VAMISOUND

THE SOUND
IS YOURS

V49

BUILDING
INSTRUCTIONS

WE SOUND BETTER

Dear DIY friend,

first of all thank you for your support and choice of the VAMISOUND product. We wish you a happy DIY and the joy of a new microphone in your arsenal!!

Jan and Milan

WE SOUND BETTER

VAMISOUND M49 BUILDING INSTRUCTIONS

Before you start building your new microphone please carefully read this building instructions.

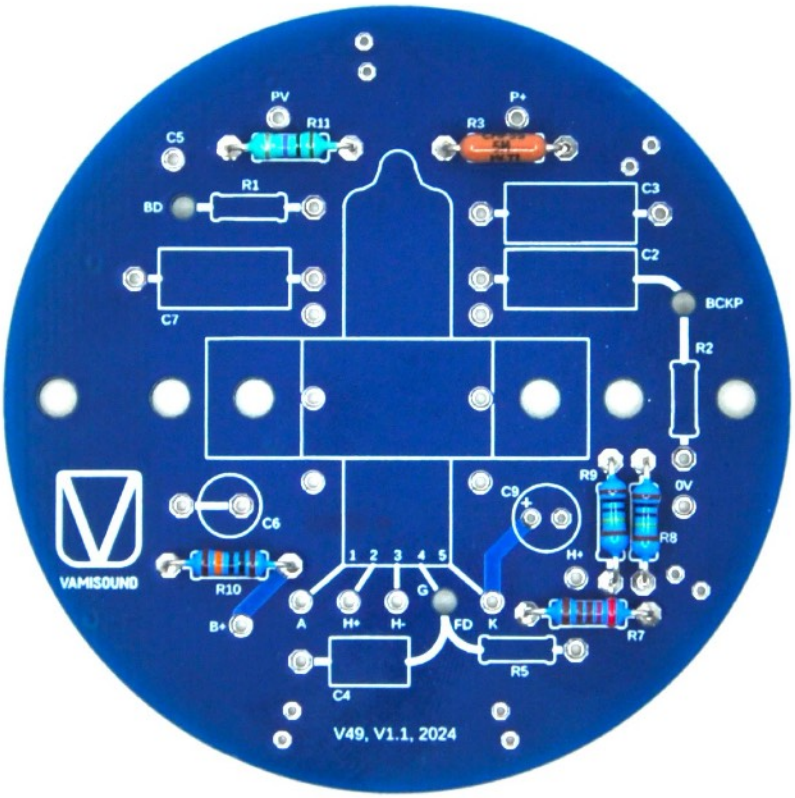
Attention: VAMISOUND M49 is a medium-heavy project. It should be borne in mind that certain manual skills will be required or the successful completion of the mic construction. Good soldering experience and soldering stations with fine soldering tip are recommended. If you do not have this, please delegate the construction to a more experienced technician with proper equipment. We are not responsible for malfunctioning construction or injuries associated with improper assembly of our kits.

This project leads to the construction of a tube microphone, which requires a cable and a power supply. These are not included with the kit and must be built by yourself or by a knowledgeable person. Tube microphones are powered by high voltage which can cause fatal injury. We reserve no responsibility for any injuries caused by unprofessional intervention. If you do not have the necessary knowledge to operate the entire tube microphone system, please pass its construction and tuning to a knowledgeable person. It's really not fun, so don't take it lightly.

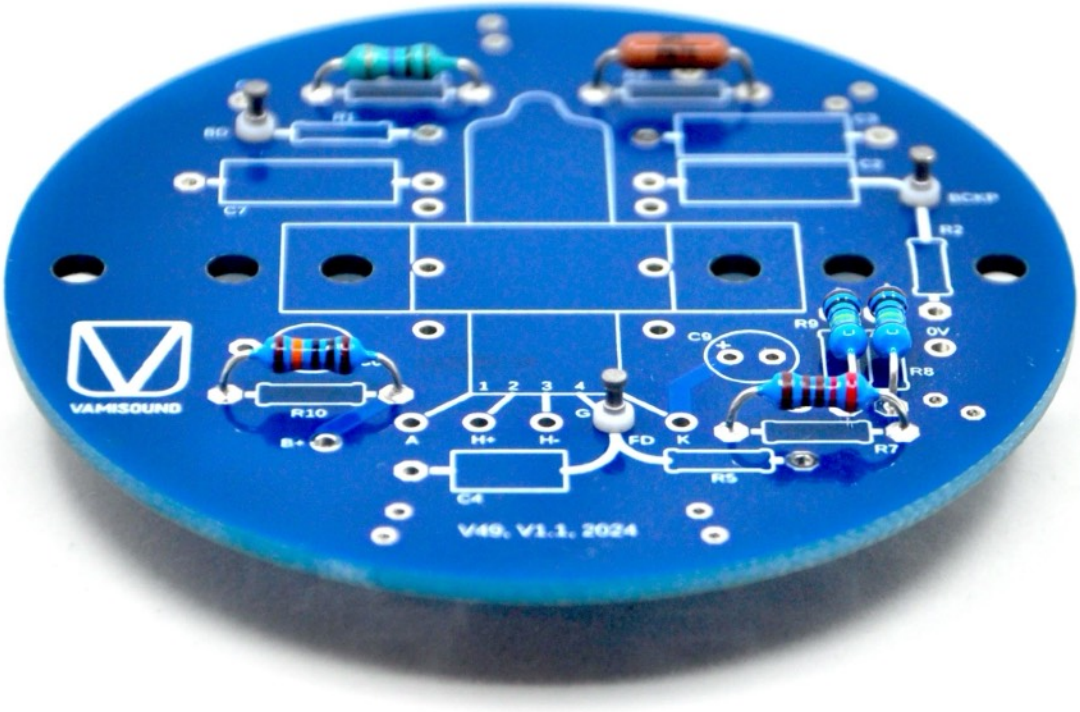
Document info	
Document name	V49 building instructions
Document revision	1.0
PCB revision	1.1
Date	October 2024
Project difficulty	★★★★★
Complexity of soldering	★★★★★
Risk of electrick shock	★★★★★
Changes and notes	

V49 printed circuit board set consists of three printed circuit boards – transformer pcb, main component pcb, and capsule pcb. The set also includes six teflon pins, one rubber pad under the transformer pcb and a rubber tube holder. A grounding metal ring is also included.

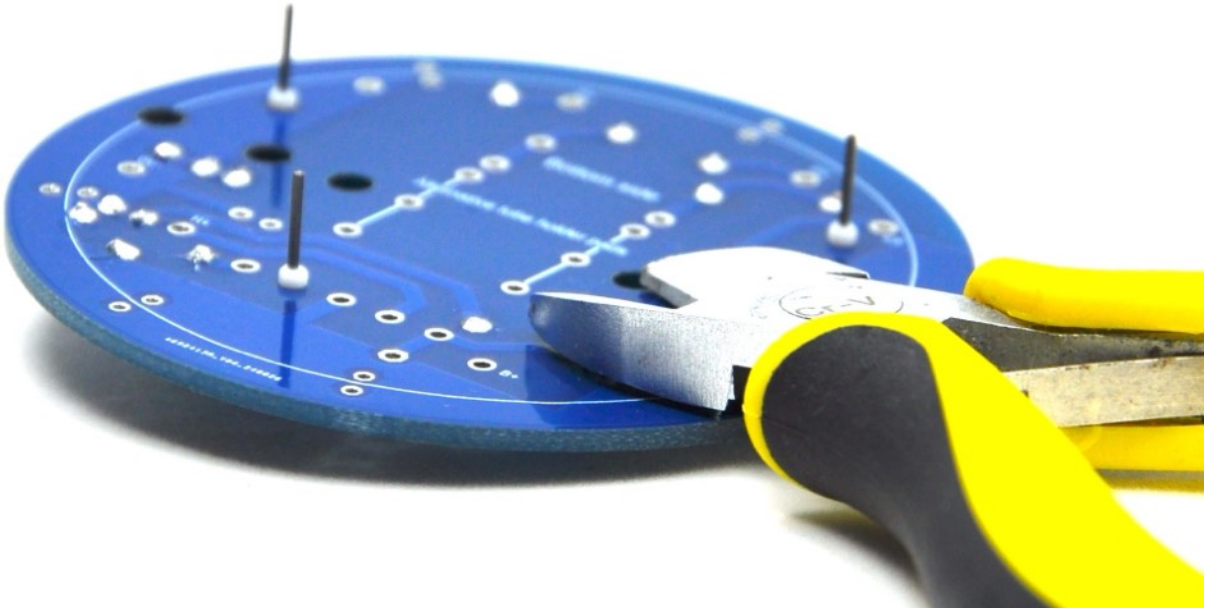
The soldering machine is hot so we can get started. We're gonna start by installing the main parts pcb. Start soldering the first resistors. Namely R3, R7, R8, R9, R10 and R11.



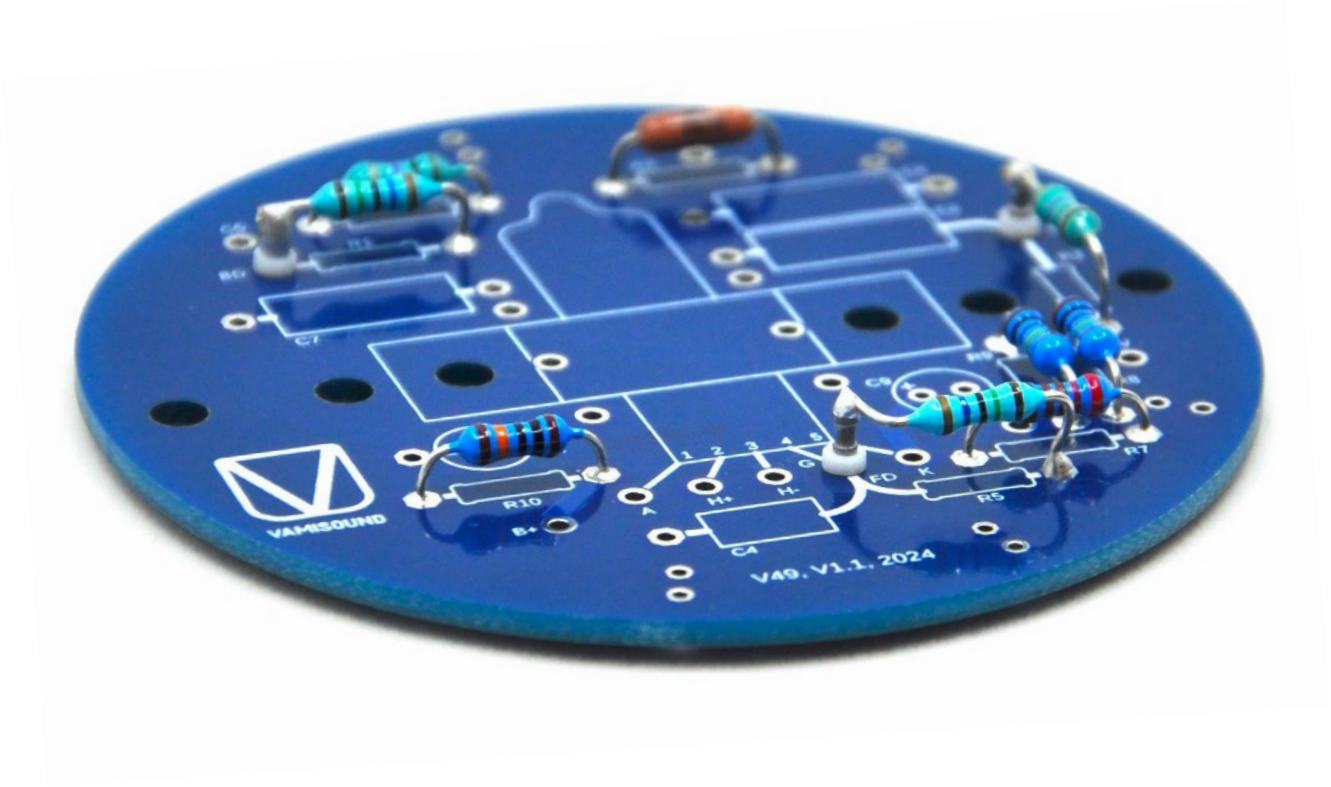
Note that three teflon pins were also installed in their holes.

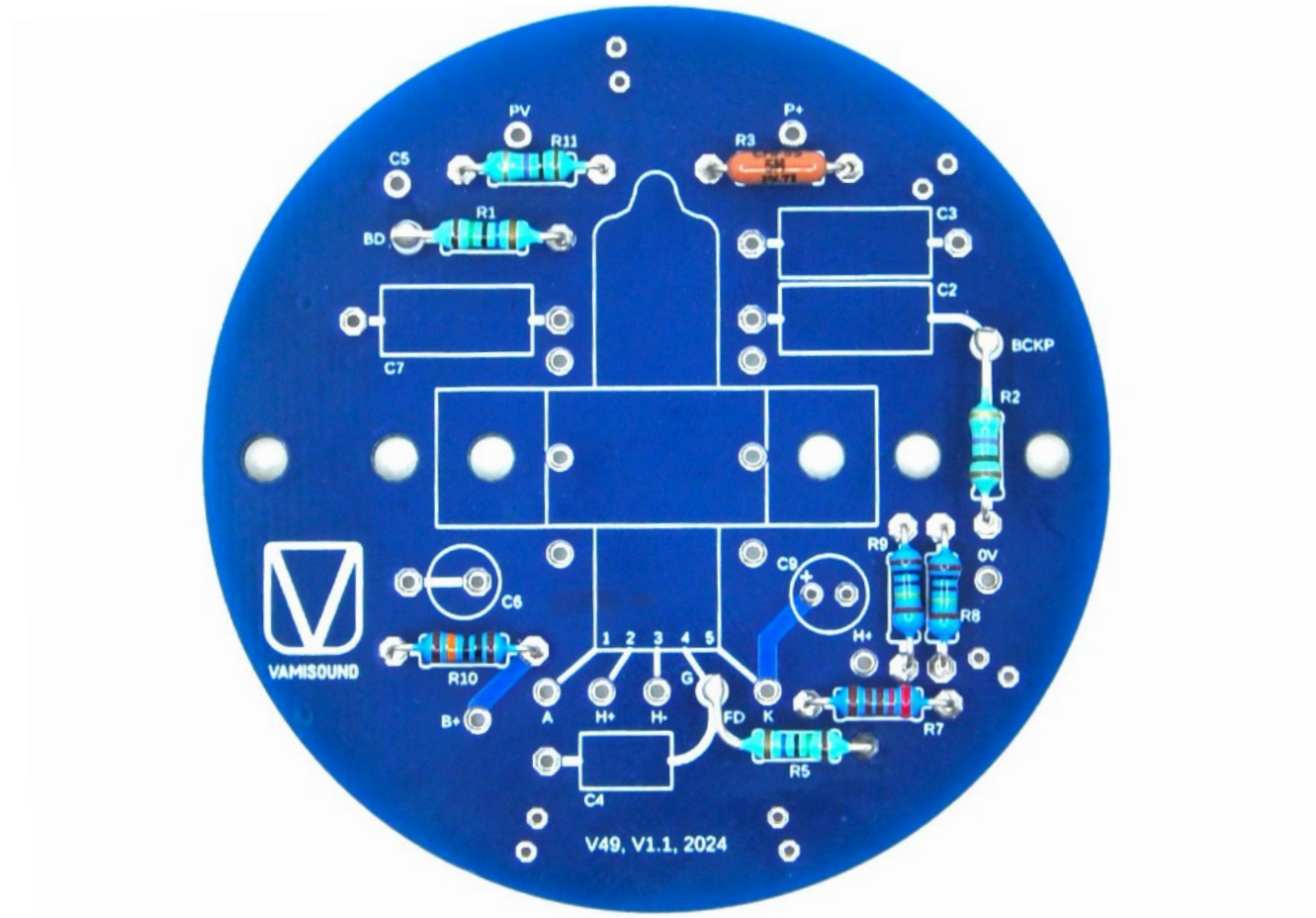


Shorten the teflon pins from the underside so that only the white teflon part is visible. Nothing will be installed on this side, so there is no need to leave them sticking out.

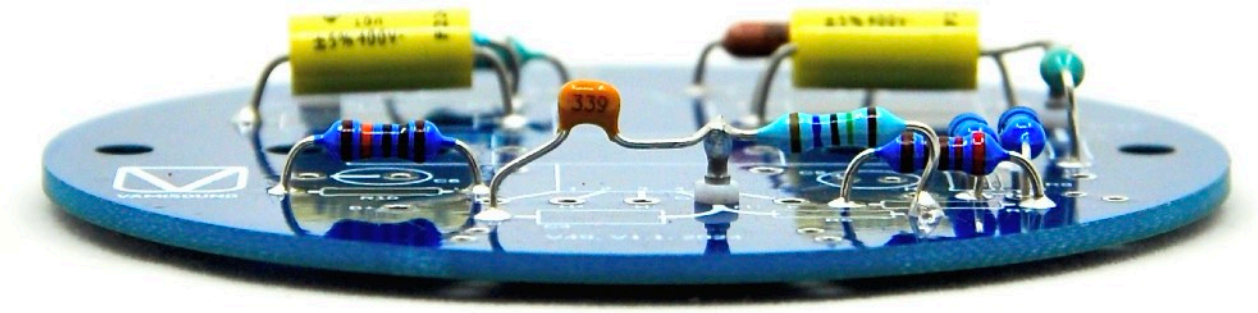


Solder the three resistors R1, R2 and R5 to the teflon pins as if in air as you see in the picture. These are where you will subsequently connect the cables leading from the direction of the capsule.

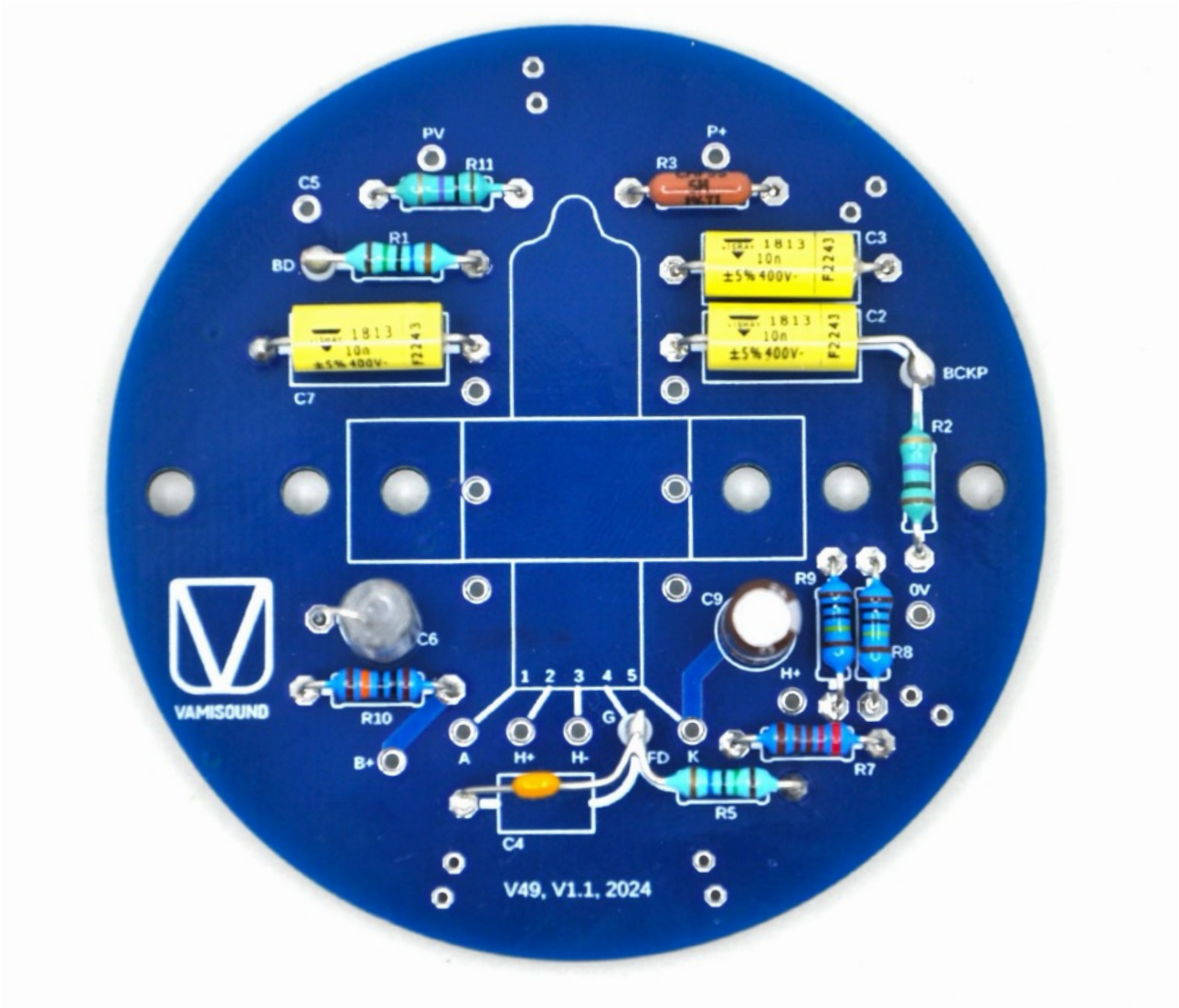


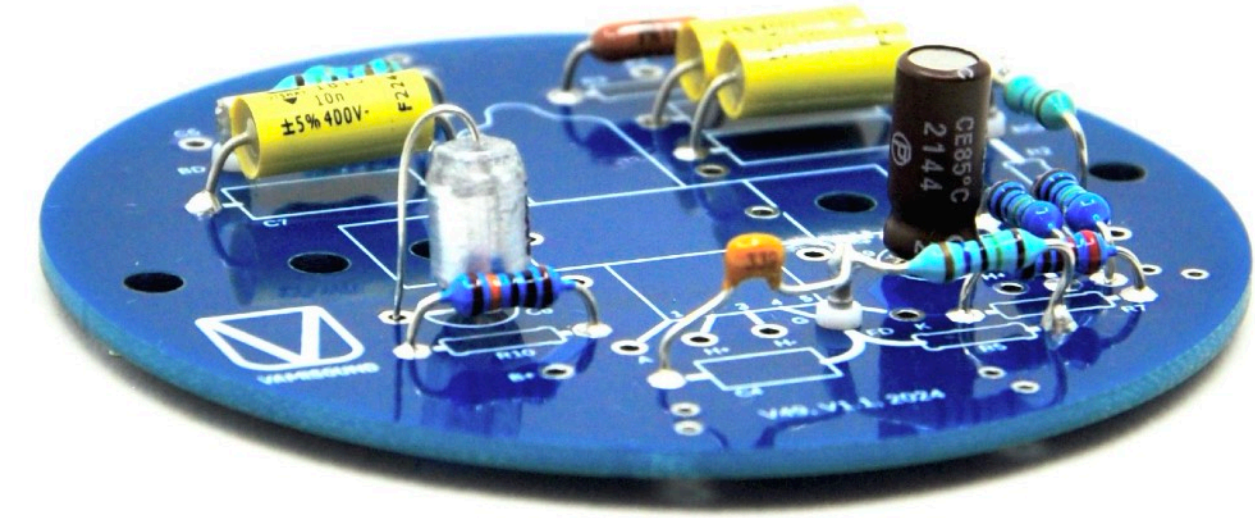


Next are the yellow axial capacitors C2, C3 and C4. Note that C3 is again soldered in air to the teflon pin, on which resistor R2 is already soldered.

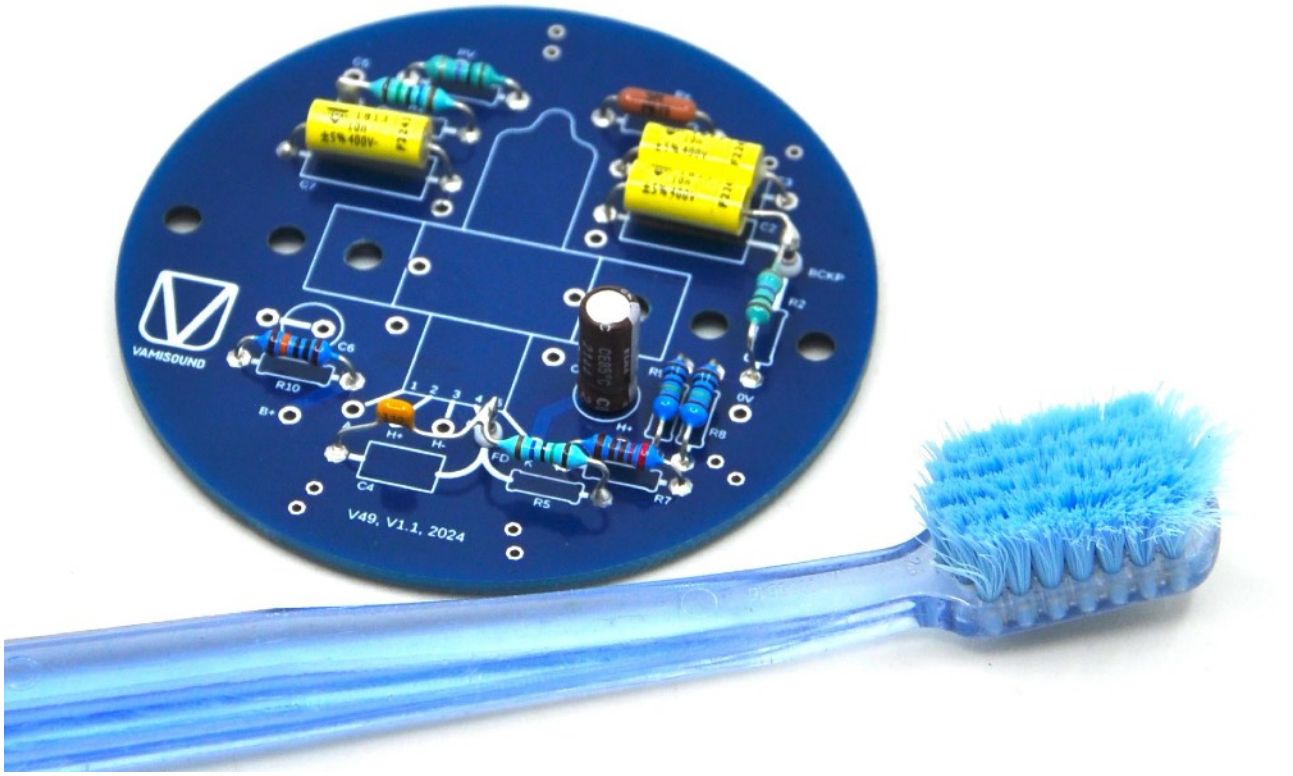


Then solder the ceramic capacitor C4 to the teflon pin as you can see in the picture. Electrolytic capacitor C9 and polystyrene capacitor C6 were also installed. C6 is an anode-to-ground capacitor that creates LPF on the highs (suppresses the highs), so it's up to you whether you install it or not. I ended up not installing them.

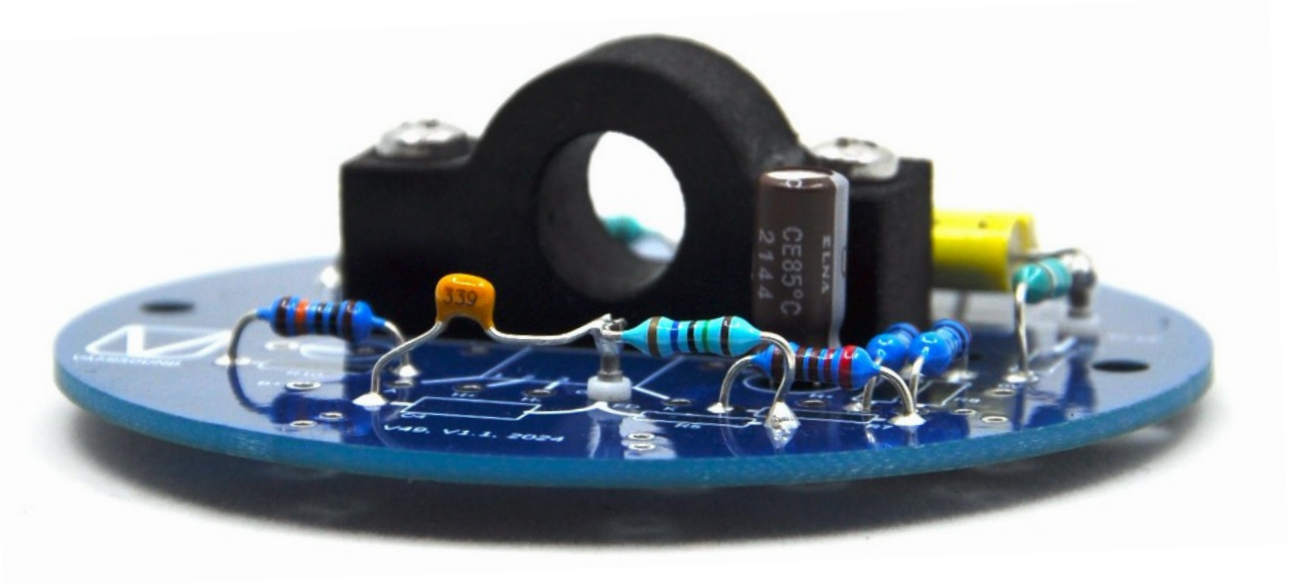




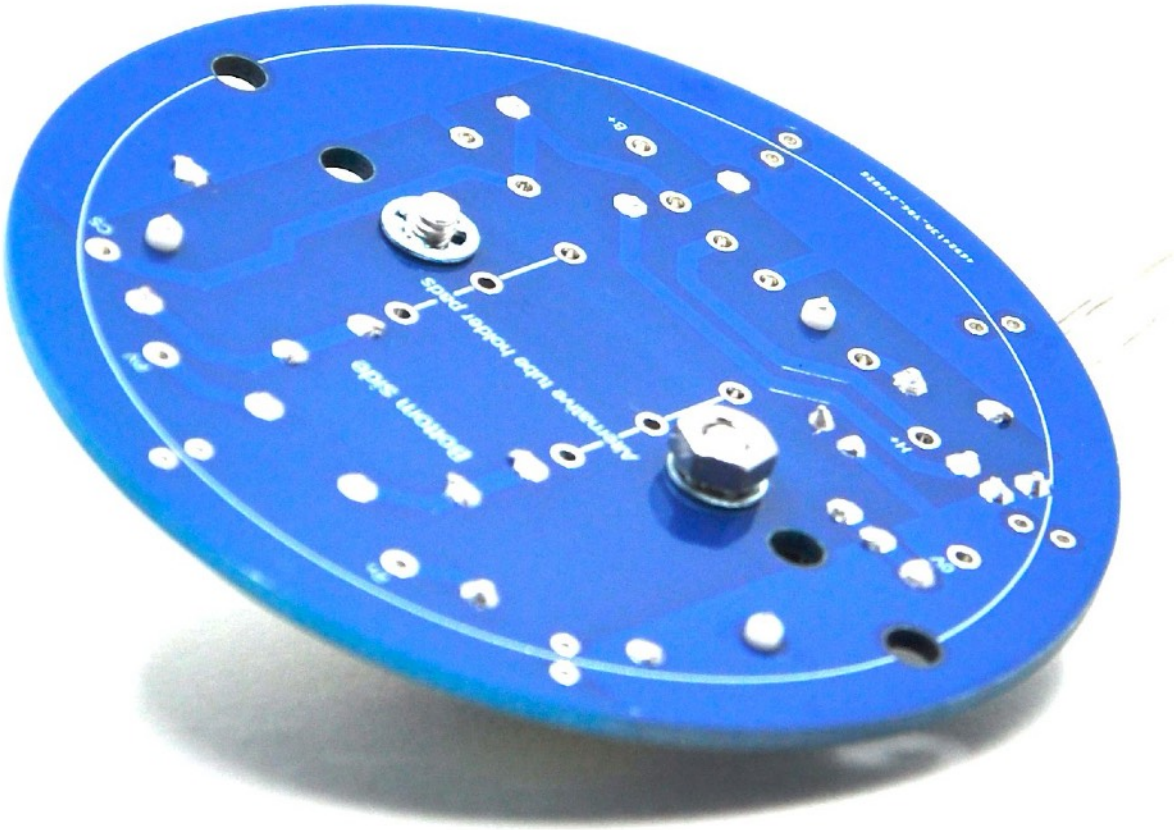
Now it's time to carefully wash the pcb with a brush and isopropyl alcohol. Make sure everything is clean and free of flux from soldering. Especially focus on the teflon pins and the connections to them. Be careful especially around the polystyrene capacitor which don't like the isopropyl alcohol.



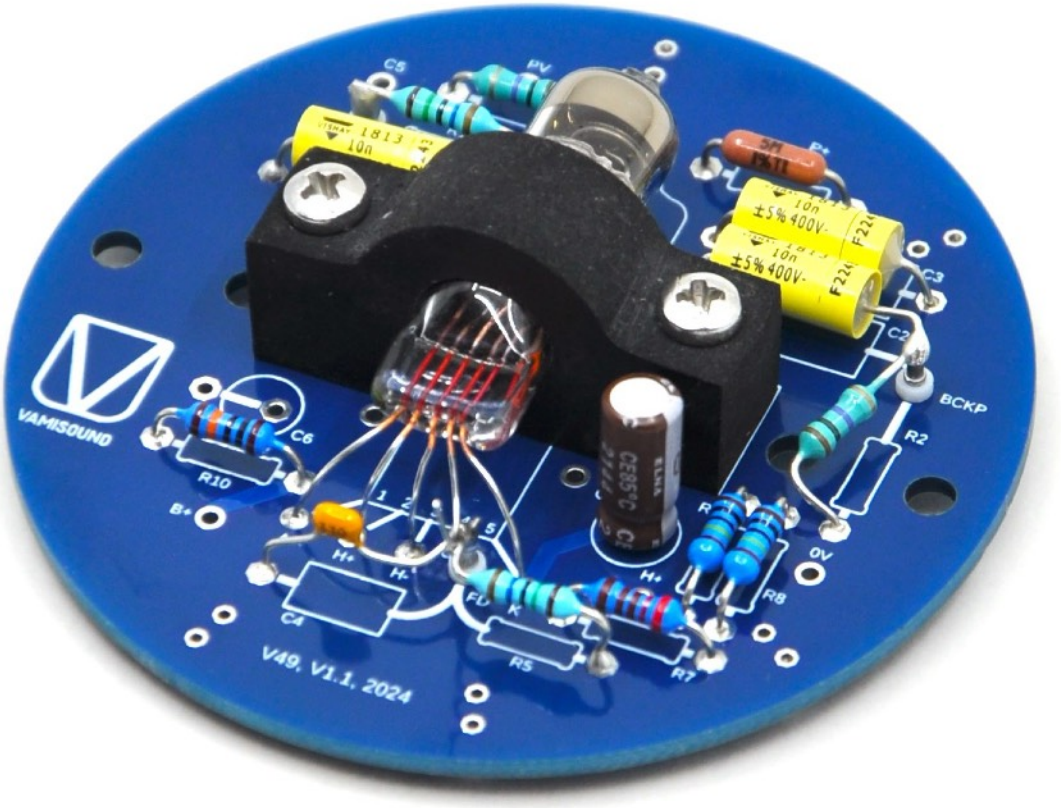
Now it's time to install the rubber tube holder. Use two M3 screws that are approximately 14mm long.



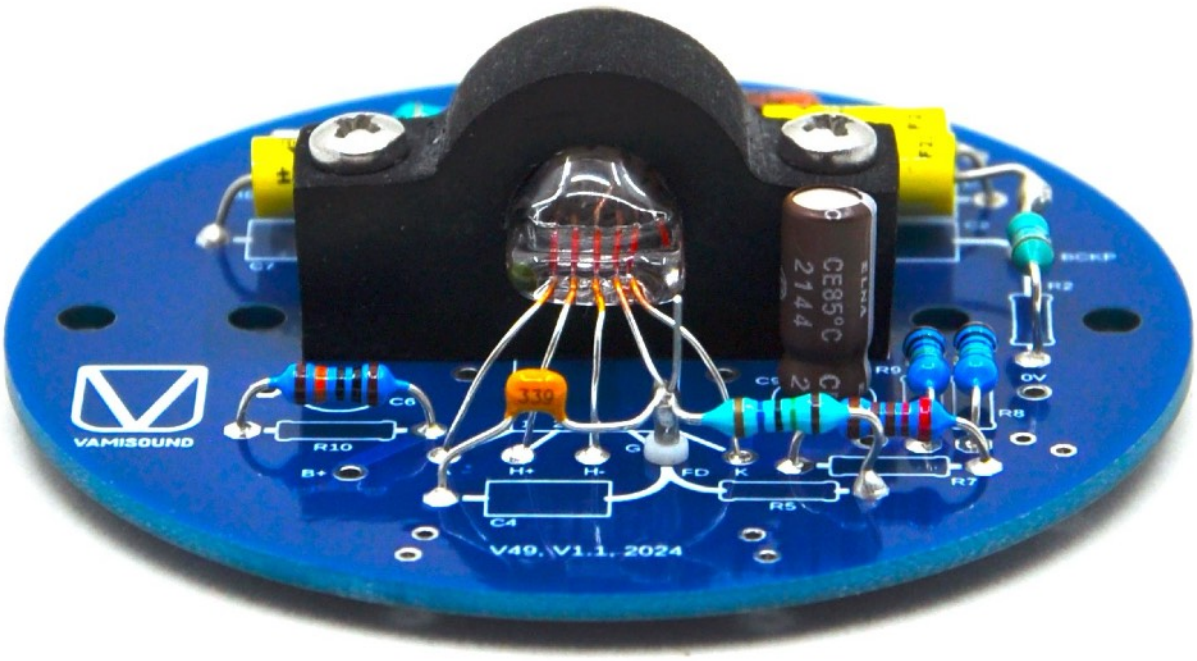
It is always a good idea to back the bolt nut with a safety washer.



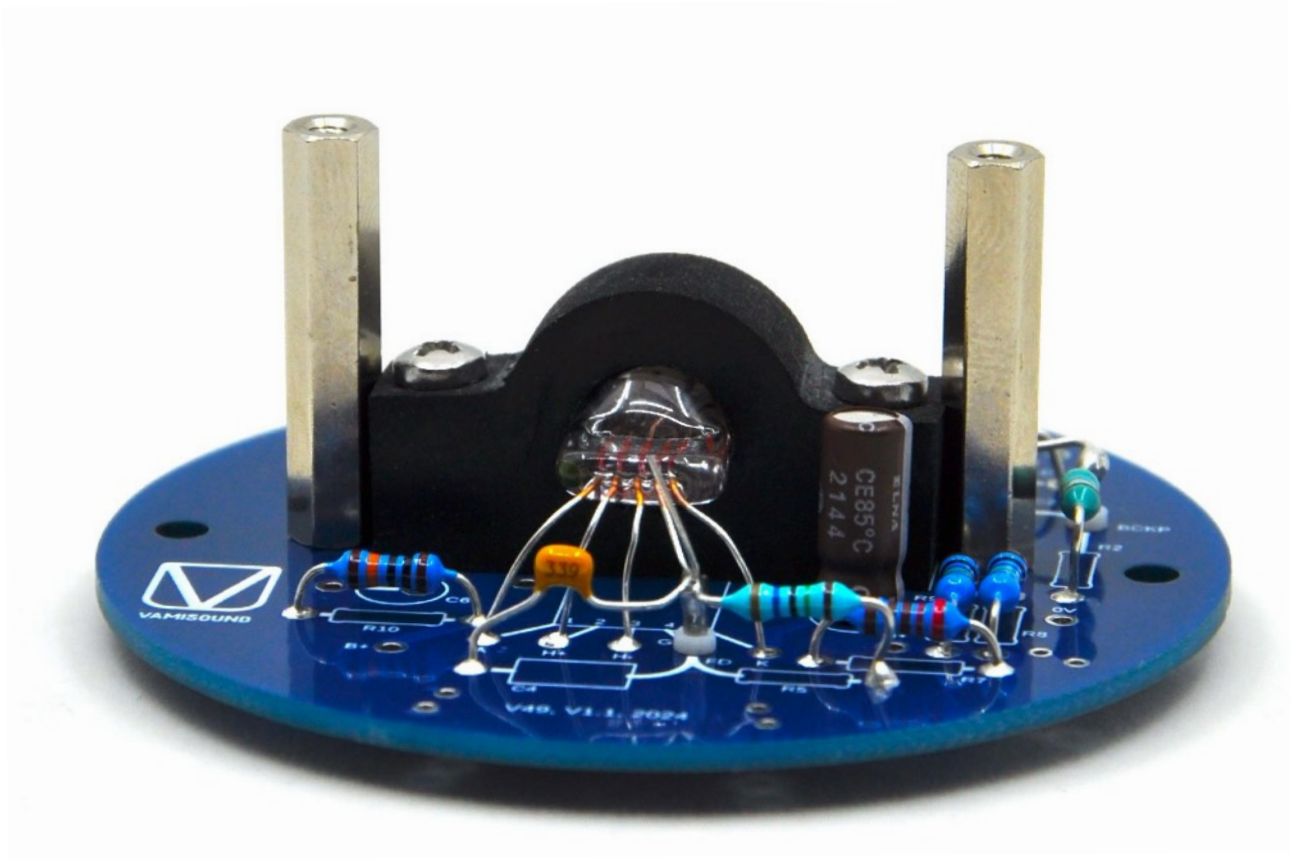
Now install the tube of your choice and preference. Always carefully check the pinout of your lamp against its data sheet. If you look at the pads on the circuit board, there are several. They're marked with abbreviations:
"A" = anode (plate)
"H+" = heater start
"H–" = heater ground
"G" = grid (on teflon pin)
"K" = cathode



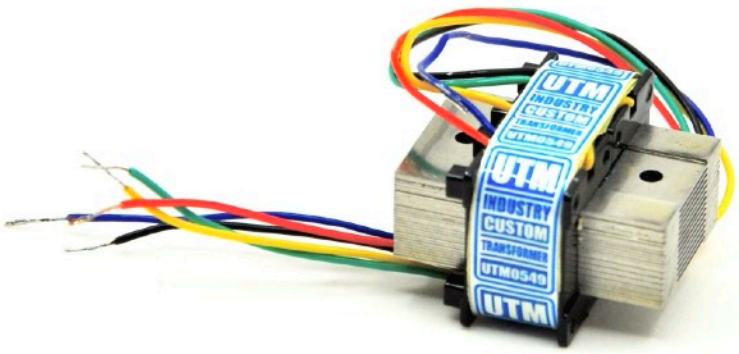
The tube grid is connected in air to a teflon pin to which resistor R5 and capacitor C4 are already connected.



Finally, screw in two 20mm long M3 spacers. Tighten them securely and don't forget the washers.

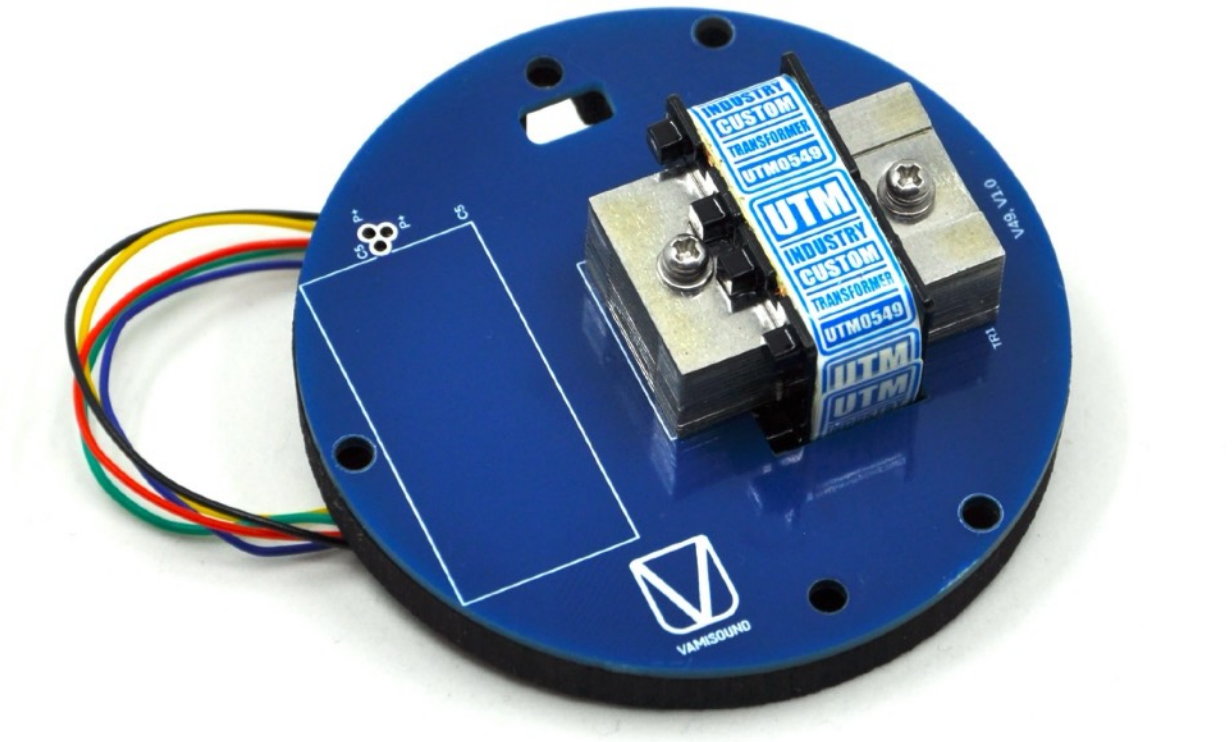


Now we move on to installing the transformer on the transformer pcb. I chose UTM0549. Always check the manufacturer's datasheet to see which wire are which. According to the manufacturer, the pinout of the transformer is as follows:
Red-Blk – Primary (Tube side)
Blu-Grn – Secondary (XLR side)
Yel – Shield

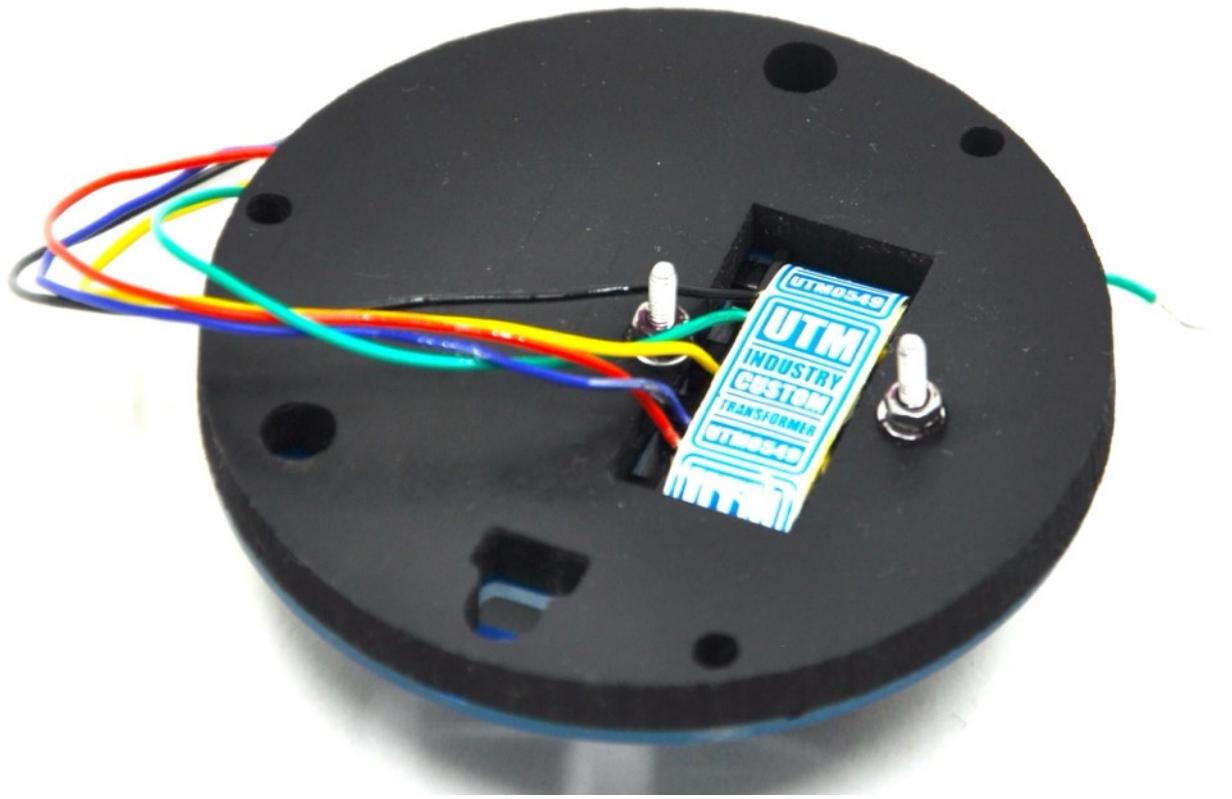


If you have chosen Moby's BV11 transformer, follow his datasheet and our wiring diagram.

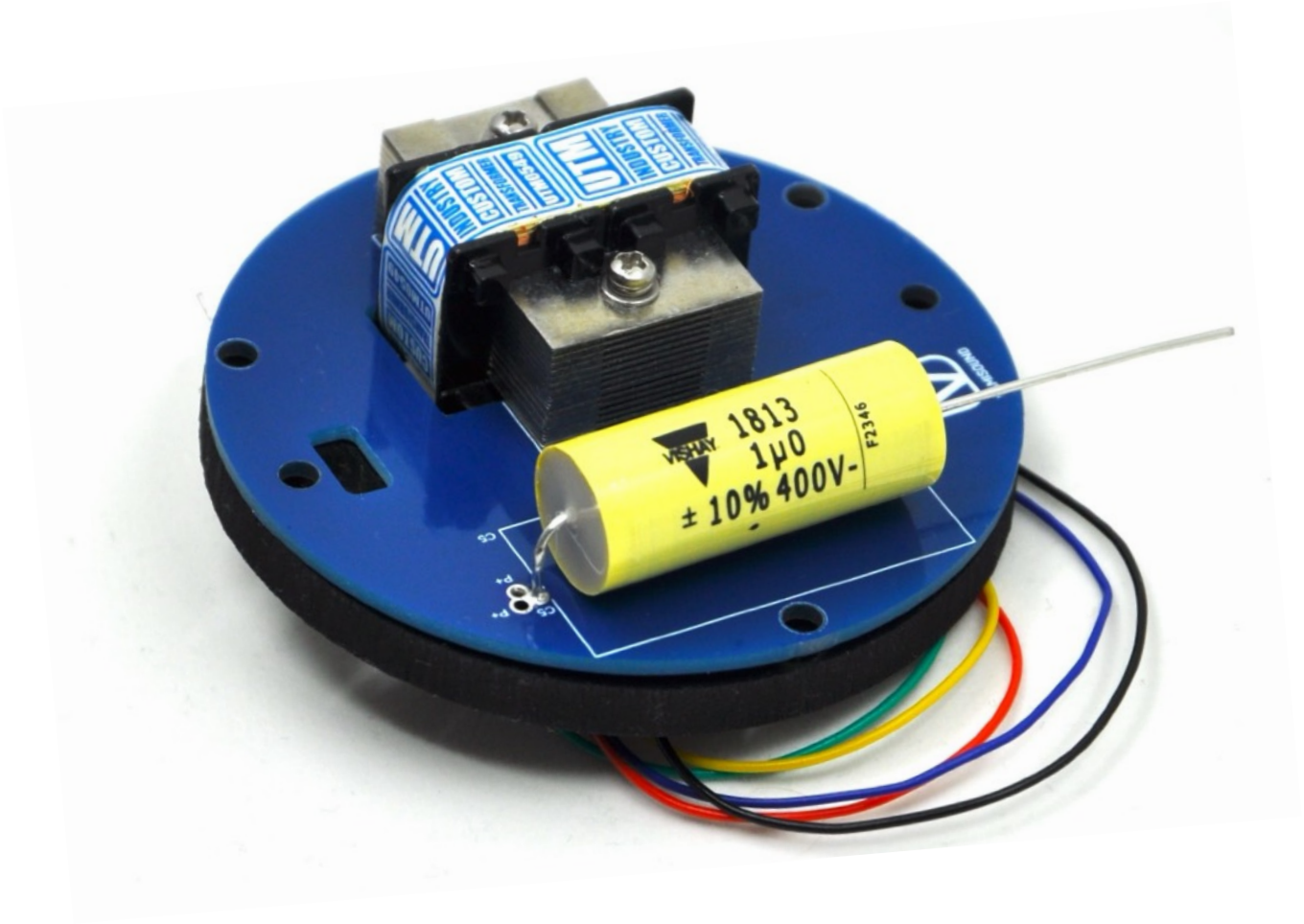
Attach the transformer with two 20mm M2 screws to the plate and rubber washer.



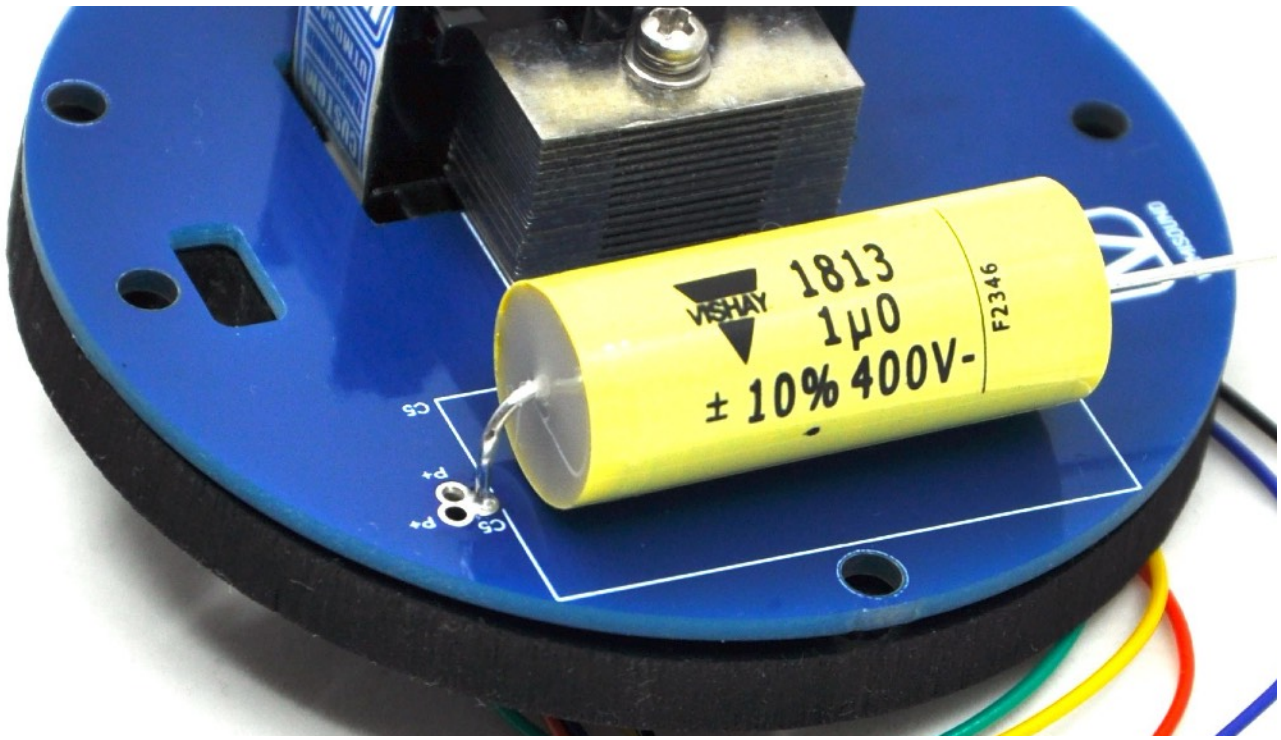
Again, use washers under the bolt nuts.



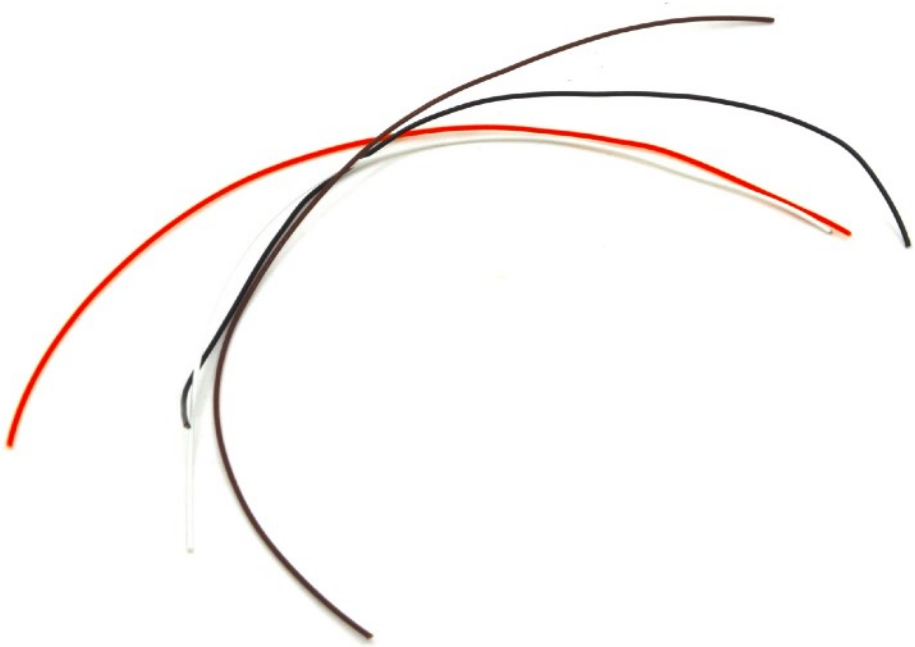
Install and carefully solder the large C5 output capacitor from the top side to the „C5“ marked pad on the transformer pcb. Be careful not to cover with tin the other two holes (both marked as „P+“), which are at the soldered leg of the capacitor. These will be used later to connect the cables.



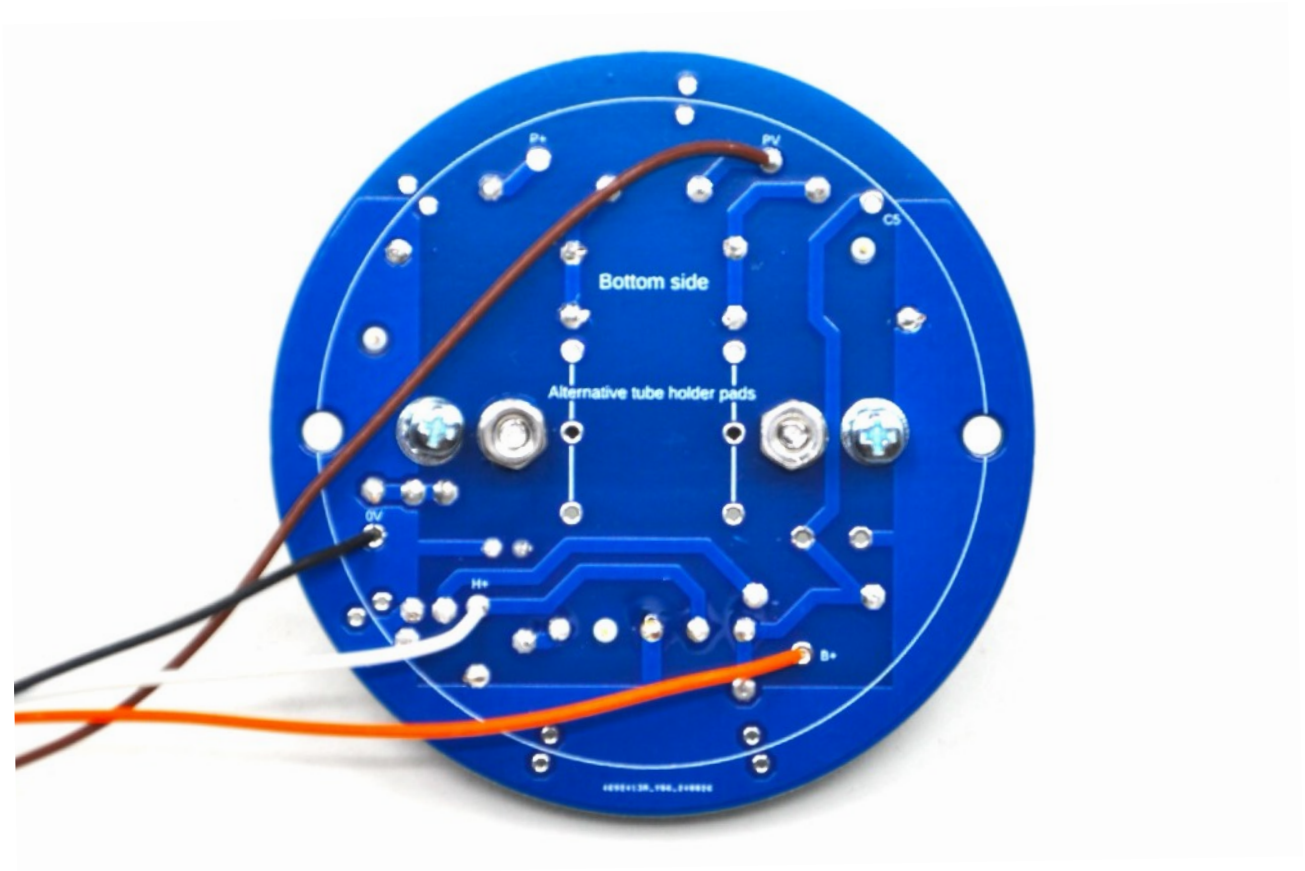
Here is detail:



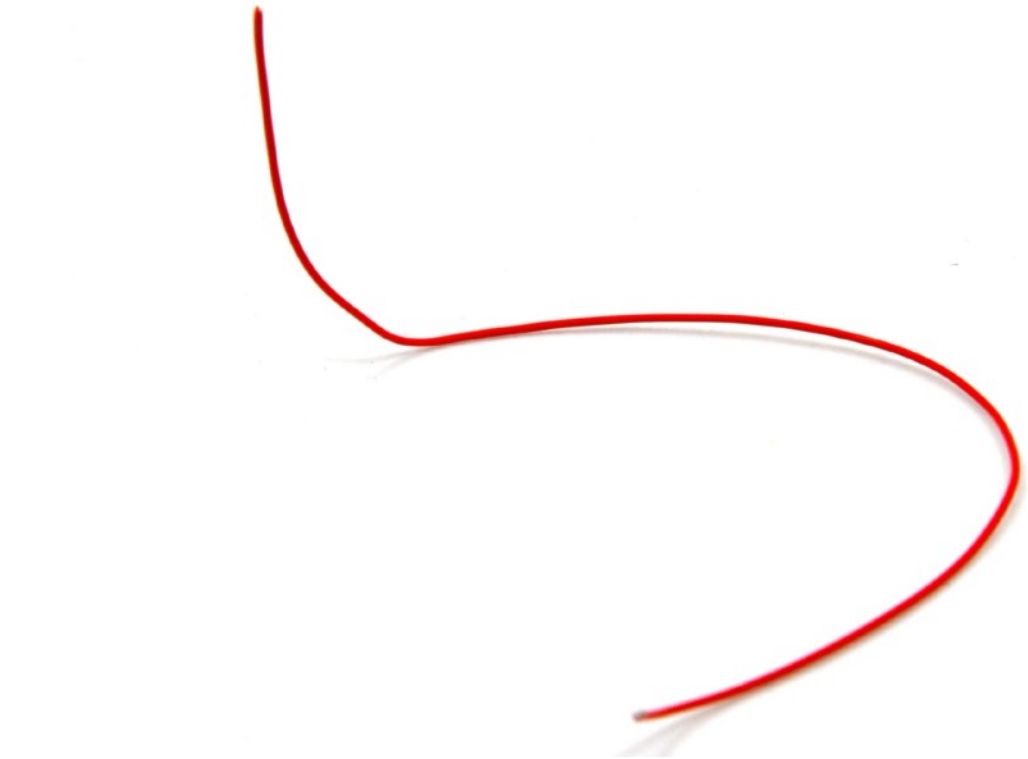
Prepare 4 wires approximately 20cm long. We are about to wire all the boards together. Use only teflon insulated cables, 24awg (0.22mm) are the ideal choice.



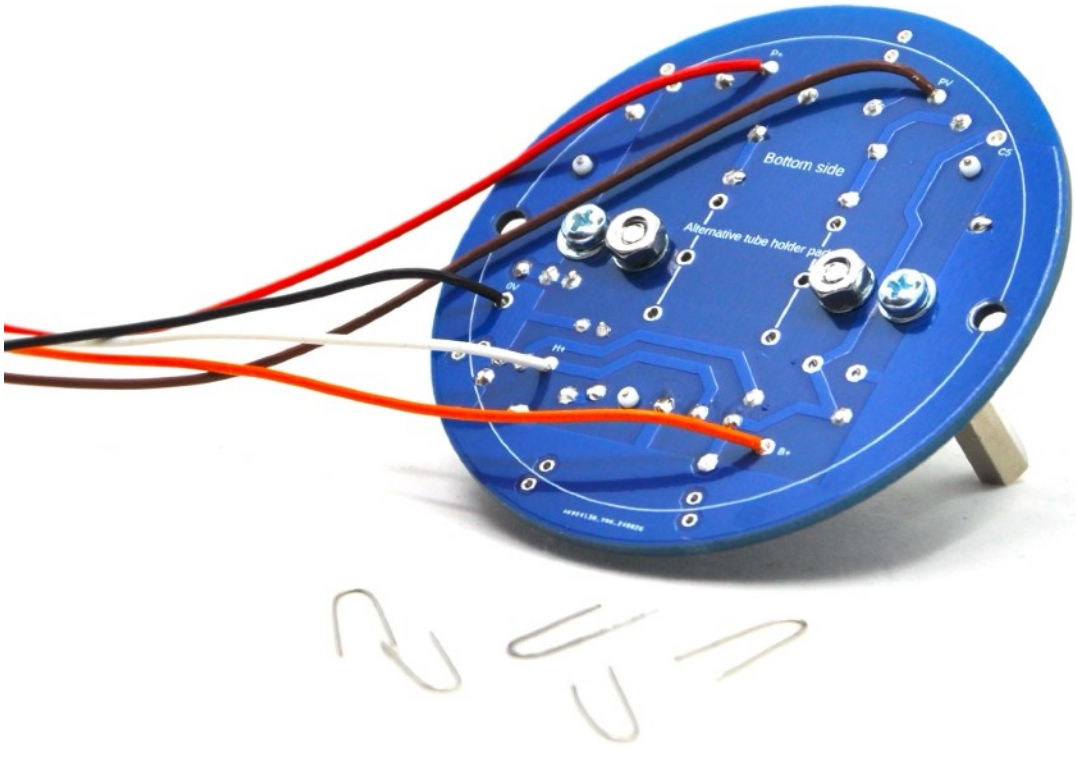
Connect the cables to the associated pads on the pcb.
PV = variable polarization voltage (brown cable in the picture)
B+ = 120V anode voltage (orange cable in the picture)
H+ = 6,3V heater voltage (white cable in the picture)
0V = circuit ground (black cable in the picture)



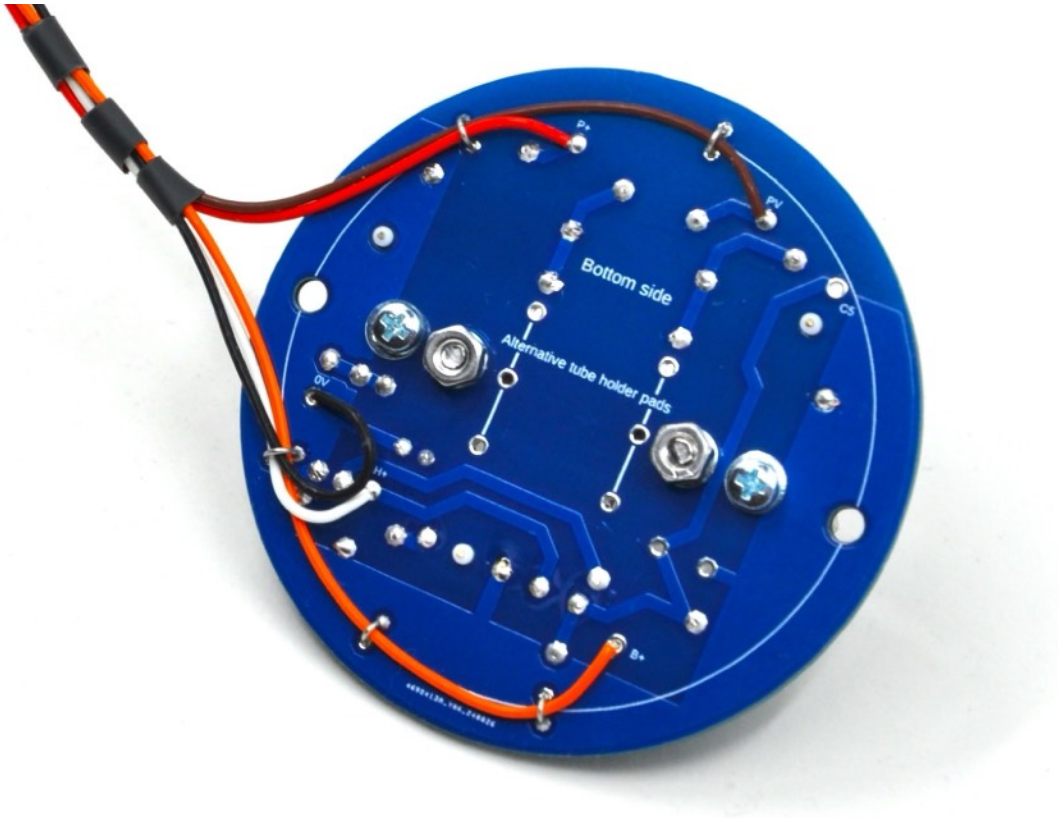
Prepare one last cable to connect the "P+" pin from the main part pcb to the "P+" pin on the transformer pcb. It is about 20cm long.



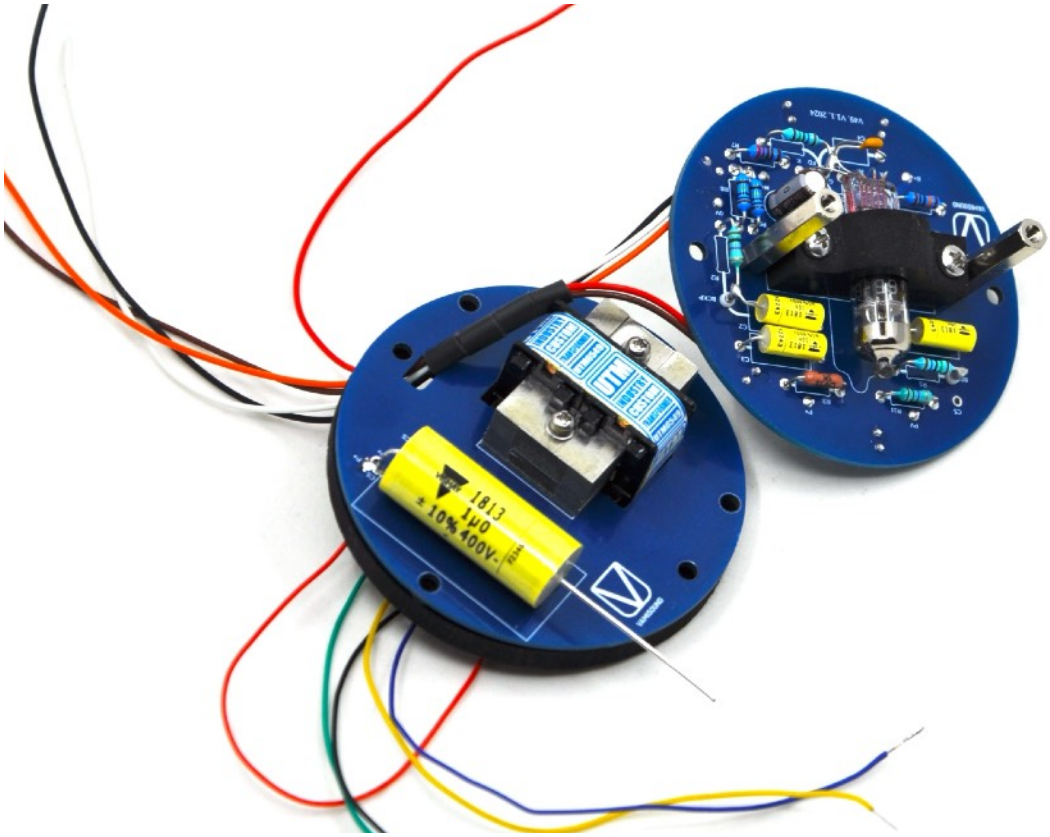
Here it is already connected to the "P+" pin on the main part pcb. Find the 5 remaining cut off legs from the resistors and bend them into a U shape.



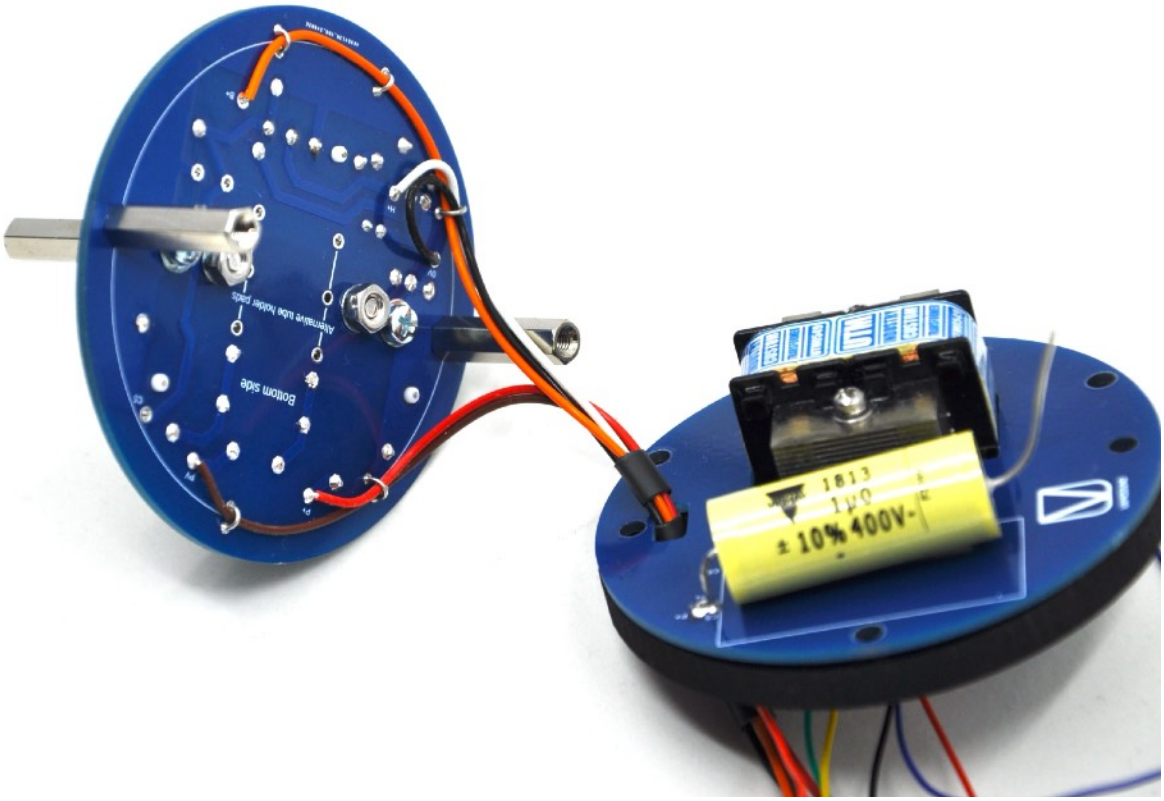
These legs are used to attach the cables to the underside of the pcb. They are soldered from the top side of the pcb. Caution cables that do not have a teflon insulator may be damaged when soldering U shape resistor legs. Use only cables with teflon insulation that will not be damaged by soldering.



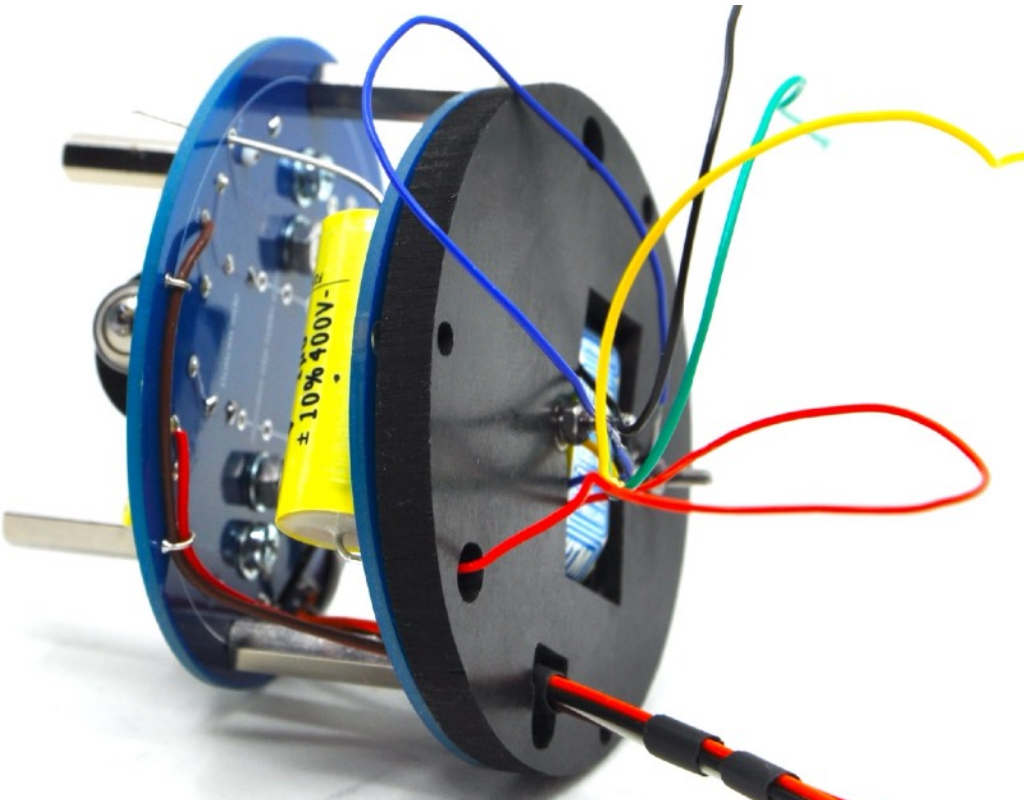
Now it's time to connect the main parts pcb to the transformer pcb. Push the cables from the main parts pcb into the „cables hole" of the transformer pcb as you can see in the picture. These are 5 cables that you can shrink wrap.



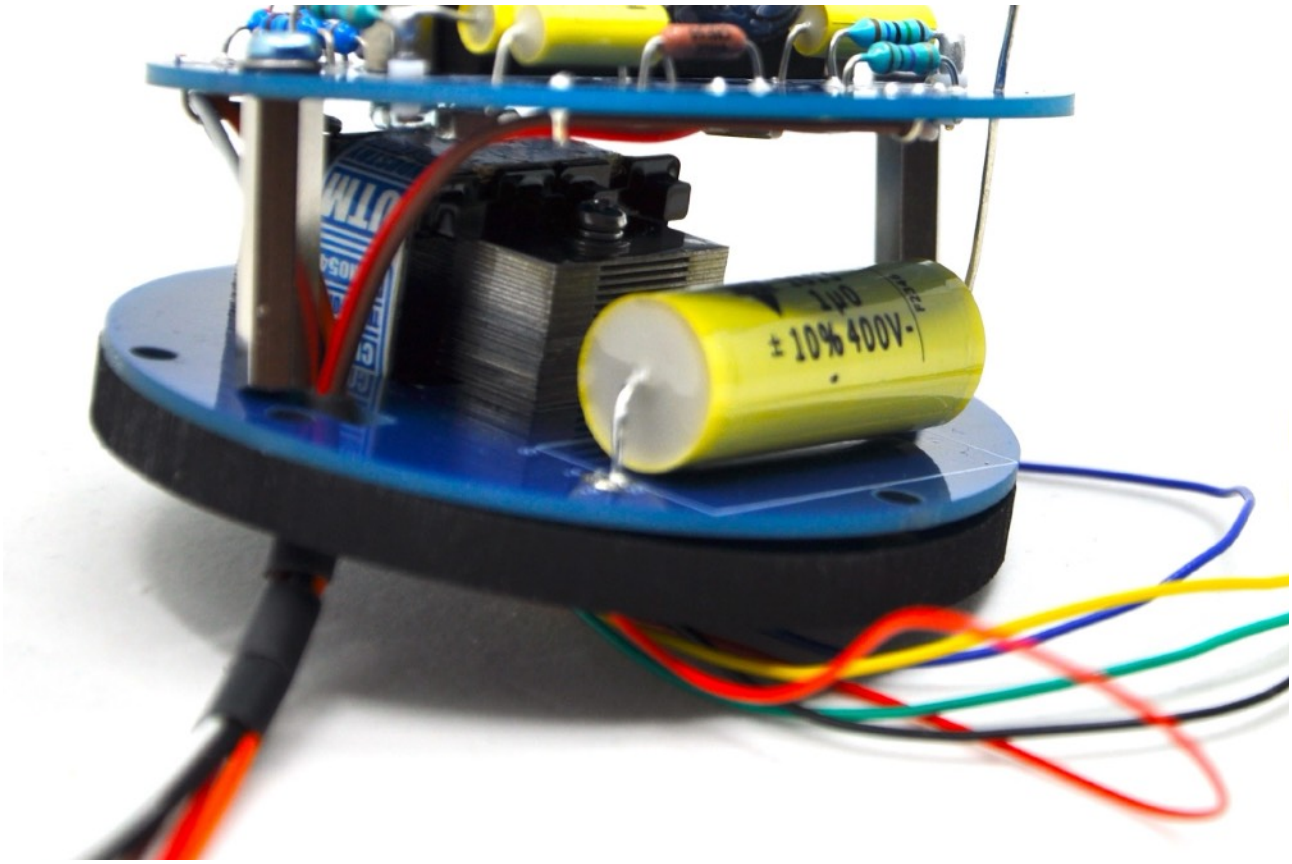
As you may have noticed there are already two 20mm long M3 spacers installed from the bottom of the main parts pcb.



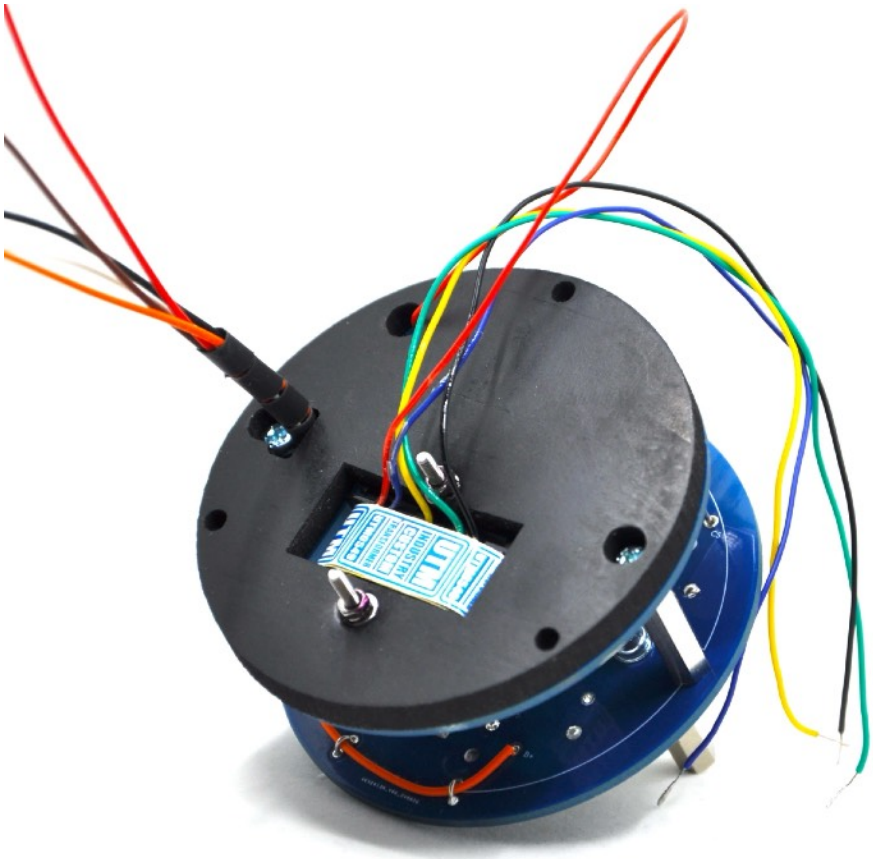
Connect the red cable prom the transformer to the pad that is marked as "P+" on the tranformer pcb – near the leg of the yellow output transformer. Thread the cable through from the bottom side as you can see in the picture.



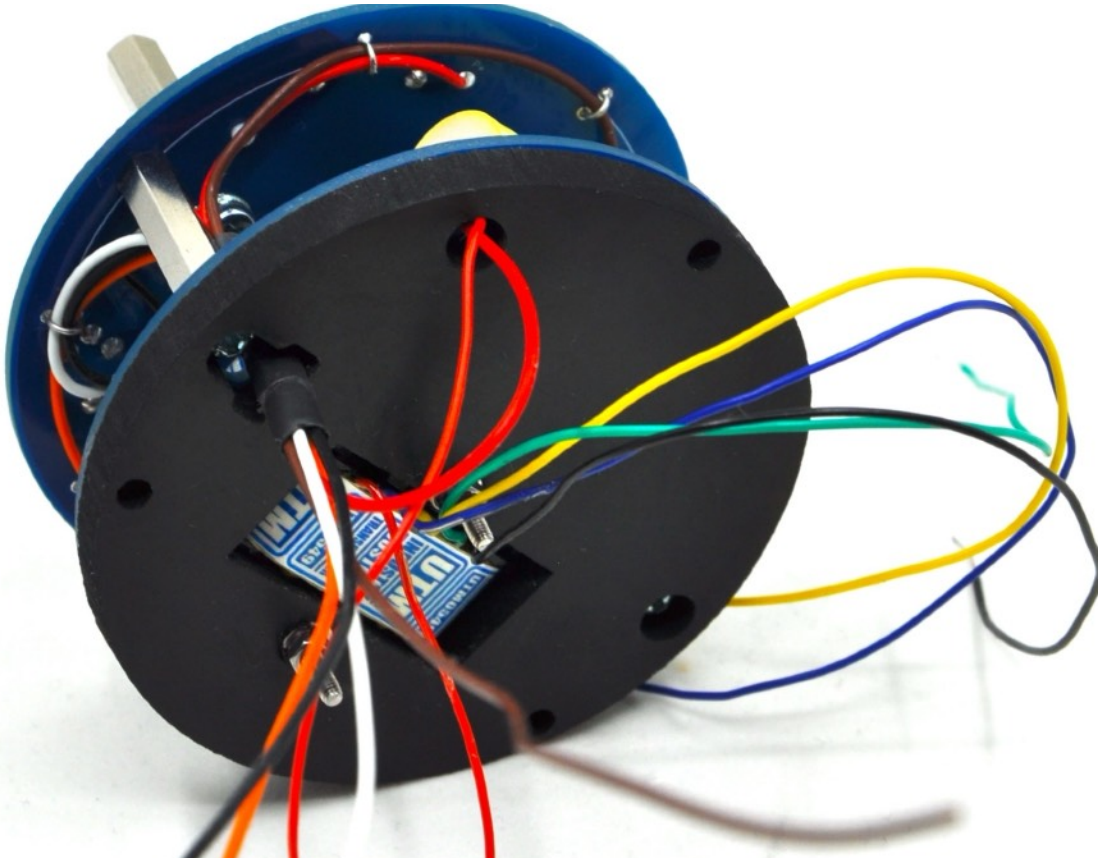
Thread the second leg of the yellow output capacitor C5 into the pad marked "C5" on the main parts pcb.

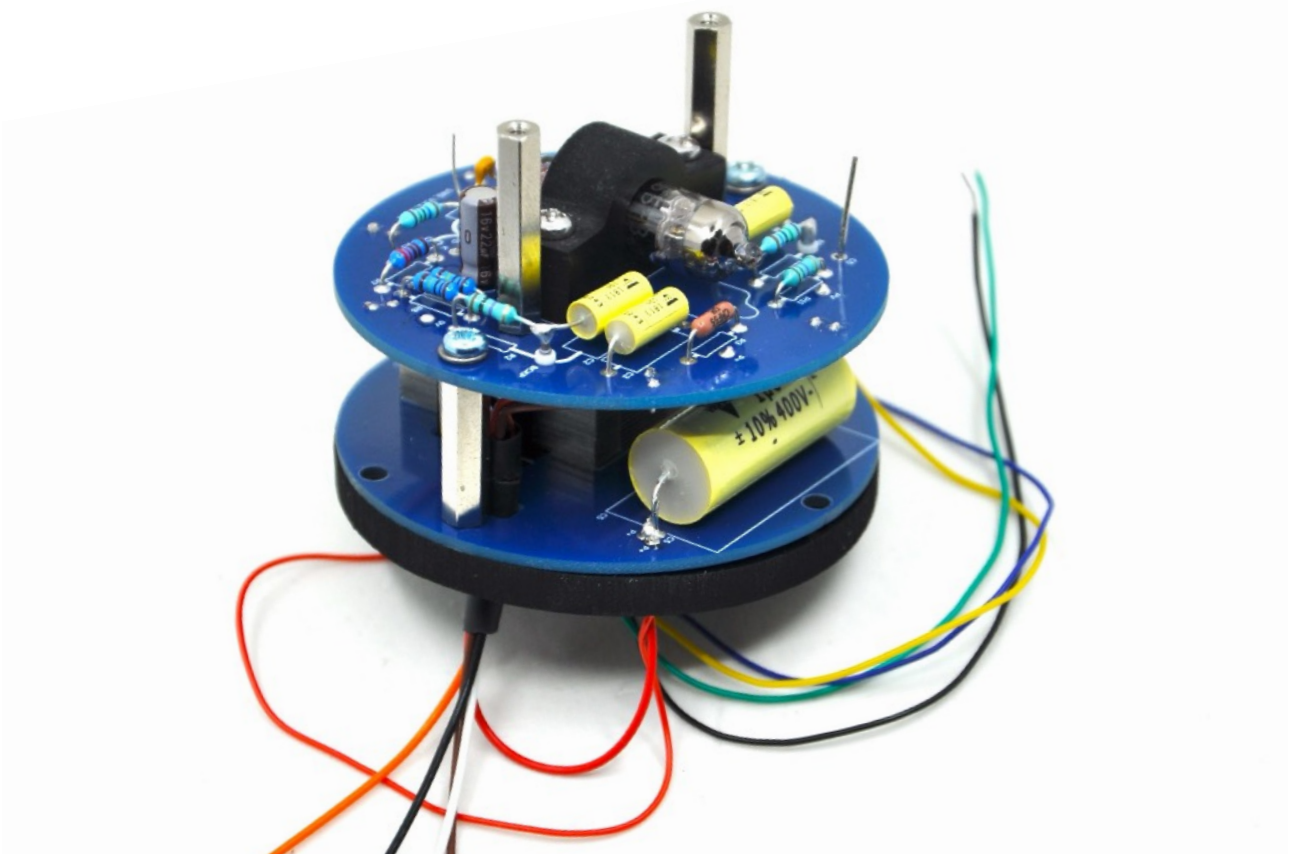


Carefully screw the two pcb's together. Use washers under the screws.

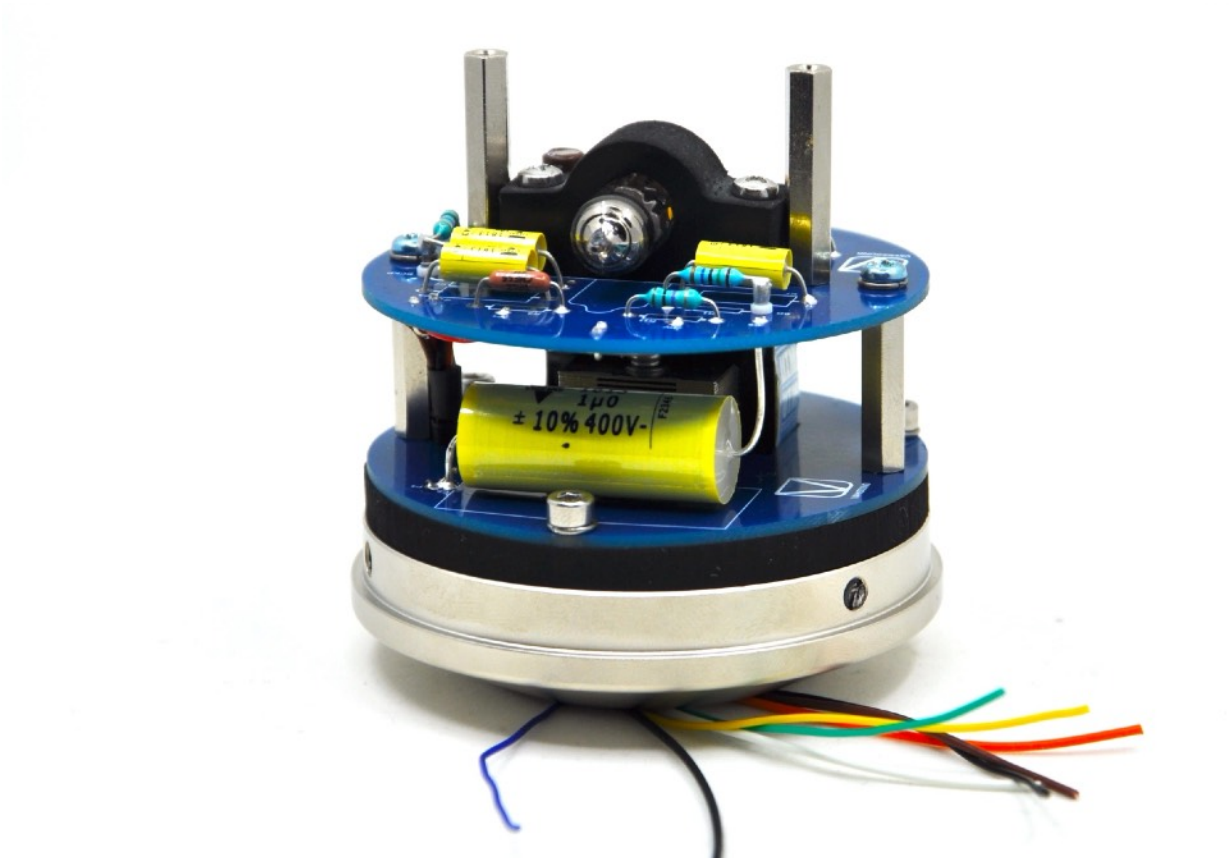


Now connect the red cable that runs from the "P+" pad on the main parts pcb to the "P+" pad on the transformer pcb near the C5 leg of the capacitor.

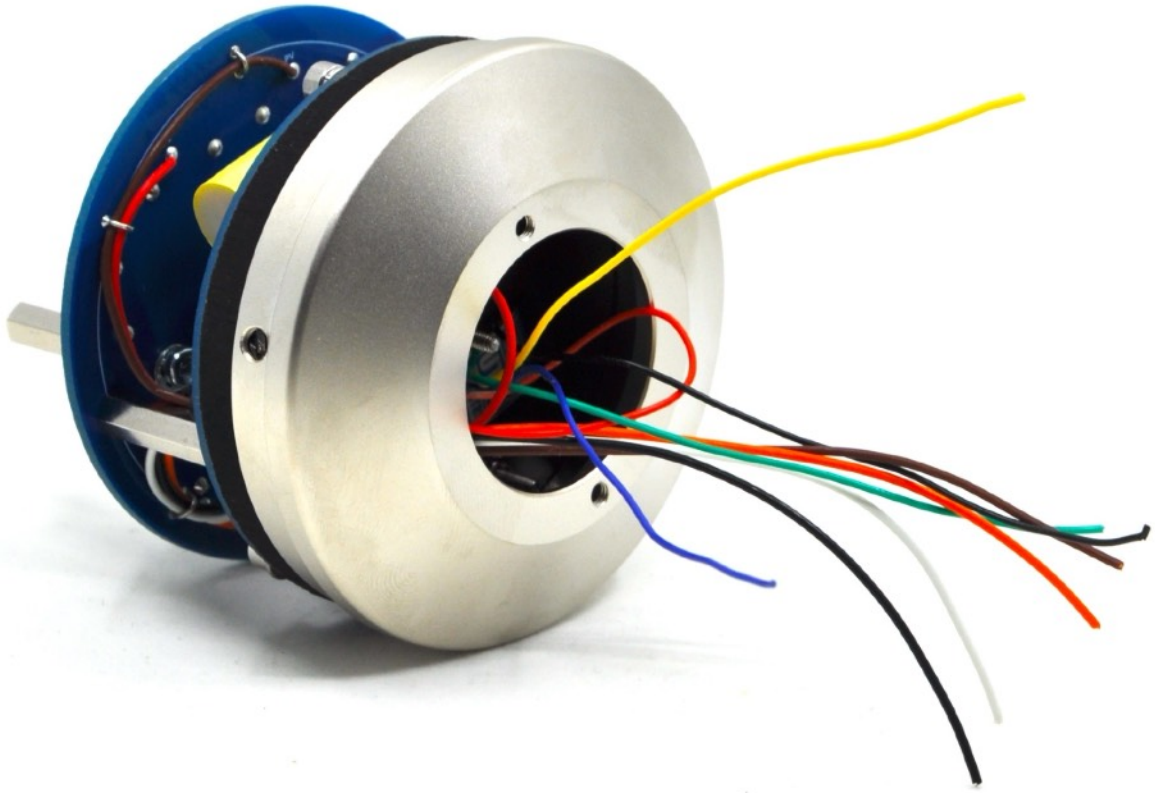




Screw both pcb to the bottom circular part of the M49 style body. Use 3 pieces of M3 screws about 10mm long. Use washers. Solder second C5 leg into the main parts pcb.

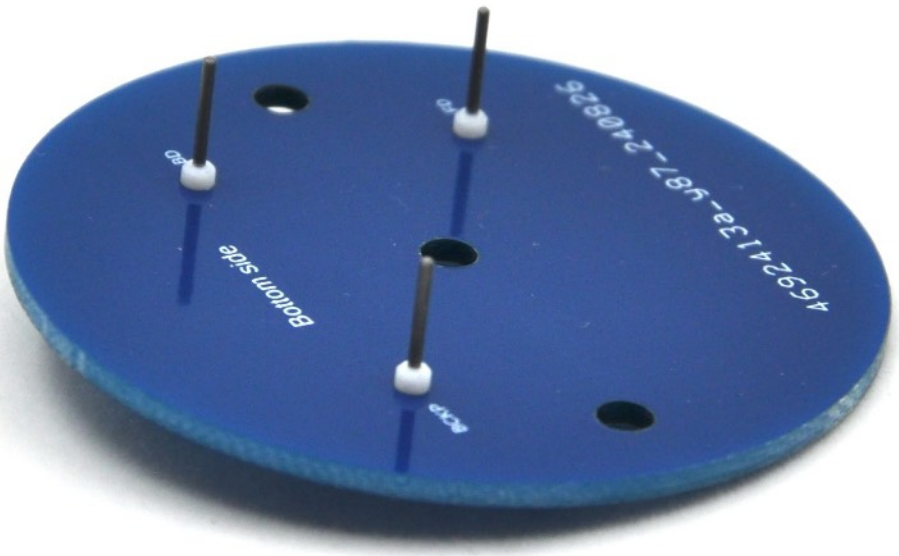


Make sure that all cables are routed through the hole in the bottom of the M49 body and are not pinched anywhere.



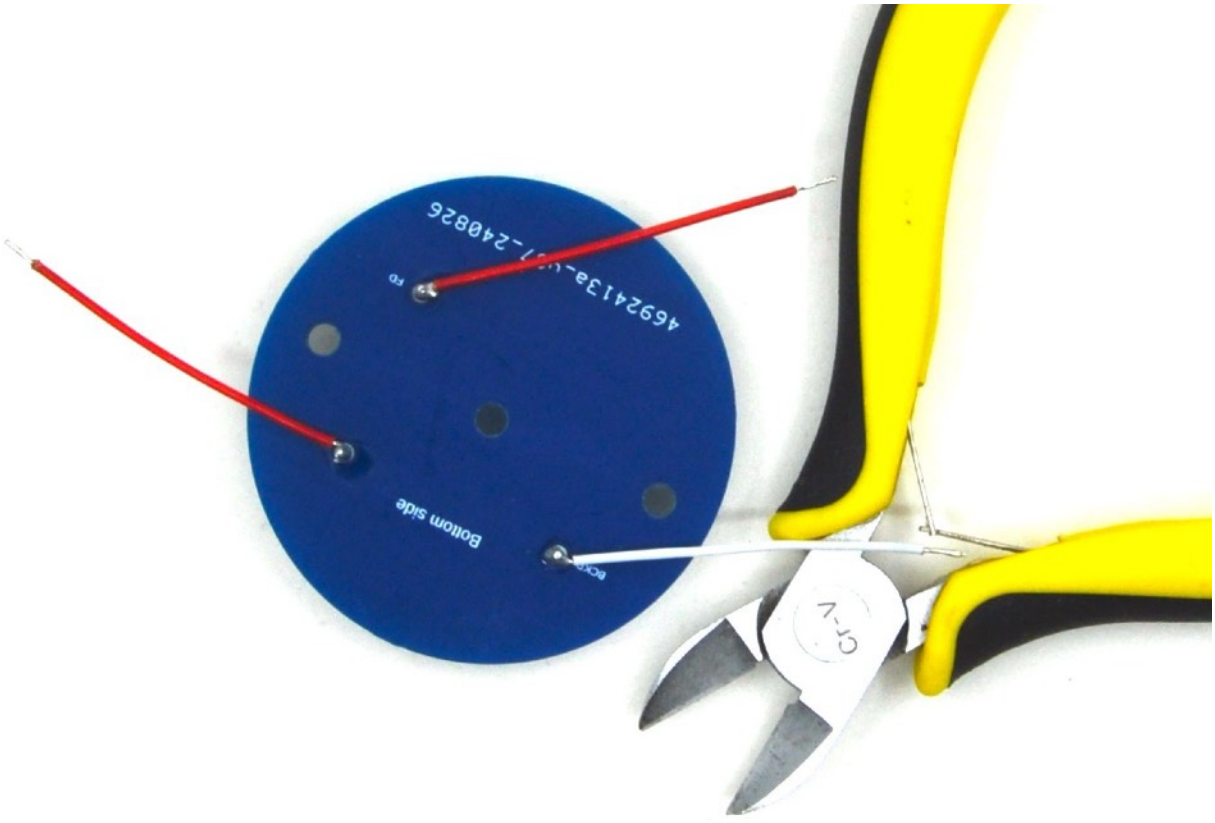
Install 3 teflon pins on capsule pcb. Solder C1 capacitor.

Do not shorten them on the underside of the plate.

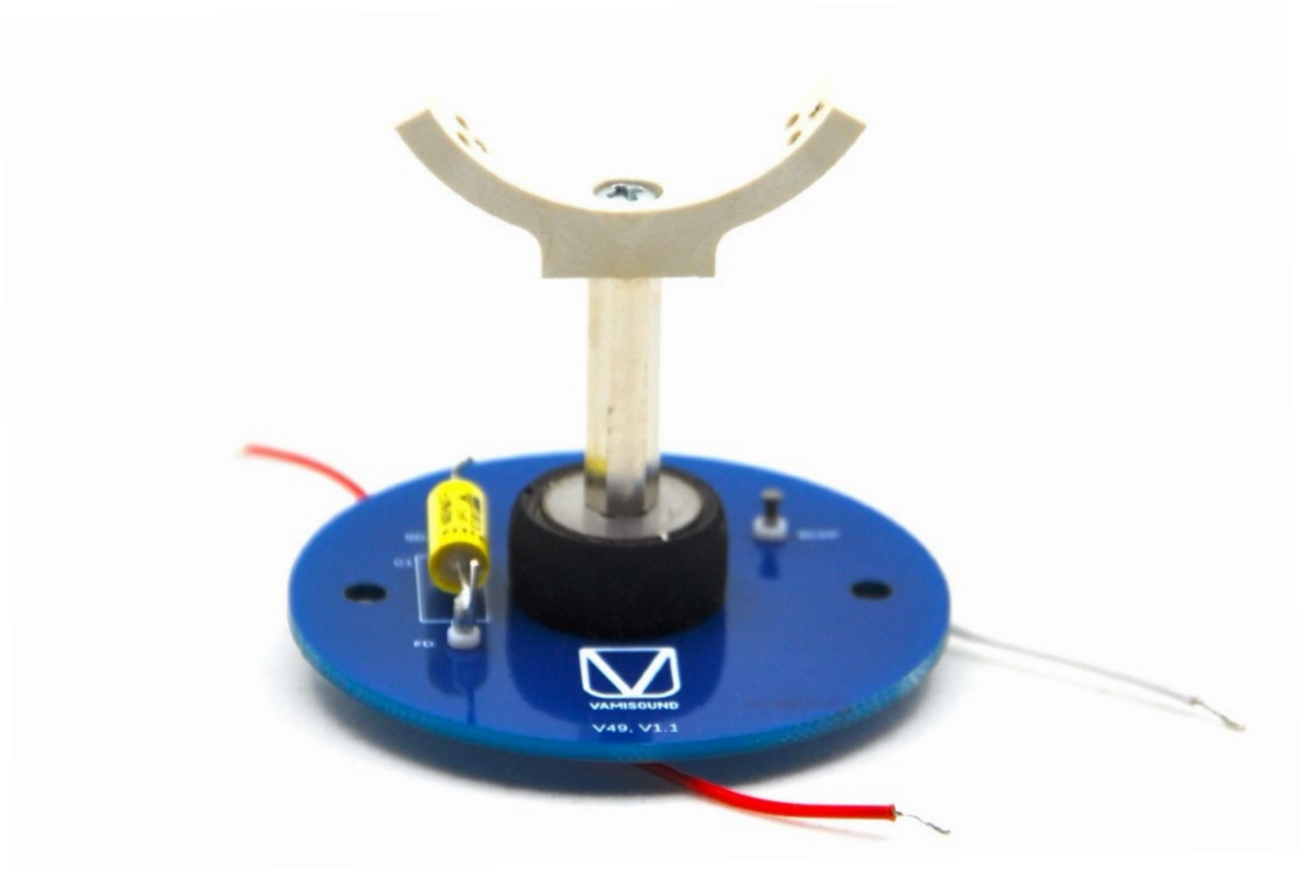


Wash the plate thoroughly with isopropyl alcohol.

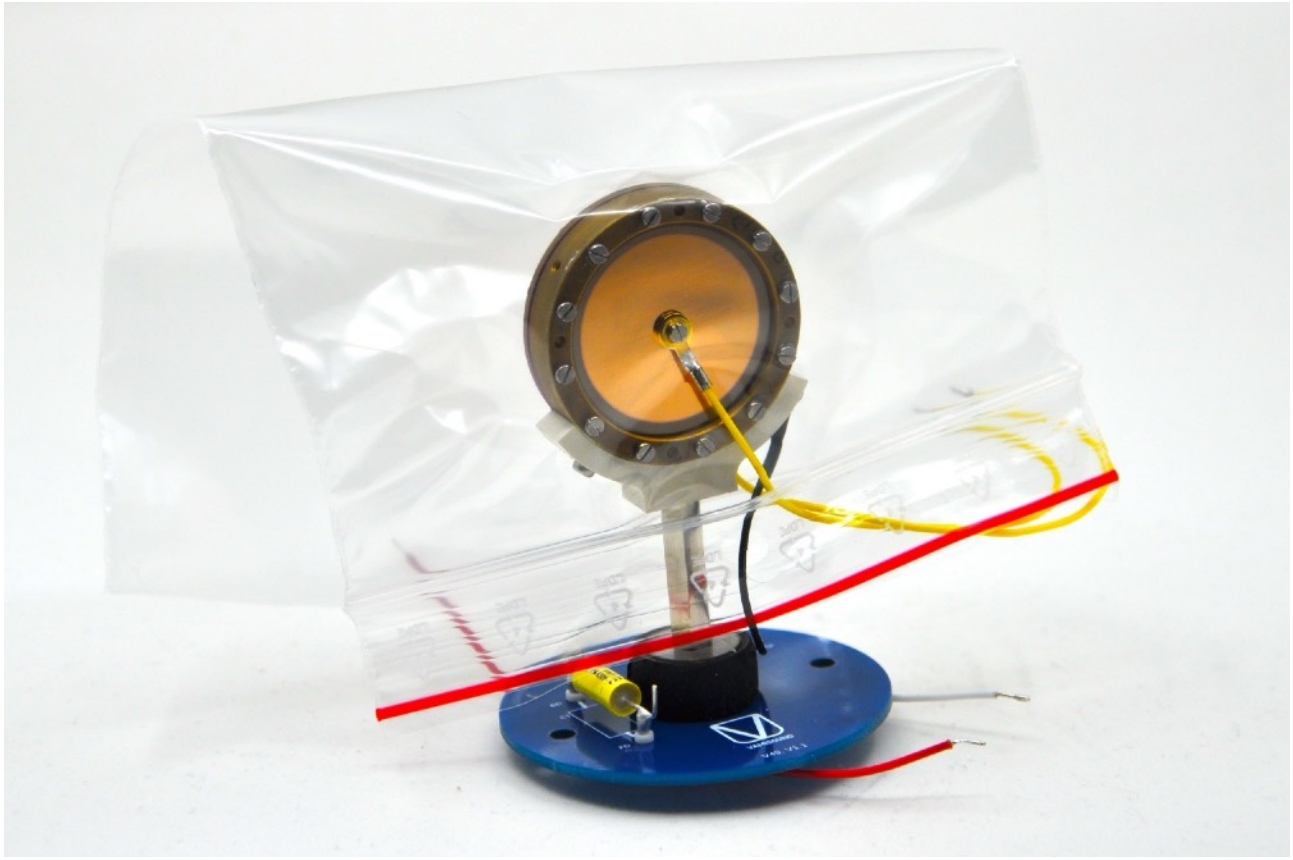
From the bottom strap, solder 3 cables about 5cm long to the teflon pins. Shunt the remaining part of the teflon pins. Clean these connections again.



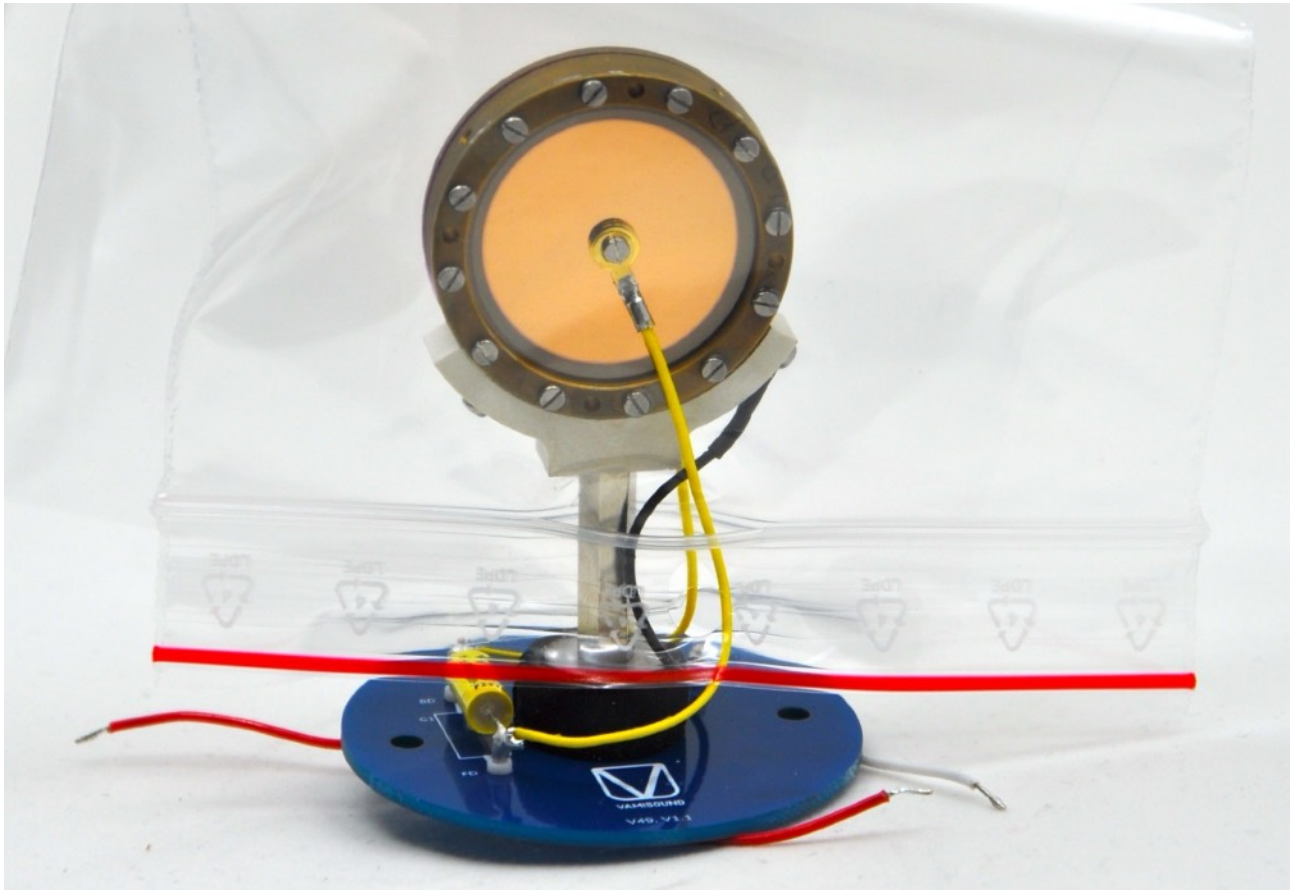
Install the capsule holder. The spacer post under the capsule should be about 25mm overall from the pcb to the underside of the capsule saddle.



Carefully install the caspsule in place and immediately cover it with the protective bag.



Now solder the capsule cables into place. The cable from the front diaphragm solder to pin "FD", the cable from the rear diaphragm to pin "RD" and the cable from the capsule backplate to pin "BCKP". Carefully clean these connections again.

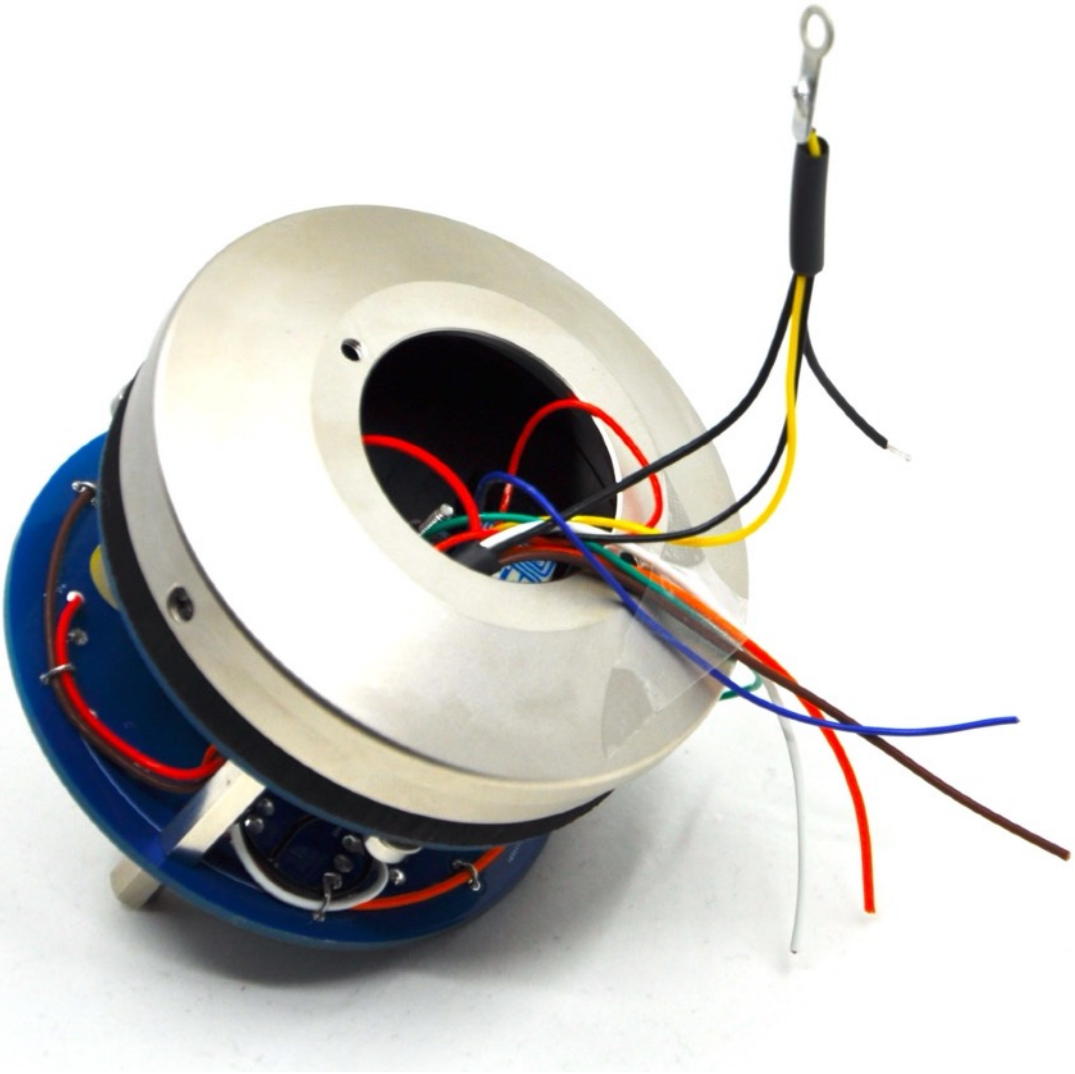


Put the prepared capsule pcb in a safe place, because now we are going to solder the binder connector and prepare the ground ring.

Using pliers, bend the inner protrusion of the ground ring as shown.

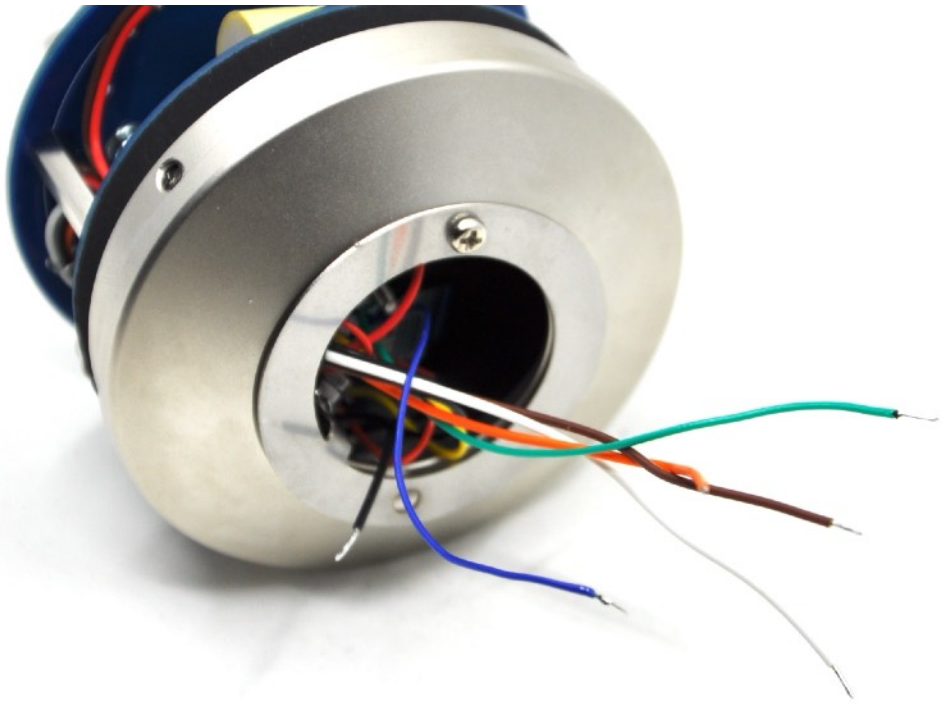
Prepare a small wire about 70mm long.

Connect this wire to the black cable leading from the transformer, the yellow cable (shield) leading from the transformer and the black cable leading from the "H-" pad of the main parts pcb. Solder these cables with tin to the eyelet as you see in the picture. Notice that the short black cable we prepared a moment ago is not connected to anything on the other side (this end will be connected to the binder connector).



Screw the loop with the cables to the grounding ring using the screw. Use a safety washer and two nuts. This is the whole mic ground connection and should be as solid as possible.

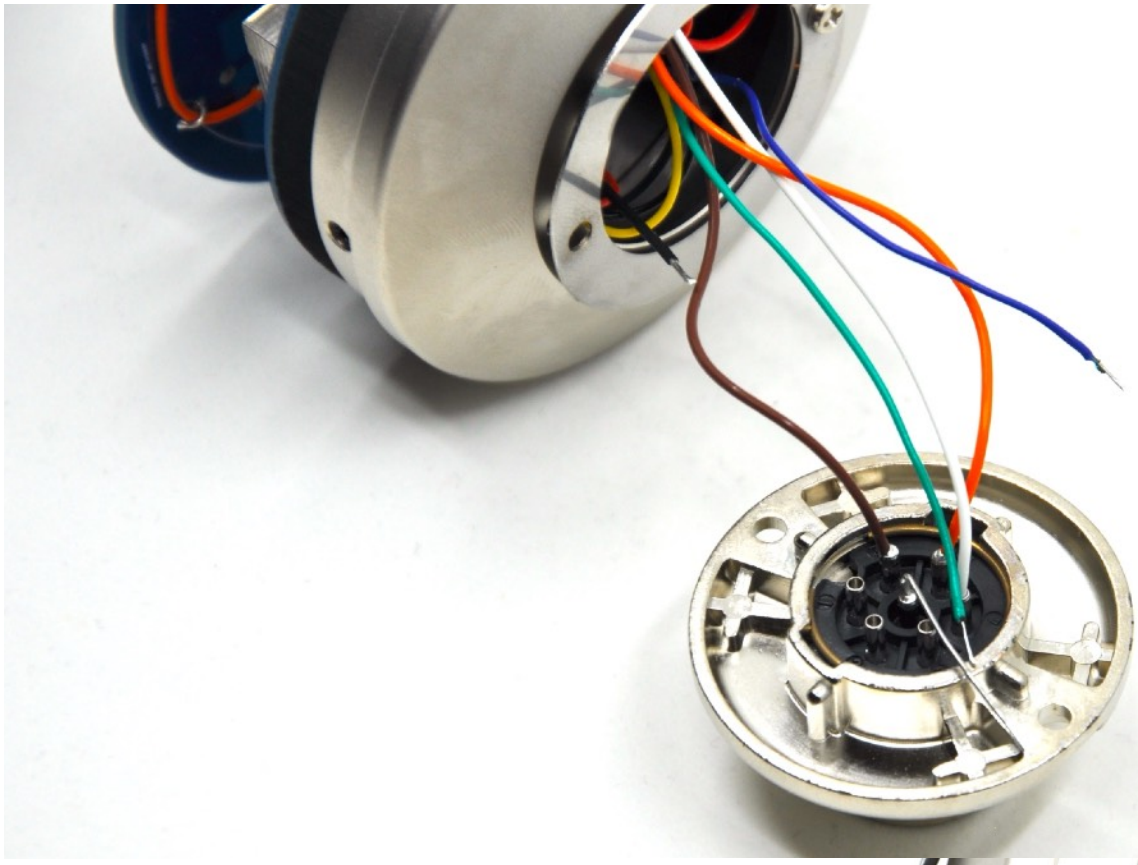
Attach the grounding ring to the body and temporarily screw it on using one screw. Route all cables through this earth ring to the outside. That screw with the eyelet and cables is now hidden inside the body.

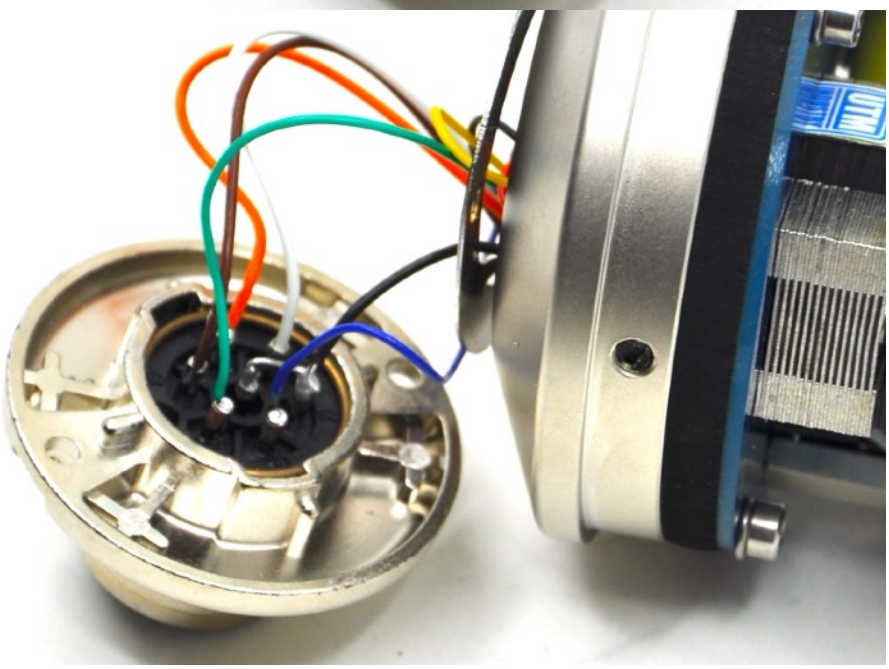


Now we will solder the cables to the binder connector. There is no standard for what to solder to which pin of the connector.

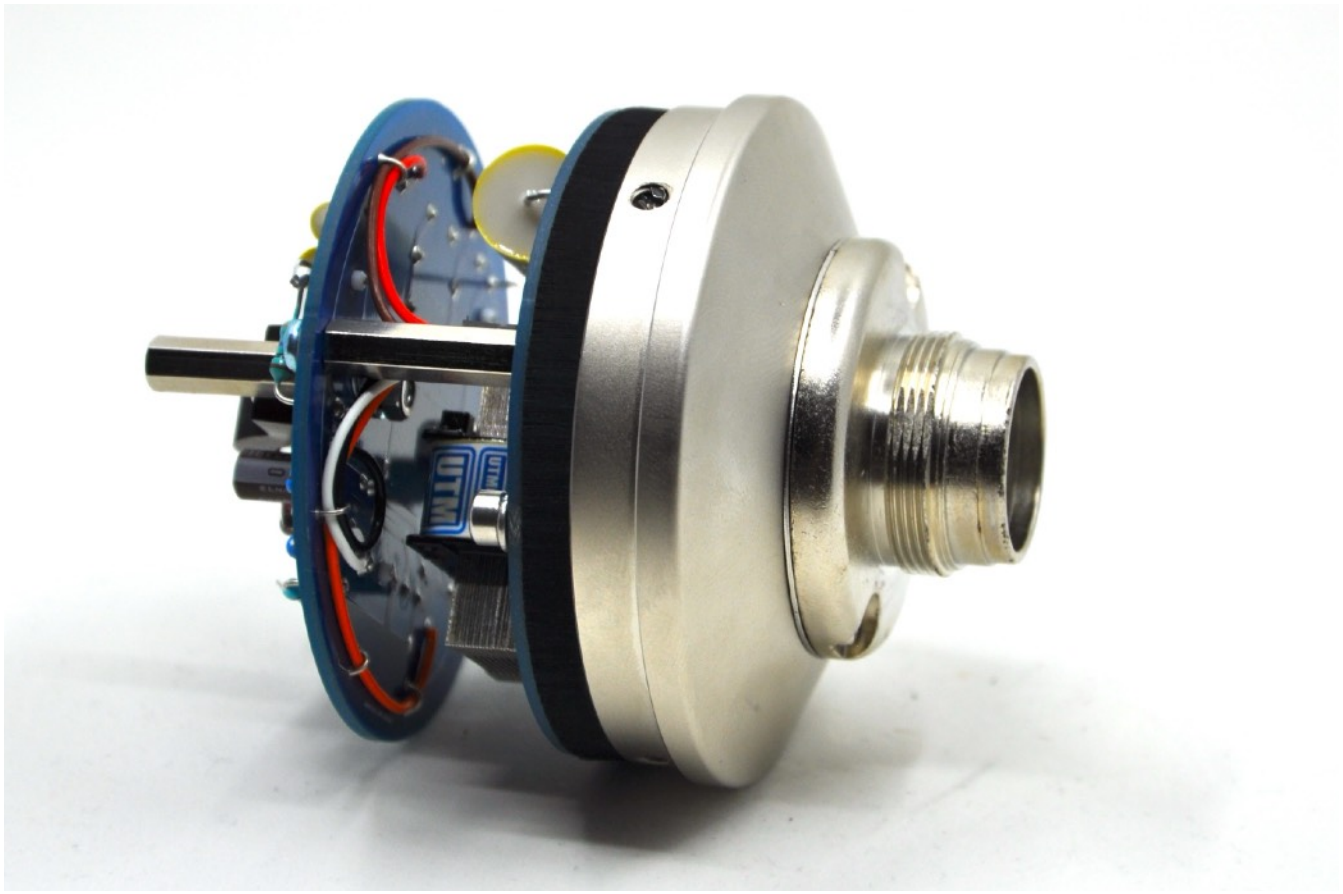
The way I do it is:
A– = pin1 on binder connector = secondary negative cable from transformer
A+ = pin2 = secondary positive cable from transformer
0V = pin3 = circuit ground cable which leads from pad „0V" of main parts pcb via grounding ring lug
H+ = pin4 = heater voltage
B+ = pin5 = anode voltage
PV = pin6 = polarization voltage
CS = pin7 = microphone cable shield

On the binder connector, pin 7 is connected to pin 3 using the remaining resistor leg. It is about connecting the microphone cable shield to 0V (theoretically the cable could lead from pin 7 to the loop on the ground ring but...).





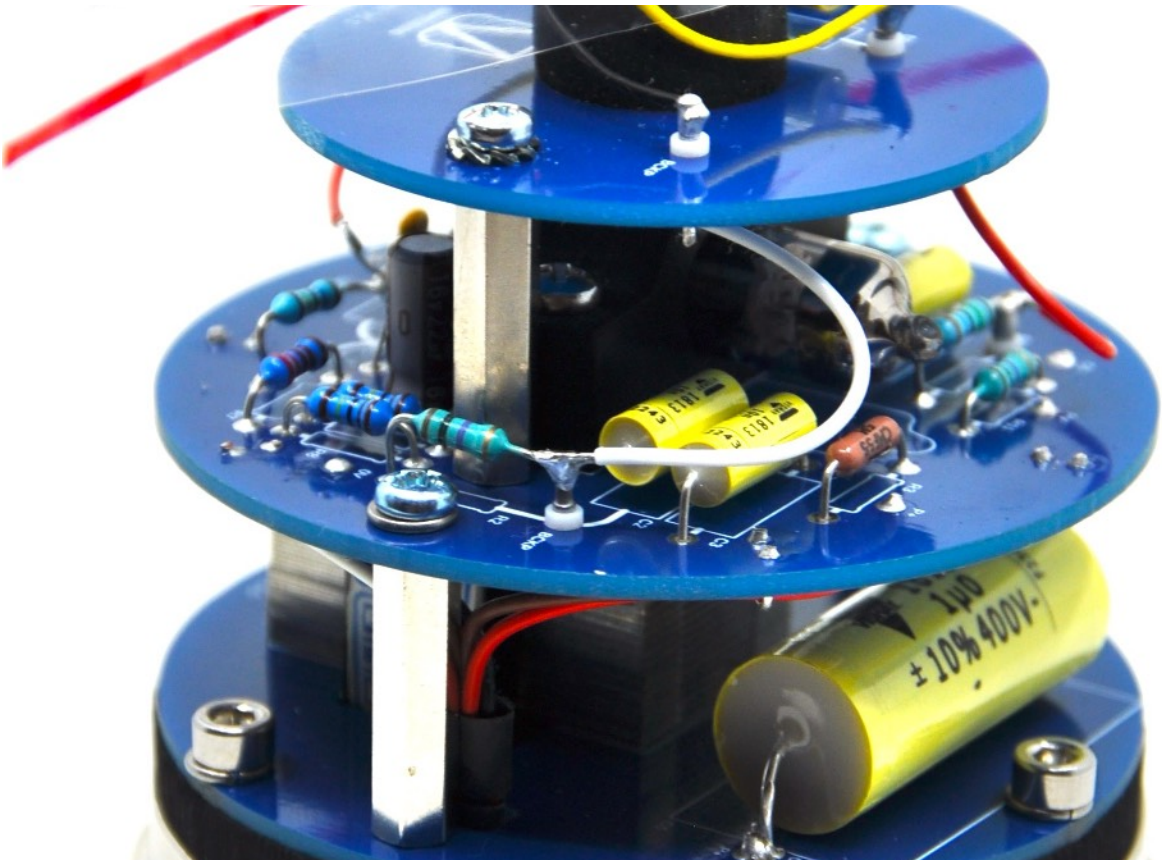
After connecting all cables to the binder connector, carefully tuck these inside the bottom of the body. Make sure that no cable is pinched. Screw the ground ring connector to the body using two screws.

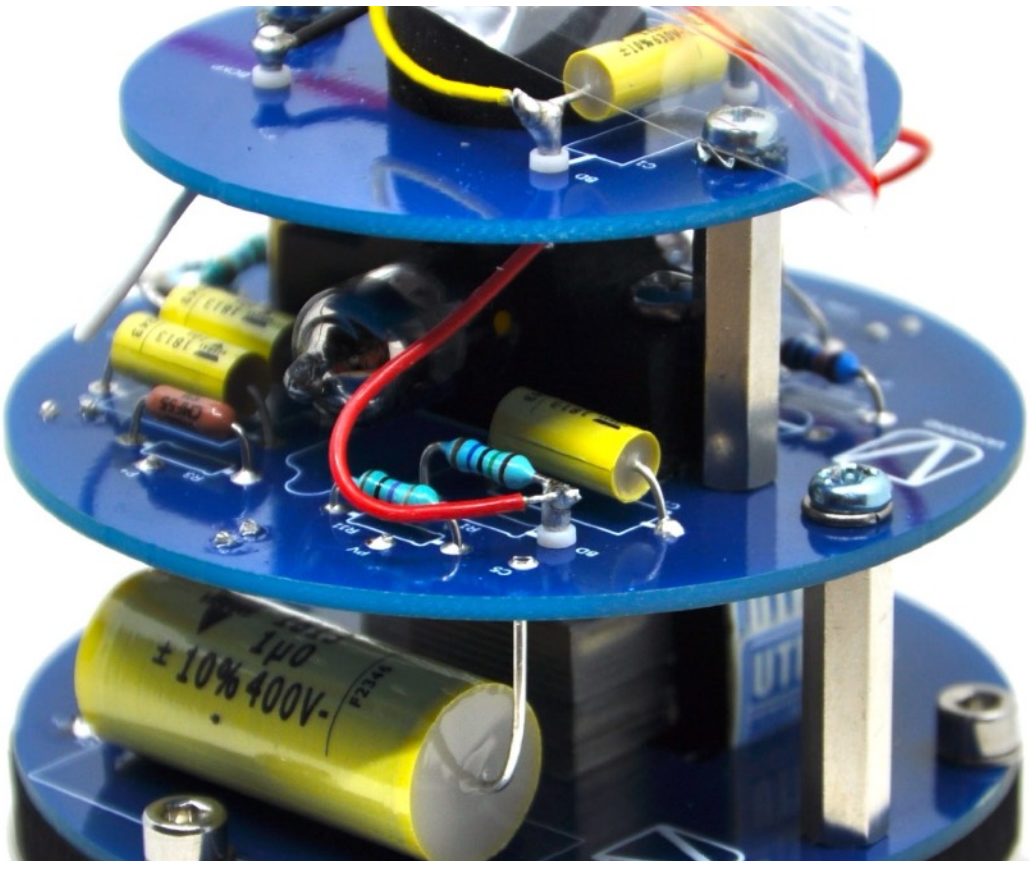


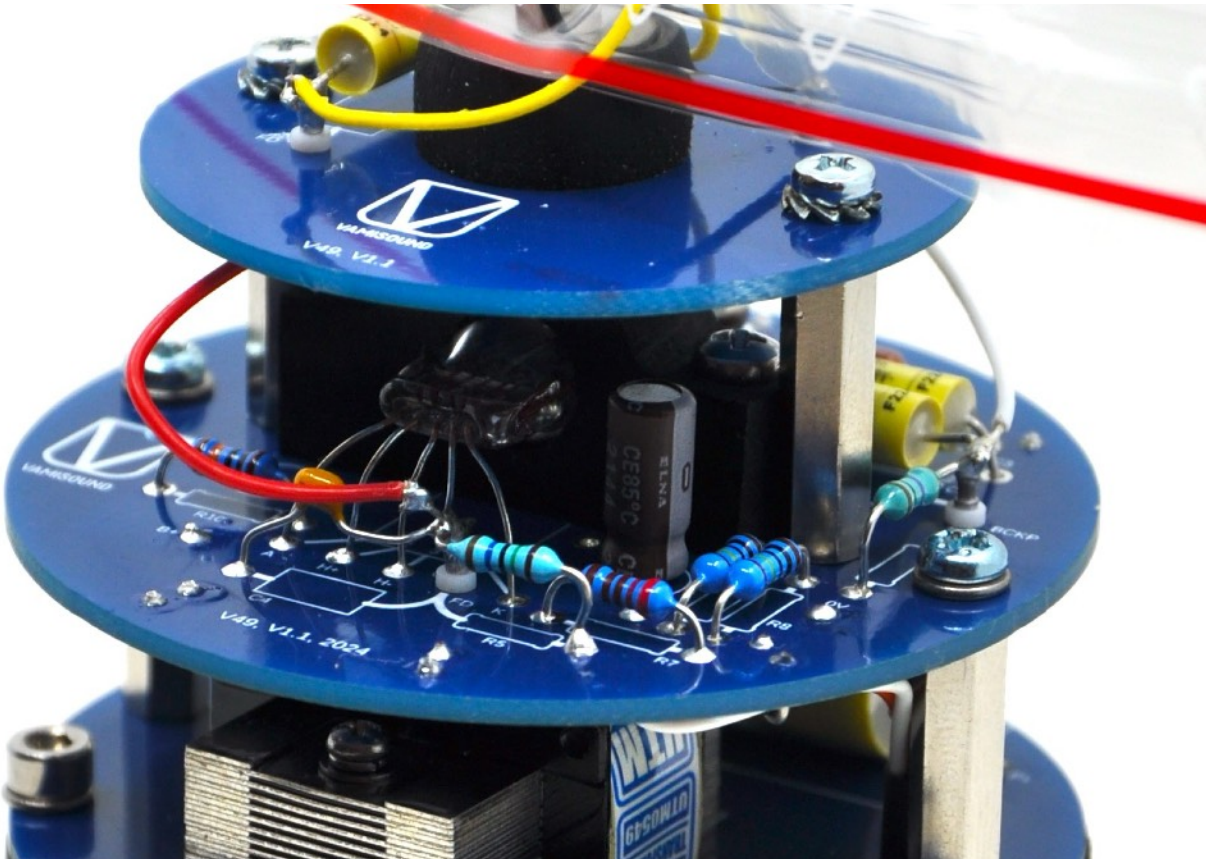
Now it's finally time to complete the microphone. Remember where you put the finished capsule pcb?

Screw the capsule pcb to two spacer posts. The cables that stick out from the bottom have to be connected now to the main parts pcb.

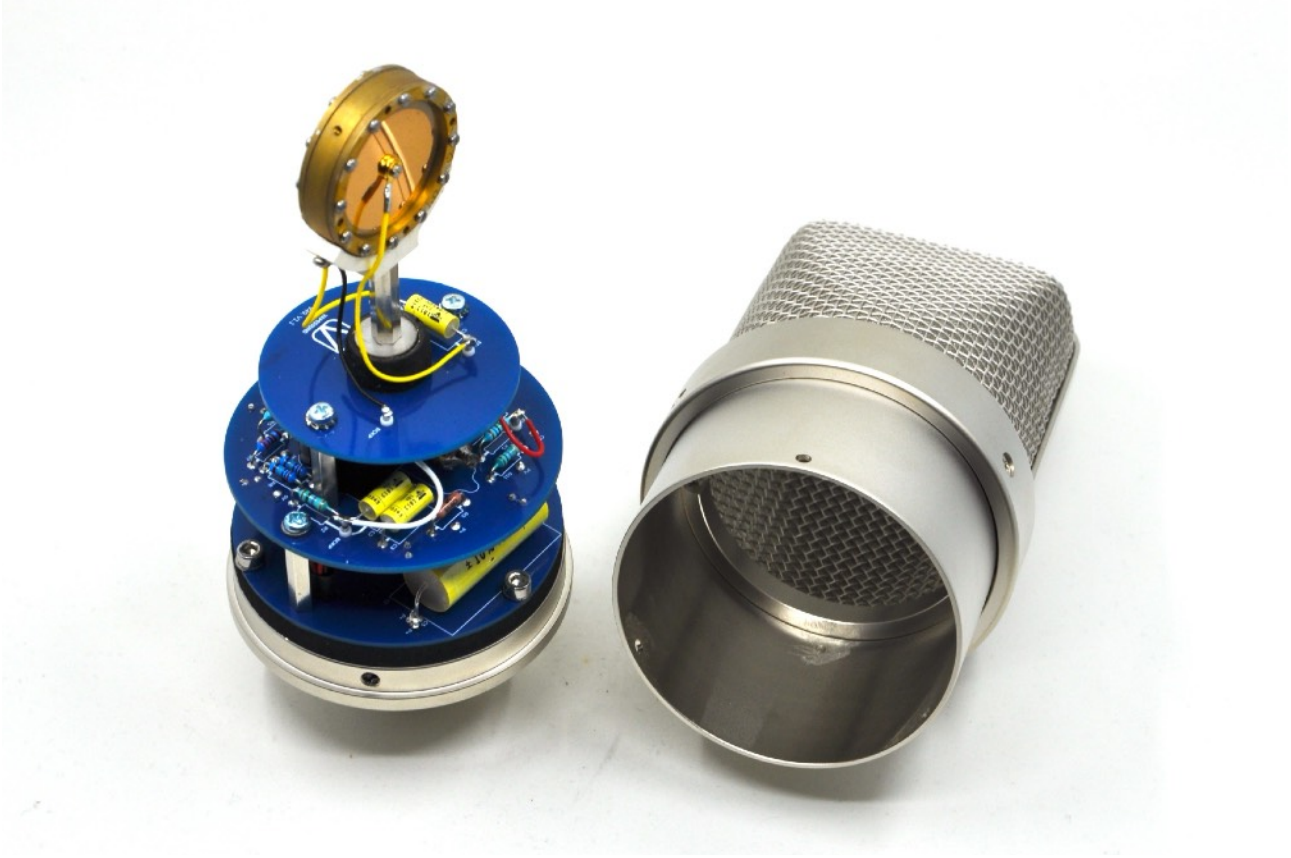
Connect pin from the front membrane of capsule marked as "FD" to pin "FD" on the main parts pcb.
Connect pin from the rear membrane of capsule marked as "RD" to pin "RD" on the main parts pcb.
Finally connect pin from the backplate of capsule marked as "BCKP" to pin "BCKP" on the main parts pcb.



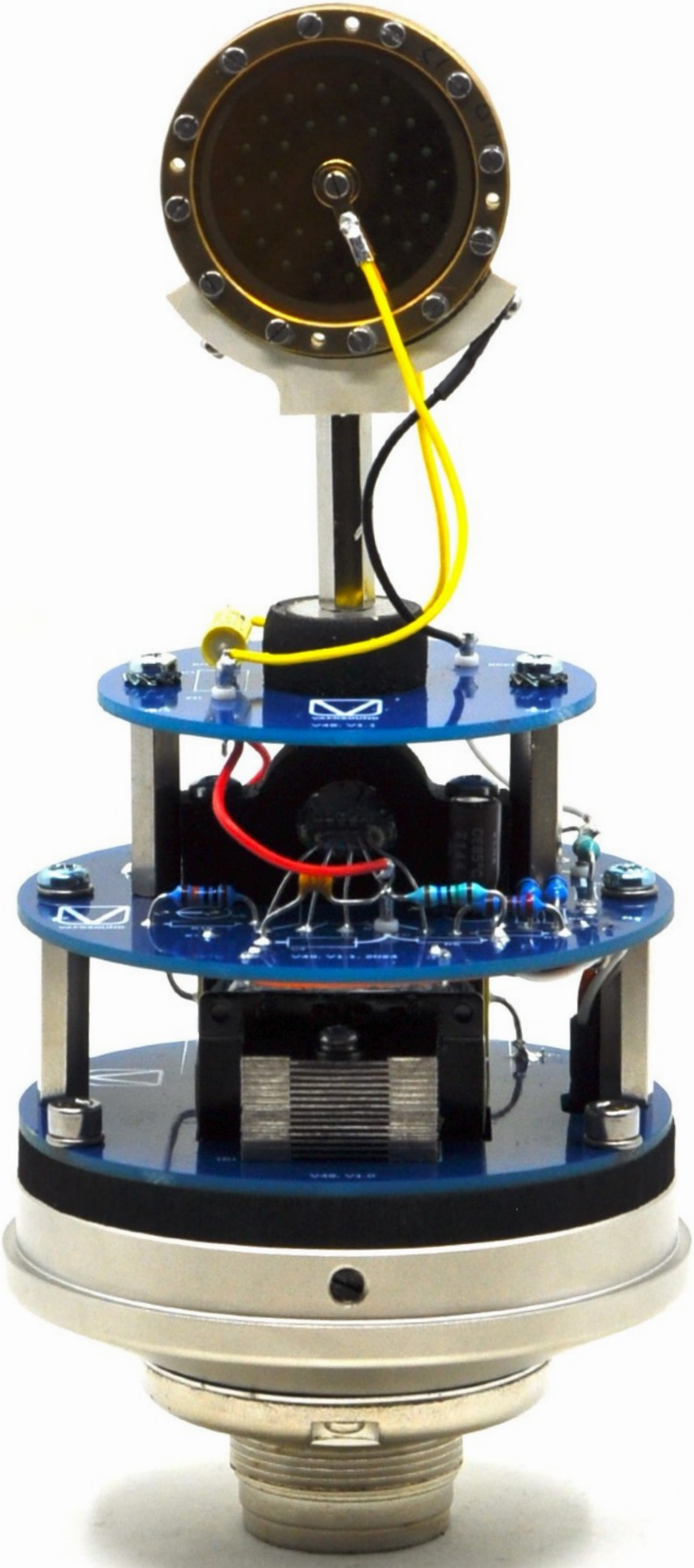


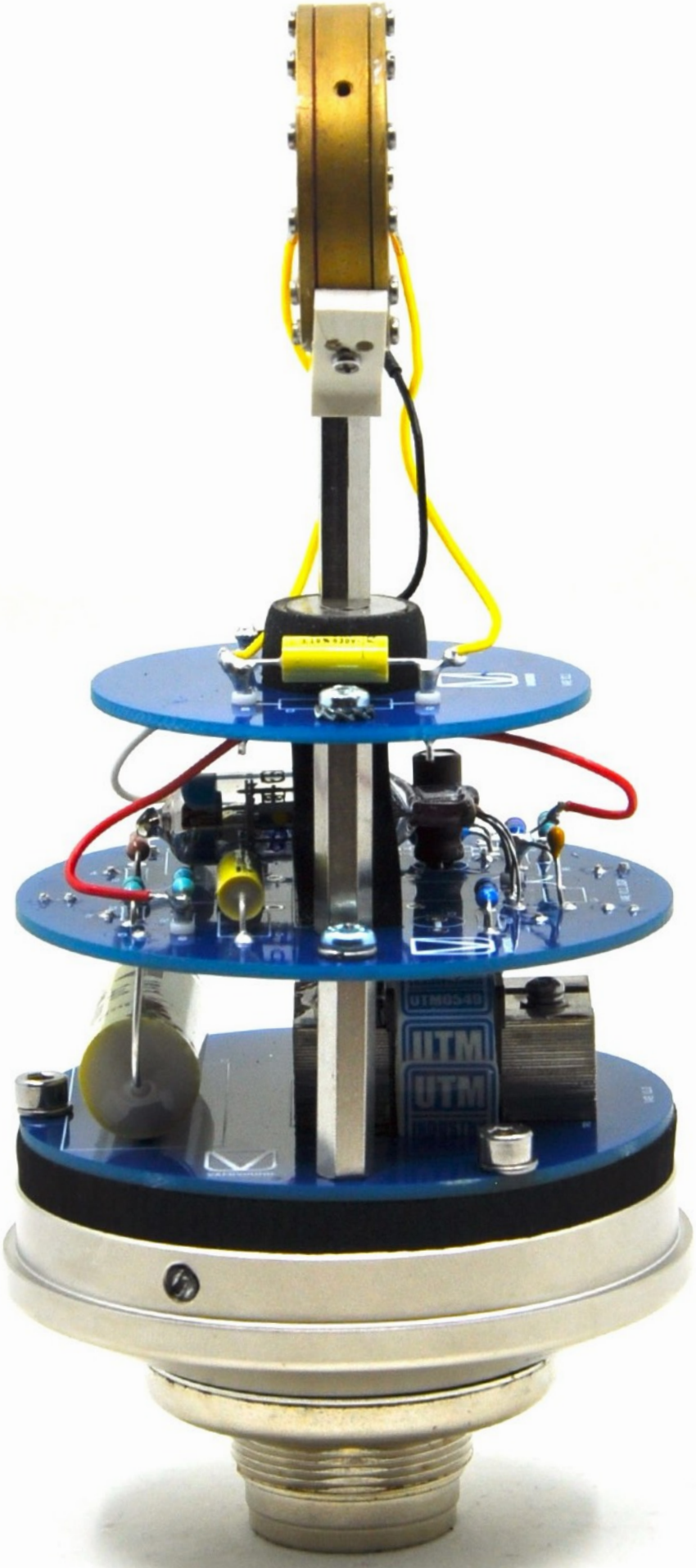


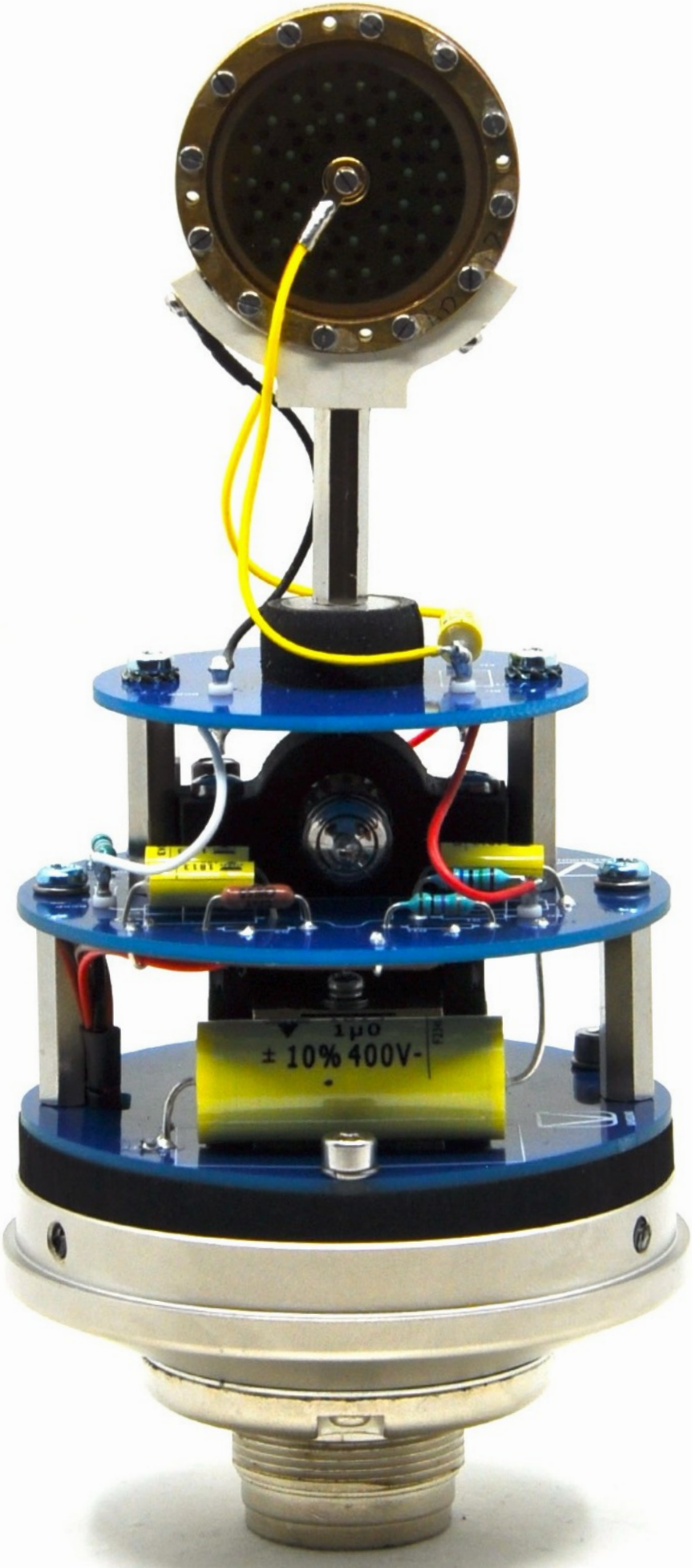
Now all you have to do is screw the microphone body together!




±10% 400V~




IITM
UTM


1µo
± 10% 400V-

Congratulations!!!! Your new microphone is built now and ready for another testing!

WIRRING INFO

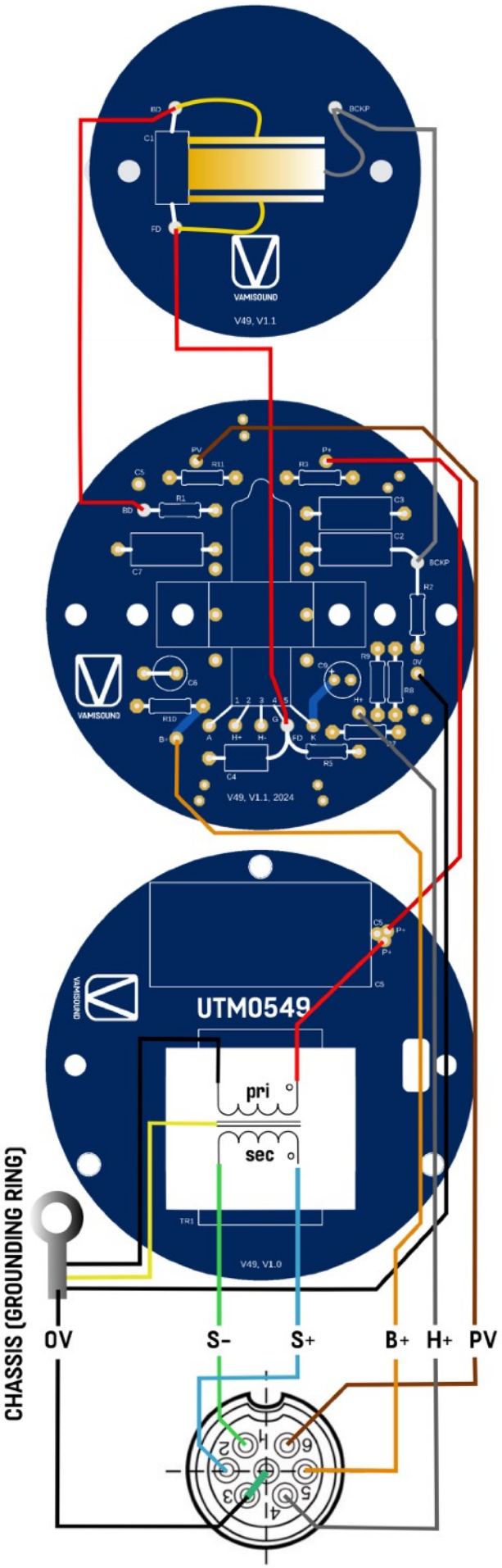
1) Capsule wiring: Front membrane cable to teflon pin marked as „FD“ from the top side of capsule pcb. Cable from capsule backplate to „BCKP“ pad from the top side on the capsule pcb. Cable from capsule rear membrane to „RD“ pad from the top side on the capsule pcb.
2) Its always great idea to check phase of DIY microphone against commercial microphone. In case it was reversed, just swap the two cables on the XLR insert in PSU case.
3) Transformer wiring: Check the transformer manual. Also, there is a detailed photo description of what to connect where in this manual.
4) Binder connector wiring: There is a detailed photo description of what to connect where in this manual.

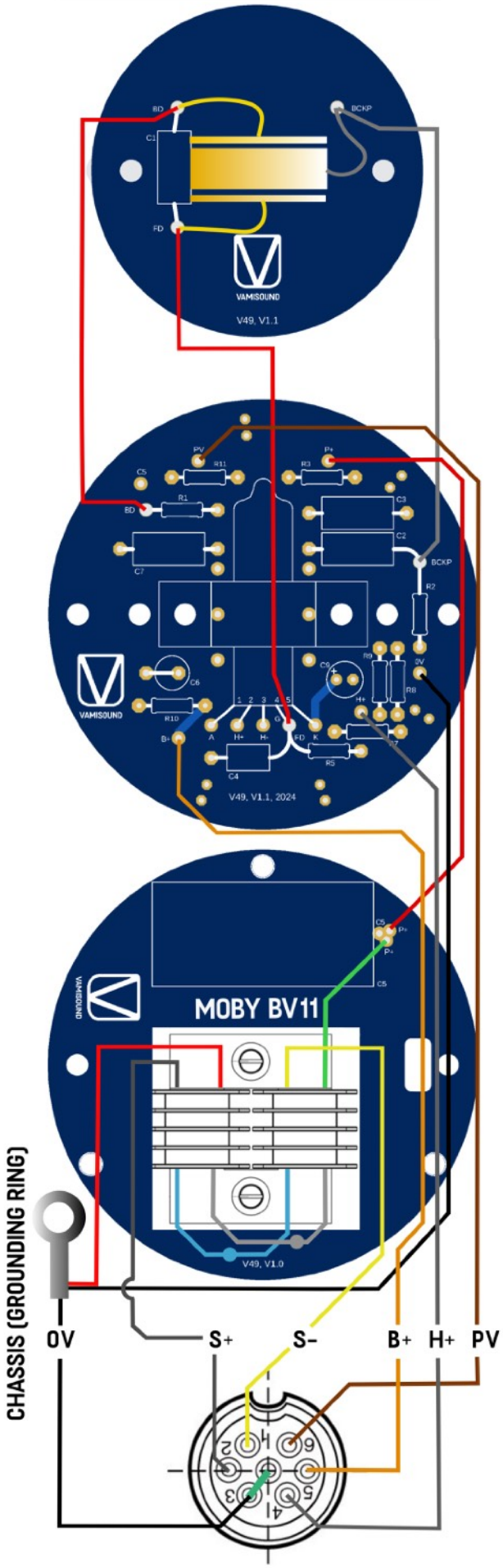
ADDITIONAL INFO

Take you time when soldering the binder connector pins. You don't want to burn the plastic of the binder insert. Take a break while soldering the individual wires.

When soldering polystyrene capacitors, be as fast as possible and do not overheat them. They could be easily damaged. Also, you can't clean them with isopropyl alcohol!!!!

WIRRING SCHEME (UTM0549 and Moby's BV11)





BILL OF MATERIAL

Part	Value	Tol.	Min.Volt.	Dimmensions	link 1	link 2	notes
Resistors							
R1	150M	5 %		6.5x2.2mm	mouser link		
R2	100M	5 %		6.5x2.2mm	mouser link		
R3	5M	1 %		6.1x2.29mm	mouser link		
R5	150M	5 %		6.5x2.2mm	mouser link		
R7	2K2	1 %		6.3x2.4mm	mouser link		
R8	1M	1 %		6.3x2.4mm	mouser link		
R9	1M	1 %		6.3x2.4mm	mouser link		
R10	100K	1 %		6.3x2.4mm	mouser link		
R11	100M	5 %		6.5x2.2mm	mouser link		

Part	Value	Tol.	Min.Volt.	Dimmensions	link	type	notes
Capacitors							
C1	1nF		630V		mouser link		
C2	10nF		400V		mouser link		
C3	10nF		400V		mouser link		
C4	3.3pF		250V		mouser link	ceramic	1pF-10pF
C5	1uF		400V		mouser link		output capacitor
C6	600pF		100V		eBay.com	polystyren	
C7	10nF		400V		mouser link		
C9	22uF		16V		mouser link	electrolytic	

Part	Value	Tol.	Min.Volt.	Dimmensions	link	type	notes
Other							
Capsule	M7 or K47 style						
Caps. mount	depends on capsule						
Teflon pin	6x				mouser link		included in set
Tube holder	1x						included in set

Part	Value	Tol.	Min.Volt.	Dimmensions	link	type	notes
Tube	6S6B-V, 5840W, 5718						
Rubber pad	1x						included in set
Transformer	UTM0549 ransformer				https://utmindustry.com/utm0549/		
Mic body	M49 style				https://www.vamisound.com/parts/m49-body/		
Binder connector (male)	part of M49 style body						
Binder cabel side connector (female)	Binder part nr. 09-0042-00-07						
M3 stand	20mm	4x					
M3 stand	25mm	1x			Under the capsule saddle		
Pcb		3x					included in set
Cables	24awg (0,2mm) teflon silver cables				eBay.com		
M3 cable eyelet	1x						
M3 screws	various lengths						