



## CP4500 Assembly guide



### Safety warning

The kits are main powered and use potentially lethal voltages. Under no circumstance should anyone undertake the realization of a kit unless they have full knowledge about safely handling main powered devices.

Please read the “DIY guide” before beginning.

Print or open the following documents :

- CP4500 Schematics
- CP4500 Components layout
- CP4500 Parts list
- CP4500 Setup guide

Follow this guide from item number 1 till the end, in this order. The assembly order is based on components height, from low to high profile, in order to ease the soldering process : The component you are soldering is always taller than the previously assembled ones and it is pressing nicely against the work area foam.

## Soldering

All the PCB holes are metallized. It means the connection between the top and bottom pads is already done. The parts must be soldered only from below (unless differently stated).

Use only small diameter solder, 0.5 or 0.7 mm, 1mm maximum. Use just the minimum necessary amount of solder. Bad joints are often masked by too much solder.

Cut the component leads and pins totally flush with the PCB after soldering. A too long tail could create an electric connection with the side plate.

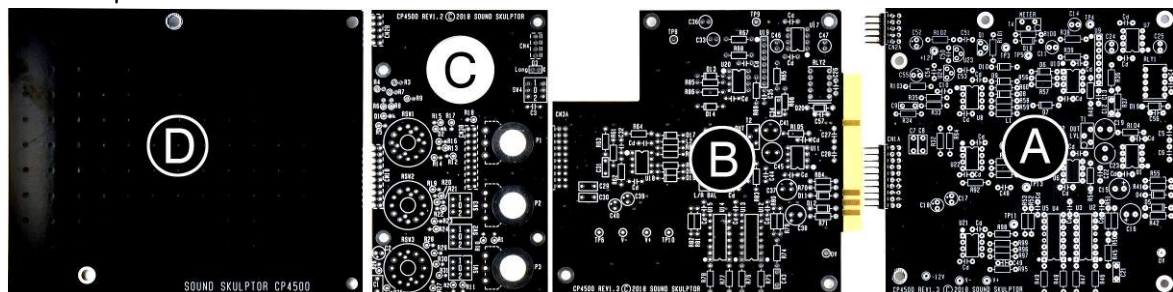
Here are two excellent introduction to soldering videos:

<http://www.eevblog.com/2011/06/19/eevblog-180-soldering-tutorial-part-1-tools/>

<http://www.eevblog.com/2011/07/02/eevblog-183-soldering-tutorial-part-2/>

## CP4500 Assembly guide – PCB A

### 1. PCB split



Split the PCB along the groove. Use extra thin sandpaper to polish all the rough sides.

## CP4500 Assembly guide – PCB A



### 2. SMD or SIP package for the VCA's

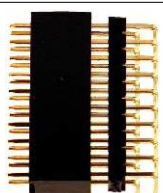
The PCB can accept two package types for the THAT VCA's: SIP (single in line) and SMD (surface mount device). The type you get in your kit depends on the availability at this time.



Both packages are identical inside, except for one thing: The SMD package cannot be laser pre-trimmed (because too small) and therefore requires an additional setting for distortion. This setting is provided on the PCB via a trimmer potentiometer.

We may also supply a SIP package named 2081A which, while not SMD, also requires the additional distortion setting trimmer. If you get this package, the trimmer will be included in the kit.

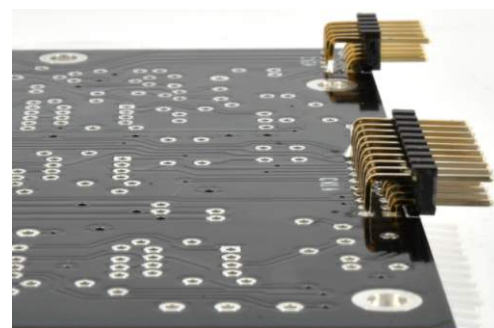
If your VCA's are of the SMD type, they are already soldered on your PCB for convenience.



### 3. PCB to PCB connector CN1A & CN2A

Insert and solder the 2x10 male connector below PCB-A, **on the solder side**. The connector must sit flat on the PCB. Solder one pin, check position then solder the other pins.

Do the same for CN2A 2x5 connector.



### 4. Resistors

Here is a good method for selecting and installing the resistors:

1. pick a row of resistors in the resistors bag,
2. Measure one of the resistors with your DMM,
3. Look up the parts-list PDF for the closest value,
4. Check the color code and quantity for confirmation,
5. Use the search function on the Layout PDF page with the resistor value: All the corresponding resistors are highlighted,
6. Insert and solder.

You can choose to populate the 3 boards one at a time or all together.

In the parts list, the resistor identifiers (Rx) are printed in black for PCB-A, in blue for PCB-B and in green for PCB-C.

You can use the same method later, for the capacitors.

Add the resistors of board A. Bend the leads at 0.4" with a lead forming tool.

**Warning** : It is important to check the resistors value with a DMM because the color code can sometimes be ambiguous. For example 1K (brown-black-black-brown-brown) can be confused with 110R (brown-brown-black-black-brown).

**Warning** : When soldering components close to the golden fingers of the edge connector, be very careful not to touch them with your soldering iron tip. It would cover them with irremovable tin. It is a good idea to protect them with adhesive tape.



### 5. Diodes

Add D6...D10. Use a lead forming tool to bend the leads at 0.4".

Add D18.

Add D4, D5, D19.

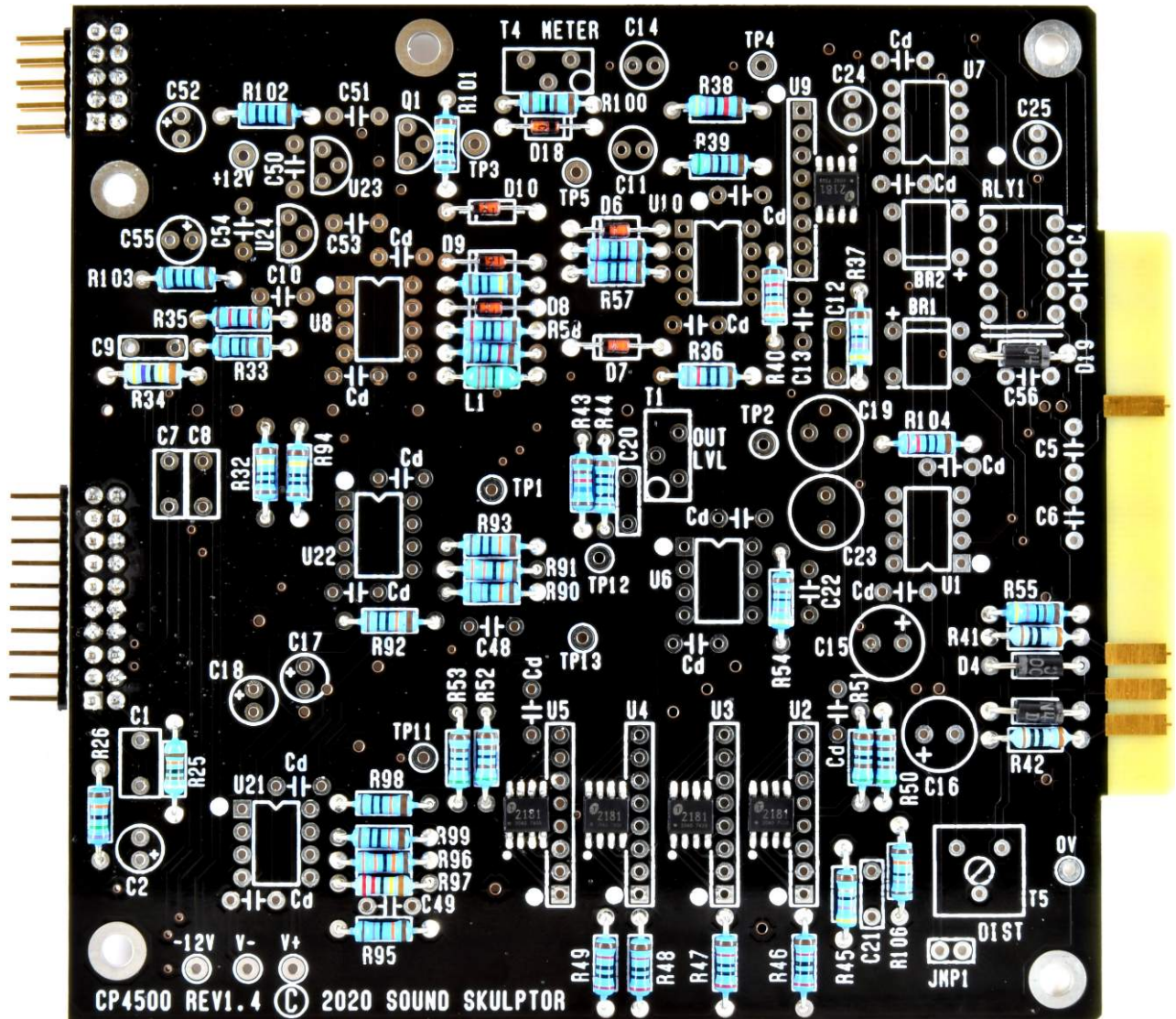
**Warning** : Make sure to respect the direction of the diodes which is marked by a ring on the component and a double line on the PCB.

## CP4500 Assembly guide – PCB A



### 6. Inductor

Add L1.




### 7. IC Socket 1x8 pins


This socket is only necessary for the THAT VCA's of SIP type. Insert and solder the SIP IC sockets only in places where there is no SMD IC already soldered. It can be in U2 to U5 and/or U9.



### 8. IC Socket 2x4 pins

Insert and solder the seven 8 pins IC sockets.

**Warning** : Make sure to respect the DIL sockets direction, marked by a notch.



### 9. Bridge rectifiers

Insert and solder the two bridge rectifiers BR1, BR2.

**Warning** : The direction of the bridge is identified by a beveled side and 2 signs + and - on the case and on the PCB.



## CP4500 Assembly guide – PCB A

## 10. Ceramic capacitors



Add C13, C4, C10, C22, C5, C6.  
Add C48, C49, C50, C53, C56.  
Add C51, C54, 16 x Cd

## 11. Relay



Add RLY1.

**Warning** : Make sure to respect the direction of the relay which is marked by a white line on the component and on the PCB marking.

## 12. 1 turn trimmer



This trimmer is only present if the VCA's U2...U5 are SMD's or 2181A-SIP.

Insert and solder the one turn trimmer T5.

If your VCA's are 2180-SIP, leave the place empty.

## 13. Test pins



Solder 13 test pins TP1, TP2, TP3, TP4, TP5, TP11, TP12, TP13, V+, V-, +12V, -12V and 0V.

The pins are inserted squared shortest end first. They require some pressure to fit. Cut short on the solder side after soldering.

## 14. Jumper header



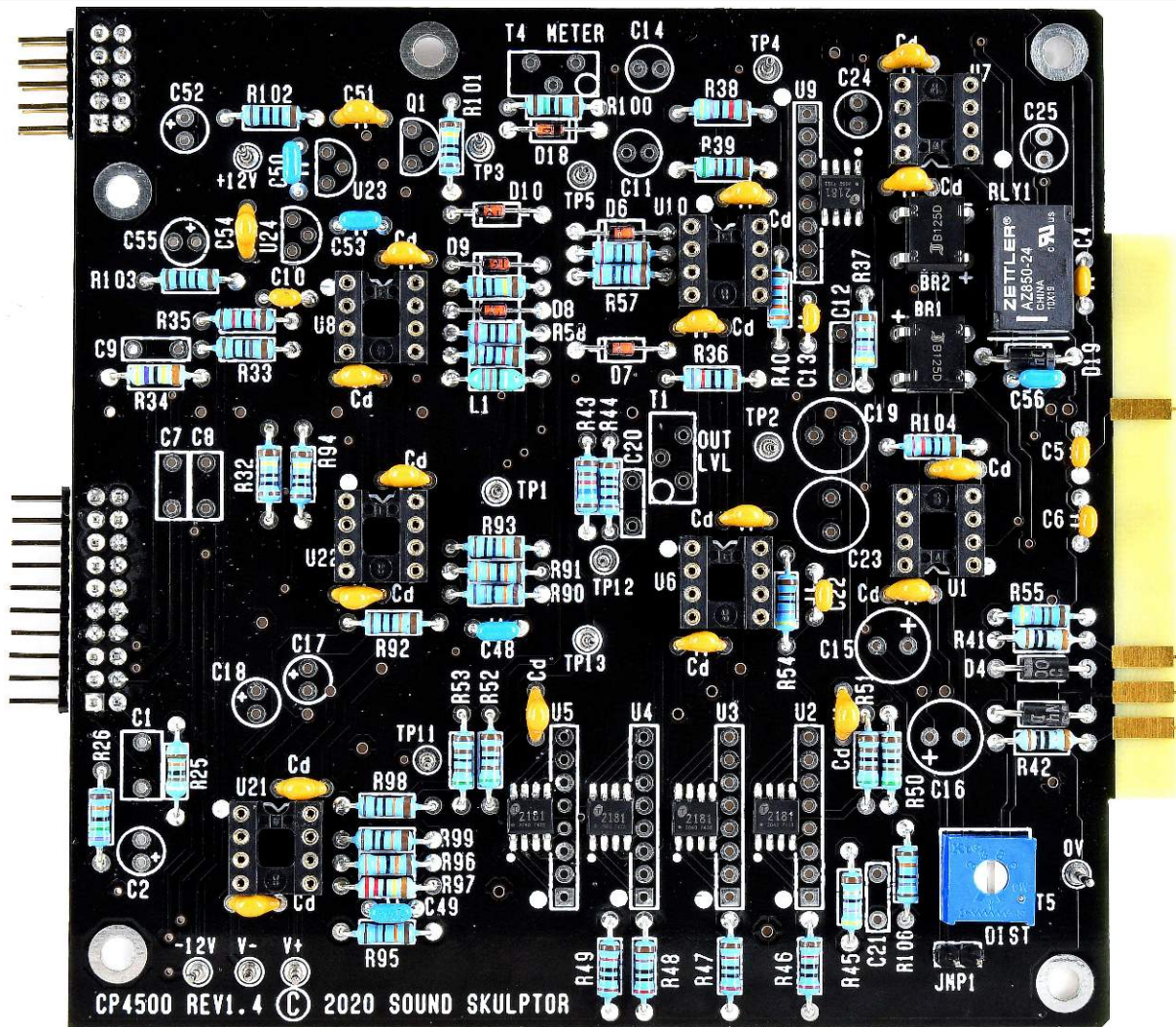
Add the 2 pins jumper header JMP1.

Solder one pin, check verticality then solder the other pin.

Insert the jumper on the header.



## CP4500 Assembly guide – PCB A



## 15. Transistor and regulators

Add Q1, U23, U24.

**Warning** : Q1 is a device sensitive to static electricity. Make sure your body is grounded before manipulating simply by removing your shoes.



## 16. Film capacitors

Add C1, C21, C9, C12, C20, C7, C8.



## 17. Tantalum capacitor

Add C2.

**Warning** : The + lead must go into the + hole. Do not reverse!



## 18. Trimmer potentiometers

Add T1 and T4. Solder one pin, check verticality then solder the other pins.

## CP4500 Assembly guide – PCB A



### 19. Non polarized electrolytic capacitors

Add C11, C14, C24, C25, C19, C23.

These caps are not polarized and can be inserted in any direction.



### 20. Polarized electrolytic capacitors

Add C17, C18, C52, C55, C15, C16

**Warning** : The +lead must go into the +hole. Do not reverse, it would damage them.



### 21. 35mm fem/fem Spacer

Insert a M3x6 mm screw from below PCB into the hole next to Q1. Insert 3 washers on the components side and attach the M3x35 mm female/female spacer.



### 22. IC's

Insert the seven 8 pins IC's into their respective socket.

There are 3 different IC references. Don't mix up!

**Warning** : Make sure to insert the IC's in the correct direction.



### 23. VCA's

If your VCA's are of the SIP type, insert them into their respective socket.

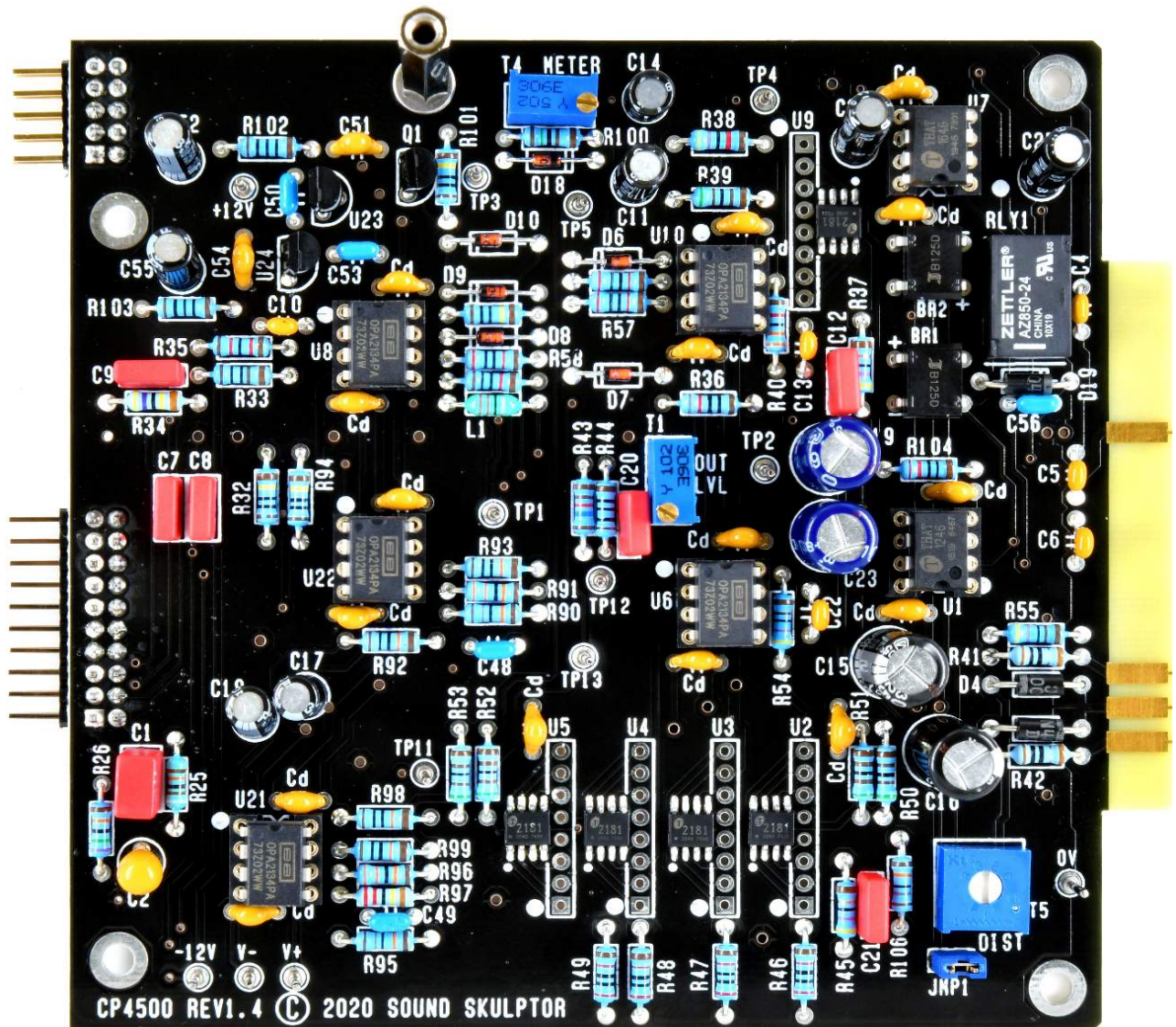
U2, U3, U4 and U5 are A grade components, marked 2180A or 2181A.

U9 is C grade, marked 2180C or 2181C.

**Warning**: the pin 1 is marked by a notch. It must face the white dot on the PCB.



## CP4500 Assembly guide – PCB A

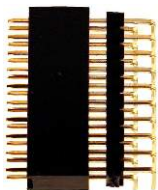


## 24. Visual check

Brush the solder side with a hard tooth brush to remove any remaining solder bits.

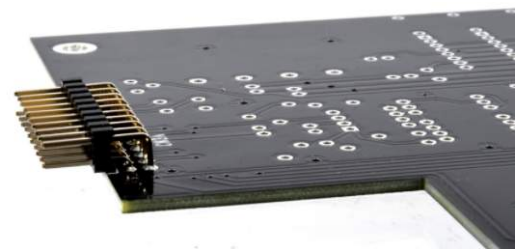
Make a full visual check. When everything looks correct, proceed with PCB B.

## CP4500 Assembly guide – PCB B



## 25. PCB to PCB connector CN3A

Insert and solder the 2x10 male connector below PCB-A, **on the solder side**. The connector must sit flat on the PCB. Solder one pin, check position then solder the other pins.





## CP4500 Assembly guide – PCB B

## 26. Resistors



Add the resistors of board B. Bend the leads at 0.4" with a lead forming tool.

## 27. Diodes

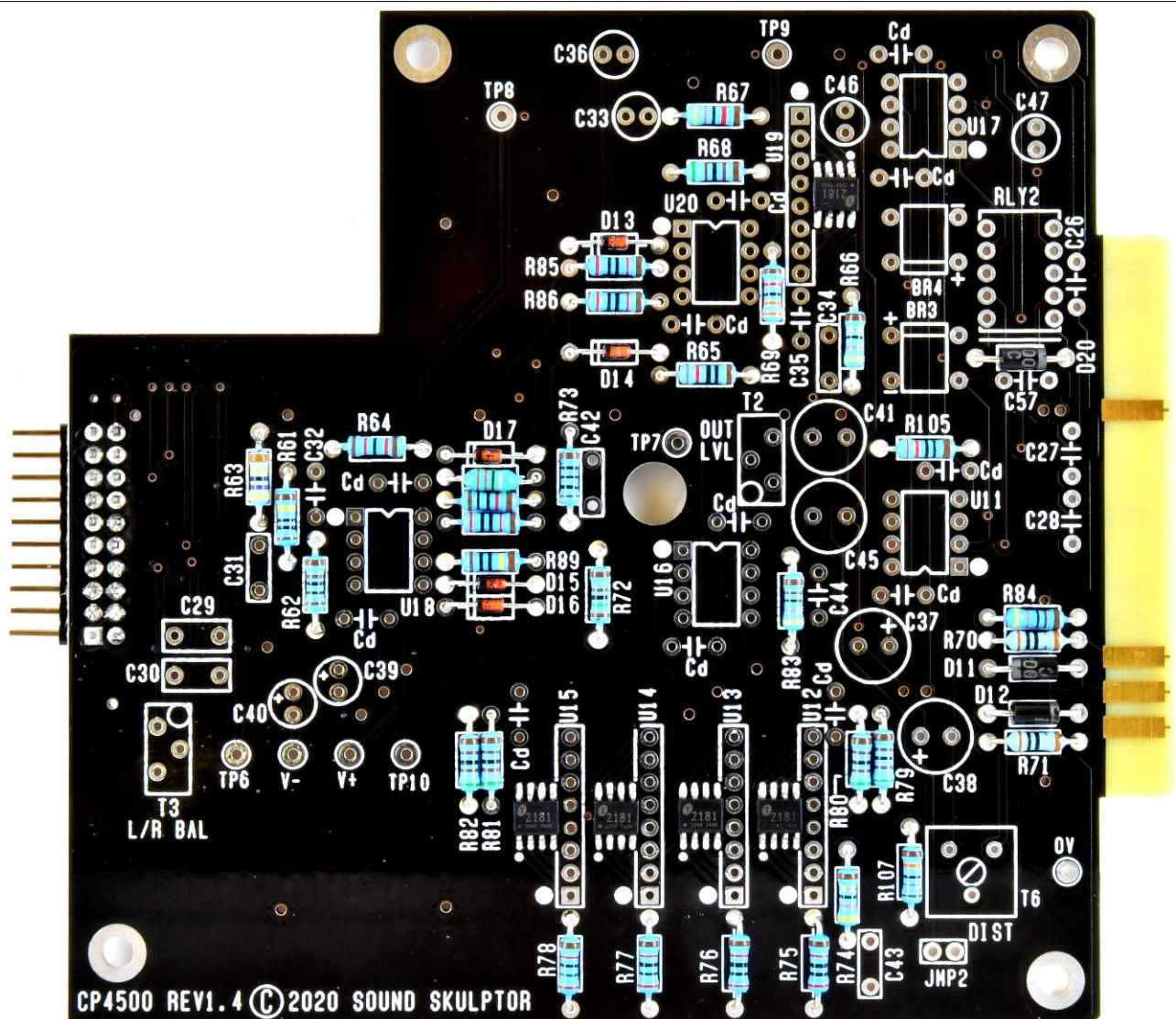


Add D13 to D17. Bend the leads at 0.4".  
Add D11, D12, D20.

## 28. Inductor



Add L2.



## 29. IC Socket 1x8 pins



This socket is only necessary for the THAT VCA's of SIP type. Insert and solder the SIP IC sockets only in places where there is no SMD IC already soldered.  
It can be in U12 to U15 and/or U19.



## CP4500 Assembly guide – PCB B

**30. IC Socket**

Insert and solder the five 8 pins IC sockets:

**Warning** : Make sure to respect the DIL sockets direction, marked by a notch.

**31. Bridge rectifiers**

Insert and solder the two bridge rectifiers BR3, BR4.

**Warning** : The direction of the bridge is identified by a beveled side and 2 signs + and – on the case and on the PCB.

**32. Ceramic capacitors**

Add C35, C26, C32, C44, C27, C28.

Add C57.

Add 12 x Cd

**33. Relay**

Add RLY2.

**Warning** : Make sure to respect the direction of the relays which is marked by a white line on the component and on the PCB marking.

**34. 1 turn trimmer**

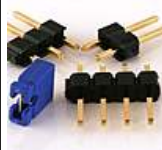
This trimmer is only present if the VCA's U12...U15 are SMD's or 2181A-SIP.

Insert and solder the one turn trimmer TG.

If your VCA's are 2180-SIP, leave the place empty.

**35. Test pins**

Solder 8 test pins TP6, TP7, TP8, TP9, TP10, V+, V- and OV.

**36. Jumper header**

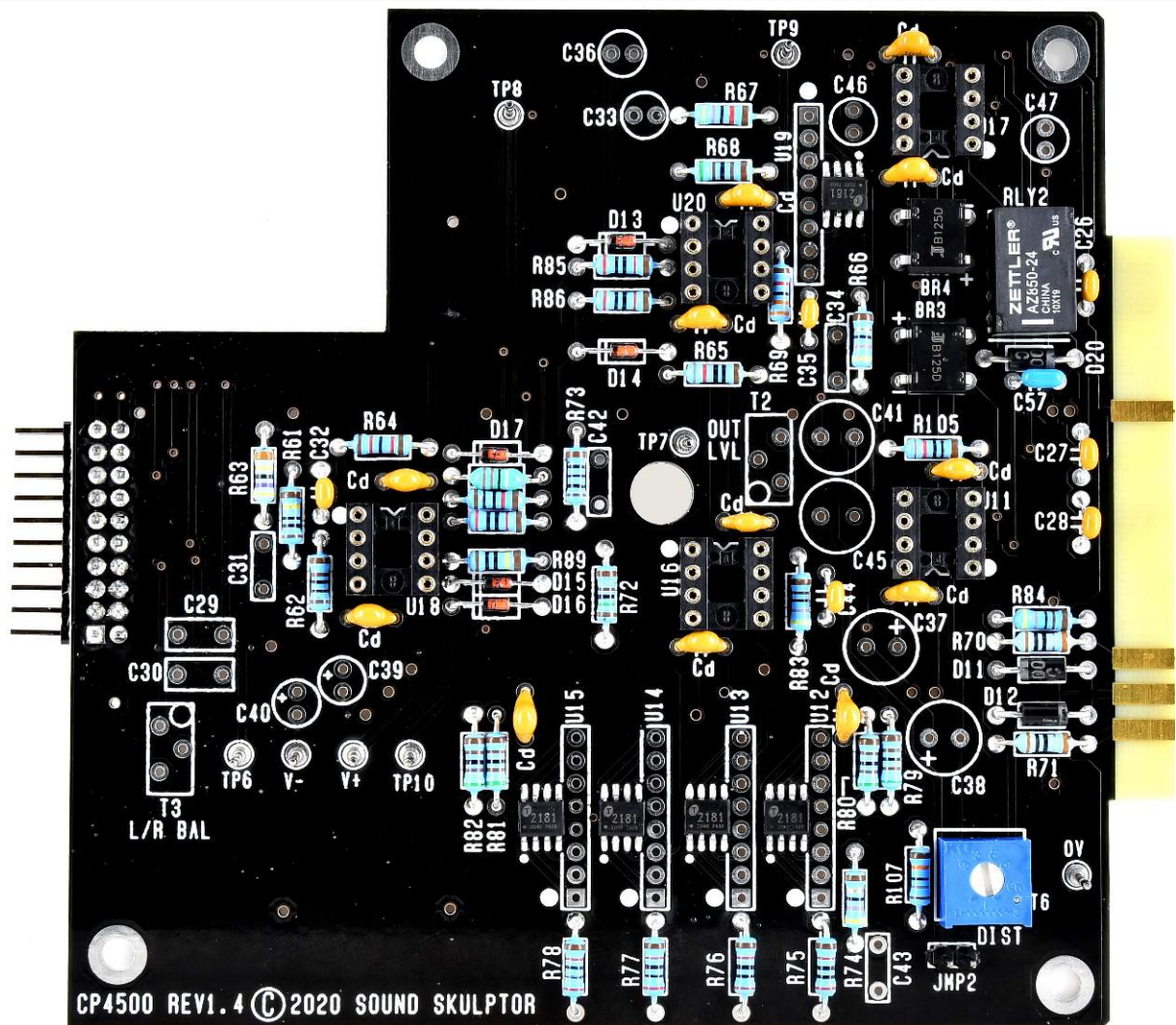

Add the 2 pins jumper header JMP2.

Solder one pin, check verticality then solder the other pin.

Insert the jumper on the header.




## CP4500 Assembly guide – PCB B

### 37. Film capacitors

Add C43, C31, C34, C42, C29, C30.



### 38. Trimmer potentiometers

Add T2 and T3. Solder one pin, check verticality then solder the other pins.



### 39. Non polarized electrolytic capacitors

Add C33, C36, C46, C47, C41, C45.

These caps are not polarized and can be inserted in any direction.



### 40. Polarized electrolytic capacitors

Add C39, C40, C37, C38.

**Warning** : The +lead must go into the +hole. Do not reverse.



## CP4500 Assembly guide – PCB B



## 41. IC's

Insert the five 8 pins IC's into their respective socket.

There are 3 different IC references. Don't mix up!

**Warning** : Make sure to insert the IC's in the correct direction.



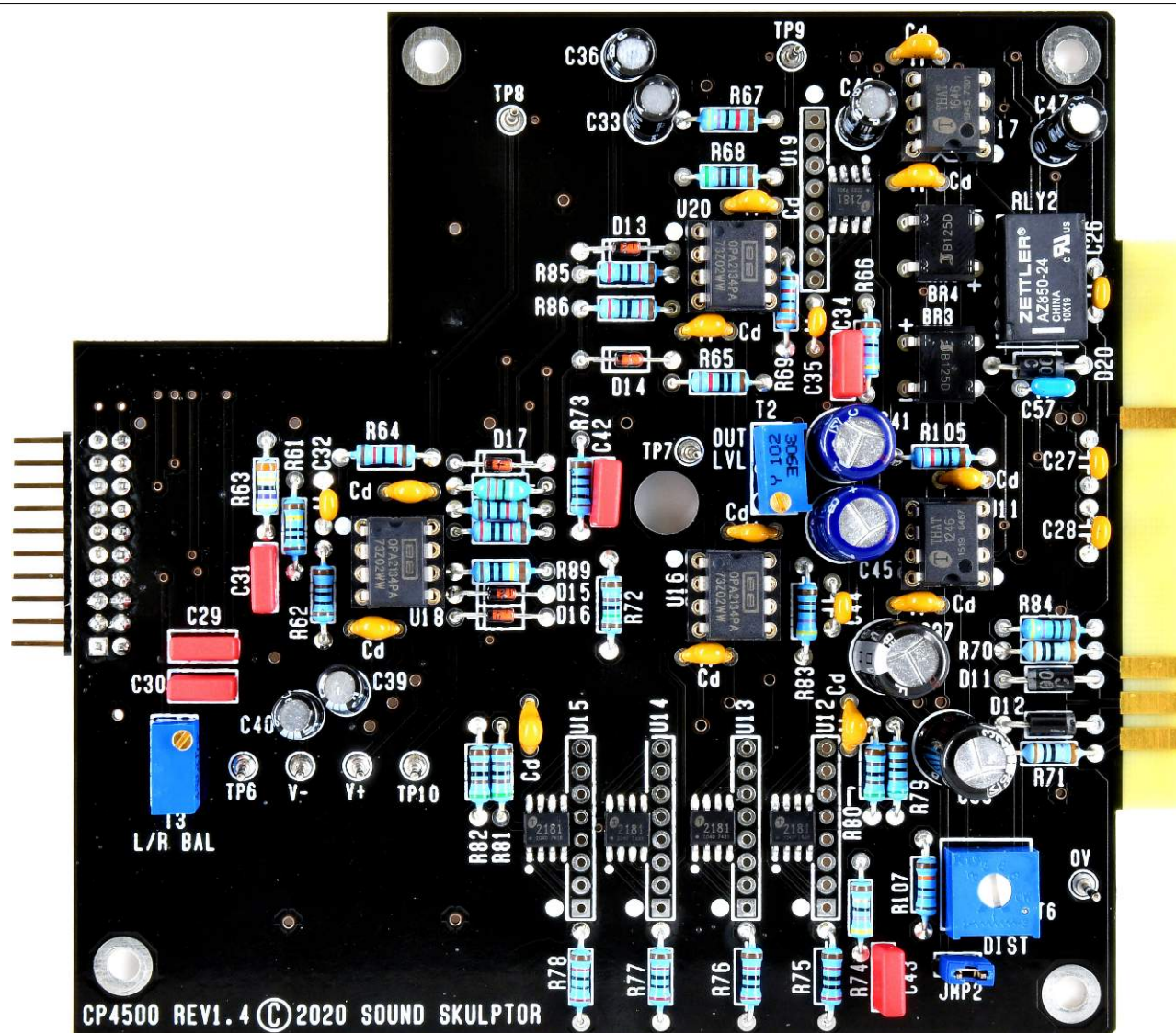
## 42. VCA's

If your VCA's are of the SIP type, insert them into their respective socket.

U12, U13, U14 and U15 are A grade components, marked 2180A or 2181A.

U19 is C grade, marked 2180C or 2181C.

**Warning**: the pin 1 is marked by a notch. It must face the white dot on the PCB.



## 43. Visual check

Brush the solder side with a hard tooth brush to remove any remaining solder bits.

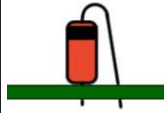
Make a full visual check. When everything looks correct, proceed with PCB C.

## CP4500 Assembly guide – PCB C



## 44. Resistors

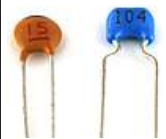
Add the resistors of board C.  
All the resistors on board C are installed vertically.



## 45. Diodes

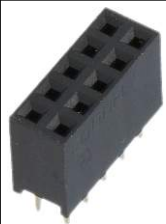
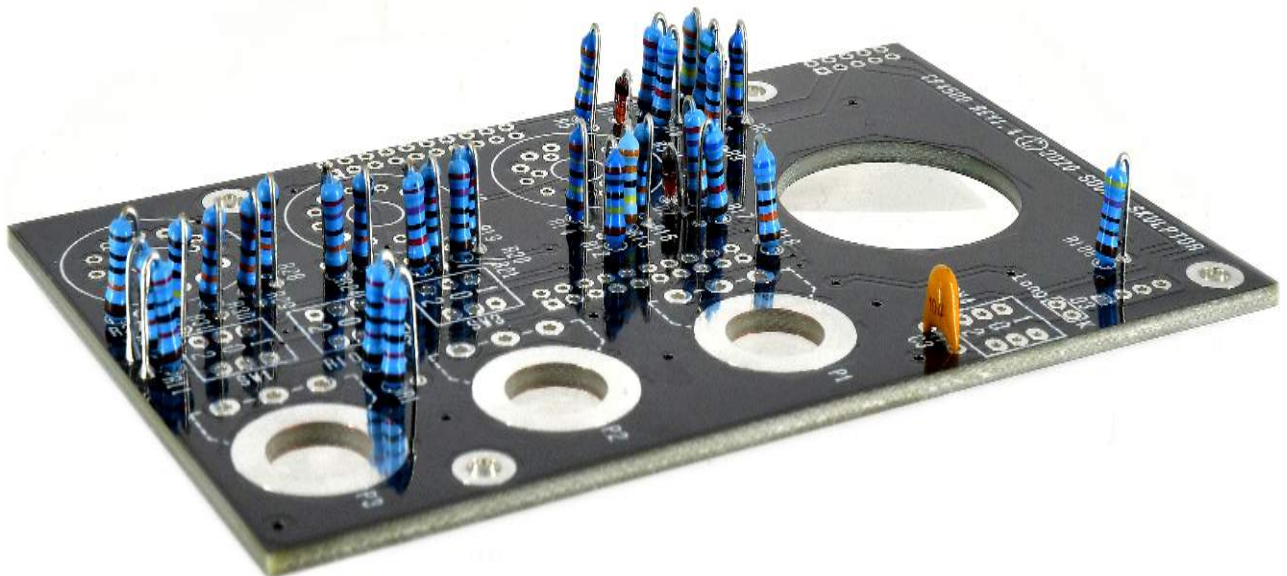
Add D1, D2. These diodes are installed vertically, cathode (black ring) up.

**Warning** : Make sure to respect the direction of the diodes which is marked by a ring on the component and a 'k' on the PCB marking.



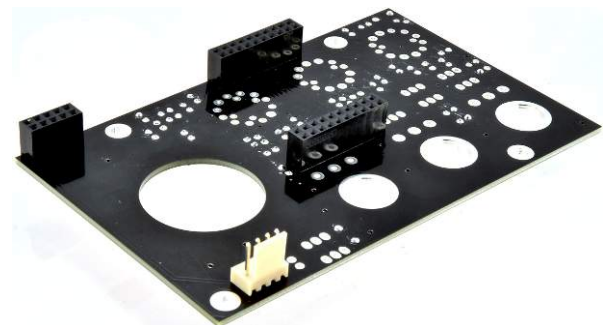
## 46. Ceramic capacitors

Add C3.



## 47. Solder side connectors

**On the solder side**, add CN1B, CN2B, CN3B and CN4.





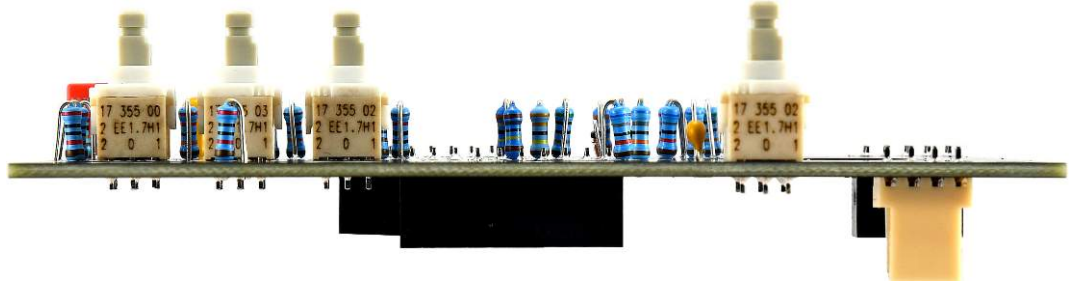
## CP4500 Assembly guide – PCB C

## 48. Push switches



Insert the push switches, flat on the PCB, in the correct direction and solder one pin. Check again the good position then solder the other pins.

**Warning** : The switch direction is given by the digits 2 0 1, engraved on one side of the switch. Match the digits with the ones on the PCB.



## 49. Rotary switches



Add the 3 positions rotary switch RSW1.

Add the 6 positions rotary switches RSW2 and RSW3.

**Warning** : The position of the switch is critical for a good front-plate matching. The switch rests on 3 small feet that must sit perfectly flat on the PCB. Press the switch on the PCB and solder two opposed pins. Check position then solder the other pins.

**Warning** : Solder carefully: you do not want to touch any other plastic part with your iron when soldering.

## 50. Potentiometers



Add P1, P2 and P3. Insert the potentiometers into the PCB holes from the solder side, making sure the pins fit into the corresponding PCB pads. Attach with washer and nut on the component side, tighten firmly to ensure a perfect perpendicular position and solder.

After soldering carefully, you can clip the push button caps on.

## 51. 15 mm spacers



Attach four 15 mm spacers to the front panel with four M3x6mm black screws.



## 52. 2mm LED

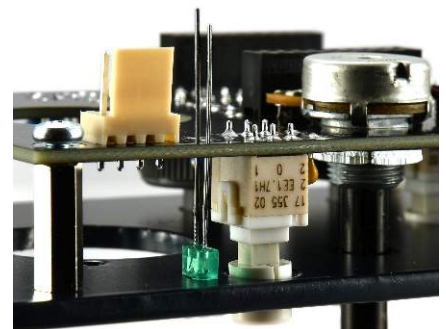


Insert the 2mm LED D3, taking care of the anode/cathode (long/short lead) position. Do not solder yet.

Attach temporarily the PCB to the front panel with a pair of M3x6mm screws.

Adjust the LED flush with the front panel surface. Solder.

Remove the front panel.



### CP4500 Assembly guide – PCB C



#### 53. Visual check

Brush the solder side with a hard tooth brush to remove any remaining solder bits.

Make a full visual check. Any missing component on the board? Any remaining component in the box?

When everything looks correct, proceed with the switches PCB assembly.

### CP4500 Assembly guide – Meter assembly

#### 54. Wires

Cut 4 wires:

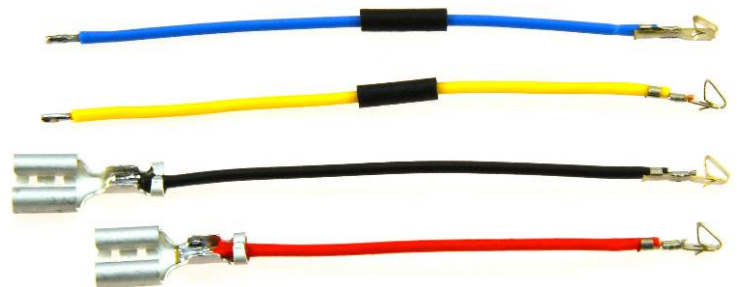
- one 6 cm red wire,
- one 7 cm black wire,
- one 8 cm yellow wire,
- one 8 cm blue wire.

Strip 3 mm of each wire ends and tin.

Solder or crimp four small wire terminals at the end of each wire.

Solder or crimp two 6.3mm wire terminals at the other end of the red and black wires.

Cut the neoprene tube in half and insert one on the yellow and blue wires.





## CP4500 Assembly guide – Meter assembly



### 55. Meter connection

Solder the blue wire to the (-) small solder lug on the meter.

Solder the yellow wire to the (+) solder lung.

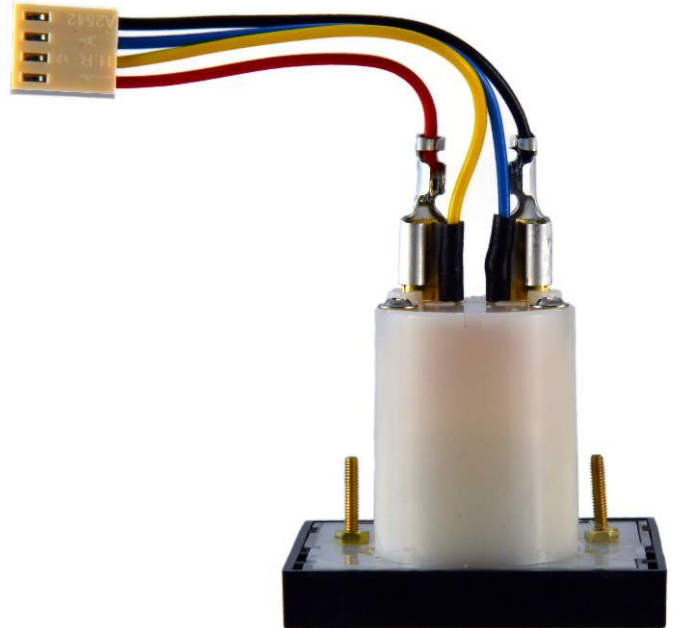
Pull down the neoprene tubes on the connection.

Insert the black wire connector to the (-) terminal.

Insert the red wire connector to the (+) terminal.

Insert the 4 wire terminal into the connector, taking care for the correct direction.

**Warning** : The 6.3mm wire terminals are very difficult to remove from the meter blade contacts. Only insert when you are ready.



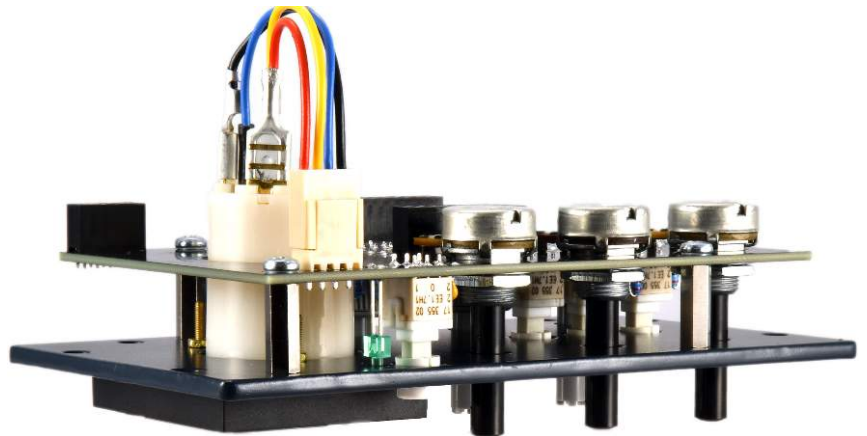
### 56. Meter & front panel

Remove the 2 nuts from the meter threaded studs and attach the meter to the front panel with the same 2 nuts.

## CP4500 Assembly guide – Final assembly

### 57. PCB C & front panel

Attach PCB C to the front panel with 4 M3x6 mm screws.  
And connect the meter.



### 58. Front panel & chassis

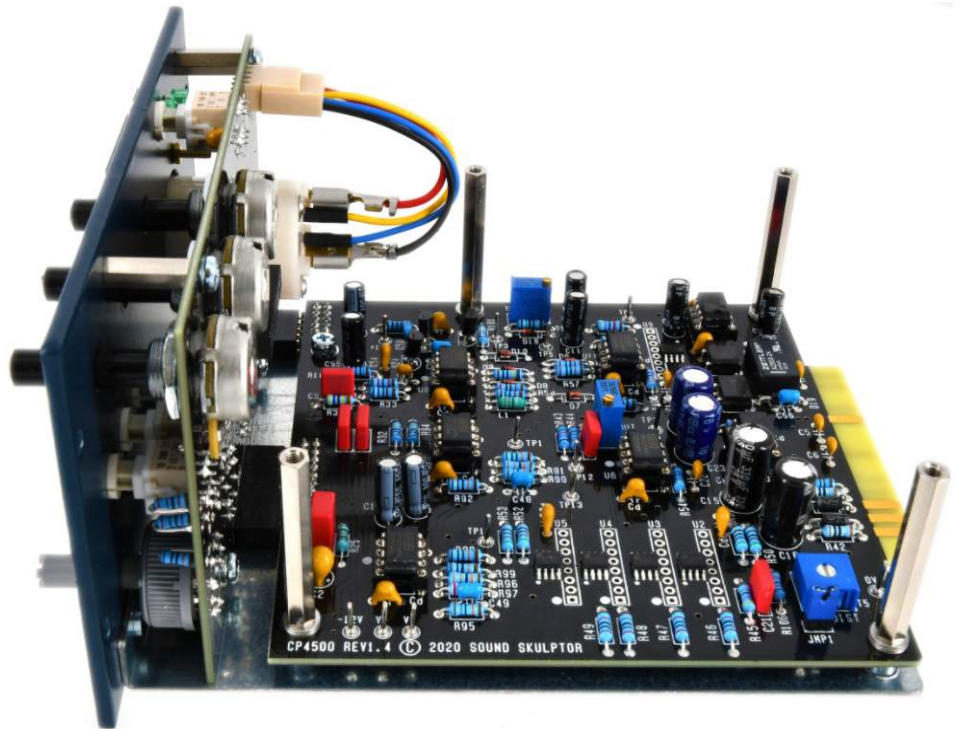
Attach the chassis to the front panel with two M3x6mm black screw.



## CP4500 Assembly guide – Final assembly

### 59. First channel (PCB A) assembly

Insert PCB A connectors into PCB C connectors and attach to the chassis plate with three 35 mm spacers and nine metal washers. The fourth corner is attached with a M3x6 mm screw and one lock washer.



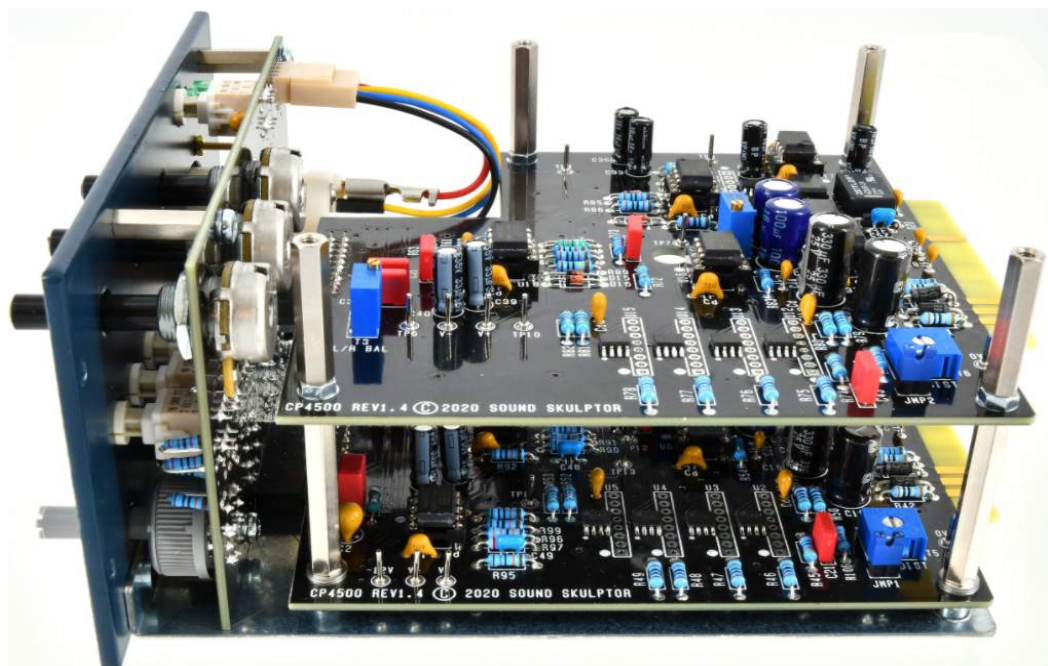
### 60. Setup – first channel

It is now time to setup the first channel of the compressor. Please refer to the Setup Guide.

### 61. Second channel (PCB-B) assembly

Prepare four 25mm spacers by screwing and tightening four nuts to extend their length.

Insert PCB B connector into PCB C connector and attach to the chassis plate with four 25 mm spacers + nuts.





## CP4500 Assembly guide – Final assembly

### 62. Setup – second channel

You can now finish the setup. Please refer to the Setup Guide.

### 63. Knobs

Set all the potentiometers and rotary switches fully anti-clockwise.

Attach the 6 knobs to the corresponding shafts, lining up the index with the marking.

**Warning** : To not tighten too hard the switch knobs in order not to warp the shafts.

### 64. Closing

Attach the cover PCB with four M3x6 countersunk screws.

### 65. Congratulations !

You're done !

