

DIY in the Home VO Studio: Building a PVC-framed, Soft-sided Vocal Recording Booth



By Jim Edgar - JustAskJimVO.studio

Question: Why Choose to Build a PVC-framed Booth?

One of the most cost-effective ways I've found to treat a potential voiceover recording space is by using industrial quality moving blankets suspended on a PVC frame. Though not the most elegant looking solution, the method of using a soft-walled construction provides strong acoustic benefits.

A heavy, suspended moving blanket does "double duty" in reducing sounds which originate from inside of the booth space. Sound waves lose energy as they go through other material. This reduction varies by frequency - you've likely noticed lower frequency noises tend to penetrate walls much more decisively than high frequency sounds. That's why we hear only that throbbing bass from a passing car, or the rumbling low tones from a conversation on the other side of a wall.

As sound waves expand from a soft-walled or "blanket" booth, those waves hit the heavy fabric and lose energy, becoming quieter. These waves continue outward, moving through the air in your space before hitting the wall and reflecting back towards you.

Here's the benefit: before they reenter the booth, they must travel through the material once more. This causes a second loss of energy, making them less present in your recordings.

Compare that to acoustic foam adhered directly to a hard wall. Even high quality acoustic foam does not have much of an effect upon lower frequencies. Those lower frequencies include much of the vocal range. When sound penetrates the foam, the wall immediately reflects a portion of the wave back into your space. Cheaper or thinner foam makes this issue even worse.

As I discuss in [my recording classes](#), those reflections will show up either as noticeable echoes - making the space sound too "live" to be usable - or they will tend to cause certain frequencies to resonate. That's why a lot of commercial VO booths will sound "boxy" or "boomy" - certain frequencies are getting trapped inside of the room.

Trapped reflections in a hard-walled space may also cause "comb filtering". That's a situation where certain frequencies are reduced (or emphasized) as the reflected audio bounces back into your room. Those reflected audio waves may reach your microphone out of phase with your voice, causing recordings to sound weirdly thin and muffled.

When we build a recording space within hard walls such as a closet or smaller room, then controlling those reflections becomes an important task. It's why most of the prefab vocal booths need additional acoustic tuning to sound their best.

The soft-sided booth sidesteps many of those issues, so often they sound very good with minimal additional treatment.

I'll remind you again at the end of this process, but please send an audio sample when you get up and running, and I'll provide feedback on the audio quality.

Building the Soft-Sided PVC-Framed Voiceover Booth

Scope of Plans

These plans will create a booth that has a footprint of approximately 50" x 50", with a height of just under 7' tall. Because of the modular nature of the design, these can be shortened horizontally if you have less floor space. Generally speaking, most people find that working in a space smaller than 3' by 3' (36" x 36") can be tricky. I have had clients with severely limited floorspace make very narrow versions of this - some just wider than a chair.

Lowering the ceiling will cause the Producer's Choice Sound Blankets to gather on the floor. These plans assume that you will be using four of the Sound Blankets to create the walls and ceiling of the booth.

Where to Locate Your Booth

Generally, I like to have an air gap between the soft walls of the booth and any hard surfaces in the room. This lets the blankets do "double duty" as sound waves will lose energy in both directions (escaping the booth and entering the booth after bouncing back off the walls).

Acoustic Corrections

If it would be helpful, please send me a sample of your recordings and I will suggest an EQ correction (if necessary) to balance your sound. Please use the link on my Audio Review page and label your audio with your name and "PVC Booth Test", in addition to the date (e.g. JimEdgar_PVC-Booth-Test_060122.mp3)

My audio review page - <https://justaskjimvo.studio/audio-review/>

PLEASE NOTE THAT YOU ARE WORKING WITH A DRAFT COPY OF THIS RESOURCE WHICH MAY CONTAIN INCOMPLETE INSTRUCTIONS AND/OR ERRORS OF DESCRIPTION. User assumes all risk.

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Here are the various parts you will need

Schedule 40 1" PVC - 10' lengths

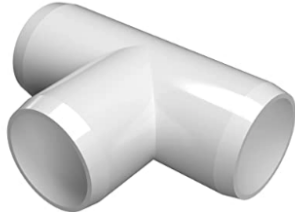



*Note - the Materials List and Cut List have been created assuming you are working with 10' lengths. Some stores may sell the PVC in shorter lengths. You will need to adjust quantities if that is the case.

Since full length PVC tubing is usually sold in bulk open stock bins, they are often roughly handled. I usually take the time to get the less bent ones, and confirm that the ends have not been chipped or cracked. They can be pretty dirty, too. I use gloves when I'm grabbing these.



PVC Connectors

I've never found the need to do anything other than press fit the pipes into these connectors when building up a blanket booth. Not using adhesive can also make breakdown simpler if you ever have to move the structure to a new location. You will have to give them a healthy "scrunch" to make sure everything is seated firmly. *If you choose to use adhesive, please follow all manufacturer warnings and directions as that is fairly caustic stuff.*

The "T" Connector - 1" Three-way flat connector	The "C" (Corner) Connector - 1" Three-way corner connector
	
The "K" Connector - 1" (It just looks kinda like a "K" to me) Four-way corner connector	The "Plus" Connector - 1" Four-way flat connector
	

Other Items

Rubber Feet 1 ¼" Caps	Shower Curtain Rings	Anvil Spring Clips
		

The Rubber feet will prevent the PVC ends from slipping on the floor (or potentially scratching surfaces).

The Shower Curtain Rings will be attached to the horizontal bar at the top to hang the grommets Producer's Choice Sound Blankets. Any will work, but I do like the ones that have the little roller bearings on the top. [This model has been proven to be quite rugged.](#)

The Anvil Clamps will secure the ceiling blanket over the corners of the frame. Note, these will be visible from the outside, so some voice actors choose to use bungee cord or some other less industrial-looking solution. The clamps are inexpensive to purchase, and having a couple available during construction can be helpful to hold material in place when positioning the blankets. Get ones which will open wide enough to go around the 1" pvc connectors.

A Helpful Tool - Ratcheting PVC Cutter

***NOTE - please be careful with this tool. They are sharp and can easily remove stray appendages.**



<https://amzn.to/3yF8qVt>

These are solidly made, but there are all kinds of other models. The cheaper ones tend to be pretty flexy. The expensive ones work well. This one seems to sit nicely in the middle ground. Any of them work better than hacksaws or reciprocating saws. We don't need to cut perfectly squared-off ends, so if there's a slight angle to the results, that's OK.

Materials List

Item	Qty
PVC - Schedule 40 - white - 1" - 10 FOOT LENGTHS	9
PVC - T-Connector - white - 1"	12
PVC - C-Connector - white - 1" (Corner)	4
PVC - K-Connector - white - 1" (Mid-joiner)	7
PVC - Plus-Connector - white - 1" (Cross)	2
Tip Protector - 1 1/4" diameter rubber no-skid	4
Shower Curtain Rings - package of 12	2
Anvil Spring Clamps - 2"	6

Purchasing Notes:

I find the C and K connectors are frequently out of stock at my local home improvement store. I've posted links to online options on the [JustAskJimVO.studio Gear page](#). Availability sometimes fluctuates there as well - please let me know if these have changed.

Here are those links.

K-Connector: 4-Way – <https://amzn.to/3gLMLiz> – (alt) <https://amzn.to/3KPKzWR>

C-Connector: 3-Way – <https://amzn.to/33NmahE> – (alt) <https://amzn.to/3KQajSY>

It may be simpler to get all the connectors at the same time.

T-Connector – <https://amzn.to/30JTT9G>

Cross/Plus Connector – <https://amzn.to/33KZgHz>

90-degree Elbow – <https://amzn.to/2XMgh0k> (A 90-degree connector is not used for this design. I am including it only for completeness).

For Each 10' Section, you will make one of the following sets of cuts. The "QTY" column at the right is how many 10' sections you will cut in that manner. For example, you will cut a total 4 (four) 10' sections using the "C" (24" only) cut schedule. *NOTE: You only need 7 x 18" sections and will have one extra with this cut schedule.*

CUT LIST - From 10' stock - 1" Schedule 40 PVC	QTY
CUT "A" - 48" 48" 24"	2
CUT "B" - 48" 24" 24" 24"	1
CUT "C" - 24" only	4
CUT "D" - 18" 18" 18" 18" 18" 18" 6" 6"	1
CUT "E" - 24" 24" 24" 18" 6" 18" 6"	1
QTY 10' TUBES NEEDED	9

<u>Total 48"</u>	<u>Total 24"</u>	<u>Total 18"</u>	<u>Total 6"</u>
4	2	0	0
1	3	0	0
0	20	0	0
0	0	6	2
0	3	2	2
5	28	8	4
<u>Total 48"</u>	<u>Total 24"</u>	<u>Total 18"</u>	<u>Total 6"</u>

ADDITIONAL CUTS REQUIRED:

On four of the 24" sections, you will shorten them by 1.5" (so they will be 22.5" in length). Those will be the horizontal sections used on the front, lowermost sides.

Reason: With the vertical bracing connected with a "T" connector, they need to be shortened so that the overall length of these sections match the 48" horizontal section above them.

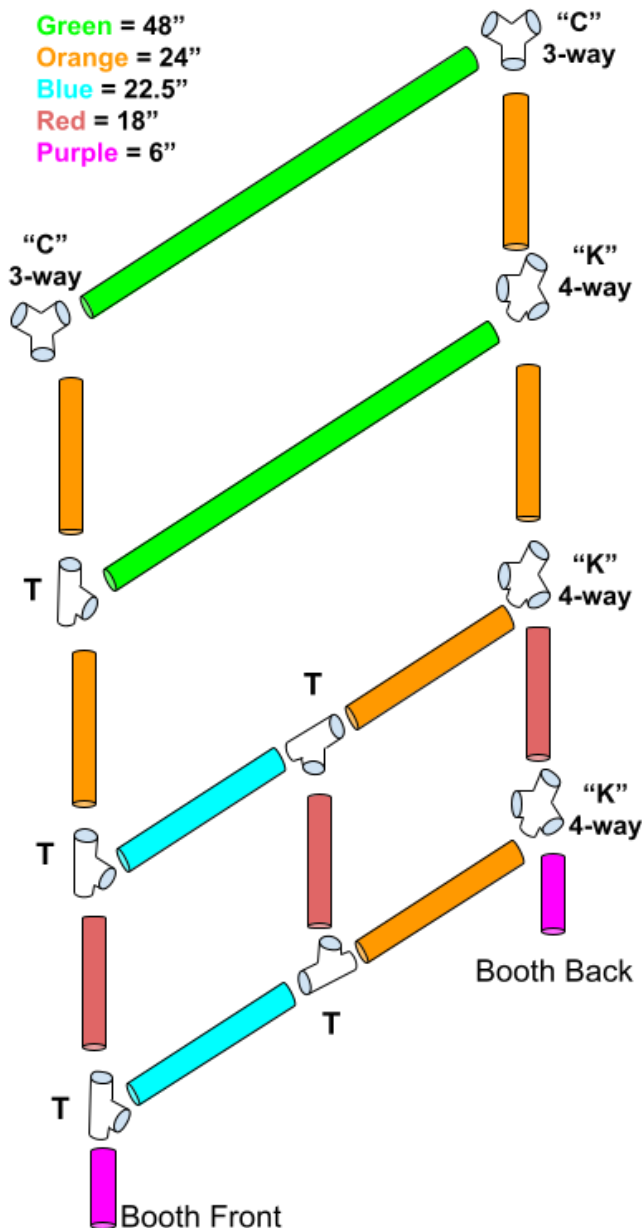
This is shown on the "Side Section Details" on the following page.

Construction Overview

I've found it's easiest to start by forming the ceiling, then building the top half "downward", then completing the bottom half. When those two parts are connected, you can raise the top half up and mate it to the connectors on the back corners, then align the front corners.

SECTION DETAILS

Here's how everything lays out. Don't start sticking things together yet. Just get a sense of where the various parts are needed.



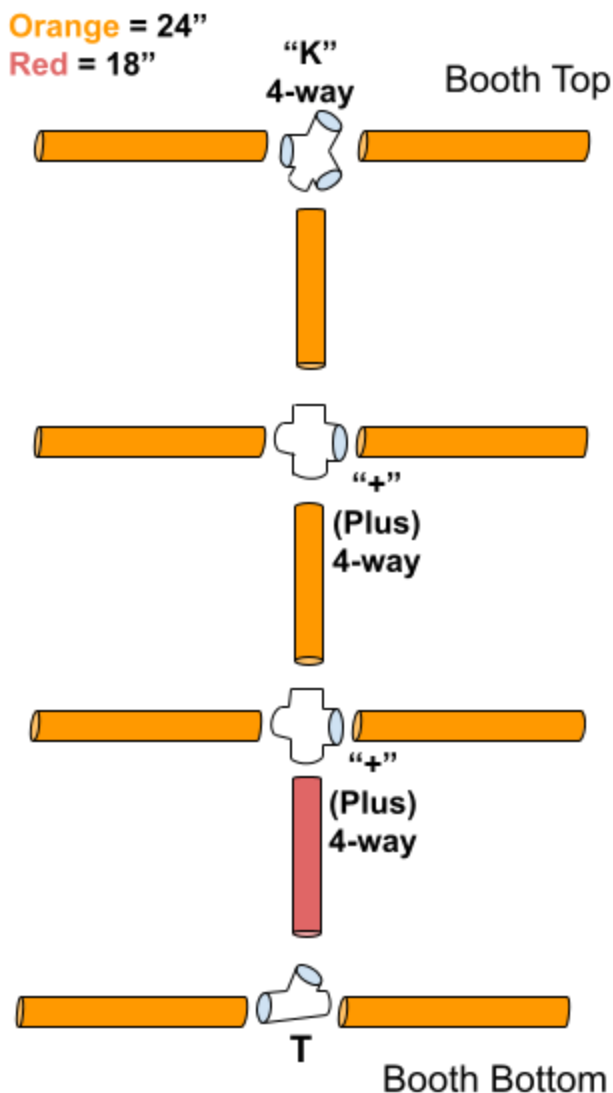
Side Section Details

The right and left sides are mirror images of one another.

There are two 48" sections used, one at the ceiling and the other just below it.

The next section is a side brace, which gives the frame more rigidity. Those consist of a 22.5" section, a T connector, and a 24" section. When combined together, these should be the same overall length as the single 48" section. You may have to trim the 22.5" pieces to ensure the overall length is 48".

The LOWER side brace uses 18" vertical sections above the horizontal, and 6" vertical sections below. The 6" sections can be cut longer if you want to add vertical height to the booth. (You should have some extra PVC left over from the initial cuts if you want to do this). I have used 12" pieces here in some versions for taller voice actors.



Back “Spine” Section Details

Since I was showing the connectors on the right and left sides, this schematic only shows the connectors which are not attached to those pieces.

The “K” 4-way connector at the top will connect to a ceiling strut (described in the construction steps to follow).

The “+” (Plus) 4-way connectors form the main spine to the rear of the structure. It uses 24” sections for the top two parts, and a single 18” section for the bottom brace section.

The main spine terminates in a “T” type connector. There is nothing below that as there is no direct contact to the floor.

The only contact to the floor is made on the four corners of the booth. This should support 4 x Producer’s Choice Sound Blankets which weigh about 10 pounds each.

Additional Notes:

When I construct these frames, all of the connections are “press-fit”. Under normal circumstances, they stay together and retain their structure without using PVC adhesives.

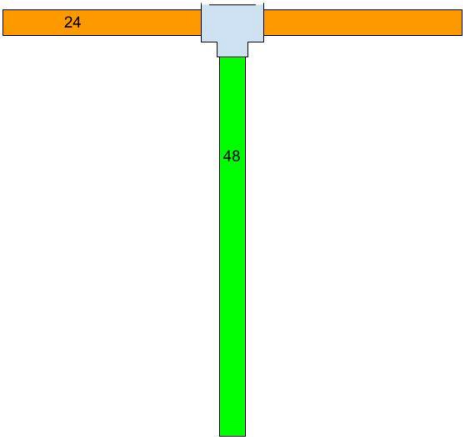
Note: If you choose to use any type of adhesive, please read and follow all manufacturer’s warnings and instructions and use in a well ventilated place.

BEGIN THE BUILD

STEP 1 - Ceiling Brace

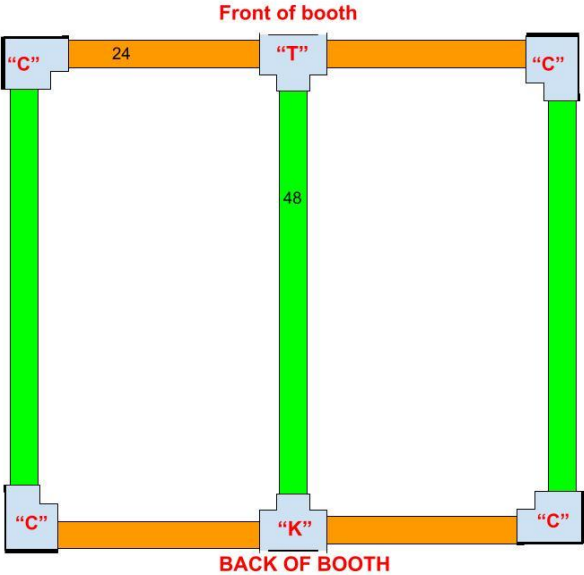
Connect 1 x 48" section into the right angle part of a "T" Connector
Connect 2 x 24" sections into the other two openings of that "T" Connector

This is the FRONT of the Ceiling.



STEP 2 - Complete Ceiling

Connect a "C" Connector (three way connector) to the end of each 24" section. The "extra" (i.e. "open") connector should be facing "Down"
Then attach 2 x 48" sections parallel to the 48" Ceiling Strut.
Then attach 2 x "C" Connectors to those 48" sections
Then attach 1 x "K" Connector (four way connector) to the Ceiling Strut in the center.
The "K" Connector will be at the back wall of the booth. It forms the top of the rear "spine".
Then fit a 24" section between each of the two "C" Connectors and the "K" Connector in the center.



STEP 3 - Add Verticals to the Ceiling

Place 1 x 24" in each of the 5 open connectors - 1 in each corner, and one on the "spine" of the back wall of the booth.

This section should now be standing on the 5 vertical sections. Take a moment to make sure each part is well seated (i.e. "scrunch" them into place).

STEP 4 - Add the next layer to complete the upper section

Face the Front of the Booth.

Starting on the left hand side nearest you, connect a "T" to the end of the 24" section so that it runs vertically. The open parts of the "T" connector should be facing away from you toward the back of the booth and down toward the floor.

Connect a 48" section from the "T" connector toward the back corner of the booth.

Connect a "K" (4-way) Connector from that 48" section to the vertical 24" section on the back left corner. The open parts of the "K" connector should be facing toward the right rear corner of the booth and down toward the floor.

Connect a 24" section from the "K" Connector at the left rear corner toward the "spine" of the back wall of the booth.

Connect a "PLUS" between that 24" section and the vertical 24" section at the "spine" of the back wall of the booth.

Connect a 24" section from the "PLUS" Connector at the "spine" of the back wall of the booth toward the right rear corner of the booth.

Connect a "K" Connector in the right rear corner between that section and the vertical 24" section at the right rear corner of the booth.

Connect a 48" section from the back right corner of the booth toward the front.

Connect a "T" Connector between the 48" section and the right front corner vertical 24" section to finish this layer.

By the time you have completed these steps, the top section should look close to the photo on the next page.

You will set this section aside for now, and build the base.

COMPLETED TOP SECTION OF BOOTH



Top section of booth shown above. Back of booth ("spine") is resting on the floor. Front is to the top of the image. Ceiling strut is near the wall to the back of this image.

STEP 5 - Build the Base Structure Feet

Fit Rubber Feet into the 4 x 6" Sections

Build Front Right and Left Vertical (total of 2) =

6" Section > "T" Connector > 18" Section > "T" Connector

Build Back Right and Left Vertical (total of 2) =

6" Section > "K" Connector > 18" Section > "K" Connector

STEP 6 - Build the Base Structure Frame

Start with the FRONT Left Vertical from STEP 5

Connect 2 x 22.5" Sections at the "T" Connectors.

Connect a "T" Connector to the end of each 22.5" Sections.

Connect a 18" Section between the upper and lower "T" Connectors to create the low vertical brace.

Connect a 24" Section from the lower "T" Connector to the BACK Left Vertical from STEP 5

Connect a 24" Section from the upper "T" Connector to the BACK Left Vertical from STEP 5

You have created the left side, lower section

Connect a 24" Section from the BACK Left Vertical LOWER "T" Connector.

Connect a "T" Connector to that section with the open connector facing UP.

Connect a 24" Section from the BACK Left Vertical UPPER "T" Connector.

Connect a "PLUS" Connector to that section with the open connector facing UP/DOWN. This will be creating the vertical "spine" on the back wall of the booth.

Connect an 18" Section vertically between the lower "T" Connector and the upper "PLUS" connector.

Connect a 24" Section from the lower "T" Connector to the BACK Right Vertical from STEP 5.

Connect a 24" Section from the upper "PLUS" Connector to the BACK Right Vertical from STEP 5.

Continue forward with a 24" Section from the BACK Right Vertical from STEP 5 at the upper and lower Connectors.

Connect a "T" Connector to each of those sections.

Connect an 18" Section to create the right lower brace.

Connect 2 x 22.5" Sections forward from those two "T" Connectors.

Connect the FRONT Right Vertical from STEP 5.

You have now created the base section of the structure.

STEP 7 - Add the Vertical 24" Sections

Connect a 24" Section at each Connector. These should be facing up toward the ceiling.

STEP 8 - Connect the Top and Bottom Sections

Lift the Top Section and set it on top of the bottom section.

Carefully mate the vertical 24" sections to the corresponding Connector on the top.

Confirm that all connections are tight and solid. Be careful to supply opposing pressure at all connection points - in other words, push in from each side.

Photos from a recent build



Precut PVC sections ready to be assembled.
Grippy gloves are helpful.

I keep the 23" cut sections separated so
I don't accidentally try to use them prior to their proper placement.



Step 1 - assembled Ceiling strut



Step 2 - Ceiling strut built into the ceiling panel. The front of the booth is closest to the camera. Notice there is a "T" connector on the front and a "K" connector on the back



Vertical struts have been added to the ceiling, and capped with the appropriate connectors:
“T” connectors at the front of the booth (nearest the camera)
“K” connectors at the back corner (near the wall)
“+” connector in the middle for the Spine.



The next set of vertical connectors complete the top part of the frame.
I then move on to build the base.
Following that, I flip the top and line up the connections into each corner.



Booth corner detail with first blanket attached.
I start at the left corner and work to the back.
This is the Producer's Choice Sound blanket
and the shower curtain rings from the parts list.



Booth blankets in place. View from front door flap area.
Roughing in position for microphone stand, laptop stand and accessories.



View of microphone and laptop stand area.
Door flap has been pulled back.



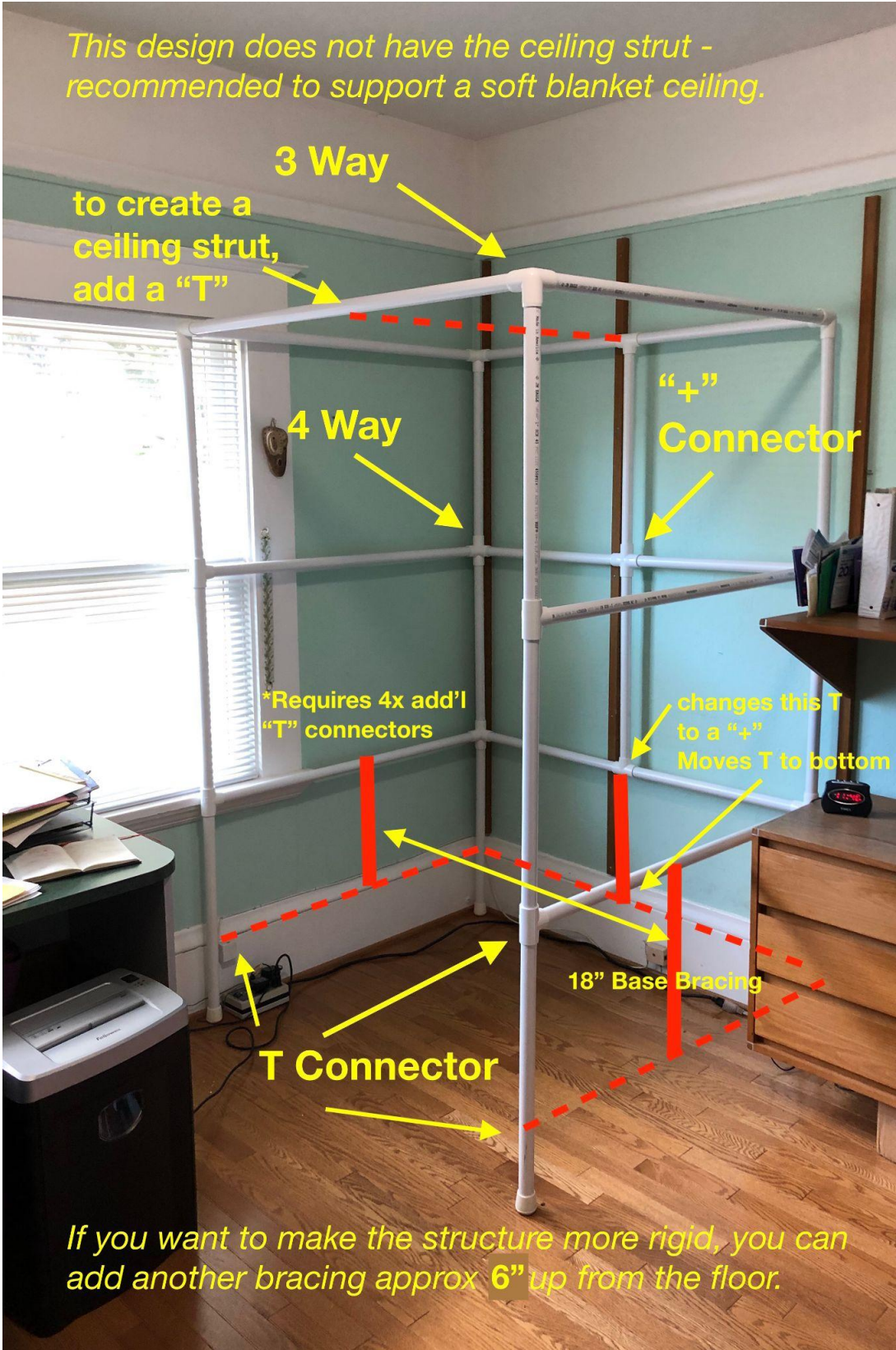
Another simple, soft-sided booth is ready to be wired up and used!

I am always looking to improve the clarity of these instructions. If you have feedback or any of the steps seem unclear, I would greatly appreciate feedback to jim@justaskjimvo.studio

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These instructions are supplied as a rough guide only. User assumes all risks associated with the construction and/or use of this design. If you are uncomfortable with construction or any of the processes involved, please hire a professional to construct this project.

This is an image of an earlier design which lacked the lower bracing and the ceiling strut. It has been annotated in red to show where those sections are located.



Completed 4x4' booth with Producer's Choice Blankets in place on side and ceiling. LED "rope" lighting has been placed in the the upper brace for additional lighting.



Modifications

Ceiling

Bungie for raising blankets rather than mount on the top rail.

Ceiling Tracks rather than PVC

Adjustable shower curtain rods rather than PVC

A Few Final Thoughts

I still prefer to keep the computer out of the booth.

This is not a sound _PROOF_ solution

Longer than 4' = wiggly

Shorten if necessary

Risk disclaimer.

LAST REVISION - 10/6/23