# Low-budget acoustic treatment options.

## For the beginning voice actor.

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# Introduction: Why do we need acoustic treatment?

A good question, right? And yet, any serious voice artist or recording engineer will tell you that, of all the components in your recording setup, the space is by far the most important. Why's that, anyway?

When we speak, our voice bursts out like rubber shotgun pellets, and bounces all over the walls, floor, furniture… Annoyingly, this means that, aside from the sound that goes directly into the mic, there will also be reflections, especially in the bass frequencies, sneaking their way in and making the recording sound worse ("echoey", "boxy", etc.)

End result: **a better mic in a bad space will sound worse**, because it will pick up more of those reflections that don't sound good!

The solution? Treating your room to banish the reflections! There are two ways to go about this, diffusion (making the waves scatter) and absorption (absorb the waves into some thick material). Of the two, absorption is what we'll focus on, as it's more useful and easier to use.

# Caveat! Sound *treatment* is **NOT** sound *isolation*!

This is a sufficiently important distinction that it's worth pointing out. This document will provide tips and tools to help make a room sound better. It will ***not***, however, help isolate a room from outside noises, such as lawnmowers or trucks, and it also won't save you from your neighbors getting annoyed when you do screaming parts.

There are some things you can do, however, mostly by focusing on doors and windows. The goal is to "plug up" any gaps where air can move between your space and the outside world. Weather stripping and door sweeps on doors are a great first step, for instance.

For a more detailed presentation on what you can do, see this video by industry legend Bobby Owsinski (Frank Zappa, the Byrds, …), especially the timestamped section (21:00).

# The Freebies

0$ guaranteed.

If you're just starting out, chances are you already have everything you need for your very first vocal booth. This section focuses on methods that cost *absolutely nothing* to set up… Assuming you already have the materials on hand.

# “Repurposed” acoustic treatment material

Here are some things you probably have lying around that you can use to improve the acoustics of any room, whether you use the methods in this document or not, at no cost. I won’t go go too in depth into these, as they are fairly self-explanatory.

- Comforters/Duvets (the thicker the better)
- Pillows
- Clothes (in sufficient quantities)
- Mattresses
- Stuffed animals and plushies
- Carpets and carpet liner
- etc.

# The Blanket Over the Head

Cost: Definitely $0

Don’t laugh! By far the simplest and cheapest method you’ll encounter on this list is to take a blanket or comforter (the thicker the better), and toss it over your head.

No, seriously, that’s it. Doing this encases you in absorbent material, and most of the methods that follow can be seen as merely improving upon this basic concept: by mounting the material on a frame to give you space to move, using a better material…

But for now, this is actually an acceptable starting point. Just… try not to move too much. Don’t want your mic picking up rustling noises.

This was an actual moment that happened on an official Voices dot com video. And you know what? He sounded pretty good down there!

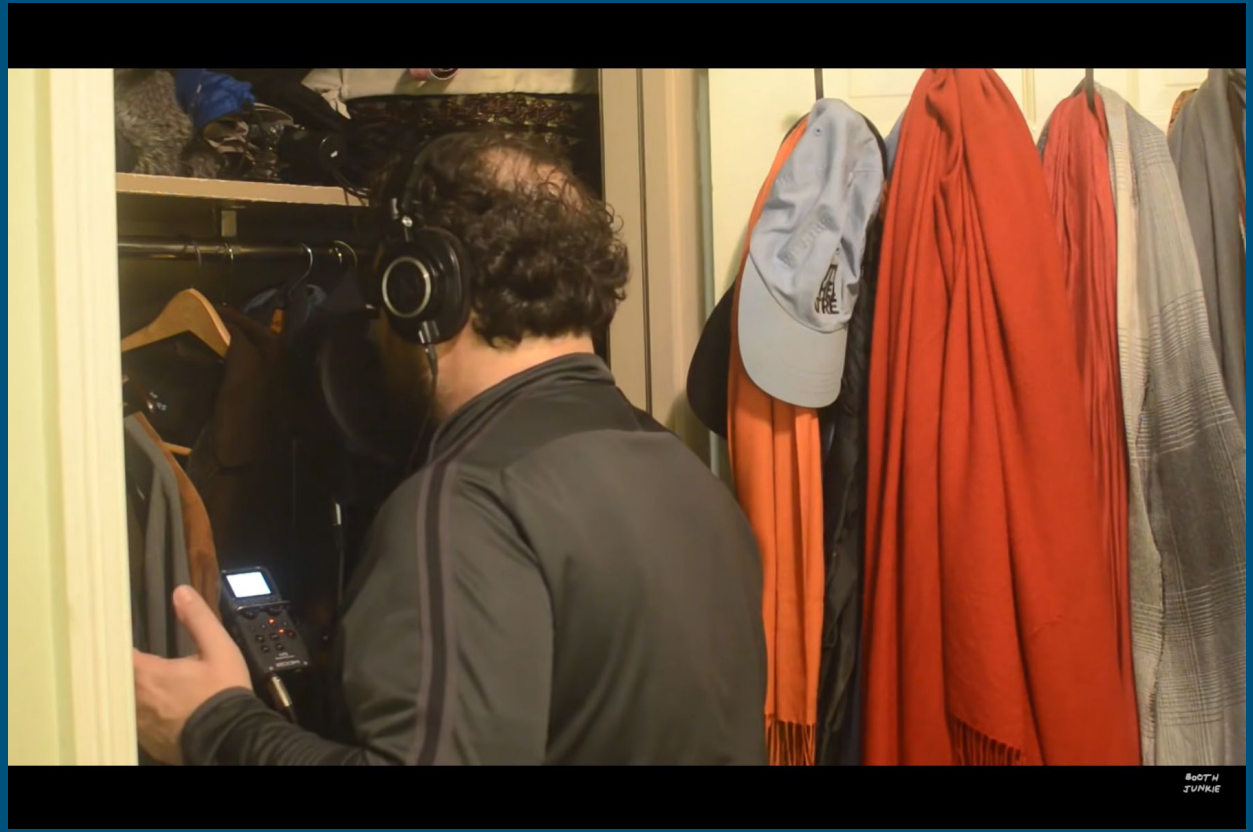
# The Closet

Cost: 0$

Probably the simplest starting method. You take a coat closet, filled with coats, shove your mic in there, snuggling it among the coats, and… you're done.

No, seriously. As long as no coat is directly touching the mic, and you don't have it too close to the back wall, you'll get an excellent "first booth" sound.

That being said, the closet method can lead to a somewhat "boxy" sound if you go too far into the closet. Recording *inside* a regular closet is probably a poor idea.




The excellent Booth Junkie demonstrating the closet method. (link to video)

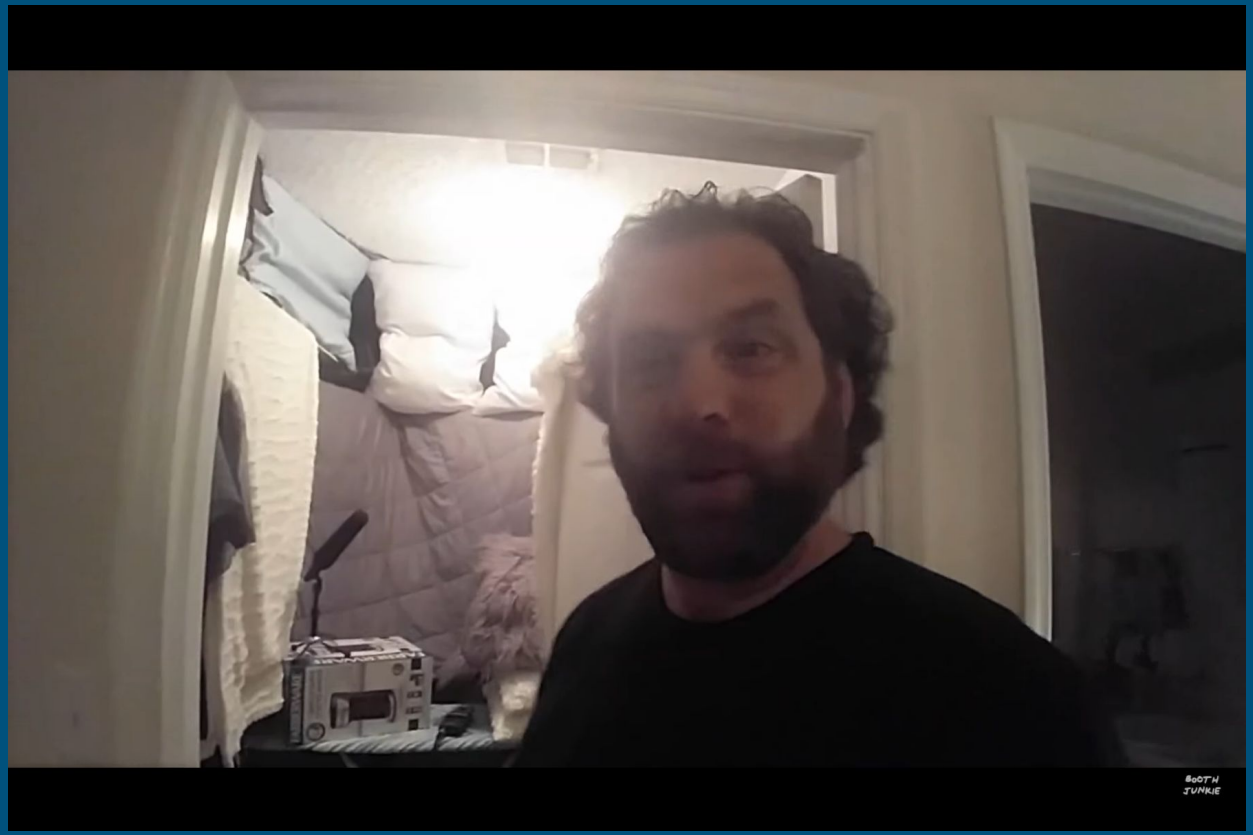
# The (Walk-In) closet

Cost: 0$ (If you're lucky)

This is a direct upgrade to the closet method. If you have a walk-in closet, you're really lucky, it's probably the *single best place* to start recording! It's not too big and it's got clothes everywhere (which help greatly with absorption).

Chances are you can just take your mic in there and record something awesome with fairly minimal acoustic treatment.

*You lucky dog.*




Booth Junkie (again!) with an improvised walk-in closet booth. (link to video)

Thanks for the idea Colin!

# The bookshelf method

Cost: 0$ (Maybe)

Not a booth by itself, but potentially a good component for one. This one's pretty simple. You take a ***backless*** bookshelf, and you fill it with books. Make sure each book is at a different depth so that the surface is as uneven as possible.

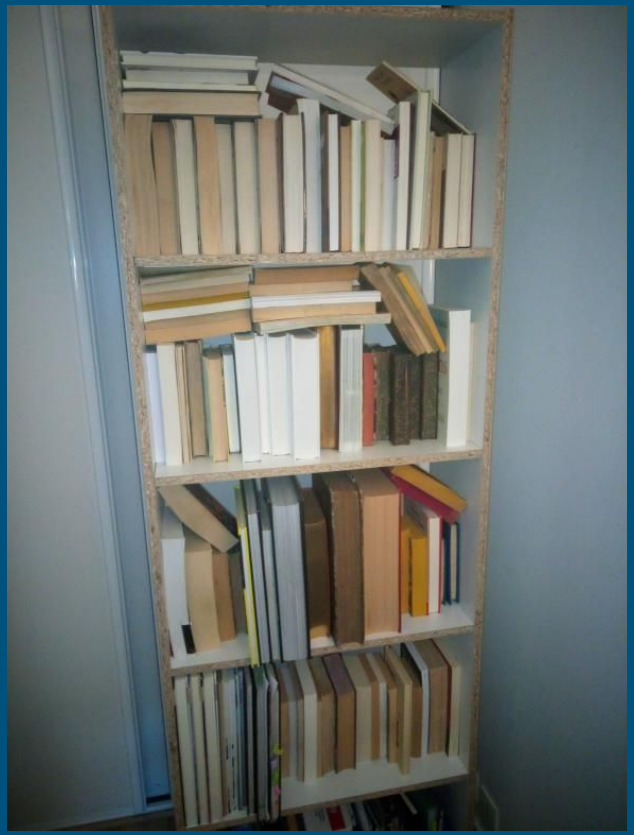
At that point, you simply turn the bookshelf around such that the *paper* side is facing towards the microphone.

This accomplishes three things:

**1-** The paper pages provide surprisingly good absorption.

**2-** The uneven surfaces make for an excellent person-tall diffuser.

**3-** When you're done recording, it becomes a bookshelf again; Great for a temporary "put up & take down" booth!



The bookshelf method in action with an IKEA Gersby.

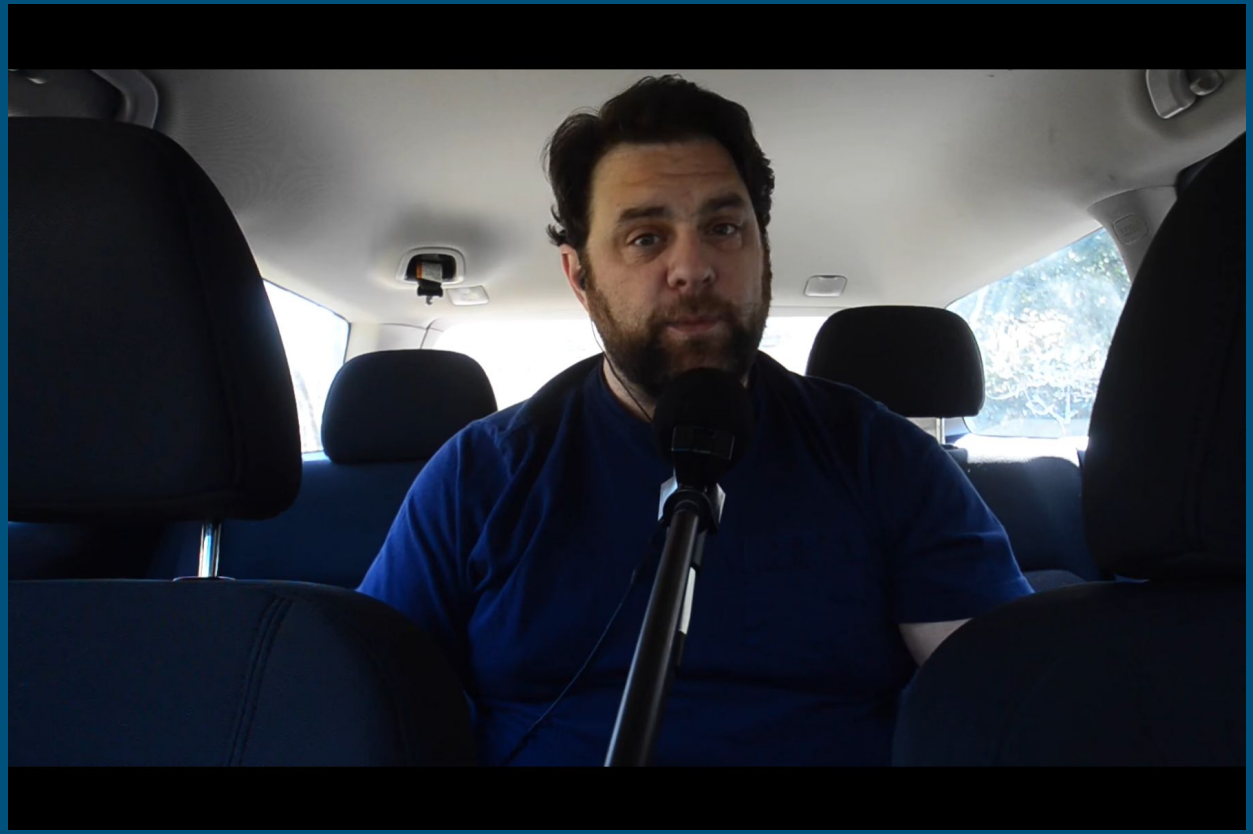
# The Car

Cost: 0$ (If you already have one)

If you lack the space or the material for one of the previous methods, your saving grace might come in the form of your car if you own one.

Cars are built to be as acoustically isolated from the outside world, have thick absorptive chairs (especially if they’re fabric and not leather) occupying most of the space, and often minimize strictly parallel surfaces, which reduces standing waves. Add some cushions, blankets or acoustic panels, and you might have an awesome setup right there!

Try it out! Take your recording setup and put it in your car! The results might surprise you!



Booth Junkie in his car. Where won't this man record for our sakes? (link to video)

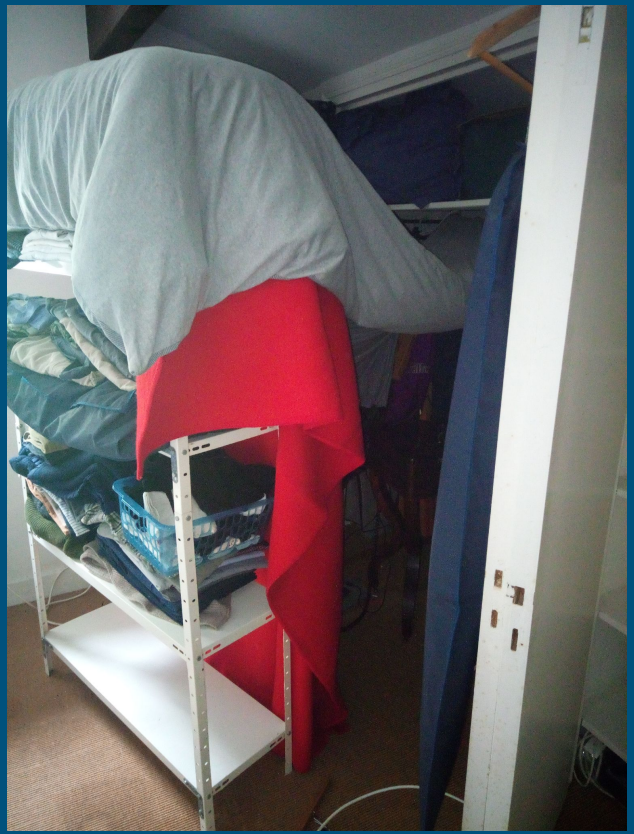
# Example in action: My Closet Booth

Cost: 0$

For a practical example of how to put all of this together, here's a booth I set up not too long ago. I had access to a closet as a starting point, and then used various tricks to improve it from there.

I used a freestanding shelf filled with clothes as a "back wall" behind me, and draped a thick comforter over me. A small table on wheels, several pillows stuffed behind my mic and in the space over the closet, and more comforters and blankets put up around the place, and I had a pretty decent-sounding booth for nothing at all.

Tough to set up and take down, however, and all those blankets could potentially become a fire hazard. Something to bear in mind if you go this route.



My “advanced” closet booth. On the “budget” end of the scale, creativity is key!

# El Cheapos

1-15$ components,
200$ or less full booths.

Just because you want to invest into a slightly more professional sounding (and looking) booth doesn't mean you need to break the bank! Here are some of the budget-lightweights that punch far above their class.

You can keep your "Freebie" booth, and use some of the materials and techniques discussed here to upgrade it.

# A warning about Snake Oil.

## If it sounds too good to be true...

- You might have seen some videos of putting up thin panels of foam on the walls, sometimes with an “eggcrate” or “zigzag” pattern carved into them. Don’t bother. Acoustic foam has its purpose, but those panels are generally too thin to do much at all, and the cheap ones especially will do little more than decorate your booth. Some people like the way they look, though.

- You might have also seen some gadgets that go right around the mic, promising good sound without all the hassle of a full booth. Maybe it’s a massive cover, like the Kaotica Eyeball, a foam box you put the mic in, or a panel that goes behind the mic. While *some* of these can improve the sound your mic gets, they tend to be expensive for the useful ones, and none of them are a proper replacement for a well-treated room (or we’d all be using those instead!), and at worst some of them can make your audio sound boxy. Spend your money on “real” treatment first.

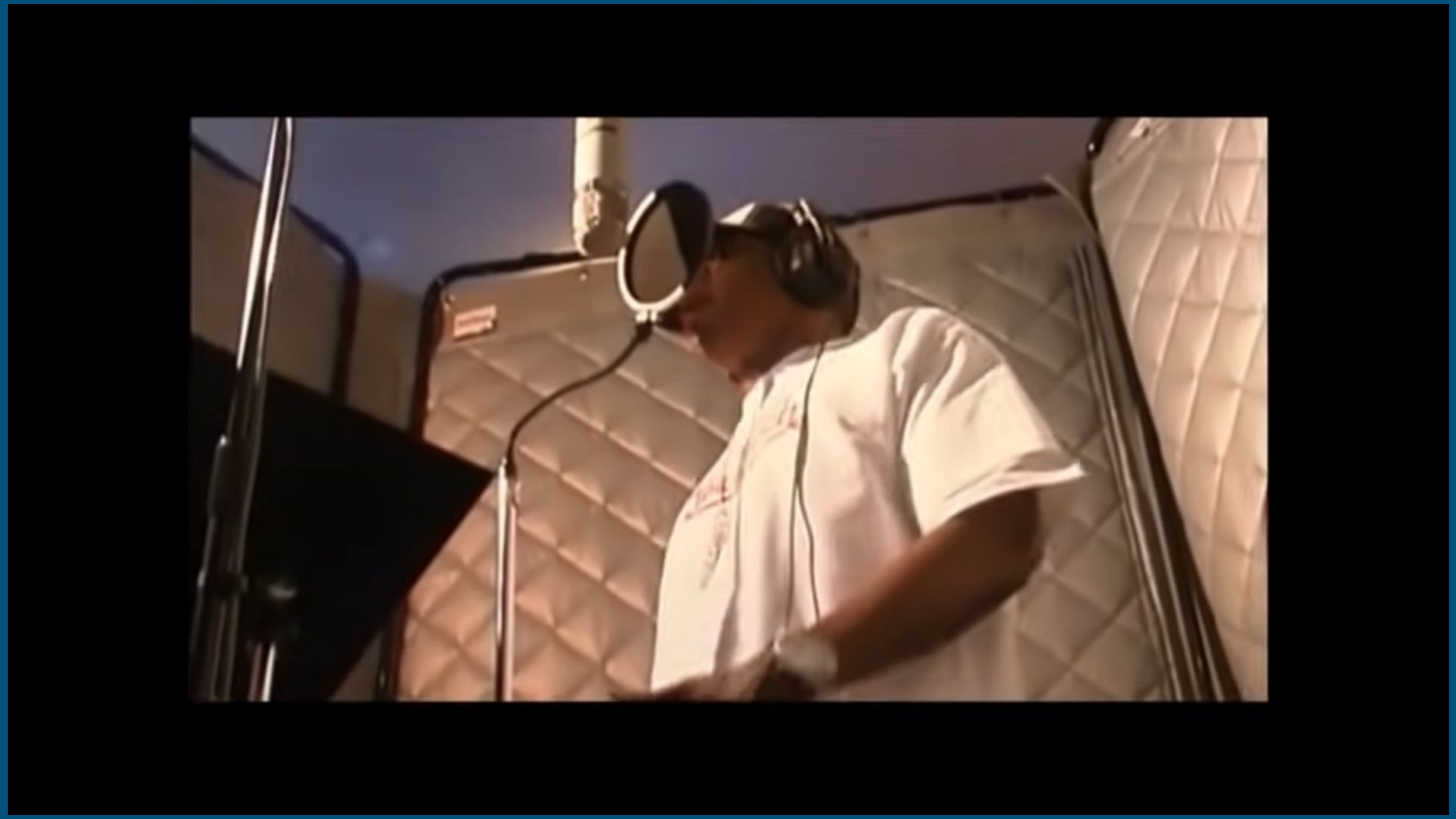
# Moving Blankets

Cost: 5-15$ (Amazon.com) / 6€ (Amazon.fr)

An enduring classic, and for good reason! These babies are light, cheap, easy to work with, and surprisingly great at sound absorption. These are absolutely the workhorse of the “El Cheapo” tier, and many a new voice actor and singer has gotten their start with them.

The reason they’re so good is that these are functionally acoustic blankets at a mere tenth of the price of what a serious studio acoustic blanket would cost. And if you double them up, you’re unlikely to hear the difference.

Make sure to grab quilted “American Style” blankets! The fuzzy gray ones are mostly identical acoustically, but they’re ugly, and those exposed fibers can irritate your throat and lungs… Less than ideal for VO!



See this picture? That's JayZ recording 99 Problems surrounded by acoustic blankets. If it's good enough for him, it's good enough for you.

Thanks for the idea (again!) Colin!

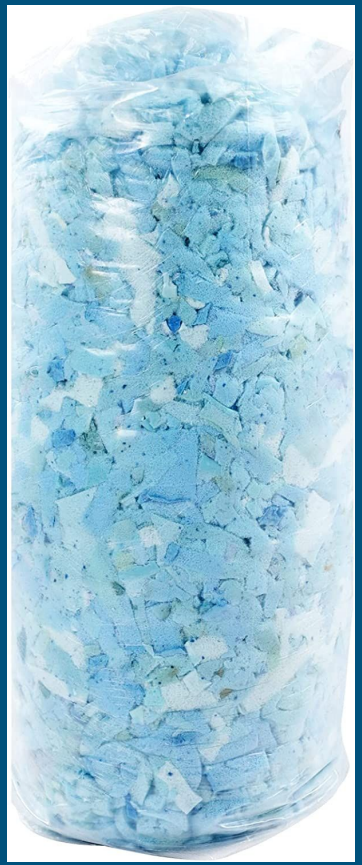
# Foam Offcuts/Scraps

Cost: $27.30/5lbs (Amazon.com) /

The best acoustic treatment is, rather unfortunately, volume. You can “cheat” a bit with air gaps, but at the end of the day, if all you have is a blanket, your results are going to be pretty limited.

The issue is that padding out volume isn’t cheap. This right here, at a mere 5-ish dollars a pound, is probably as good as it gets. Random scraps of foam make for *alright* (though not great by any means) treatment without being too expensive.

This is also good if you live in a place without convenient access to “better” materials like rockwool or even moving blankets.



Five whole pounds of acoustic treatment has never looked so unabashedly blue and fluffy.

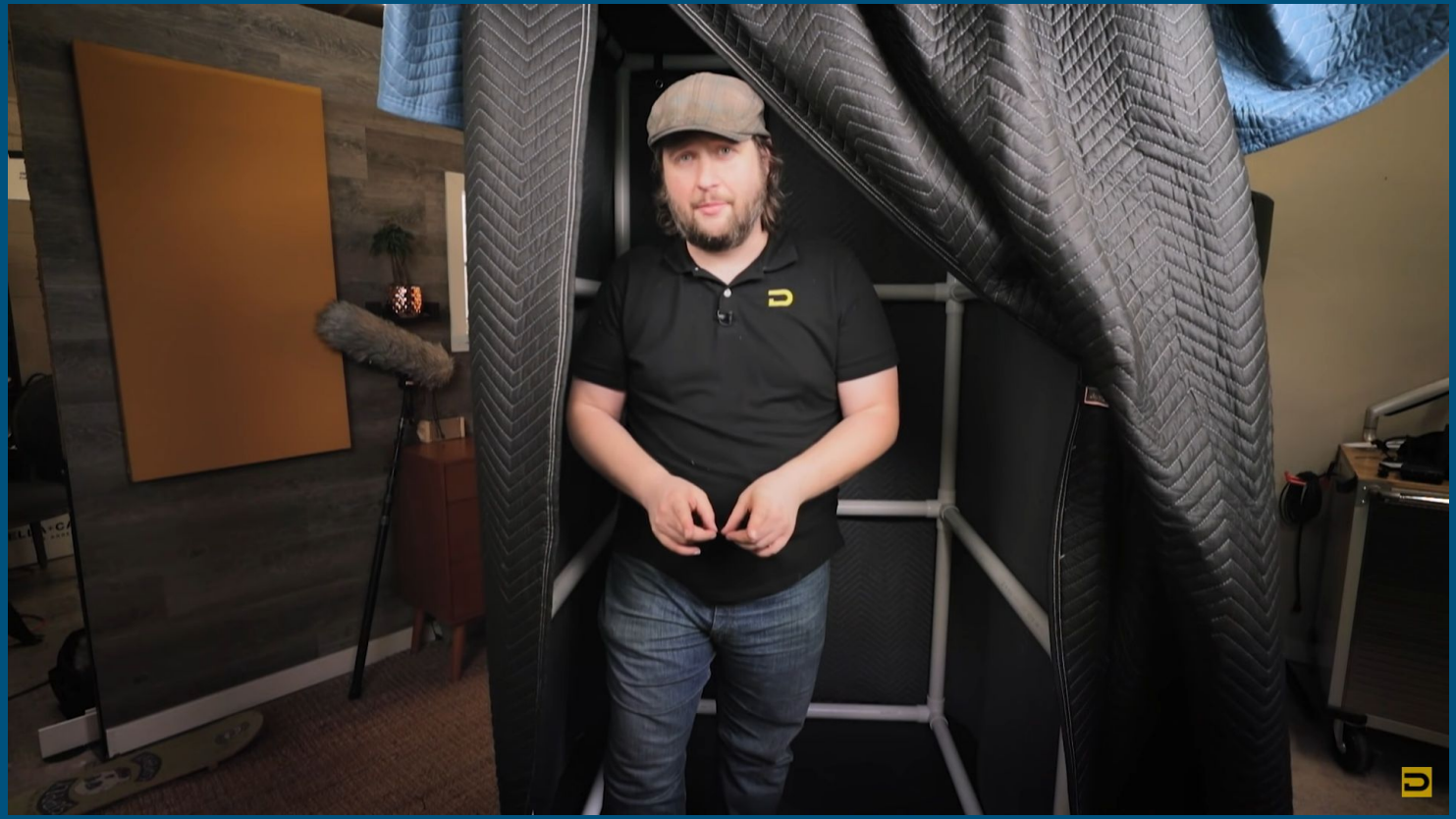
# The PVC booth

## Cost: 200$-ish (in the U.S.)

This is a neat method that consists in constructing a person-tall “box” frame out of PVC pipes, then draping/clipping moving blankets to said frame. Nothing fancy, though it does require a certain degree of DIY know-how.

As an added bonus, when not in use, it is fairly easy to disassemble and store away until you need it again. You could even stick it inside a duffel bag and have a travel booth always with you. Just remember to bring a light source (preferably LED, don’t want to start a fire!).

However, this method has a significant drawback for non-Americans: PVC piping can be *quite difficult* to find outside the USA. Of course, any “frame” to drape the blankets over will do, but PVC is by far the cheapest and easiest method sturdy enough to take their weight without chance of deforming. For non-American VAs, this option might sadly be impractical.



The Deity Microphones YouTube channel put out a video detailing the construction process. Check that out for instructions.

# The VUKU

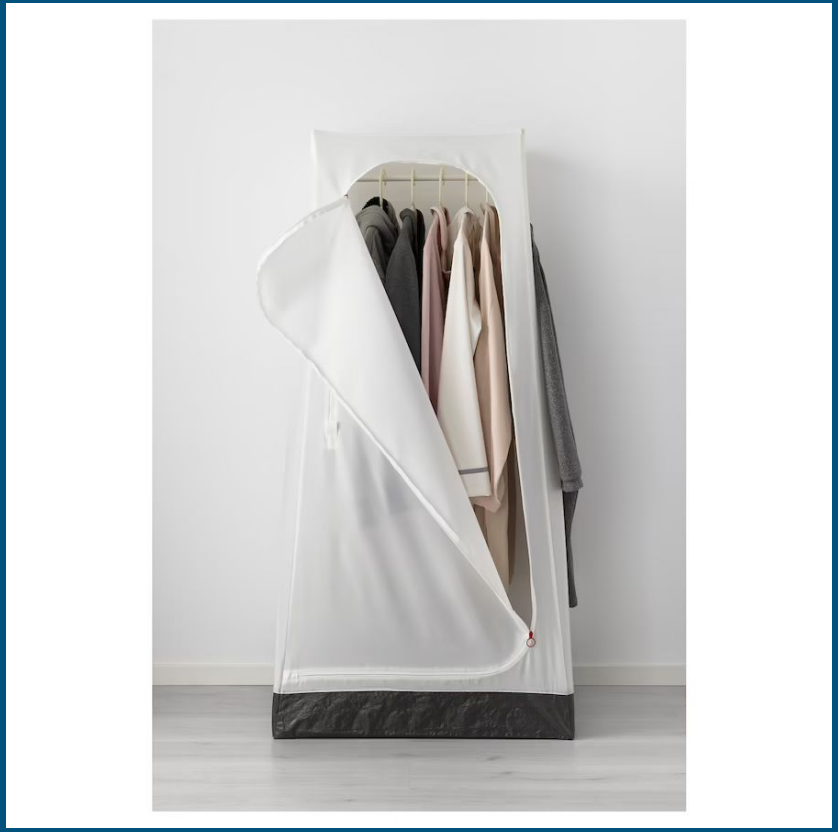
## Cost: $20-30ish

So the PVC booth's got you down. You like the idea of it, but it's both expensive, somewhat complicated to build, and requires materials not easily found outside the U.S.

But there is another way. An IKEA way!

A VUKU is an IKEA wardrobe that will run you $13. It's basically just a lightweight metal stand with a cover thrown over the top of it. Now, the plan is this: Build the framework, but instead of using the provided cover, use moving blankets. Voilà! A booth!

Sort of. The issue with the VUKU is that it's quite short, a mere 150cm (4'10") tall, too short for most people to comfortably stand and record in. You might need to improvise a workaround by elevating the feet, or rework it into a sitting booth (perhaps by setting two next to each other?). But it's certainly a good start.



A picture of the VUKU. Link to the page (USA link).
*It's just VUKU too, it's all VUKU too...*

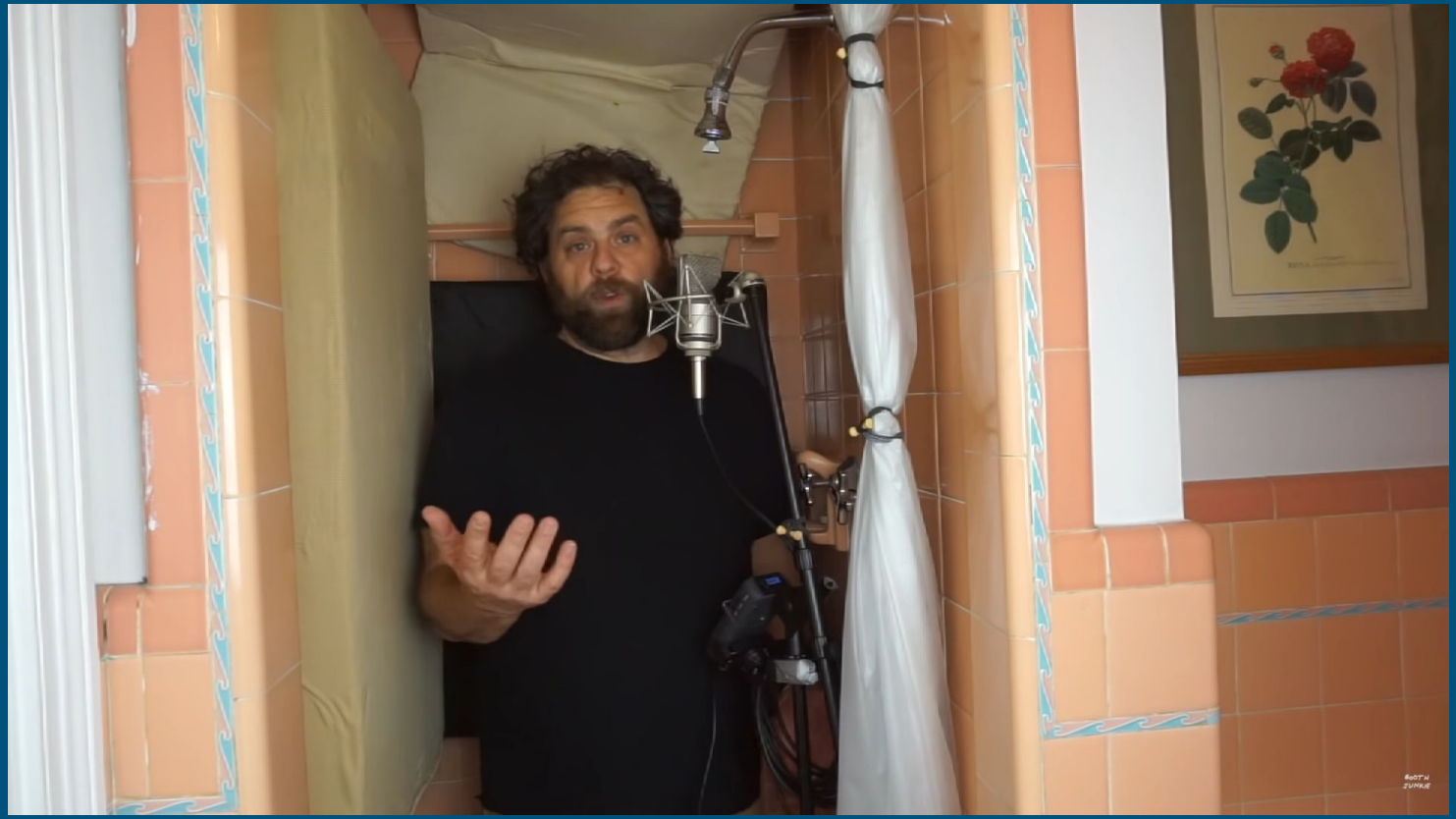
# The Booth Junkie Acoustic Panel.

Cost: $10-ish/panel (3”)

Likely the most effective component in this tier, but also where portability and convenience cease being applicable. It might be somewhat surprising to see “acoustic panels” this cheap, but that’s because this method takes all the gristle out and focuses only on what matters: the acoustic qualities. No lovely wooden frames or fancy tool here, just fiberglass, fabric, spray glue and picture wire for mounting.

It’s not the prettiest, but it’s light, easy to make, and doesn’t require any tools.

For the actual construction method, check out Booth Junkie’s video guide here.



Whenever I need to demonstrate the importance of good acoustic treatment to someone, this is the video I use. Watch some thirty seconds, then skip to 9:18. Wow!

# The Serious Business

16-100$ components,
2000$ or less full booths.

Alright, time to break out the big guns.

This third and final tier is all about how to set up a booth that will go the distance. Perhaps it won't be "industry standard", but as far as home booths go? This is as good as you can be expected to have.

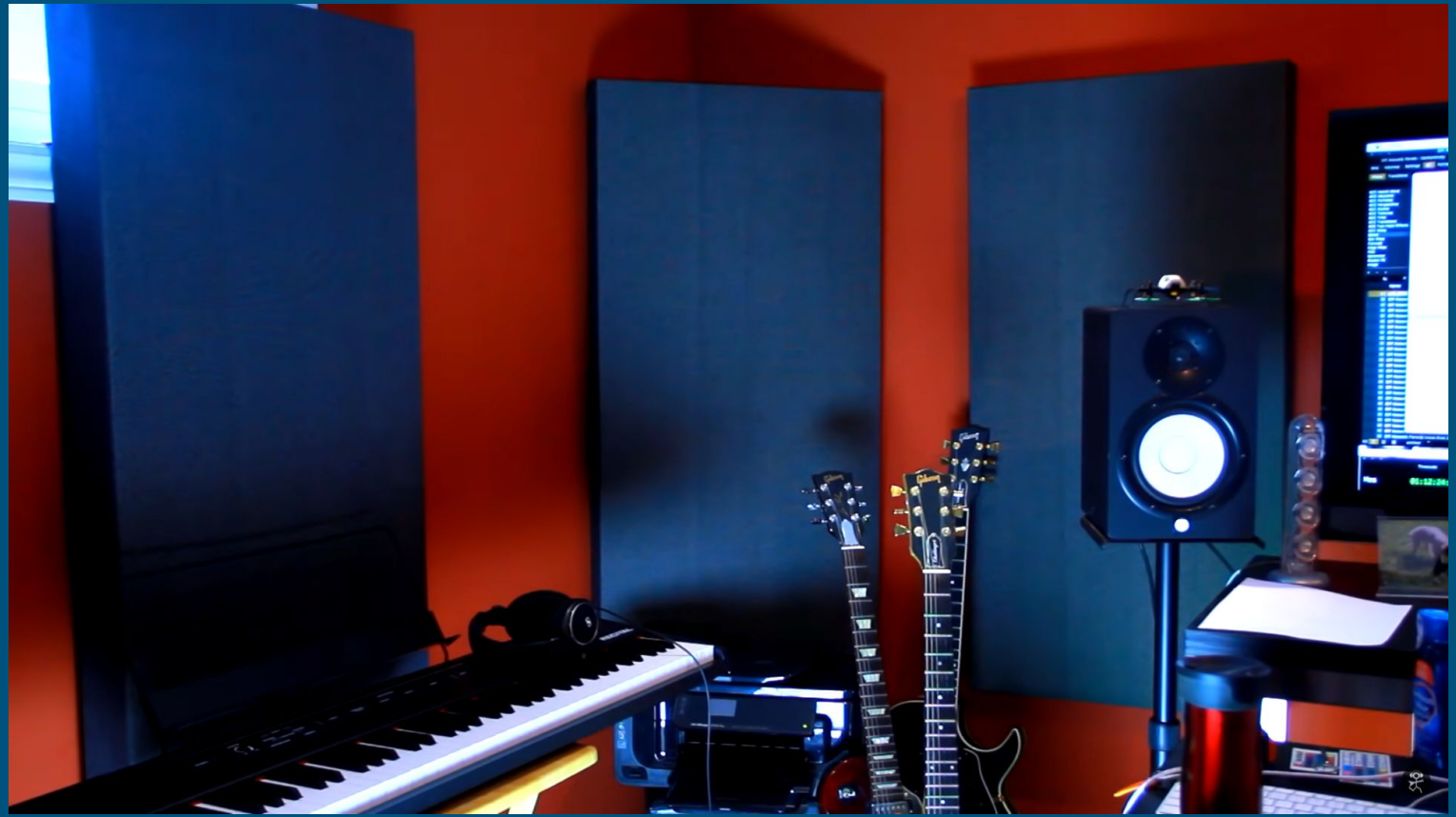
# Acoustic Panels

Cost: *Probably* <$20/panel (depending on materials, thickness, etc.)

The method that becomes the norm around here is acoustic panels. The concept is pretty simple: You take a wooden frame (usually that you've built yourself), stuff it full of your isolation material, then staple fabric over it (both for aesthetics and to keep the isolation fibers in), and… voilà! Just hang them up in key points in your room and you should be good!

Basic principle is that sound has to move through your fiberglass/rockwool, unable to reflect on it, but also attenuating a lot as it does, and then travel back through it again after it bounces on a wall (especially if you leave an "air gap", more on that later) to get back into the mic.

I personally recommend doing them DIY. As such projects go, they're really not too difficult, and you can save a *lot* of money compared to buying them pro-made.



This is what your panels might look like once finished and mounted. Pretty, eh? Here's a great video with instructions.

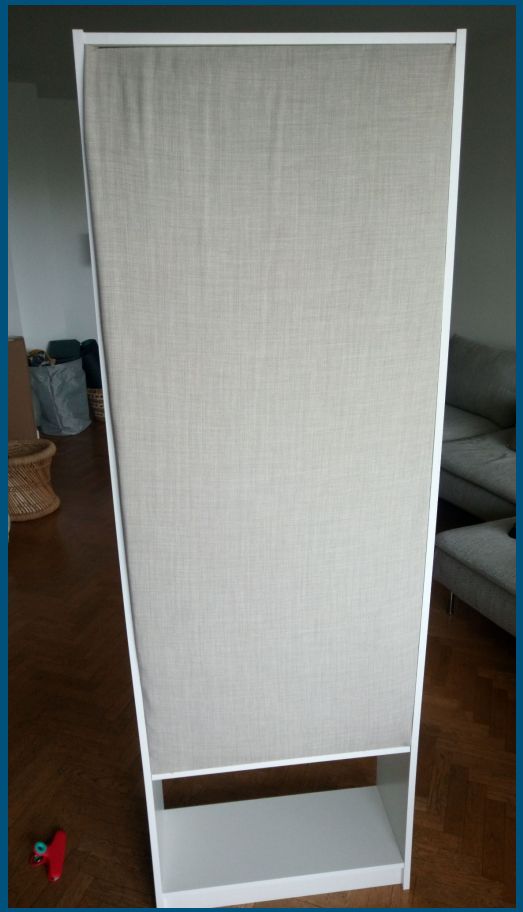
# The IKEA method

## Cost: varies (on furniture choice and insulating material)

You may have looked at the “serious” panel and thought “Wow, that’s a lot of DIY!” I mean, you need a saw (preferably electric, trust me), drill, electric screwdriver, lumber…

There is a simpler way. An IKEA way. Again!

It’s fairly simple in concept: Take an IKEA bookshelf (I used a GERSBY, but a BAGGEBO or a BILLY could presumably work as well), and build it in such a way that you leave a wooden frame roughly the size of your treatment panels. Staple your fabric along the inside, put your treatment in, staple more fabric to close up the back, and voila! You have a professional-looking freestanding acoustic panel, and the only tool you had to buy was a wall stapler.



Here's a picture of what the finished product looks like.

# Material choice:

## Rockwool or Fiberglass?

So in this tier, two materials really start dominating the conversation: thermal building isolation, specifically Rockwool and Fiberglass. So, which do you pick?

*Common wisdom* (and bear in mind that not everyone agrees with this) is that Rockwool is more expensive, but also *a bit* better. Not hugely better, *a bit*. There's also talk about it being safer for the lungs, but no studies have linked either material to significant health hazards, so I personally wouldn't stress too much about it. You'll be wrapping both in fabric anyway.

What you *really* want to look out for is *density*. The two most popular materials for the purposes of acoustic treatment are Rockwool Safe'n'Sound and Owens Corning 703, which are 38kg/$m^3$ and 45kg/$m^3$ respectively. Whether Rockwool or Fiberglass, my research indicates that **roughly somewhere around 40kg/$m^3$** (*2.5 lb/$ft^3$*) seems to be the sweet spot. In Europe, where neither 703 nor Safe'n'sound are available, density is what should guide your choice.

# What fabric to use?

This is a topic that comes up surprisingly often, and the answers are not as obvious as you might expect. A good fabric needs two things:

- Acoustic transparency (does not reflect some of the sound waves)
  - Test: place it over your mouth and breathe, *not blow*. If you can do so unimpeded, you're good.
- Dense thread count (keeps isolation material in)
  - Test: Can you see through it? No? You're good.

There are many fabrics that can work, but the key is to see what's available to *you*.

For instance, my panels use a tablecloth fabric. Others swear by speaker fabric or upholstery fabric. As long as it passes both tests, it'll do. Other things to take into consideration are toughness (*you want something durable*), flammability (*if it's going on a wall, it shouldn't be a fire hazard. 100% Polyester is ideal because of this*) and aesthetics (*It matters!*)

# Universally Useful Techniques.

Priceless knowledge.

So you have all of your treatment ready to go. Great! But what's the point if you don't really know how to use it?

This section is dedicated to information that will cost you *nothing*, but could make or break your setup.

# Standing Waves:

## What are they, and where should you put your treatment?

If you've ever taken a physics course, you might be getting some PTSD flashbacks right now. Don't worry! In our context, standing waves are a very simple thing to understand. All the physics you really *need* to understand is that sound comes in waves, and bounces on walls.

The issue is that not all sound waves have the same shape. If you have two parallel surfaces (two opposite walls in a rectangular room, for instance), some waves will bounce better than others, and then bounce back on the other wall, and back again, and then into the mic… End result is that some frequencies, especially in the bass, will get massively over-emphasized. We do **NOT** want this.

So how do we fix it? We "break up" our standing waves! If you have two parallel surfaces with your mic in the middle, that's where you put your treatment! Even just one side is fine, as long as this "endless amplification" process is not allowed to happen. One piece of treatment to your right, one behind you, and one above or below you (yes, the floor and ceiling still count!) will get you a long way.

If you still need to tame that bass, try focusing on the corners. The corners are at the intersection of two different standing waves, so a thick (and I do mean thick) "bass trap" there is industry standard in bigger room-sized studios and booths.

# Note on EQ:

## Can you EQ a bad space to sound good?

For the uninitiated, Equalization is basically tweaking a recording's frequencies. Boost the bass, dim the treble… In theory, assuming the base signal is good enough, you can do just about anything with it.

In theory.

If you ask any good sound engineer about EQ, they will always say "get the sound right at the source." EQ is good, and it *can* touch up a less than stellar sound if tastefully applied, but as Glenn Fricker put it best, "an EQ is basically a terrible amplifier for just a certain frequency band, and using too much of it is going to add noise into your signal".

# What to do with the computer?

## Noisy fans do not a good recording make.

*: These are not specific product recommendations. I have not personally tried these, and can't vouch for their quality beyond what the Amazon reviews say. Do your own research!

Voice actors specifically suffer from a problem: We need a computer to record, but computers make noise, which can make a recording useless for our purposes. Catch-22, right?

Well, there are some things you can do. One is to buy a portable recorder like a Zoom H5 in lieu of a "normal" interface, but those can be a bit pricey. You could also buy a "fanless" computer like the Microsoft Surface Go (watch out, only some models are fanless), but again, this can be expensive if you're having to buy a whole new computer just for recording.

What I would suggest for someone who already has a setup is this. Buy a long USB extension cable (You can find some 20 feet long* or longer!), then get yourself a USB dock* (Get a USB-C dock if your computer supports it, otherwise a USB-C to USB-A converter or a USB-A dock will be fine).

Now plug in your interface to the dock, as well as your mouse and keyboard and a monitor (make sure the dock has HDMI!) and you're good to go! All the benefits of having your computer in the booth, with none of the noise!

Mind you, however, USB cables *can* fail, and some bad ones can even introduce buzzing noises into your recording. It might be a better idea to have a long XLR cable (as those are forever), but certainly not nearly as convenient.

# Air gaps

## How should you mount your panels?

The concept of “air gaps” is as follows: if you move a panel (or any piece of treatment) from a wall or ceiling, such that there is a “gap” between the panel and the surface it’s mounted on, the sound waves will have to exit the panel, bounce on the surface, then enter the panel again on their way back towards the source.

This is mostly useful for catching bass with thinner pieces of treatment. If you have thicker panels, or mountains of pillows and so on, an air gap won’t hurt, but it also won’t particularly extend the treatment’s effectiveness against bass frequencies to the degree that it’d be worth the extra space.

A thinner piece of treatment however will probably benefit from having an air gap. GIK Acoustics’ official guidelines are to maintain a 1:1 “treatment to gap” ratio (1 inch gap for a 1 inch panel), so that’s probably a good number to shoot for.