CP554 Assembly guide

Safety warning

The kits are main powered and use potentially lethal voltages. Under no circumstance should someone undertake the realisation of a kit unless he has full knowledge about safely handling main powered devices.

Please read the "DIY guide" before beginning.

Print or open the following documents :

- CP554 Schematics
- CP554 Components layout
- CP554 Parts list
- CP554 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 connections between the top and bottom pads are already made. 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 the minimum possible amount of solder. Bad joints are almost always caused by too much solder.

If ever, because you have made a mistake, you need to remove a component, DO NOT TRY TO SAVE IT! Instead, cut the pins and remove them one by one. Because this PCB is made of 4 layers and there is a very high risk of breaking the connections between layers if you force a lead out.

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/

In case of error: component soldered in the wrong place

Do not try to save the component! This will very likely damage the PCB which cost 100 times more than most components.

Except for transformers which are also expensive, cut the components pins with cutting pliers in order to be able to remove the pins one by one.

Then empty the holes with a de-soldering pump (this one works great : Jonard Industries DP-100).

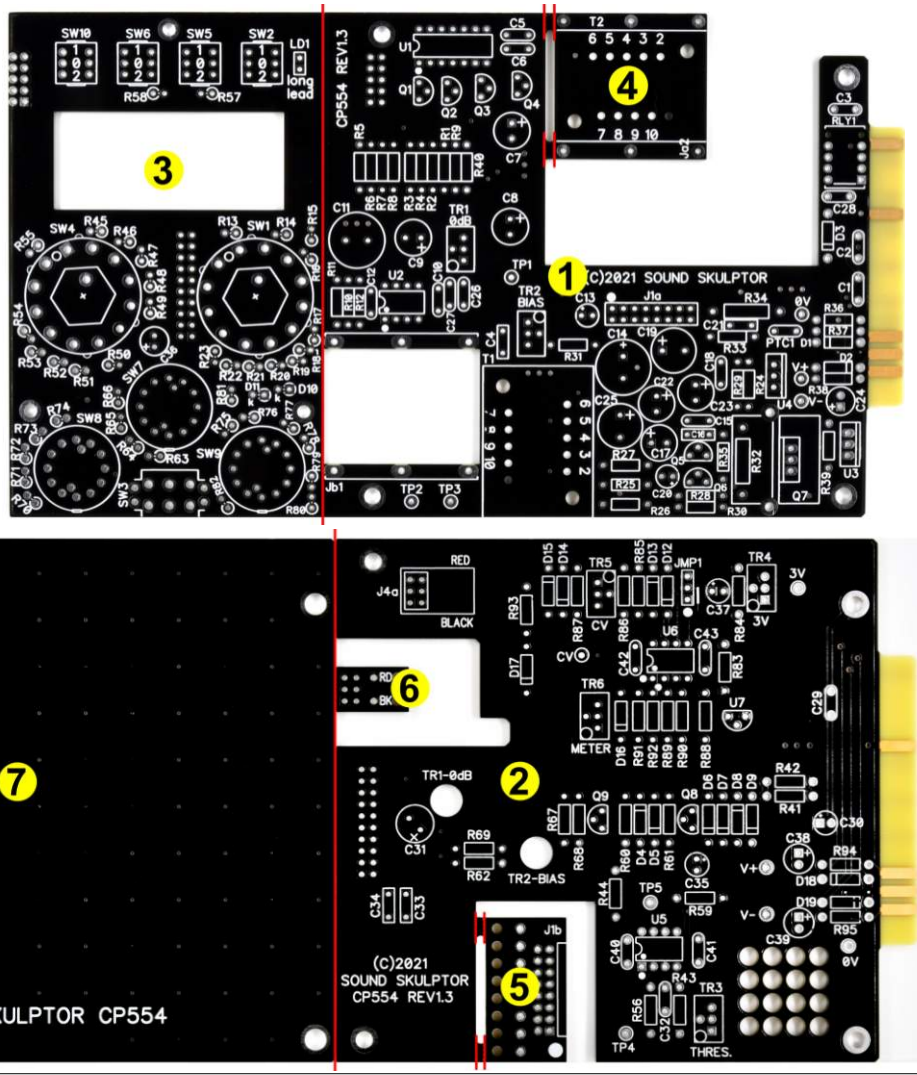
CP554 Assembly guide – PCB split

1. PCB split

Split the multiple PCB's along the red lines on the picture.

Clean up the break lines with very thin sand paper.

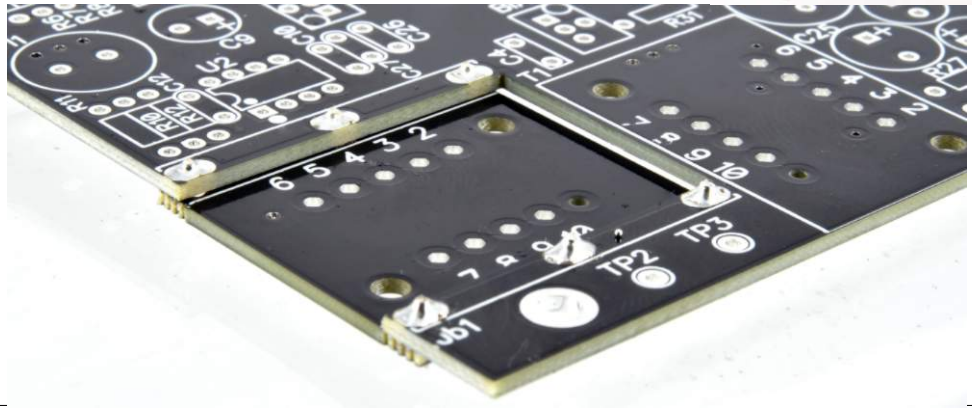
There is a total of 7 different PCB's.



CP554 Assembly guide – PCB-1

2. PCB-4 assembly

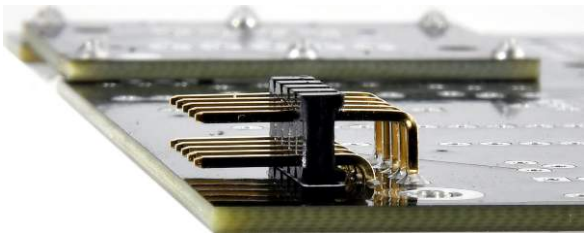
Place the small PCB-4 on the back side of PCB-1, matching the white dots position and insert 6 test pins (top down) into the 6 holes around the small PCB. Solder the pins and cut short on both sides.



CP554 Assembly guide – PCB-1

3. Connector J2A

Insert and solder the 2x5 male connector below PCB-1, on the solder side. The connector must sit flat on the PCB. Solder one pin, check position then solder the other pins.



4. Resistors

The best method to select and install the resistors is the following:
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 use the same method later, for the capacitors)

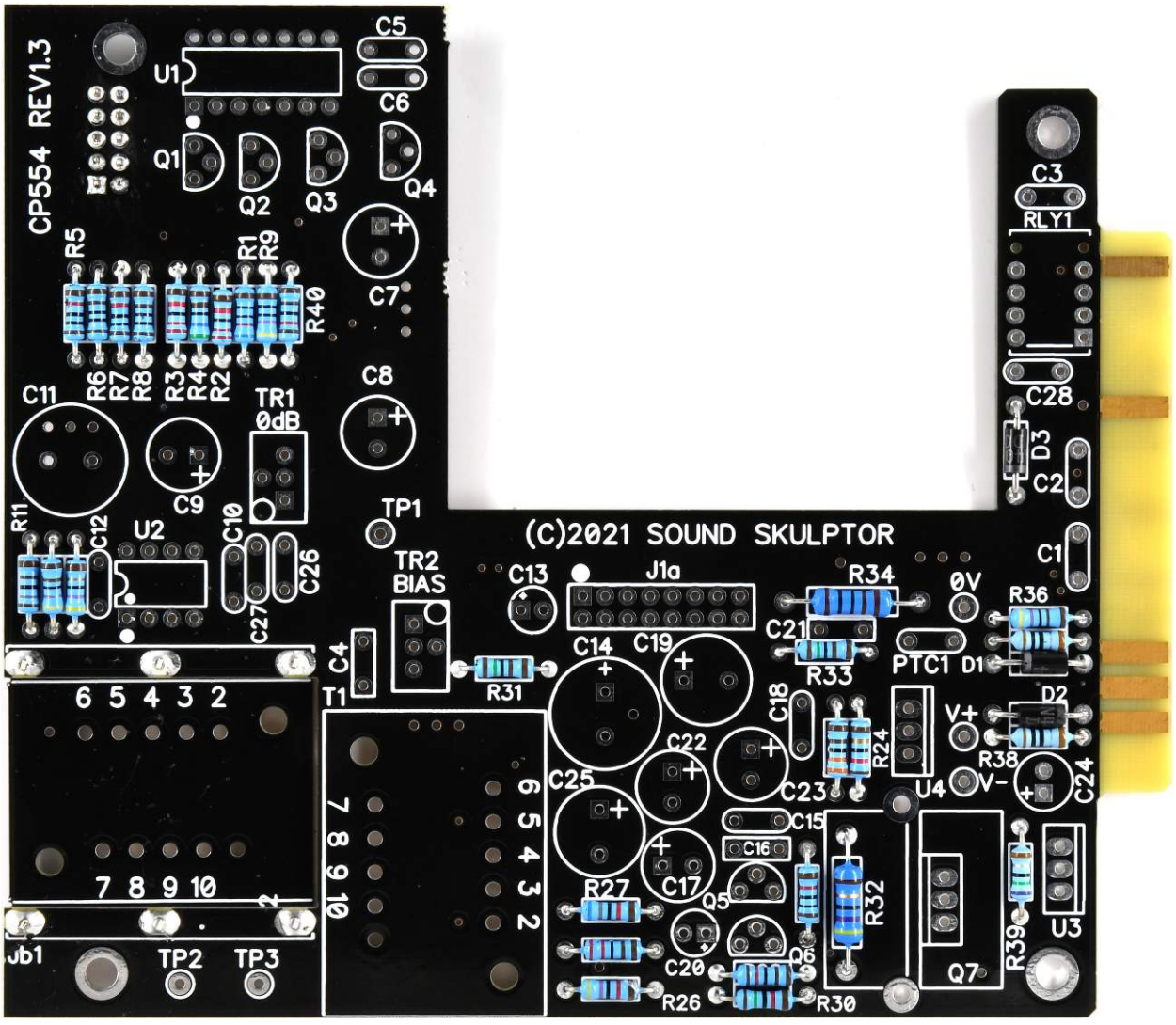
Add the 29 resistors of PCB-1, black reference in the parts list.
Bend the leads at 0.4" with a lead forming tool except R32 and R34 bent at 0.6"

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

5. Diodes

Add D1, D2, D3.
Use a lead forming tool to bend the leads at 0.4".
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 marking.

CP554 Assembly guide – PCB-1



6. Ceramic capacitors

Add the 12 ceramic capacitors.

7. IC Socket

Insert and solder the socket of U1 and U2.

Warning : Make sure to respect the socket direction, marked by a notch.

8. Relay

Add RLY1.

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.

9. Film capacitors

Add the 3 film capacitors.

CP554 Assembly guide – PCB-1

10. Test pins

Solder the 6 test pins TP1, TP2, TP3, V+, V- and 0V.
These pins are inserted from the top PCB side, long tail up. After soldering, cut flush on the solder side.

11. Tantalum capacitor

Add C13. The plus lead is the longest lead.

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

12. Transistors

Add Q1 to Q6.

Warning : Watch out the transistor direction.

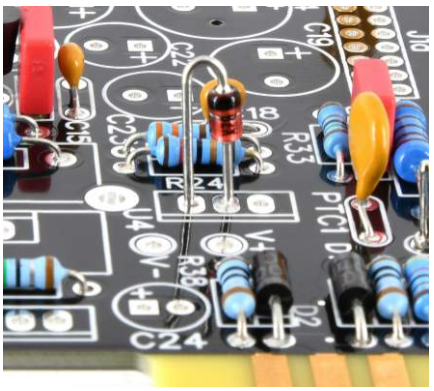
13. PTC 1

Solder the thermistor PTC1.

14. U4

U4 is replaced by D20, a 4V7-1W3 zener diode.
The diode is inserted vertically in the lower 2 holes of U4, cathode (black ring) towards Q7.

The diode is placed slightly above the PCB, in order to help heat dissipation.



15. Connector J1a

Solder the 2x8 connector socket J1a. Solder one pin first, check verticality, then solder the other pins.

16. Trimmer potentiometers

Add TR1 and TR2. Solder one pin, check verticality then solder the other pins.

17. Small electrolytic capacitors

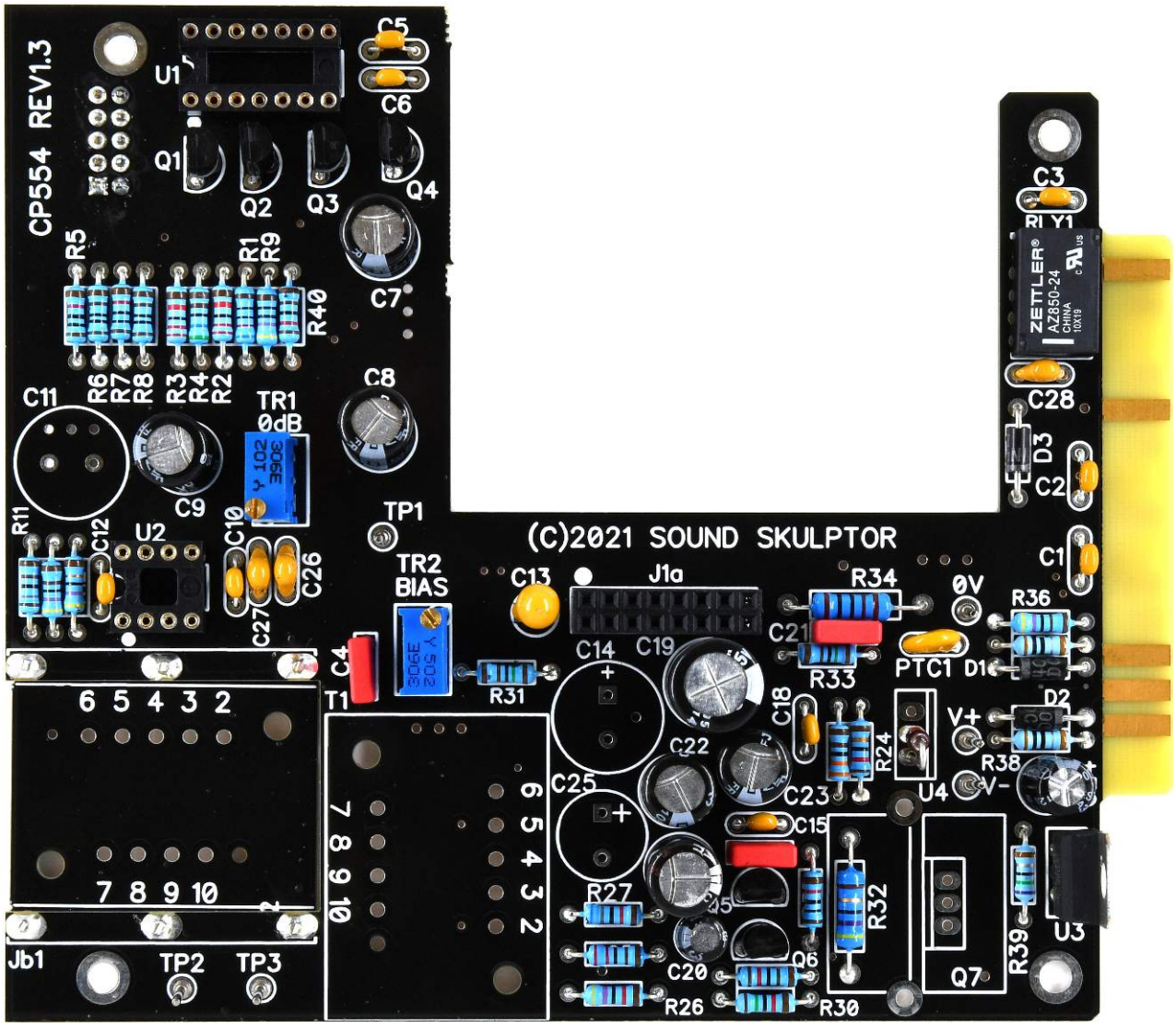
Add C20, C24, C17, C7, C8, C9, C22, C23, C19.
Solder one lead first, adjust verticality then solder the second lead.
Warning : The +lead must go into the +hole. Do not reverse (they may explode !)

18. Regulator

Add U3. Insert as far down as possible, solder one pin, adjust the verticality, then solder the two other pins.

Warning : Watch out the direction, the metal tab at the back of the device is symbolized by a double line on the PCB marking.

CP554 Assembly guide – PCB-1



19. Large electrolytics

Add C11, C14, C25.

Solder one lead first, adjust verticality then solder the second lead.
Warning : The +lead must go into the +hole. Do not reverse (they will explode !)

20. Power transistor Q7

Clip Q7 into the heatsink making sure it is well centred. The transistor must be firmly pinched by the clip. If available a drop of thermal paste can be layered on the back of the transistor.

Insert the heatsink and transistor pins all the way down into the PCB holes. Solder one of the heatsink pins, check verticality then solder the other pins.

21. Transformer T1 - VTB9046

Remove the 2 screws from the transformer plate holding the pins and insert T1 into position on the main PCB, making sure the pin numbers on the transformer match those on the PCB.
Reattach the 2 screws and solder the pins.

Warning: There are 2 transformers looking similar but they are different, don't mix them up!

CP554 Assembly guide – PCB-1

22. Transformer T2 – VTB9045

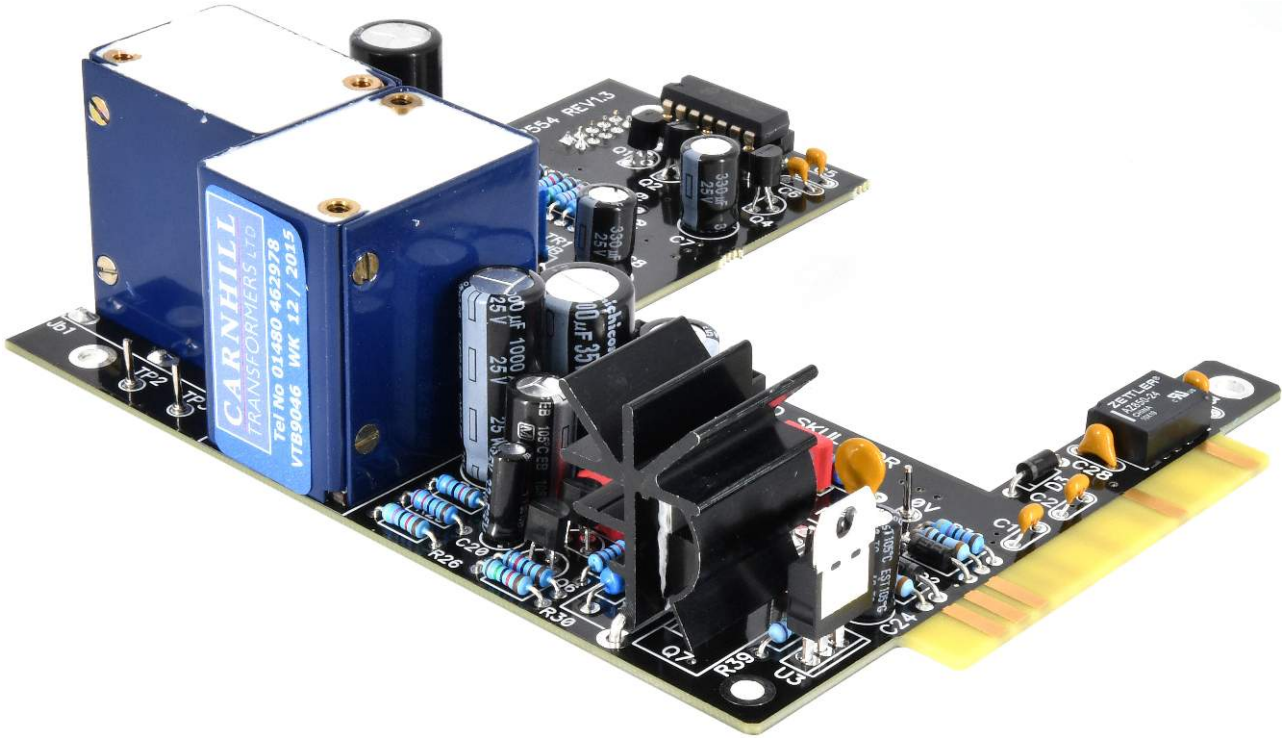
Remove the 2 screws from the transformer plate holding the pins and insert T2 into position on the recessed PCB-4, making sure the pin numbers on the transformer match those on the PCB.

Reattach the 2 screws and solder the pins.

23. U1 & U2

Insert the two integrated circuits U1 and U2 into their respective sockets.

Warning : Make sure to insert the IC's in the correct direction, identified by a notch or a dot on the IC and a white dot on the PCB.



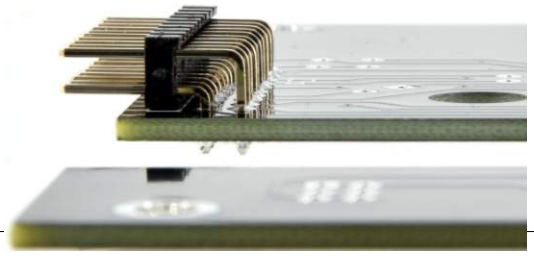
24. Visual check

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 ?

CP554 Assembly guide – PCB-2

25. Connector J3A

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



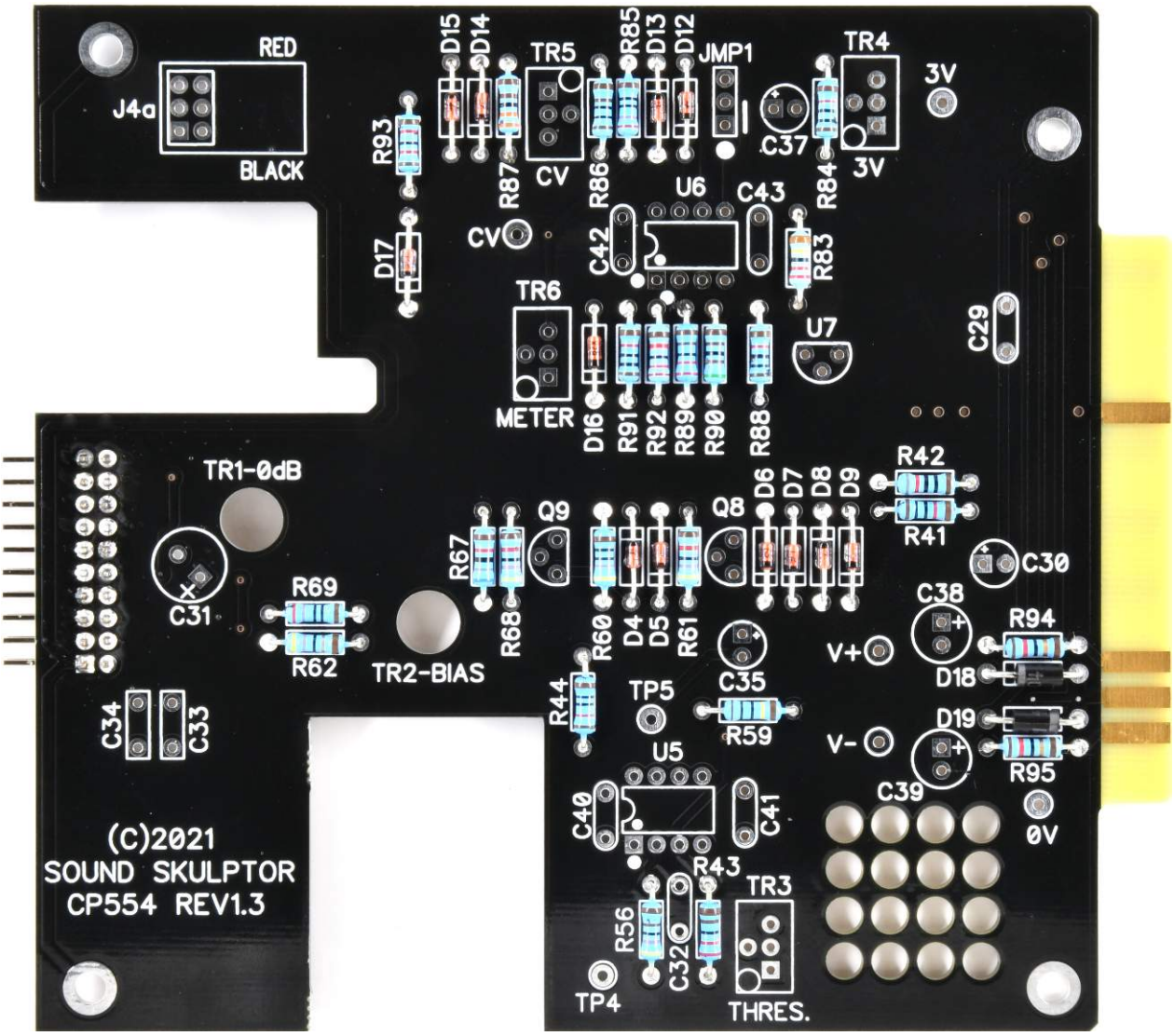
26. Resistors

Add the 25 resistors of PCB-2, blue reference in the parts list.
Control the resistor values with a digital multimeter. Bend the leads at 0.4" with a lead forming tool.

CP554 Assembly guide – PCB-2

27. Diodes

Add the 15 diodes of PCB-2.
Use a lead forming tool to bend the leads at 0.4".
Warning : D12 is not connected, leave the spot empty.
Warning : D6 and D16 are Zener diodes and must not be confused with the 1N914.
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 marking.



28. Ceramic capacitors

Add the 6 ceramic capacitors.

29. IC Sockets

Insert and solder the sockets of U5 and U6.
Warning : Make sure to respect the socket direction, marked by a notch.

CP554 Assembly guide – PCB-2

30. Film capacitors

Add the 2 film capacitors.

31. Test pins

Solder the 7 test pins TP4, TP5, 3V, CV, V+, V- and 0V.
These pins are inserted from the top PCB side, long tail up. After soldering, cut flush on the solder side.

32. Jumper header

Solder jumper header JMP1. Solder one pin first, check verticality, then solder the other pins.

33. Tantalum capacitor

Add C37. The plus lead is the longest lead.

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

34. Transistors and IC

Add Q8, Q9 and U7.

Warning : Watch out the transistor direction.

35. J4a connector

Solder the connector socket J4a. Solder one pin first, check verticality, then solder the other pins.

36. Trimmer potentiometers

Add TR3 to TR6. Solder one pin, check verticality then solder the other pins.

37. Small electrolytic capacitors

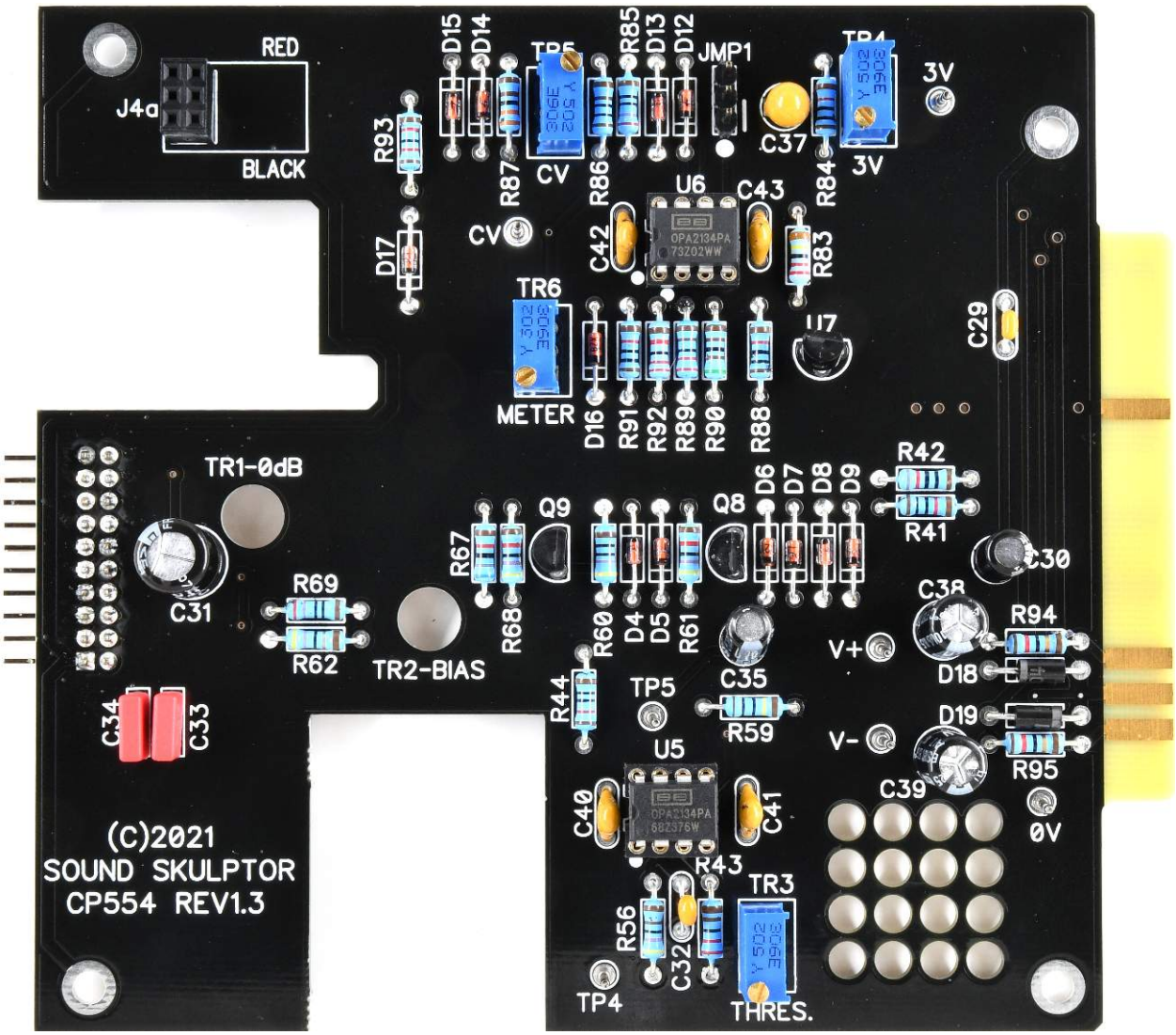
Add C30, C35, C38, C39, C31.
Solder one lead first, adjust verticality then solder the second lead.
Warning : The +lead must go into the +hole. Do not reverse (they may explode !)

38. U5 & U6

Insert the two integrated circuits U5 and U6 into their respective sockets.

Warning : Make sure to insert the IC's in the correct direction, identified by a notch or a dot on the IC and a white dot on the PCB.

CP554 Assembly guide – PCB-2



39. Jumper

Place one jumper on JMP1 on pins 1 and 2. Pin 1 is marked by a white dot.

40. Visual check

At this point, 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 ?

CP554 Assembly guide – PCB-3

41. Resistors

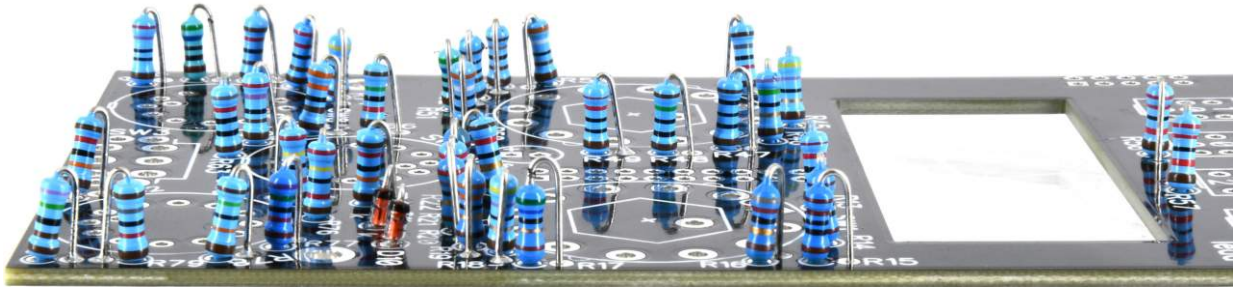
Add the 41 resistors of PCB-3, red reference in the parts list.
Control the resistor values with a digital multimeter. All the resistors are installed vertically.

CP554 Assembly guide – PCB-3

42. Diodes

Add D10 and D11. These diodes are placed vertically. Bend the cathode leg (identified by the black ring).

Warning : Make sure to respect the direction of the diodes, the cathode pad is marked by a 'K' on the PCB.



43. Solder side connectors

On the solder side, add J2b (2x5) and J3b (2x10).

44. Electrolytic capacitor

Add C36.

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

45. Push switches

Insert the push switches SW2, SW5, SW6, SW10, 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, printed on one side of the switch. Match the digits with the ones on the PCB.

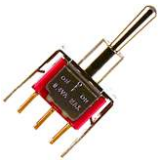
Warning : Solder carefully: you do not want to touch any other plastic part with your iron when soldering.

46. Small rotary switches

Add the three 6 positions rotary switches SW7, SW8 and SW9.

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.



47. Toggle switch

Add the toggle switch SW3.

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

48. Large rotary switches

Shorten the shaft of SW1 and SW4 with large cutting pliers at 11mm from the top of the thread.

Remove the nut and washer and solder in place.

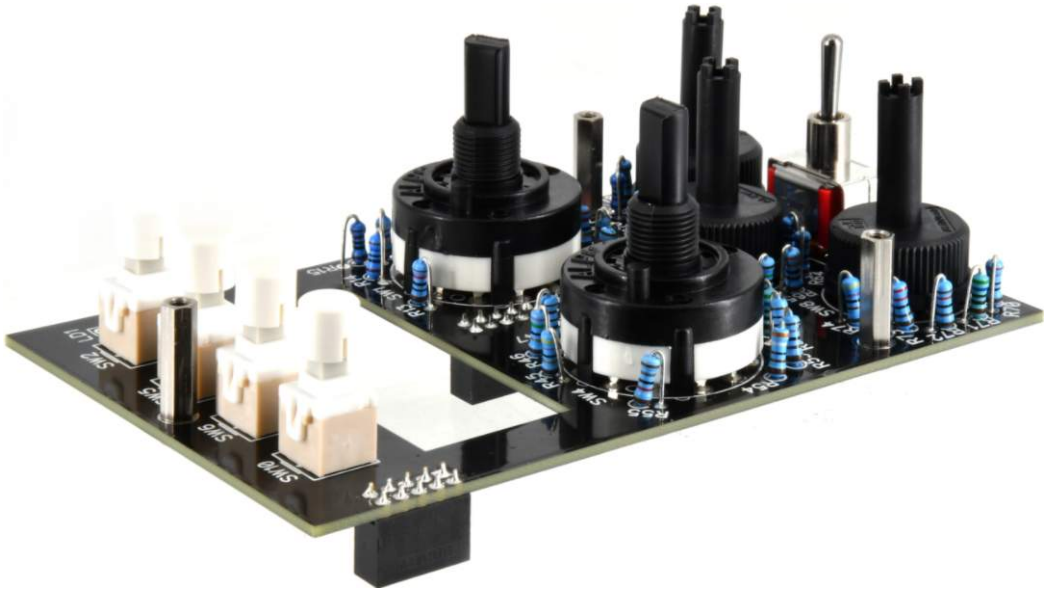
CP554 Assembly guide – PCB-3

49. Spacers

Attach 3 M2.5x15mm spacers, on the components side, in the 3 remaining holes with 3 M2.5x6 mm screws.

50. Push switch caps

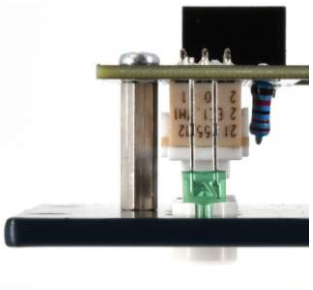
Insert the caps on the push switches



51. LED

Insert the 2mm LED LD1, taking care of the anode/cathode (long/short lead) position. Do not solder yet.
Attach temporarily the PCB to the front panel with 3 M2.5x6mm black screws.
Adjust the LED flush with the front panel surface. Solder.

Remove the front panel.

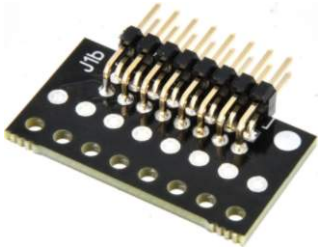


52. Visual check

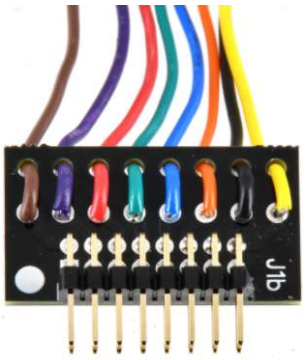
Brush the solder side with a hard tooth brush to remove any remaining solder bits. Make a full visual check. Any missing component on the board ? Any remaining component in the box ?

CP554 Assembly guide – Output transformer assembly

53. PCB-5

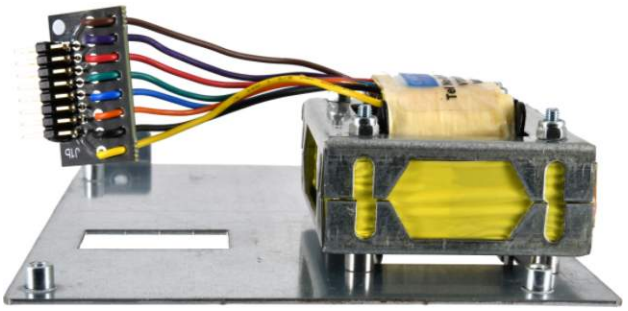


Solder the 2x8 pins, 90° connector J1b on PCB-5.
Cut the output transformer wires at approximately 10cm (4"). Strip out 5mm. Insert, one at a time, the wires from the bottom side (the side with the colour identifiers), taking care of matching the wire colour with the ID. Insert the stripped end into the corresponding hole and solder.
For a cleaner aspect, respect the wire parallelism from transformer to PCB.
YE=yellow, BK=black, OR=orange, BL=blue, GR=green, RD=red, VI=violet, BR=brown.



54. Output transformer to chassis assembly

Insert 4 M3x35mm countersunk screws into the side plate. On each screw, insert one 4mm spacer. Insert the transformer on the 4 screws and attach with 4 self locking nuts. Tighten without crushing the transformer frame.



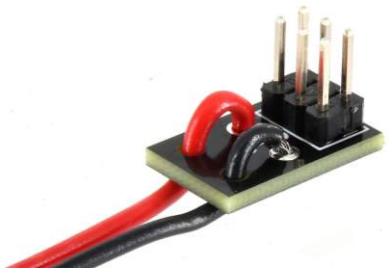
CP554 Assembly guide – Meter assembly

55. PCB-6 connector

Solder the 2x3 male connector on PCB-6.

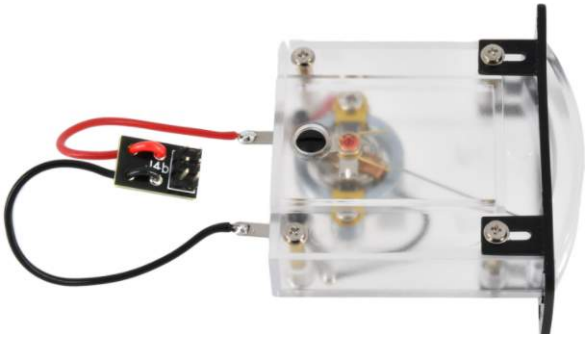
56. Wires

Cut one red wire 8cm long.
Cut one black wire 10cm long.
Strip 3 mm wire each wire end.
Solder the wires on the PCB respecting the colour position.



57. Meter

Strip 3 mm from each wire other end and solder to the meter, red wire to (+), black wire to (-)



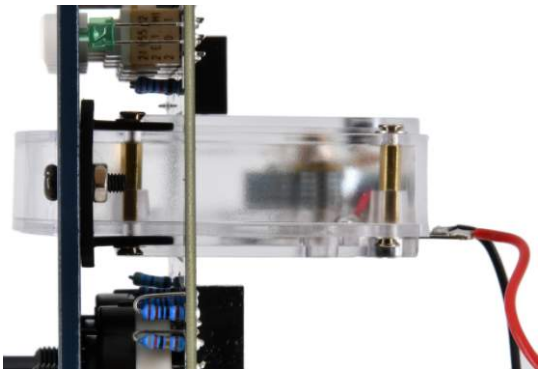
CP554 Assembly guide – Meter assembly

58. Meter to front panel assembly

Attach the meter to the frontplate with 2 black screws and 2 nuts. The black plastic frame holding the meter remains behind the frontplate.

Next, loosen the 4 screws that attach the meter to the black plastic frame and move the meter forward until the front curved part is fully out.

Tighten.



CP554 Assembly guide – Final assembly

59. PCB-1 to chassis install

Attach PCB-1 to the chassis plate with four 35 mm spacers and 12 metal washers.

Twist the transformer wires and connect to the J1a connector, taking care to match the white dots on the 2 PCB's.

60. Front plate assembly

Carefully place the front panel into position by matching the connectors J2a and J2b.

Attach the front plate to the side plate with 2 M3x6mm black screws.

61. Knobs

You may install the knobs of the front panel now as it will make setup easier.

62. PCB-1 setup

Your CP554 is now ready for the setup of PCB-1. Please follow instructions in the "CP554 Setup" document.

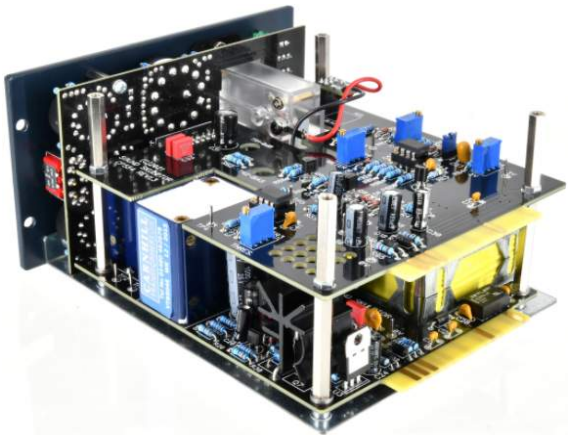
63. PCB-2 install

Place PCB-2 into position, carefully matching J3a and J3b.

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

Attach PCB-2 with them.

Insert the meter connector into J4a.



CP554 Assembly guide – Final assembly

64. PCB-2 setup

Your CP554 is now ready for the final setup. Please follow instructions in the "CP554 Setup" document.

65. Closing

Attach the cover PCB with four M3x6 mm countersunk screws.

66. Congratulations !

You're done!