

‘Shaper’ assembly instructions

Note: on the first batch of the printed circuit boards, there is an error on the screenprint. Please follow the instructions below! (This has no consequences for the working of the equalizer, after you have assembled the PCB, you will never see the screenprint again!)

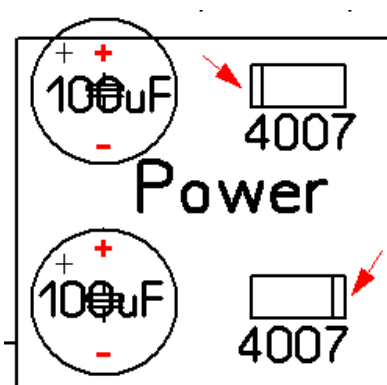
On the printed circuit board there are spaces reserved for additional capacitors and a resistor. Those extra components are **not needed** when using the supplied components. Do **not** mount anything in those holes of the PCB.

The resistors are all metal film 1% types, color coded with 5 bands. Here is the color code chart for resistors. In case of doubt, use an ohm meter to check the value.

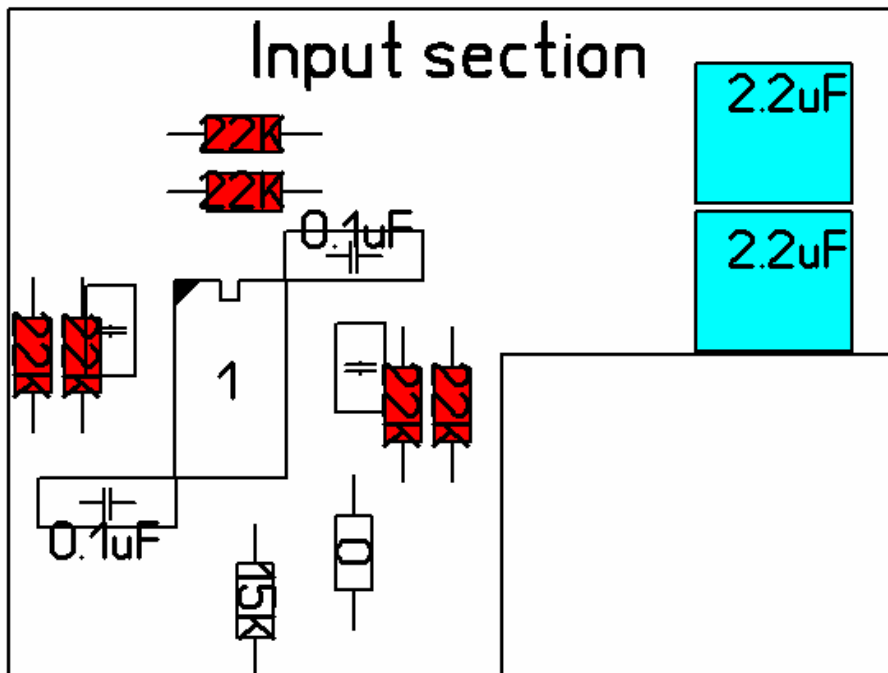
COLOR	1 ST BAND	2 ND BAND	3 RD BAND	MULTIPLIER	TOLERANCE
Black	0	0	0	1Ω	
Brown	1	1	1	10Ω	± 1% (F)
Red	2	2	2	100Ω	± 2% (G)
Orange	3	3	3	1KΩ	
Yellow	4	4	4	10KΩ	
Green	5	5	5	100KΩ	± 0.5% (D)
Blue	6	6	6	1MΩ	± 0.25% (C)
Violet	7	7	7	10MΩ	± 0.10% (B)
Grey	8	8	8		± 0.05%
White	9	9	9		
Gold				0.1Ω	± 5% (J)
Silver				0.01Ω	± 10% (K)

0.1%, 0.25%, 0.5%, 1% 237 Ω ± 1%
5-Band-Code

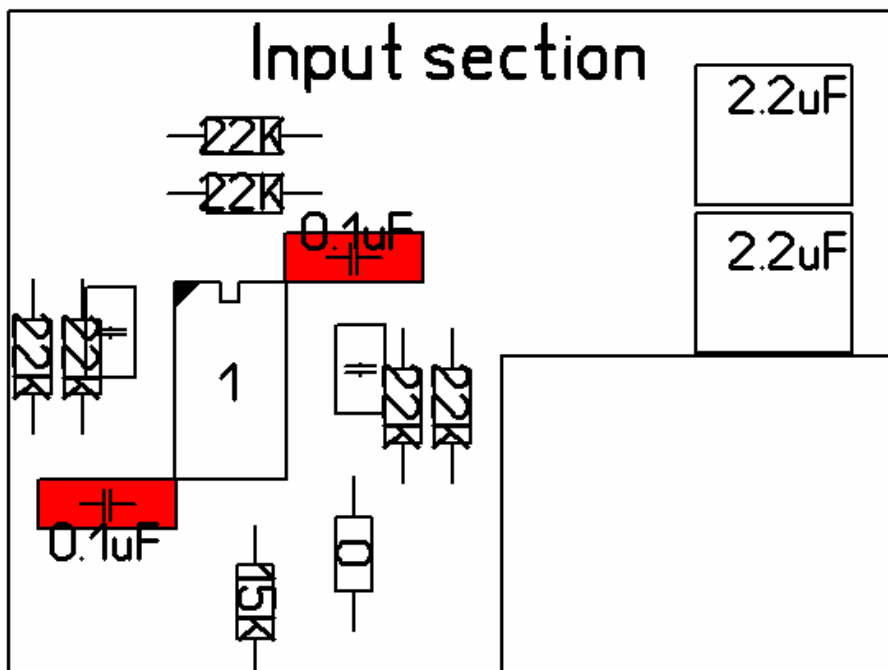
- We start the assembly with the power section of the PCB. Place the diodes (black, with 1N4007 printed on them) and the 100 uF capacitors. The negative (-) pole on the capacitors is indicated with a white band. Observe the polarity! The bands on the diodes should match the drawing below. The positive side (+) of the electrolytic capacitors should be ‘up’, the negative side (-) ‘down’.



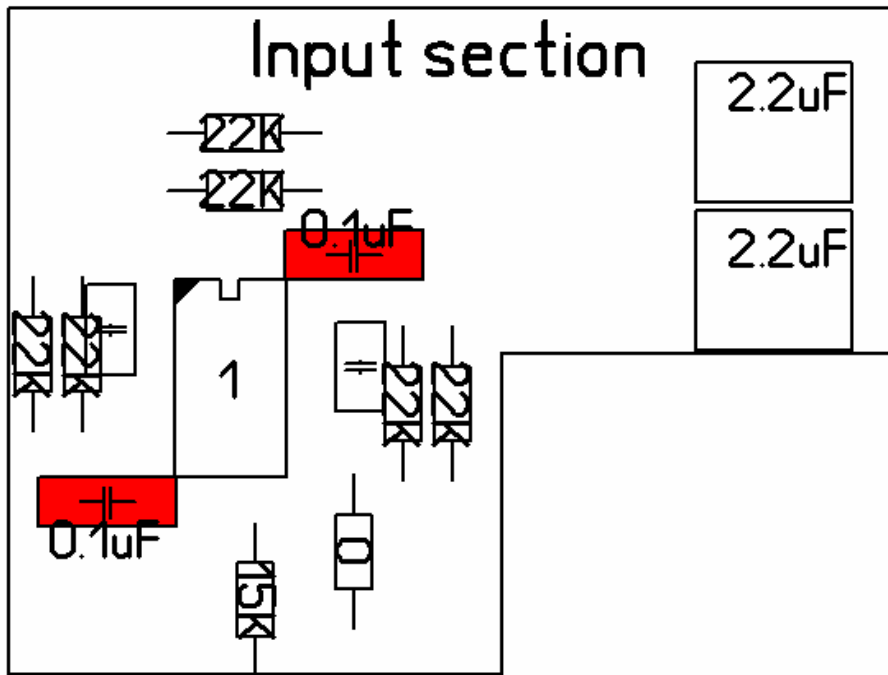
2. Next is the input section.
First mount the (6) 22 K.ohm resistors (**red**) and the 2.2 uF capacitors (**blue**).
These components are not polarized, so orientation is not important here.



3. Next place the 15 K.ohm resistor (**red**) and the 0 ohm resistor (**blue**, one black band)

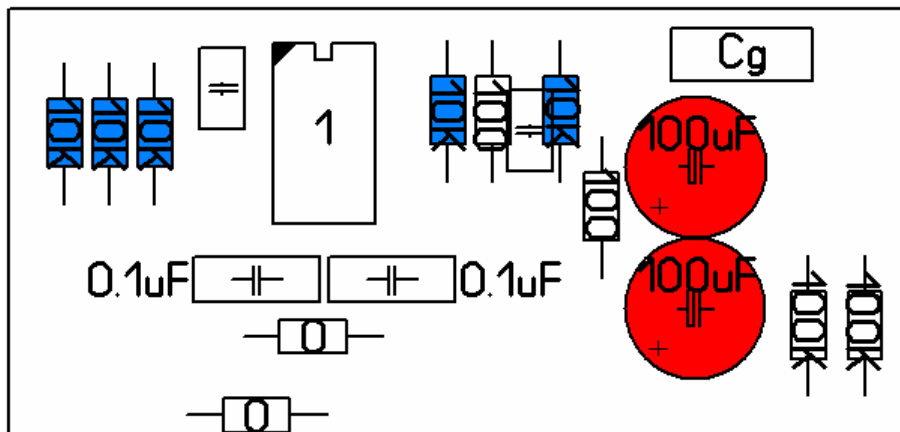


4. Now place the two 0.1 uF decoupling capacitors, they may be yellow or blue and could be marked as 0.1, 100n or 104.

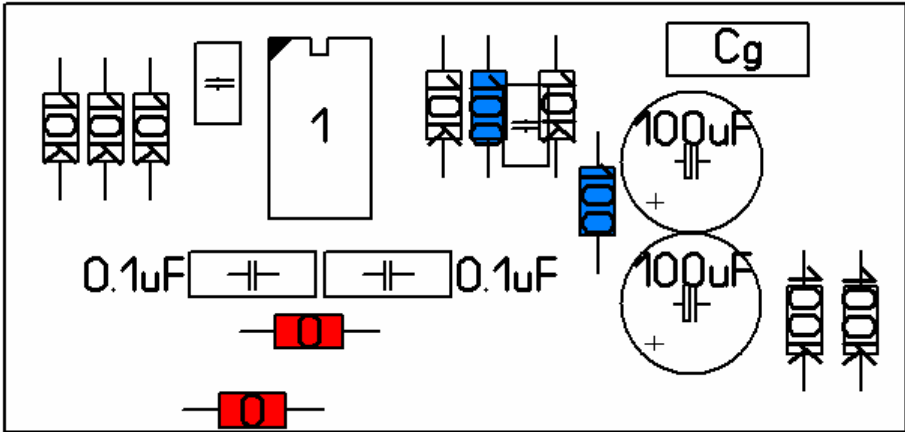


5. Next place the 8-pin IC socket. You may have noticed that there is space for an extra capacitor. This capacitor is **not** used now. Next is the output section.

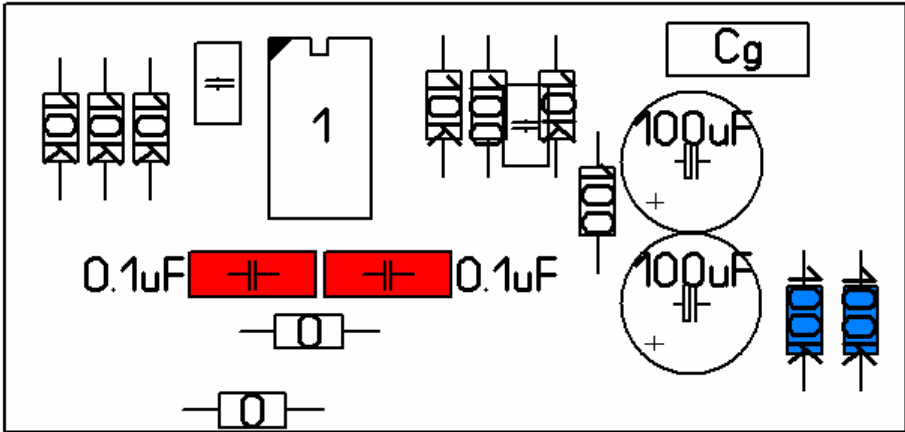
6. Place the (5) 10 K.ohm resistors (**blue**) and the (2) 100 uF capacitors (**red**). The positive (+) side of the capacitors should be on the left side, the negative side (-) of the capacitors should be at the right. The - side is the white band on the capacitor.



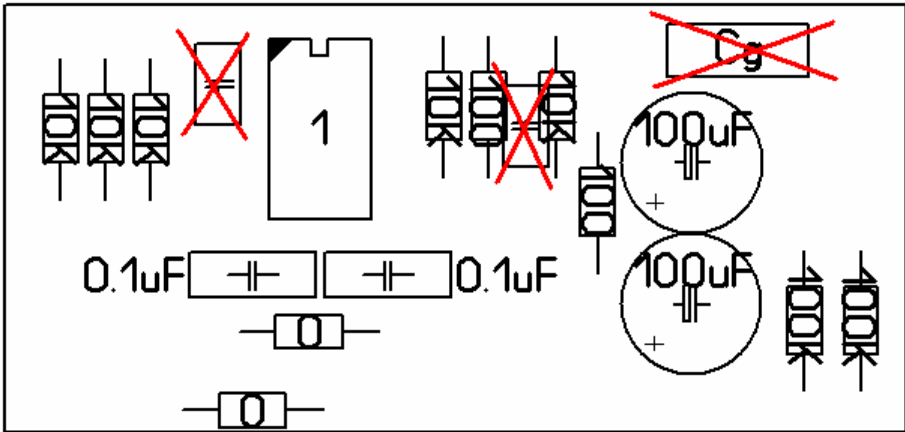
7. Put in the (2) 0 ohm resistors (**red**, one black band) and the (2) 100 ohm resistors (**blue**).



8. Insert the (2) 100 nF capacitors (**red**, marked 100n, 0.1 or 104, body color blue or yellow) and the (2) 100K.ohm resistors (**blue**).

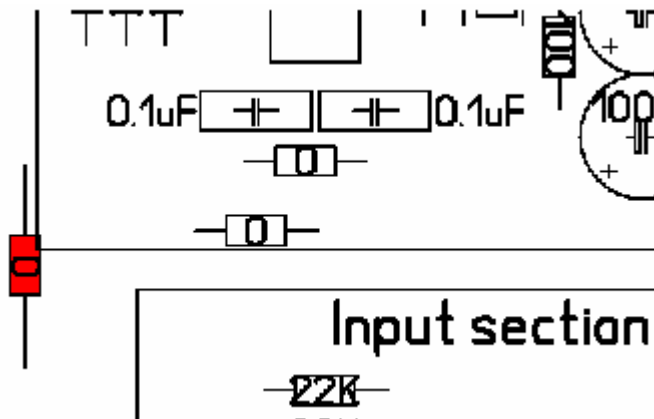


9. Finally mount the 8-pin IC socket marked '1'.
The holes for additional components (Cx) are not used. Leave them open!



10. Now we populate the Equalizer section.
Put in the (3) 2.2 K.ohm resistors (**red**), the (2) 47 K.ohm resistors (**blue**) and the 1 M.ohm resistor (**green**).

14. Mount the last 0 ohm resistor close to the input and output section. The resistor wires are a little bit longer here.



15. Mount the (2) 3-pin headers in the 3 holes marked 'Balanced/Unbalanced'.

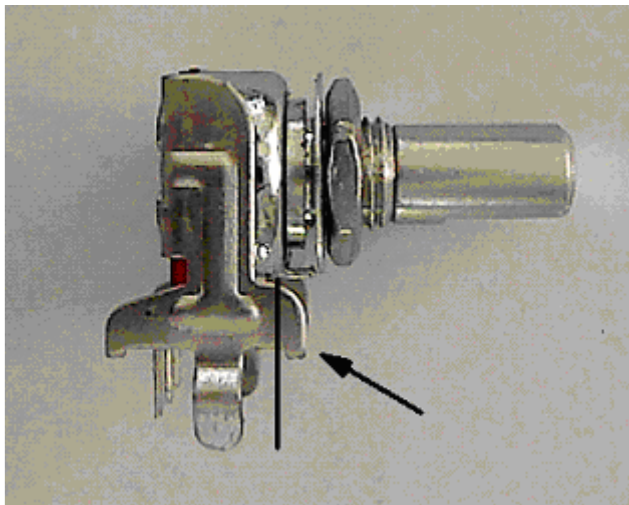
16. Now insert the 2 potentiometers and the 3 switches in the holes of the PCB, but **do not solder them yet!**

The two washers on the switch should be *behind* the frontpanel.

Put the frontpanel over the threaded shafts of the potentiometers and switches.

Check if the brackets of the potentiometers don't touch the frontpanel.

It may be needed to remove a small piece from the bracket of the potentiometer, if it touches the frontpanel.



Now gently tighten the nuts and take care that the potentiometers and switches stay in place. Now check if the angle between the frontpanel and the PCB is 90 degrees and that the switches are flat on the board.

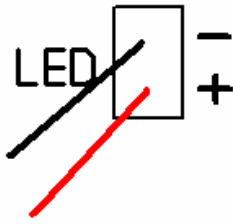
Now solder all connections of the switches and potentiometers.

This prevents that there will be mechanical stress on the solder joints.

17. Mount the green LED on the frontpanel and solder the connector on the PCB.

The red wire should be near the edge of the PCB.

Use a tie-wrap to secure the overlength of the LED wires to the printed circuit board.



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18. Place the knobs on the potentiometers and make sure that they can rotate freely, without touching or scraping the frontpanel.

Finally, insert the IC's in the sockets. Put the (selected) IC marked with the red dot in socket '2', **observing the correct position**.

Insert IC's TL072 in IC sockets marked '1', **also observing the correct orientation**.

The resistor 'Rg' is not needed under normal circumstances, leave those holes open. (It is only needed to connect the case of the 500-rack to the audio ground.)

In fact, your 'Shaper' is now complete!

The only thing you will have to do now is test the equalizer and set the jumpers.

The correct jumper setting is described below.

The basic function of the controls:

- **High band**, potentiometer: attenuates or boosts the high frequencies, to a maximum of + or – 15 dB. In the center position the high frequencies are not influenced.
- **Norm/High**: in the Norm(al) position, the high frequency control will influence a broad part of the audio spectrum. In the 'High' position, only the top-high frequencies are touched.
- **Norm/Low**: in the Norm(al) position, the low frequency control will influence a broad part of the audio spectrum. In the 'Low' position, only the sub-low frequencies are touched.
- **Low band**, potentiometer: attenuates or boosts the low frequencies, to a maximum of + or – 15 dB. In the center position the low frequencies are not influenced.
- **Bypass**: switches the equalizer circuit in- or out, to compare the original with the equalized signal. When the equalizer is on, the green LED will be lit.

Jumper settings:

- The Shaper PCB has two jumpers, for the input and the output. Both jumpers are marked 'Balanced' and 'Unbalanced'.
- Start with both jumpers in the 'Balanced' position and check if there is a *drop in level* when the Shaper is inserted into the signal chain.

- There are 3 possibilities: the level stays the same, the level drops 6 dB or the level drops 12 dB.
- If the level stays the same, leave both jumpers in the 'Balanced' position.
If the level drops 6 dB, put the output jumper in the 'Unbalanced' position.
If the level drops 12 dB, put both jumpers in the 'Unbalanced' position.
- Unused output pins should never be connected to ground. (This may damage the output stage of the Shaper.)

Using the Shaper on unbalanced inserts

- When using the Shaper on an unbalanced insert, put both jumpers in the 'Unbalanced' position. Connect the input signal (coming from the insert jack) to pin 1 (screen) and pin 2(signal). Leave pin 3 'open'. (Do not short to ground). Return the output signal from pin 1 (screen) and pin 2 (signal) to the insert jack.

Do NOT ground unused output pins, this may damage the output stage of the Shaper.