

# The ultimate tube program equalizer photo love story





### attention | disclaimer

this project is presented as artwork, and is solely intended as such.

build at your own risk

although this e-paper can help you to build a (legendary) functioning piece of tube studio gear - due to the high voltages and possibilities of human error, analogvibes | martin zobel hereby assumes no liability for injury/damage/loss which might unintentionally occur.

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### build guide Tube Program Equalizer Complete Kit Tube Program Equalizer Chassis Set

**Please note:** While this guides may refer to parts or components as *"included in the kit"*, these are **ONLY** included in the analogvibes **"Tube Program Equalizer Complete Kit"**.

The also available **"Tube Program Equalizer Chassis Set"** only consists of the enclosure as shown here: https://analogvibes.com/shop/product/chassis/program-tube-equalizer-chassis/ all components shown in this guide have to be ordered separately according to the bill of materials included with the chassis set. But the build process remains the same.

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## LET'S GET THE PARTY STARTED

### PROLOGUE

If this ain't your first analogvibes project - hey, welcome back!! If you are a first timer - exciitiiiiinnng!!!!

Ok let's focus alright calm down... breathe...relax... ...yes that's good.

### Now let's see what do we have here?

Oh my god it's the long awaited Tube Program Equalizer complete kit - it's real?!?! Oh gosh I think I'm freaking out - I gotta call my mum no I'm gonna call dad - no I have to call Jeff! Who's Jeff?!, I don't know any Jeff! I think I'm fainting...



**CHAPTER I:** Hey, good to see you around and welcome to the first ever analogvibes complete kit! If you made it until here you might already know how much work is behind this project and how proud we are that we could make it happen - with the glorious help of the totally awesome analogvibes community! You're the true legends!



Now before we get too romantic let's cut the sentiments and take action! The first thing we need to do is to take the 4 flathead M4 screws (those with the smaller heads) and use them to join the back and side panels as shown on the pics on the left.

We did our best to keep the threads clear from powder coating but if one of the screws is slightly harder to screw in, please double check for any residues and if necessary clean with a fine tool such as a small screwdriver.

## FEET ON SOLID GROUND



## Speaking of powder coating. As in any electrical circuit, we'll have to ground it properly.

To achieve this, we'll use ground lugs attached to some chassis mounted components.

In order to assure continuity between these ground lugs and chassis ground later, we need to remove some of the powder coating around these spots.

### The pic on the left shows how I did it, but you could use whatever tool comes in handy for you. The end result should look similar to what you can see inside the blue circle.

Now repeat this procedure on five more spots across the back panel as shown on the right.

When you're done, you can check for continuity with your multimeter by setting it accordingly and placing the probes on the various spots where you removed the coating.

It should beep the heck out of you!

## BEEEEEEEP!





Now lets move on to installing the first parts, namely the IEC (power) connector, the XLRs, the tube sockets, the mounting plate for the big can capacitor together with two of the single-pole terminals and the first ground lug. Start with the IEC and the XLR connectors.

Before installing the tube sockets, take the solder eyelet/ground lug and bend it a little bit as shown in the lower left.

Then attach it to the bottom mounting screw of the **12AU7** tube socket on the inner side of the back panel as shown in the center below.

Both of the **terminal strips** need to be installed to the **can cap mounting plate** (pic below).



From the back your panel should look like this now:



## **DOUBLE CHECK PT. II**



If you've done everything correctly in terms of removing the coating at the previously mentioned spots, the can cap mounting plate as well as the ground lug installed on the 12AU7 socket should be connected to chassis ground.

### Use your multimeter to double check if that's the case. You're good?

If the answer is yes, lets move on to installing the transformers.

But before we can mount them to the back panel, we need to add some jumpers.

Take a couple of the larger, black Audyn caps and cut the legs of each cap by approx. 1/2" (12mm) until you end up with six short pieces of wire.





These will serve as jumpers.



## Jump, jump!



Bend the wires and use them to connect the following terminals as shown in the pic above:

### On the HS-56 input transformer:



- connect pin 3+4 - connect pin 9+10

On the HS-29 interstage transformer:



- connect pin 2+3

- connect pin 6+7
- connect pin 1+9

On the S-217D output transformer:



- connect pin 2+4 - connect pin 9+10



**First stick the both ends of the wires** into the according terminals and then solder them in place. The end result should be similar to the pic above.

Now let's mount them. Take another one of the ground lugs and install it on the right mounting thread of the HS56 as well as another single-pole terminal strip on the top mounting thread of the HS29 (see pic below):



When mounting the S-217D please make sure you mount it upside down so the "S" labeled terminal is pointing upwards. Here we'll need another single-pole terminal mounted like this:



**Before we can finally start wiring this thing** up we need to install the **3-pole terminal strip** together with the **stand-off** on the small mounting hole between the **12AX7** and the **12AU7** tube sockets.



Now, we need to prepare the power transformer before mounting it to the chassis. More precisely that means we have to cut and insulate some wires we don't need for this circuit and - depending on what your mains voltage is - even merge some wires. But let's go through it step by step:

First, select the following wires: black/red, brown/yellow, white/black, blue/yellow

Cut all of them to a length of approx. **3 1/4**" (80mm) and insulate them with a piece of shrink tube as shown on the right:

## **EMPOWERMENT!**





If you live in 230V mains land - and ONLY THEN: select the black and the brown wire and cut them to around the same length as the previous wires.

But this time strip both ends and twist - and finally solder them together. Then take a piece of the larger shrink tube and insulate them as shown on the left.

Did I mention this step only applies to those who are located in the EU/230V countries? If you're in the US, skip this step.

You might know it already but so far we only dealt with the primaries of the power transformer. WHAT? What's that supposed to mean?! Well, it's where the electricity comes in. This side will be connected to your mains later. The secondaries is the outbound side of the transformer, after the voltage has been converted to what your circuit actually needs. Now, also on the secondary side we'll have to make some adjustments as follows:

**Select the purple and the yellow/black wire** and cut & insulate them exactly the way we did it with the first 4 wires of the power transformer.

The rest of the secondary wires we'll need for our build.

Now we can move on to mounting the power transformer to the back chassis with four of the larger M4 screws. Feed all primary wires (even the ones that you cut) through the hole closer to the outer edge of the chassis and the all secondary wires through the other hole.

**Before you fasten the nuts,** take the larger M4 solder eyelet/ ground lug and put it over the top left screw viewed from the inside as shown in the photo on the right.

**Before we finally start playing with wires,** install the big **can cap**. It's a so-called "twist lock" cap, that means you have to feed the outer terminals of the cap through the slots of the already installed mounting plate, and twist them with a pair of pliers like so:



#### One minor issue here:

Unfortunately CE manufactured the can caps we ordered with straight pins (used for mounting them on PCBs) instead of the solder terminals shown on the pic. That means it'll be slightly harder to mount our components to the terminals, but I'm very confident you'll still make it.

If not please let me know and I'll have Mel Gibson giving you a personal motivational speech - just like the legendary one he gave in the movie Braveheart...anyway, let's move on ;)...





Now we can finally start to wire this thing up - and because we're so thrilled we've made it until here alive, we'll even take two steps at once now. Twist both of the red wires coming from the power transformer tightly, cut them to length so you can solder one of them to pin 1 of the 6X4 tube socket and the other one to pin 6. Since we have AC here, it doesn't matter which one of the red wires goes to which pin.

And the second step is to cut a short piece (around 2.5"/ 6.25cm) of black wire and solder one end to the earth terminal of the IEC socket and the other one to the ground lug we just installed.







**Next, twist the pair of green wires** coming from the power transformer and cut them to length so you can solder them to **pin 3 & 4** of the **6X4** tube. Again which one of the green wires goes to which pin is not critical.

When you're done, take care of the green/yellow and the red/ yellow wire. The latter needs to be soldered to the **bottom negative pin** of the big **can cap** as shown on the left.

(note: the four inner terminals of the can cap are + poles of the 4 cap sections, while the outer terminals are all one common negative pole. Basically this big ass can cap is four 40uF caps in one enclosure)

While we're at it - use your multimeter to make sure all of the outer terminals of the cap make a connection to chassis ground. If you followed the manual thoroughly and tested the mounting plate earlier on, you should be all good now.

Ok, now - the red/yellow wire is soldered in place right?

Now take the green/yellow wire and solder it to the lower right single-pole terminal strip as shown on the left.

**Please give the wire some extra** and route it in a similar way to what's shown above, so the wire is actually approaching the terminal from the left hand side. We'll need the space for some other components coming up on the next page :)



### Here's what we'll need now:

- 0.33uF/600V cap
- 470 Ohms/2W resistor
- 270K metal film resistor
- 62K carbon comp resistor

First, install the larger 470 Ohms/2W resistor between pin 7 of the 6X4 tube and the upper right (+) terminal of the can cap. Next, bend the legs of the 0.33uF cap as shown on the left and solder the shorter leg to the lower left single-pole terminal and the other leg to the right hand side (-)terminal of the can cap. (see image on the left).

(Since I don't exactly know your skill level and just to make sure you don't carry a big blinking question mark on your forehead: As explained in the "**BASICS**" chapter of the "No more concerns" e-paper - both, resistors as well as regular caps are not polarized, so the orientation when installing them doesn't matter. Only certain caps are polarized such as electrolytics (to which genus our can cap belongs) and Tantalum caps.)

**During our next steps** we'll first install the 62K carbon comp resistor between the lower left single-pole terminal and the bottom (-)terminal of the can cap (where the red/yellow wire is soldered to). Followed by the 270K metal film resistor of which one end will be soldered to the exact same single-pole terminal, but the other leg is going to the bottom right (+) terminal of the can cap instead.



From that exact same (+) terminal we strap the big 1K / 1W carbon comp resistor over to the top right (+) terminal of the can cap. The associated image is on the next page, but before you go on it makes sense to prepare the resistor as shown above.



Now take the two big 47K / 1W and 2.2K / 1W resistors. The one end of both of them needs to be soldered to the top right single-pole terminal. The other end of the 47K resistor needs to be soldered to the top left (+) terminal of the can cap while the other end of the 2.2K resistor will be going to the bottom left (+) terminal. Lastly, cut a 2"/50mm piece of the yellow/black wire (the one you cut off the power transformer earlier on) and solder one end to the same single-pole terminal both of the resistors are soldered to, and the other end to the lower left (+) terminal of the can cap. (see pic on the right)

## SO FAR SO GOOD?

## 115/120V MAINS

### Wanna know a secret?

#### We're pretty much done with the power supply of this legend!

Wasn't that hard to do, right? Actually, we'll work our way through the back panel of the unit before we'll take care of the front, but in order to check if the power supply works as intended, let's go ahead and add two vital parts now that will be mounted to the faceplate later:

### the power switch & the pilot lamp

Now the thing is, as you most likely know, we have to wire up the power switch diff depending on whether you're living in 230V or 115V land. I'll show you because off with 115V/120V mains: In this case we have to wire up the order of the transformer in parallel that means you have to route the wist makes a we other or otherwise your unit is doomed and will account you was a set of the

for the US as seed ought a set 8 seed to also up the teer primary admitting is parallel has magned the light is the addition and result to be connected and california's the access schema 'have the right of the power satis's level 'schematic's the progetties and result to be addened to be access schema 'have the left of the power satis'.

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