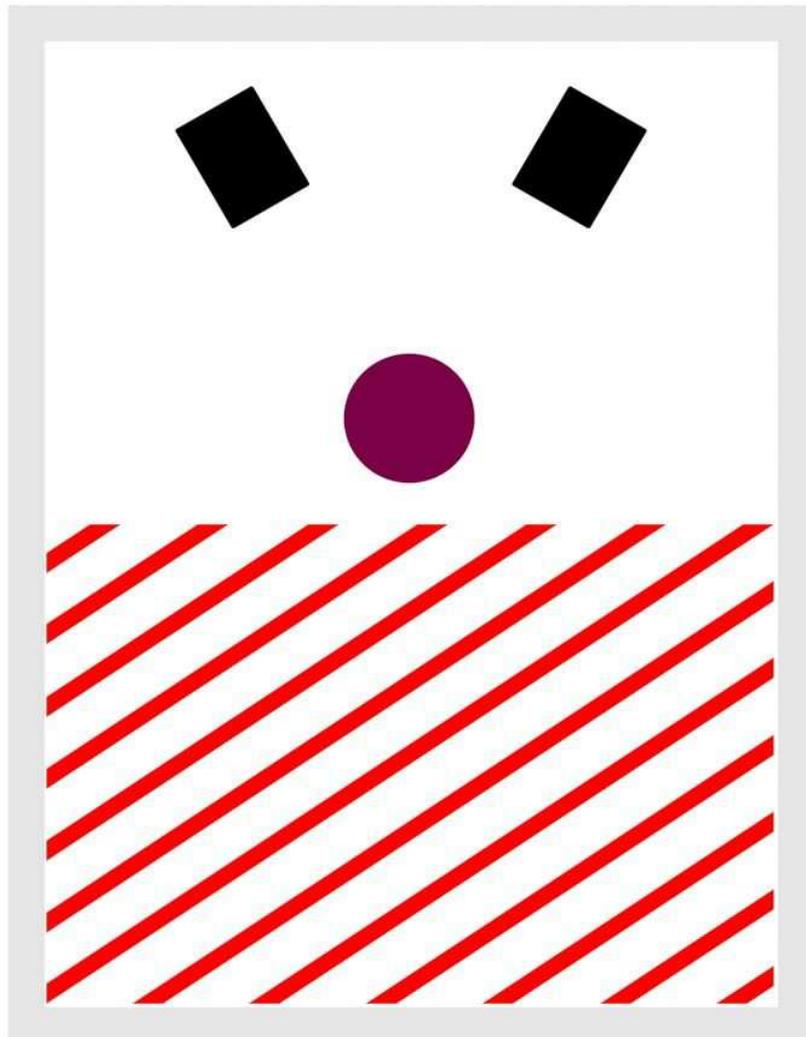
This leads nicely onto my next tip...

## Avoid Having Your Listening Position Halfway Across the Length of the Room

This only applies to the length of the room AND the distance between the floor and ceiling.

If your head is halfway between two the front wall and back wall, OR halfway between the floor and ceiling – you will hear a distinct loss in bass.

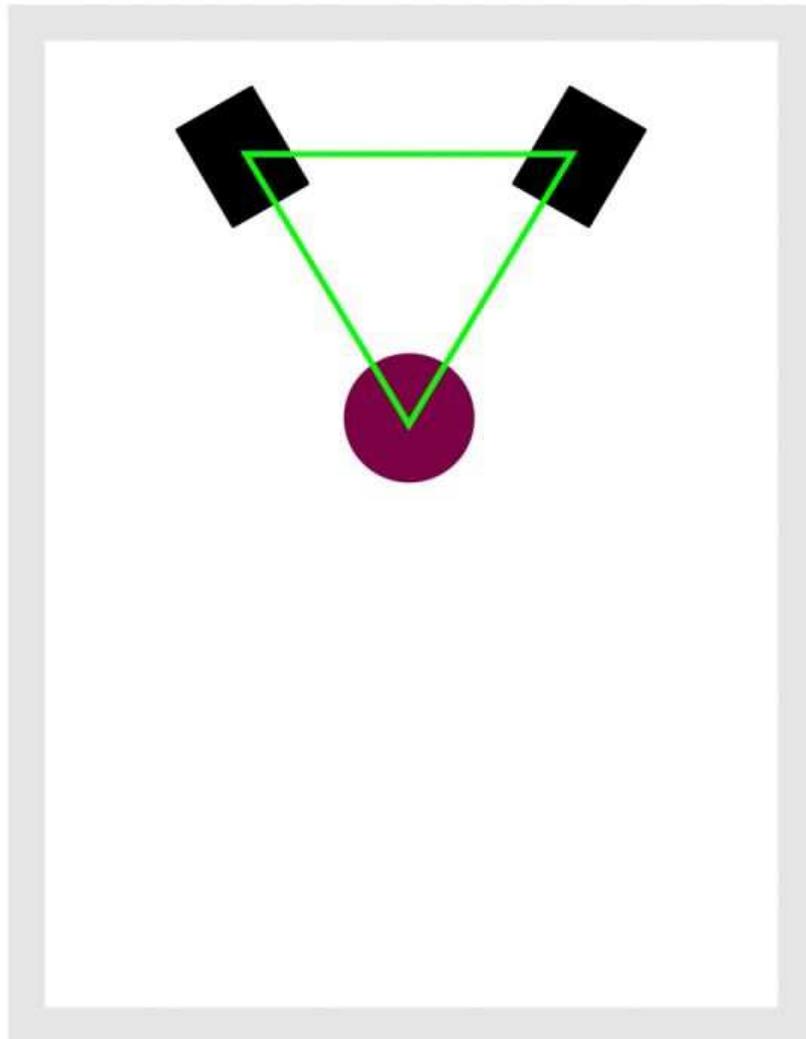
Consider the floor and ceiling as well as the walls.



## Create an Equilateral Triangle Between Your Head and the Speakers

The distance between the speakers should be the same as the distance from your head to each speaker.

This is the listening sweet spot.



## Position the Speakers at Ear Level

Most affordable monitor speakers are near-field as they are designed for smaller rooms. This means they are directional and have a designated sweet spot on the vertical plane as well as the horizontal plane.

Try to get the tweeter (the smaller speaker above the large one) level with your ears.

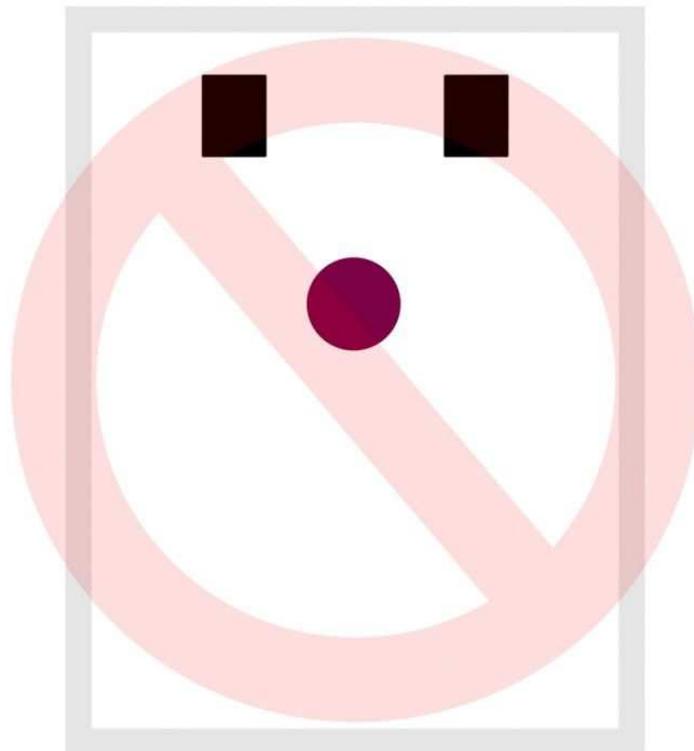
## Don't Put Your Speakers on Their Sides

Unless your monitors are specifically designed to be mounted on their sides, position them upright.

If you don't you will completely throw off the sweet spot.

## Point the Speakers Towards Your Ears

Most speakers are designed to be angled inwards pointing at your ears- not pointing straight ahead.



That's it for speaker placement.

I realize that's a lot to consider, so don't worry too much if you can't meet every requirement.

To be perfectly honest with you, my listening environment only meets 80% of these needs. You have to make compromises.

Now that your speakers are in the ideal location, you can consider treating the room acoustically.

## Home Studio Acoustic Treatment

Acoustic treatment has two main aims:

1. Correct any problems with the room
2. Create an ideal environment for recording/mixing

Before we go into more detail, I just want to clear something up:

Don't let acoustic treatment scare you.

It doesn't need to be complicated, and you don't need to be a scientist.

The study of acoustics is an entire field of physics. But you don't really need to know *any of that* in order to treat your room to a good standard.

### Which Type of Treatment?

Acoustic treatment doesn't have to be expensive. You can build your own acoustic panels if you have the time ([here's how](#)).

Avoid foam acoustic treatment. It seems like this is the best option, but it's all marketing.

Foam treatment only affects high frequencies. In a home studio, it's the low frequencies that are the most problematic.

Build your own rockwool/fibreglass panels or purchase [pre-made absorber panels](#).

### Guerilla Acoustic Treatment

If you have a complete lack of funds, you can improvise with household items. Try using the following in place of absorber panels:

- Materesses
- Thick Duvets
- Thick Drapes and Curtains

## Ideal Acoustic Treatment Placement

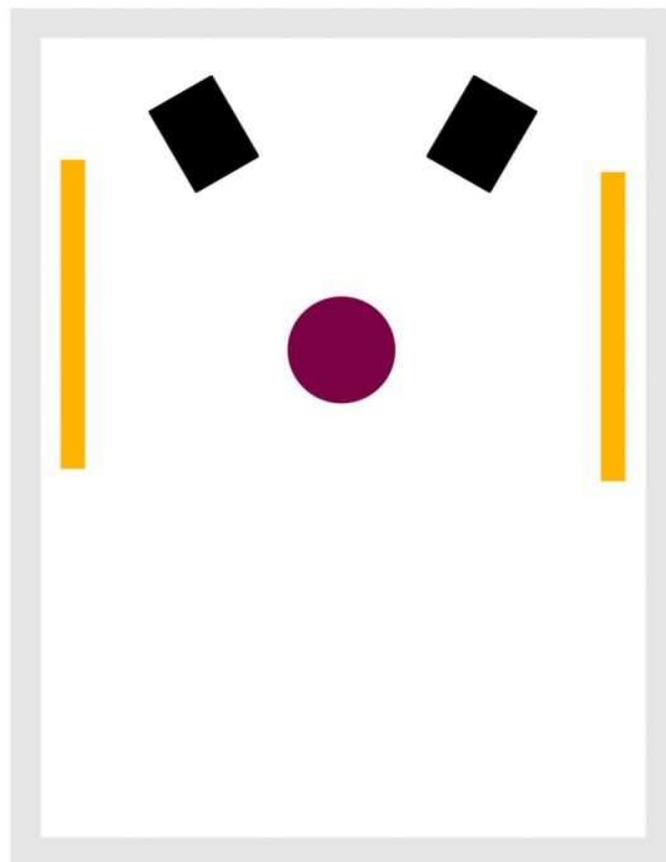
These are the primary locations to place acoustic treatment in a home studio for MIXING, in order of priority...

### 1 – First Reflection Points on Side Walls

The walls to the left and right of the speakers. Imagine the walls are a mirror. Wherever you would see the speakers is where you should place the treatment. Also consider the ceiling if it's low.

If you are using rockwool panels, try to make the panels at least 4" (10cm) thick.

You can also add an air gap behind the panel to increase the efficiency. In my room, I opted for 4" panels with a 2" air gap at the first reflection points.

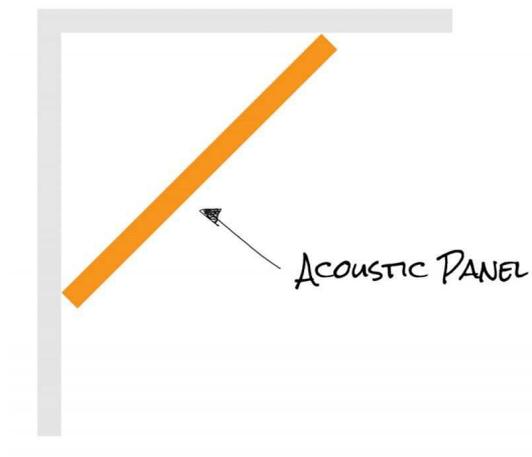


## 2 – Room Corners

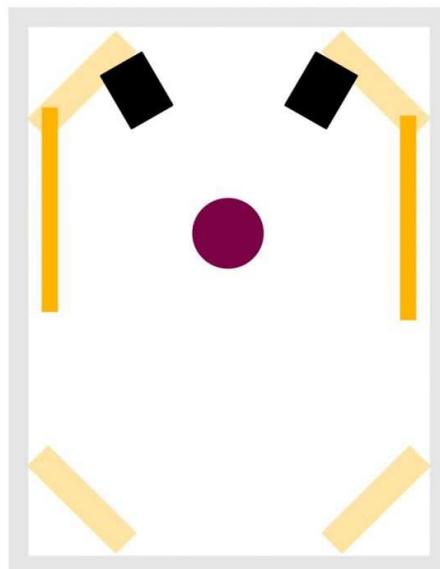
This is where bass builds up the most.

You can use purpose made bass traps...

Or you can absorber panels at an angle across the corner. This has the added benefit of creating an air gap that increases the efficiency of the panel.



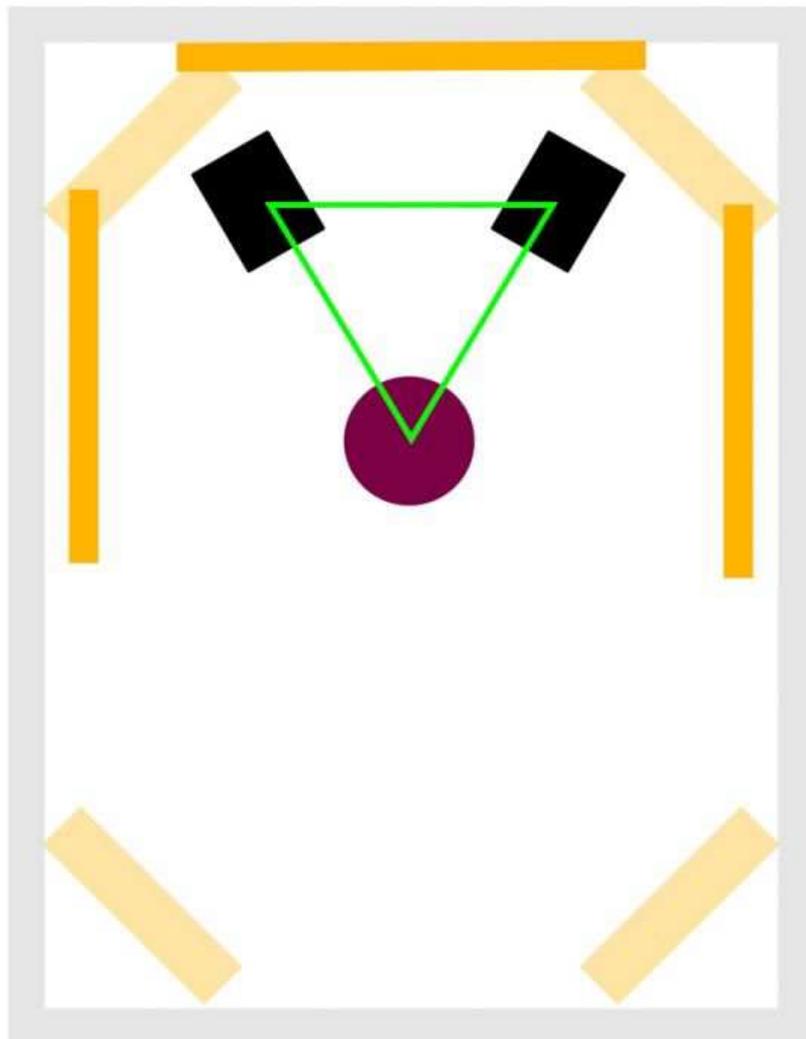
Also go for thickness here with panels ideally thicker than 6" (15cm).



### 3 – Wall Behind Speakers

After treating the side walls and corners, you can place treatment *behind* your monitor speakers.

This will allow you to move them a bit further away from the wall (1 or 2 feet) without suffering the ill effects of comb filtering from the reflections. This will result in a more consistent low end (and no need to cut the lows from your speakers any more).



## Fixing Room Issues

If you have a less than ideal room, you can also treat those issues.

For example, if the wall has a lot of hard, reflective surfaces, add more absorption.

If the ceiling is particularly low, add absorption there.

## Acoustic Treatment for Recording

So far we have only discussed room setup and treatment for mixing. A room that is ideal for recording has a different set of requirements.

For us, though, working in a one room home studio requires some compromises.

Here are a few tips for creating a hybrid recording/mixing room...

### Don't make the room too dead

In general, you want a 'live room' for recording.

This means a room that has more diffusive or reflective surfaces, rather than a room with a lot of absorption.

To find the balance, just *be careful not to overtreat your room*.

But, that would be a very hard thing to do.

Unless you invested considerable time and effort into building or purchasing a high number of absorber panels, the room will be appropriate for recording.

Just don't cover the ceilings and walls in carpet. That's the worst thing you could do, from both a mixing AND recording perspective.

### Use moveable panels

If the panels that you build or purchase are moveable, you can set them up for specific recording requirements.

For example, you could make a vocal booth out of 3 panels positioned into a triangle.

Or you could place a panel in front of a guitar cab to reduce reflections from the opposing wall.

## Split the room into two halves

Dedicate one side to mixing. Add absorber panels at the first reflection points, corners and walls nearest the speakers.

Then leave the other end of the room 'live' with no absorption or treatment.

## Conclusion

Setting up a home studio that can produce studio-level mixes isn't easy...

But it doesn't have to cost a lot either.

Placing the speakers in the best position for the room will have a drastic impact, and won't cost you a thing.

And if you can spare the time to build acoustic panels, you will notice how easier mixing becomes.

At the same time, it's perfectly okay if you don't have the time *or* money for acoustic treatment... or even monitor speakers.

You can still get great results with a single microphone and a pair of headphones – it might just take you a little longer.