LA502T Assembly guide

Safety warning

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

Please read the "DIY guide" before beginning.

Print or open the following documents:

- LA502T Schematics
- LA502T Components layout
- LA502T Parts list

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 the minimum possible amount of solder. Bad joints are almost always caused 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 introductions 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 costs 100 times more than most components.

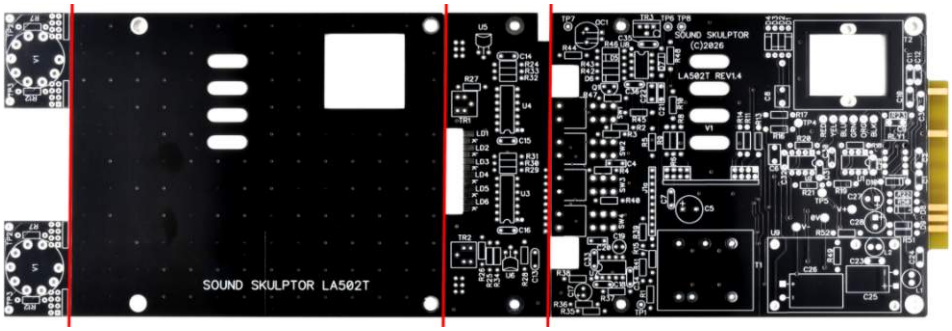
Except for transformers which are also expensive, cut the component pins with cutting pliers in order to be able to remove the pins one by one.

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

LA502T Assembly guide – Main PCB

1. PCB split

Break the PCB into 5 parts along the red lines. The existing grooves allow the PCB to be broken by hand without difficulty. Use extra thin sandpaper to polish all the rough sides



2. SKTPS2 (U9) Pin Sockets

Solder the 5 pin sockets for U9. Solder one at a time. Insert one socket, turn over the PCB and press against a solid surface then solder. The correct positioning of the sockets is very important for easy insertion of U9.

3. 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 all the resistors of the main PCB (black identifier in the parts list).
Verify the resistors value with a digital multimeter. Bend the leads at 0.4" with a lead forming tool.

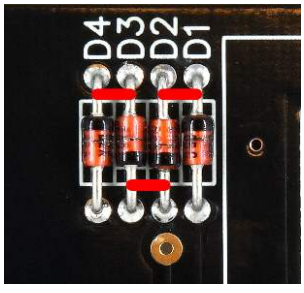
Warning: Leave the R16 position empty. The C37 capacitor will be installed there instead.

Warning: It is very 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 1.10Ω (brown-brown-black-black-brown).

Warning: It is a good idea to protect the back connector gold fingers with some adhesive tape because if your iron slips and touches one, it will be immediately and irremediably polluted with tin.

4. Diodes D1 to D4

PCB REV1.4 requires manual bridging between diodes D1–D4. For ease of assembly, complete this step prior to soldering (see image).
Cut the leads short to ensure they won't touch the chassis plate.

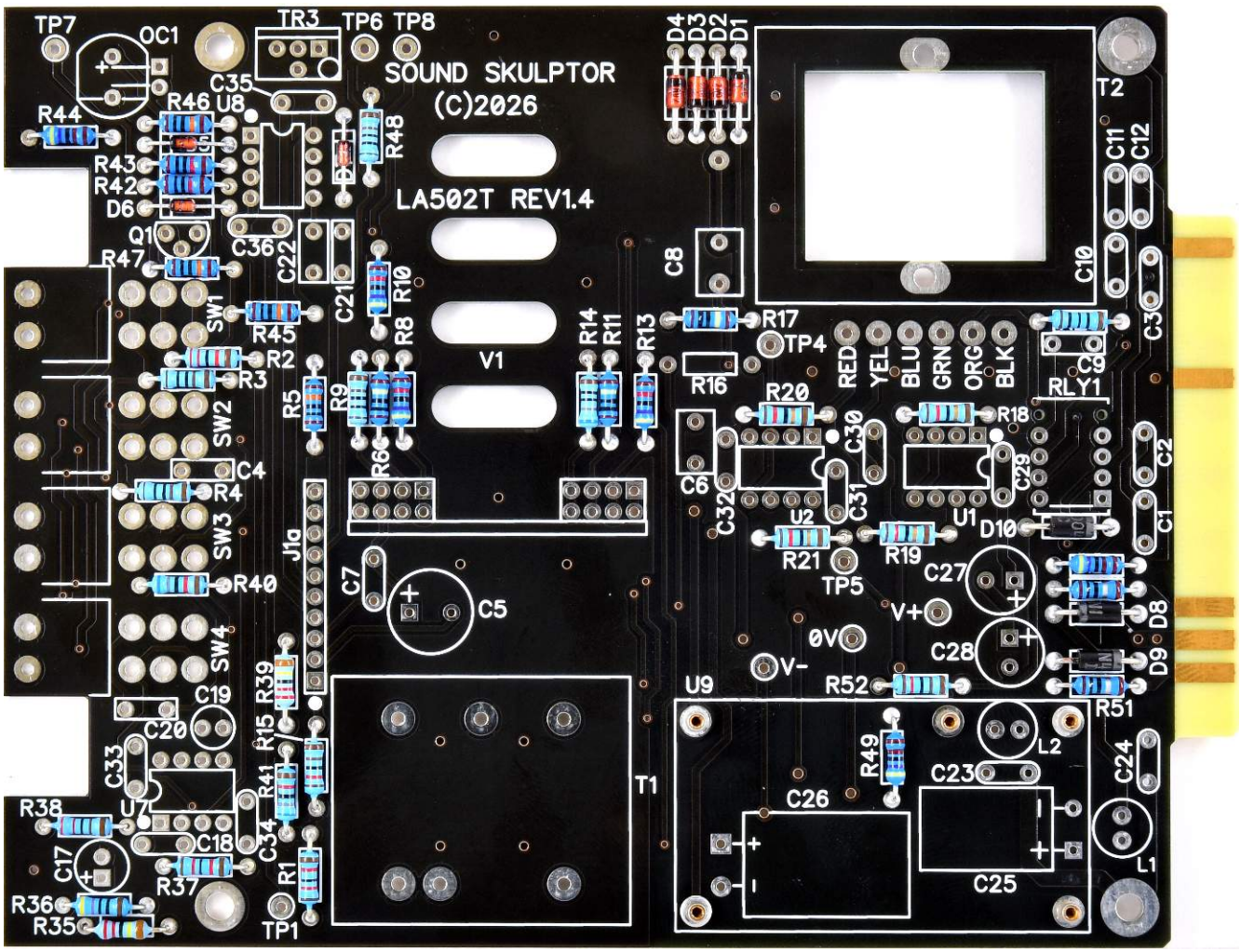


5. Diodes

Add D5, D6, D7.
Add D8, D9, D10.

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.

LA502T Assembly guide – Main PCB



6. Ceramic capacitors

Add C7.
Add C3.
Add C1, C2, C10, C11, C12, C18.
Add C23, C24, C29, C30, C31, C32, C33, C34, C35, C36.

7. IC Socket

Insert and solder the four 8 pins socket in.
Warning: Make sure to respect the socket direction, marked by a notch.

8. Relay

Add RLY1. This relay has two unsoldered pins. These two pins do not require soldering as they are not connected internally
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.

9. C37

C37 goes into the R16 position. Use the cap with long leads. Bend the leads in order to fit the larger size.

LA502T Assembly guide – Main PCB

10. Film capacitors

Add the film capacitors C9, C20, C4, C21, C6, C8, C22.

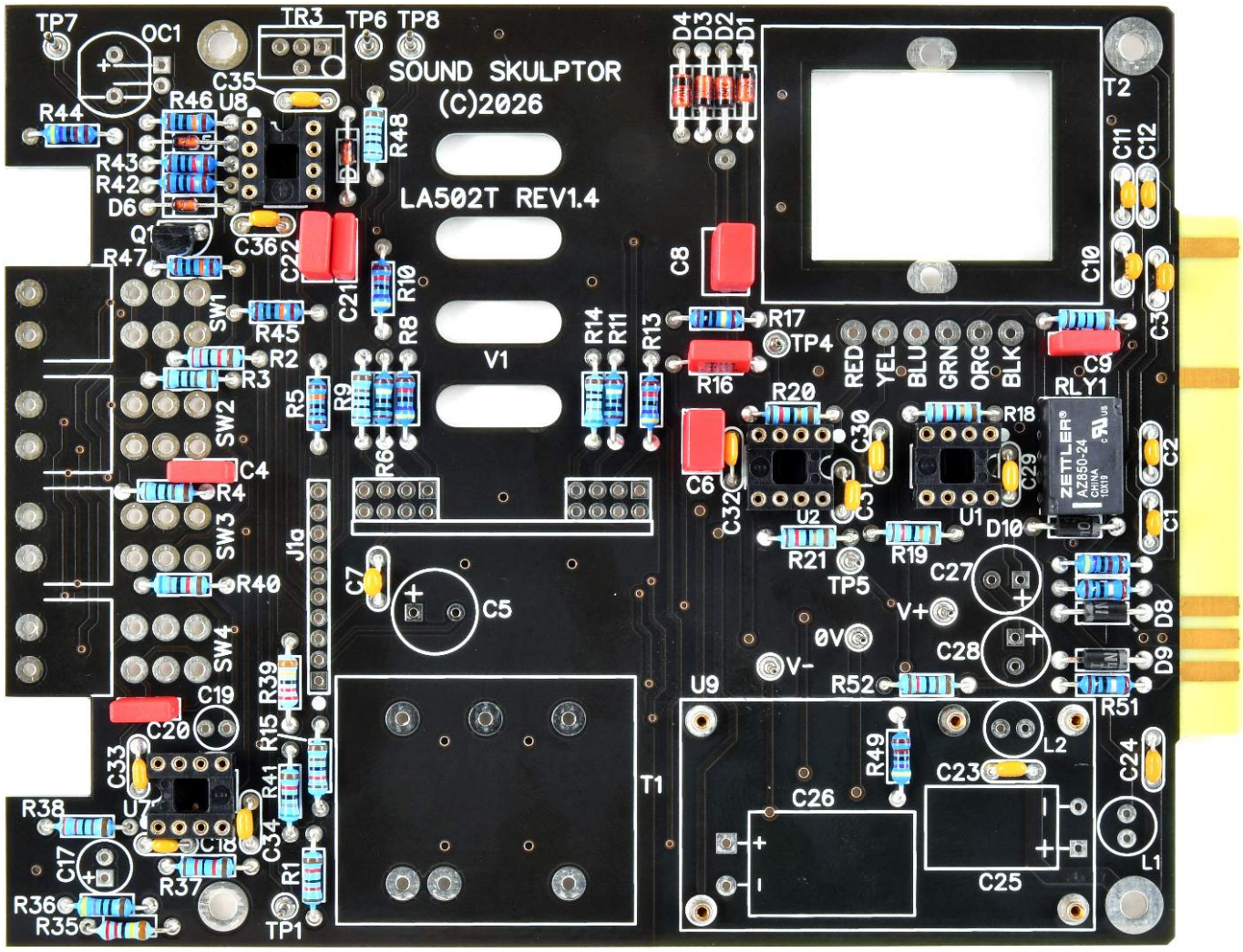
11. Transistor Q1

Insert and solder Q1.

Warning: Not to be confused with U5 or U6.

12. Test pins

Solder the nine 11mm test pins TP1, TP4, TP5, TP6, TP7, TP8, V+, V-, 0V.



13. Connectors J1a

Add J1a. Solder one pin, check verticality then solder the other pins.

LA502T Assembly guide – Main PCB

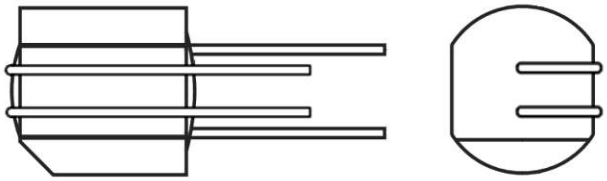
14. Radial inductors

Add L1 and L2.

15. Opto-coupler OC1

Bend the 2 wires that are narrowly spaced against the body.
Follow the diagram to bend in the correct direction, relative to the beveled side.

Insert and solder.



16. Switches

Add the 4 switches SW1 to SW4.

17. Trimmer TR3

Add and solder the 20 turns trimmer TR3.

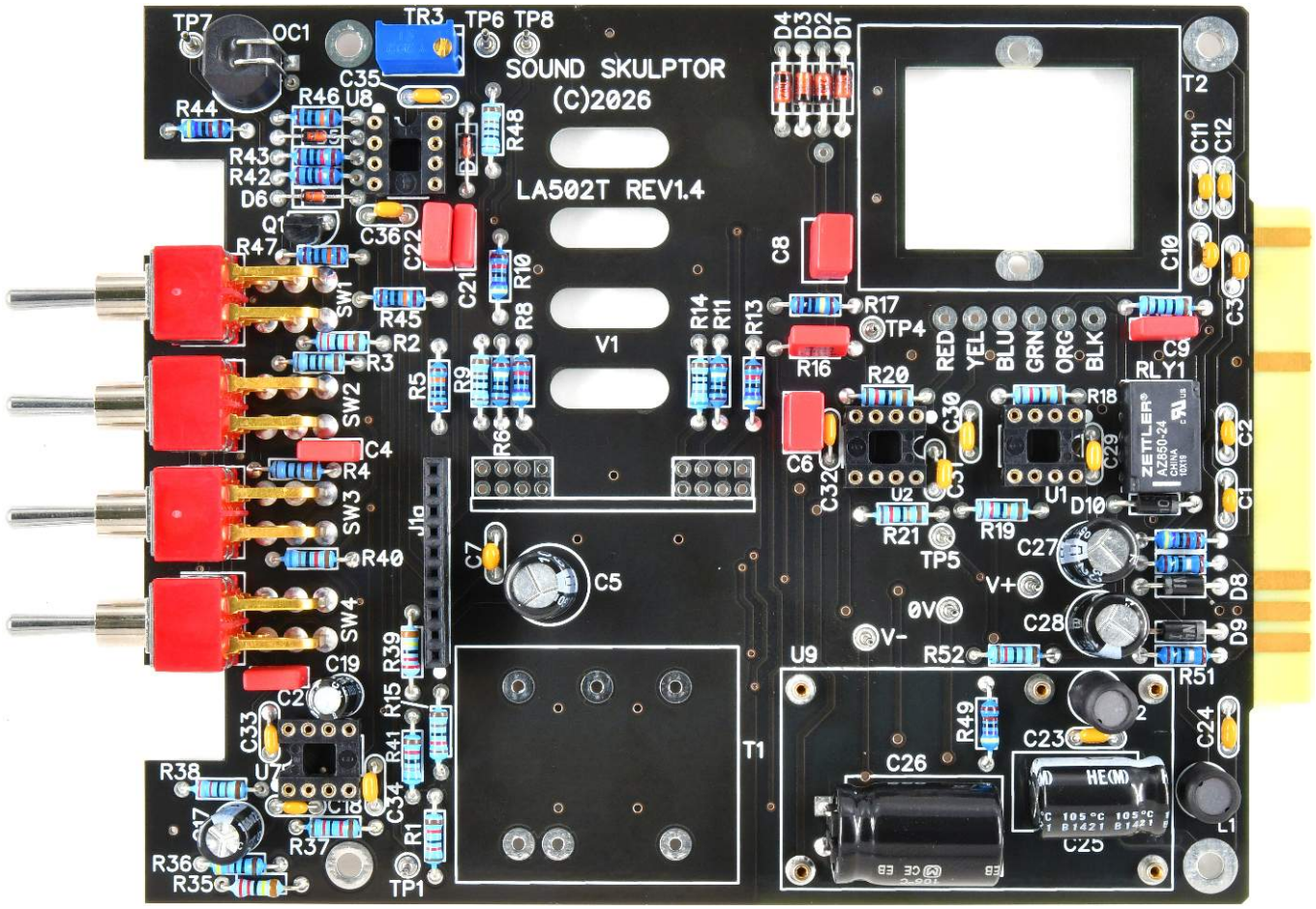
18. Bipolar electrolytic capacitors

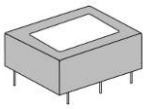
Add C19.

19. Electrolytic capacitors

Add the electrolytic capacitors C17, C27, C28, C5.
Add C25 and C26 which are placed horizontally.
Warning: The +lead must go into the +hole. Do not reverse (they may explode!)

LA502T Assembly guide – Main PCB





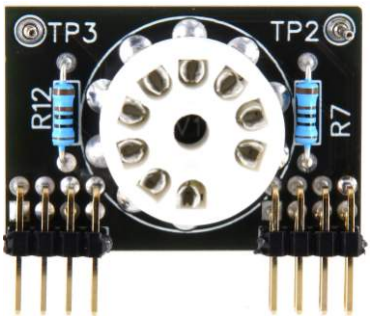
20. Transformer T1

Insert and solder the transformer T1.

21. Tube support PCB

Solder the two 2 x 4 pins 90° pin headers. Solder one pin first, make sure the header sits flat on the PCB, then solder the other pins.
Add resistors R7 and R12.
Add the two test pins.
Solder the tube socket and cut the pins flush.

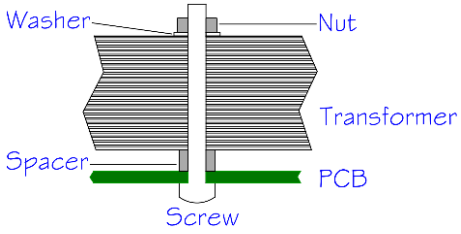
Insert the tube PCB into the main PCB. Solder one pin, check the verticality then solder the other pins.



22. Transformer T2

The transformer is mounted using two 25mm M2.5 screws inserted from the back of the board. Two 3mm metal spacers are fitted on each screw to raise the transformer. One washer is used before the nut to protect the laminations.

Shorten the leads to the necessary length, around 5 cm. Strip 5mm of insulation, insert into the corresponding color pad hole and solder. It is the wire color that matters, not the exact order.



LA502T Assembly guide – Main PCB

23. Integrated circuits

Insert the four integrated circuits U1, U2, U7 and U8 into their sockets.

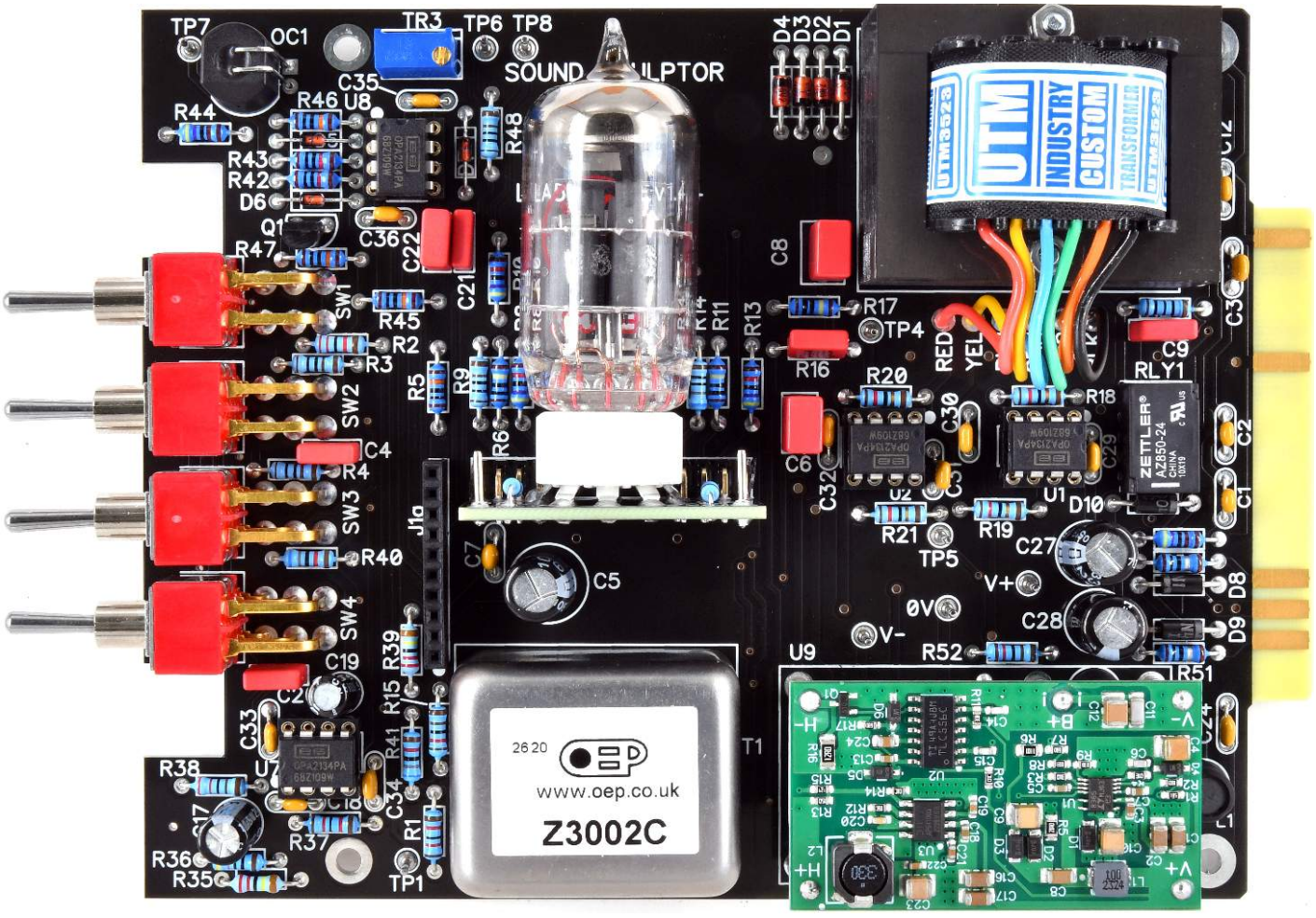
Warning: The ICs have a direction identified by a notch or a dot.

24. Module SKTPS2

Insert five 20mm pins into the five sockets of U9, on the main PCB. Place the module on the pins and solder the pins to the module from the top.

25. Tube

Carefully insert the tube into the noval socket.



LA502T Assembly guide – Main PCB

26. Visual check

Check that all component leads are cut short. Brush the solder side with a hard toothbrush to remove any remaining solder bits.

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

When everything looks correct, proceed with the other board assembly.

LA502T Assembly guide – Meter PCB

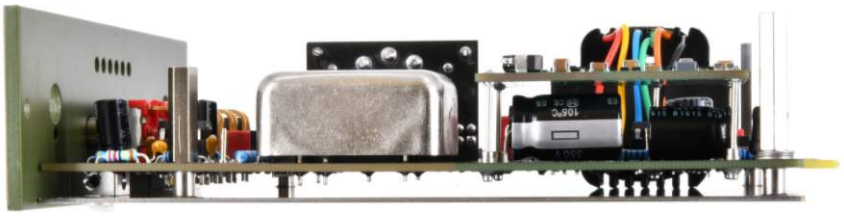
27. Chassis plate assembly

Secure the main PCB to the chassis plate with two 18mm standoffs at the front and two 25mm standoffs plus 3 metal washers at the rear.

28. Front panel

Attach two 3D nuts to the front panel with two M3x6mm countersunk black screws.

Attach the front panel to the chassis plate with the two hex, flat head screws.



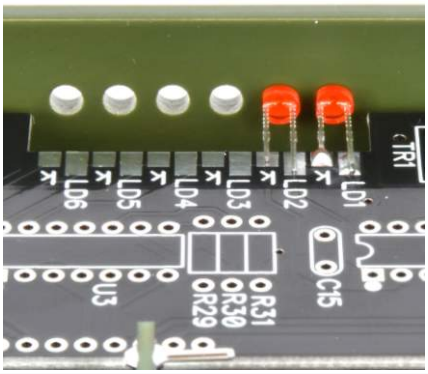
29. LEDs

Temporarily attach the Meter PCB to the 18mm spacers with two M3x7mm spacers.

Place the first LED into its corresponding hole, longest lead towards trimmer TR1. Push the LED forward against the front panel and cut the short lead to fit the "k" pad. Solder it. Next, cut the long lead to fit the other pad and solder it.

Repeat the process for all six LEDs.

Remove the Meter PCB and the front panel.



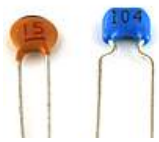
30. Resistors

Add all the resistors of the Meter PCB (blue identifier in the parts list).

31. 14 pins ICs

Insert and solder U3 and U4. These integrated circuits are installed without a socket in order to minimize the height.

LA502T Assembly guide – Meter PCB



32. Ceramic capacitors

Add C15, C16.
Add C13, C14.

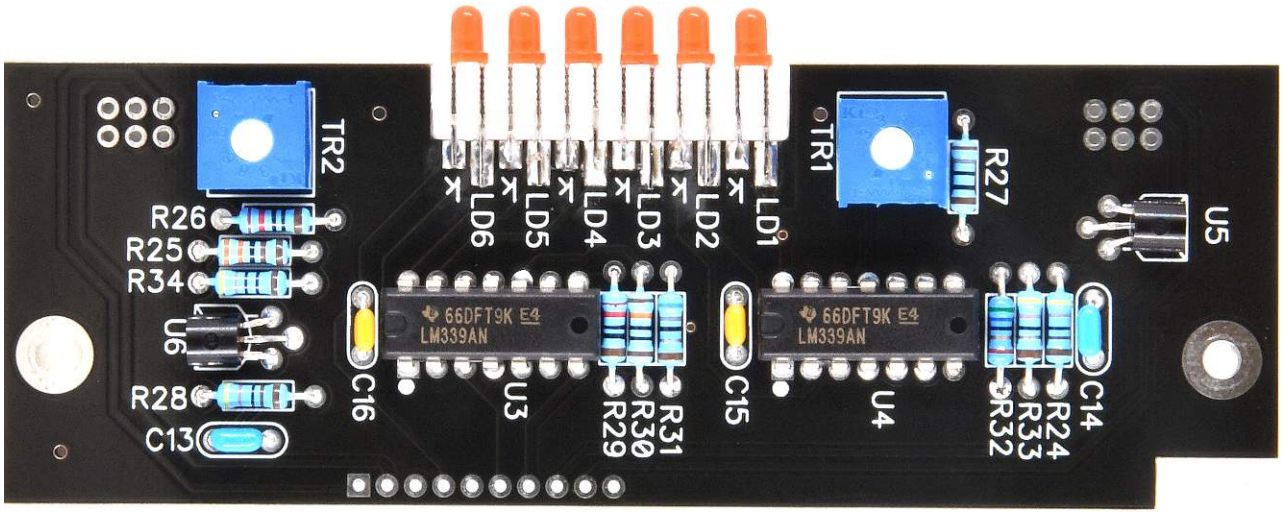
33. 3 pins ICs

Add U5 and U6. These devices are installed flat on the PCB.

Warning: The two ICs are different do not swap them.

34. Trimmer potentiometers

Add TR1 and TR2.



35. Potentiometer anti-rotation stop

Using wire cutters, remove the anti-rotation stop located at the front of the potentiometers. Make sure it no longer protrudes. If necessary, finish with a small file.

36. Potentiometers

The potentiometers are inserted from the **back side** of the PCB.

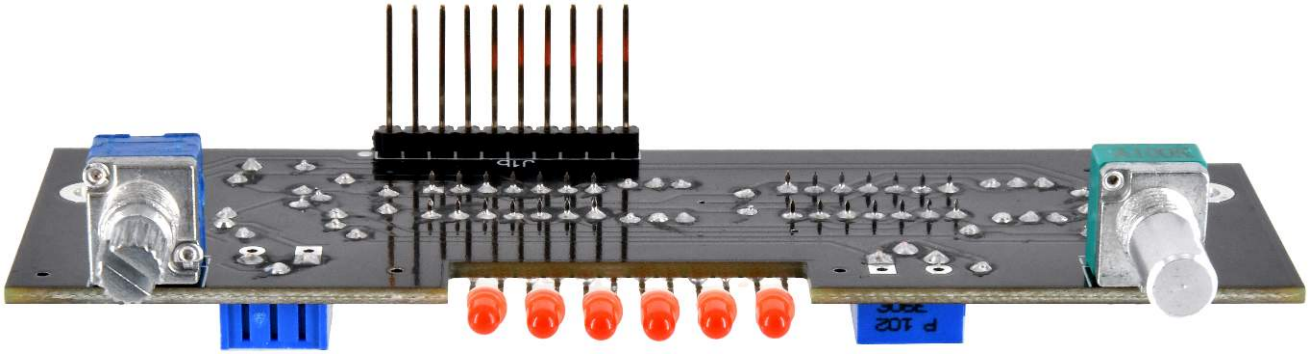
Add the 2 potentiometers P1 and P2.

Warning: The 2 potentiometers are different. Do not swap.
They can be single (3 pins) or double (6 pins) depending on the supplier. When single, insert into the row closest to the edge.

37. Connector J1b

Add the connector J1b **AT THE BACK** of the PCB.

LA502T Assembly guide – Meter PCB



LA502T Assembly guide – Final assembly

38. Front panel assembly

Insert the Meter PCB connector J1b into the main PCB connector J1a. Insert the front panel on the potentiometers, switches and LEDs and secure it with the potentiometer nuts. Tighten very gently, being careful not to scratch the panel.

Secure the front panel to the chassis plate with the two hex, flat head screws.

Secure the Meter PCB to the 18mm spacers with two 7mm spacers.

39. Setup

Follow the setup procedure as shown in the setup guide.

40. Knobs

Attach the 2 knobs.

41. Cover

Attach the cover with 4 M3x6mm countersunk screws.

42. Congratulations

You're done!

LA502T Assembly guide – Final assembly