Future Sound Systems – Brunswick
Build Document v1.4 - PCB Rev 2

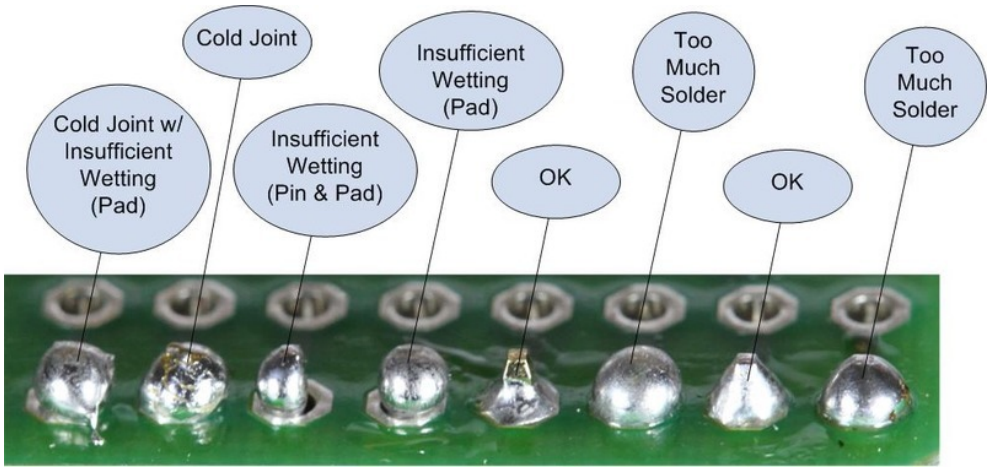
IMPORTANT!

Before you start soldering check the PCB revision on the back of the PCB. This build doc is for PCB Rev 2. For Rev 3 go here: https://www.thonk.co.uk/Documents/brunswick/

Rev 2

Rev 3

Your solder joints should look like those shown as 'OK' below, they should have that neat conical shape on BOTH sides of the PCB. If they don't look the same on both sides then stop! Work out why from the soldering guides linked and don't continue until you are getting those results. This isn't about perfectionism, you are very likely to end up with a destroyed, damaged or defective unit if you're not hitting that standard.



This photo is from the Adafruit guide to excellent soldering - http://bit.ly/1l77tF4 and is reproduced under an Attribution-Sharealike creative commons license - http://creativecommons.org/licenses/by-sa/3.0/

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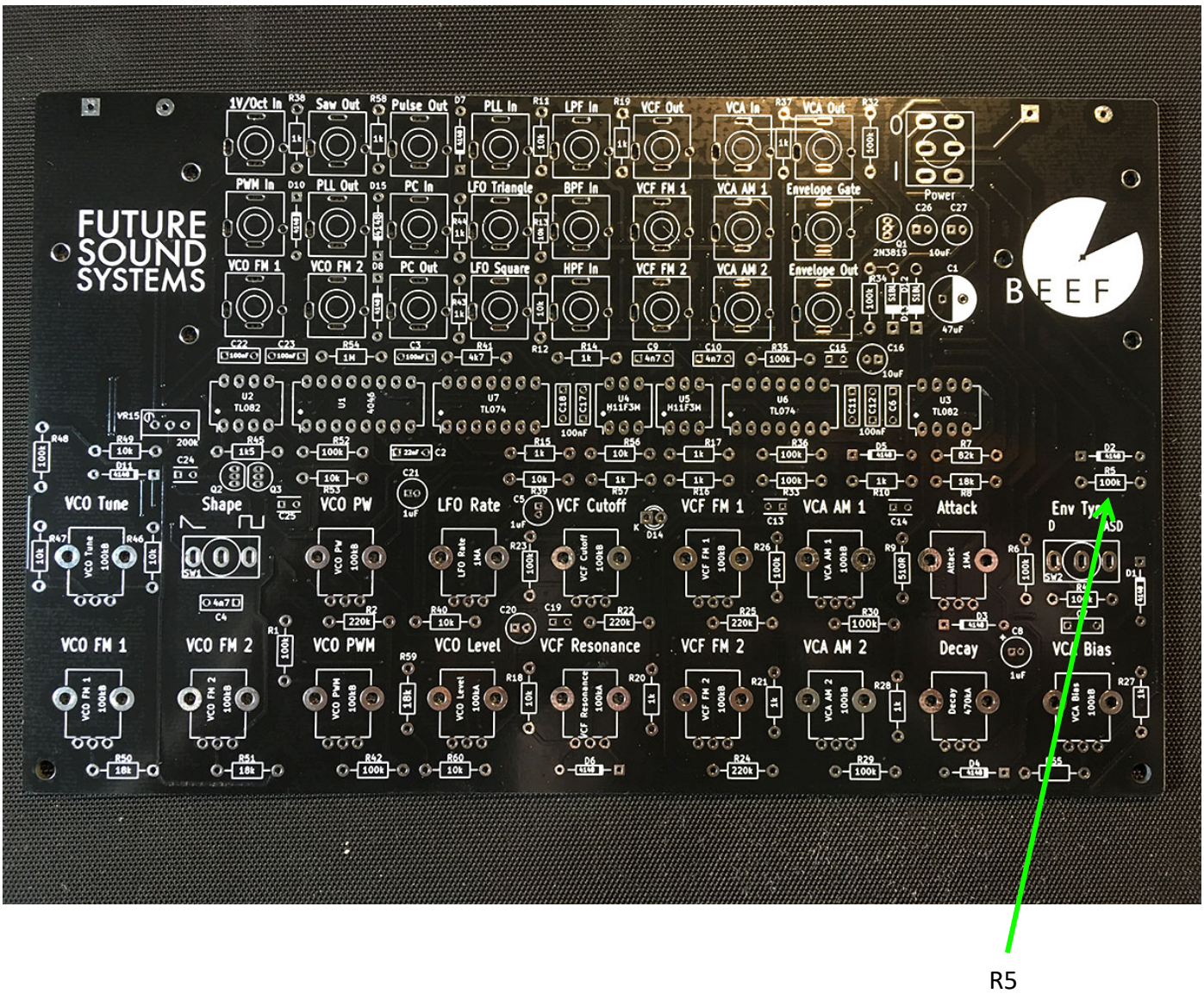

01 - This is the bare Brunswick PCB - familiarise yourself with the layout

NOTE: some builders have found that the envelope doesn't trigger from Arturia devices when using a 100K resistor at R5. The solution to this is to lower R5 to ~47k instead.

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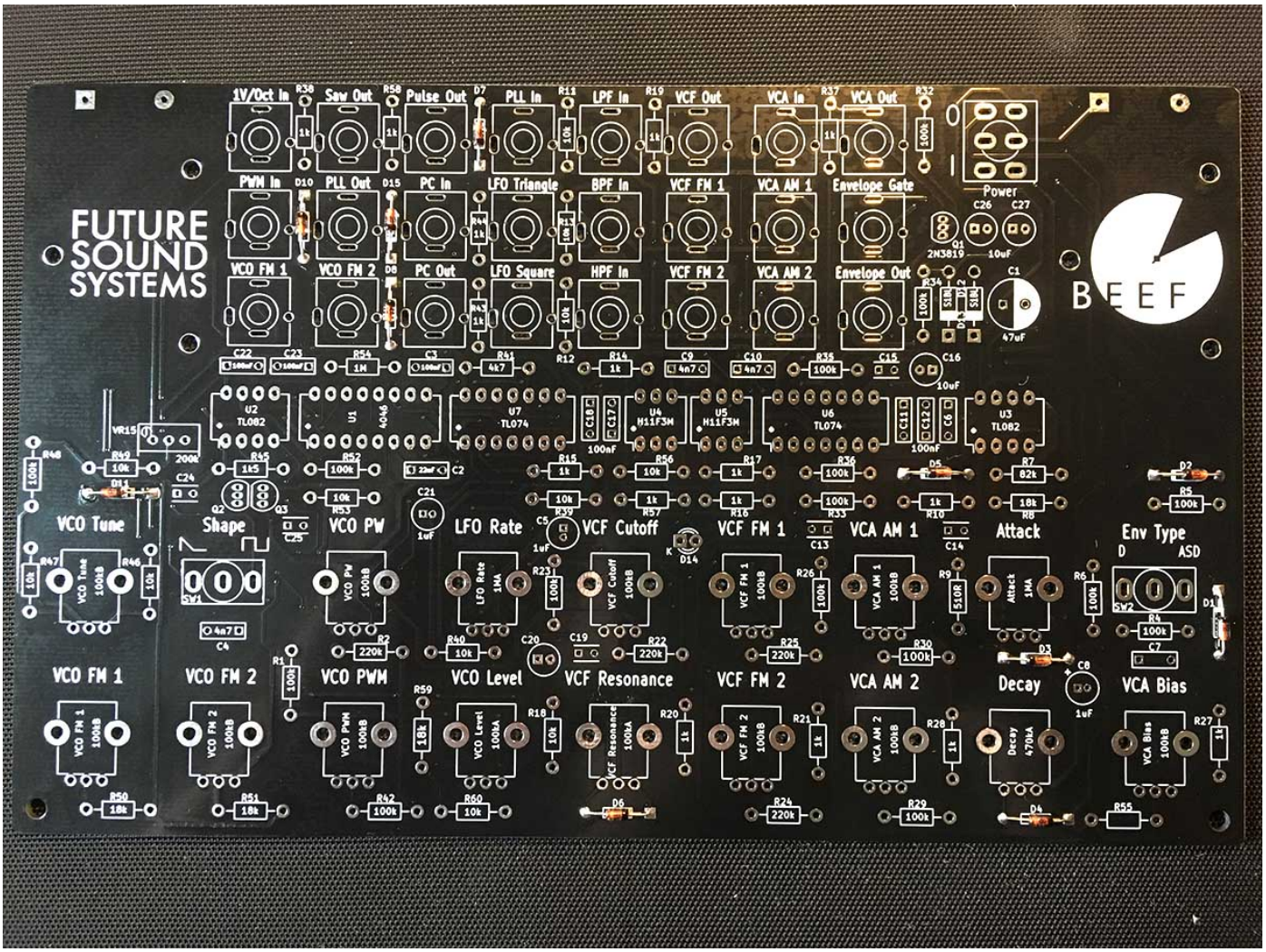

02 - First place and solder the 1N4148 diodes – Note: Orientation is vital! Be sure to match the diodes stripe with the PCB silkscreen as in the image above (D1, D2, D3, D4, D5, D6, D7, D8, D10, D11, D15)

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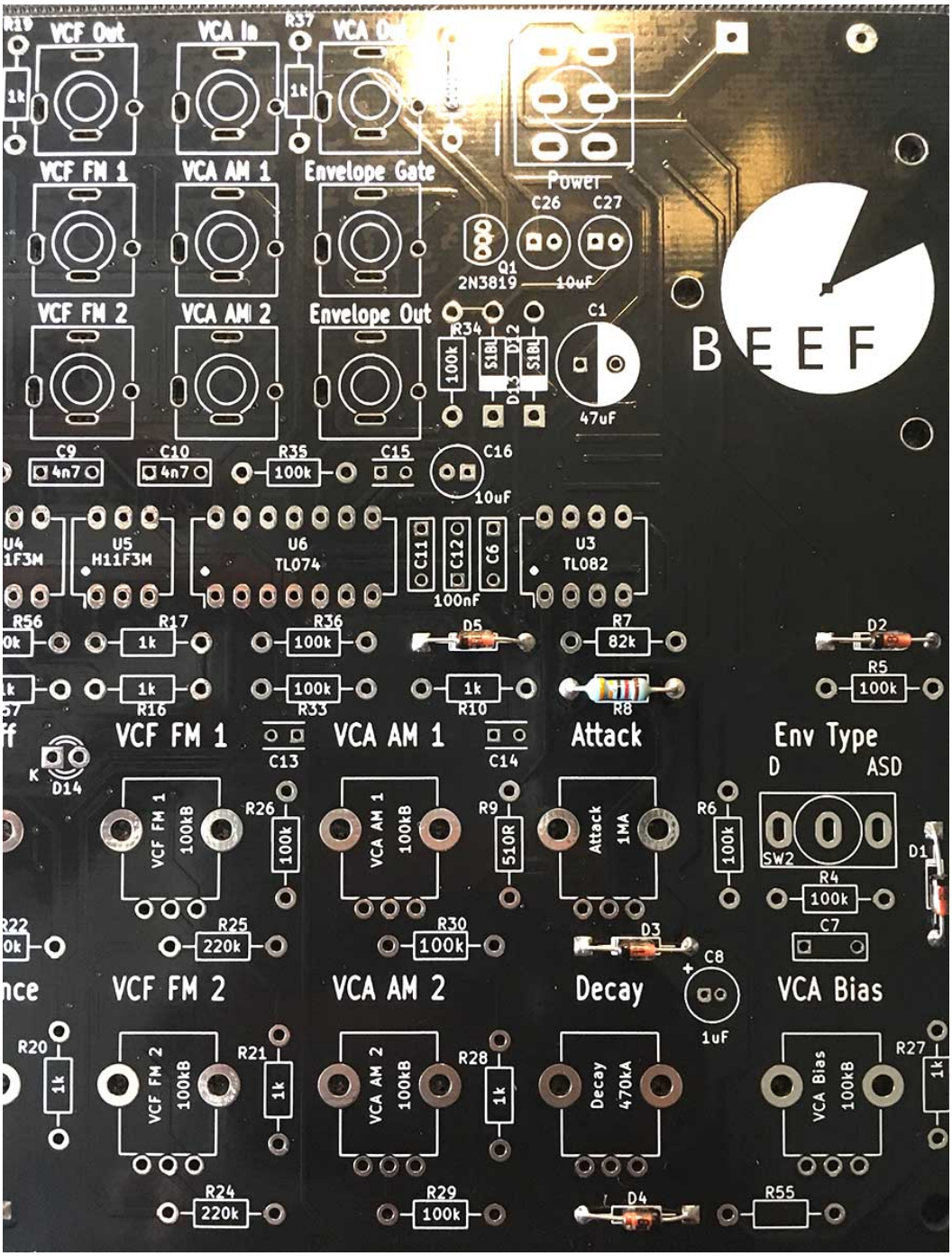

03 - Place and solder the 33k resistor at R8 – Note: IGNORE THE SILKSCREEN. THE PCB IS LABELLED 18K BUT 33K IS CORRECT

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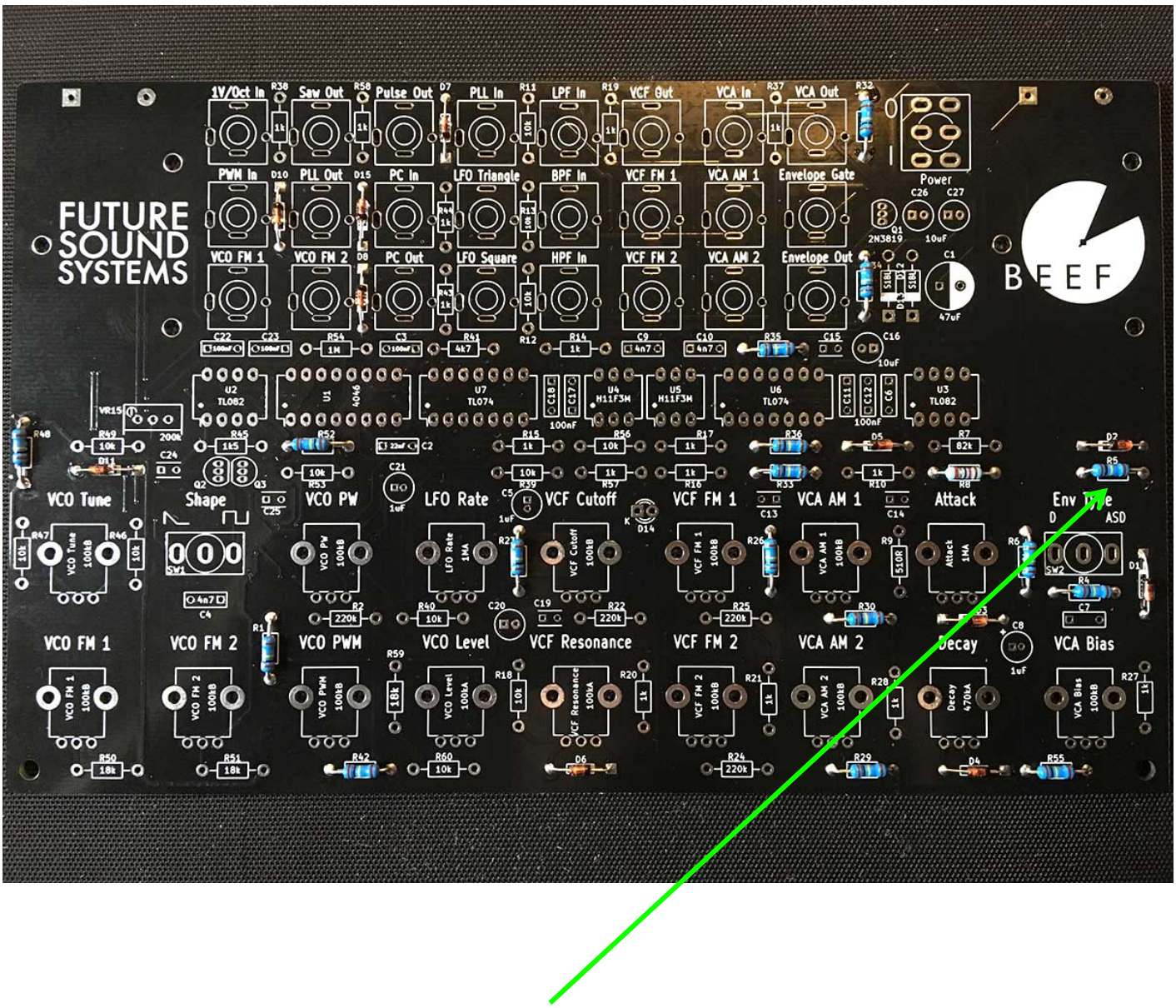

04 - Place and solder the 100k resistors (R1, R4, R5*, R6, R23, R26, R29, R30, R32, R33, R34, R35, R36, R42, R48, R52, R55)

***NOTE:** some builders have found that the envelope doesn't trigger from Arturia devices when using a 100K resistor at R5. The solution to this is to lower R5 to ~47k instead.

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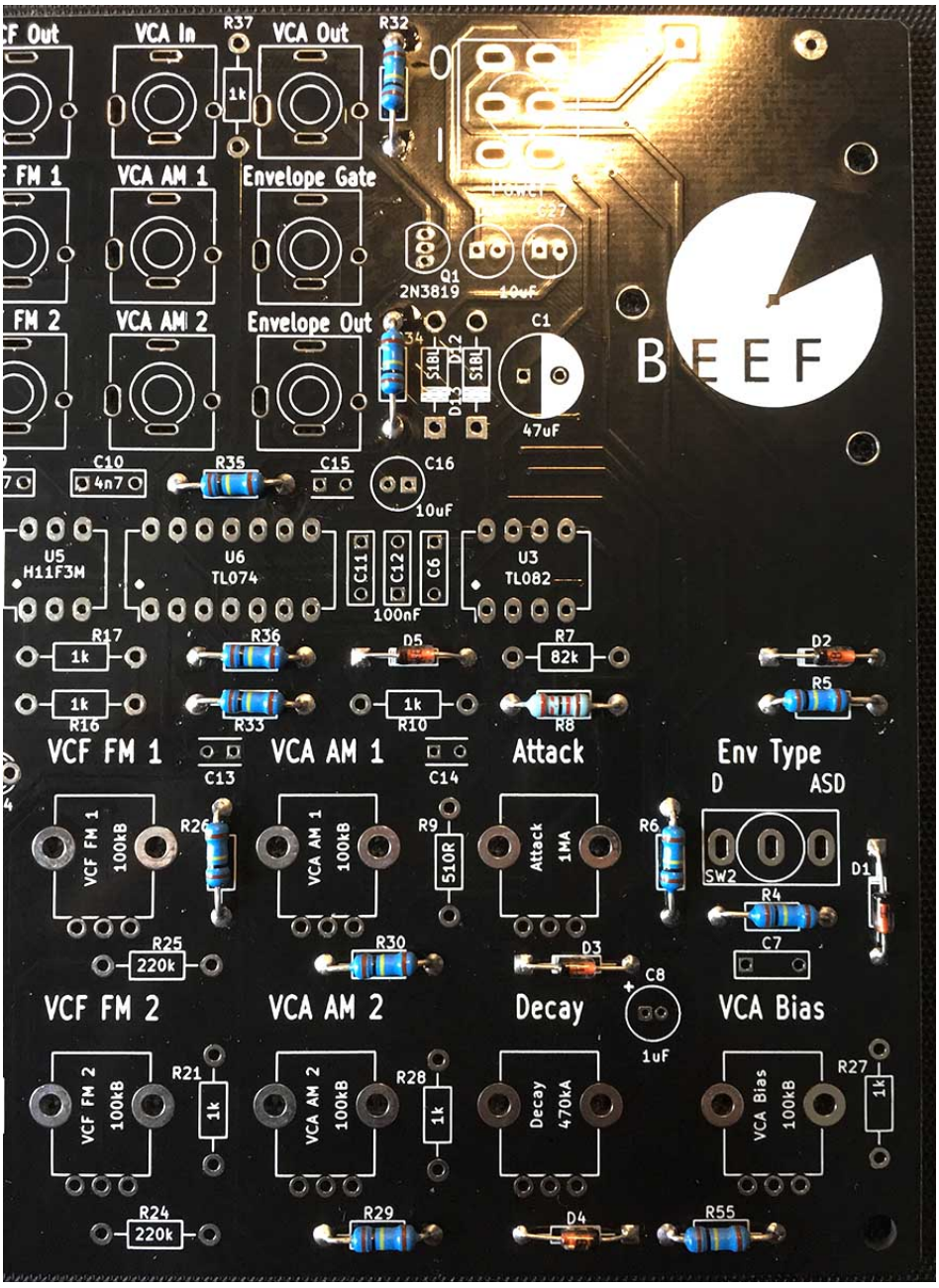

05 – Don’t forget to give R55 a 100k resistor, it’s located at the bottom right of the PCB

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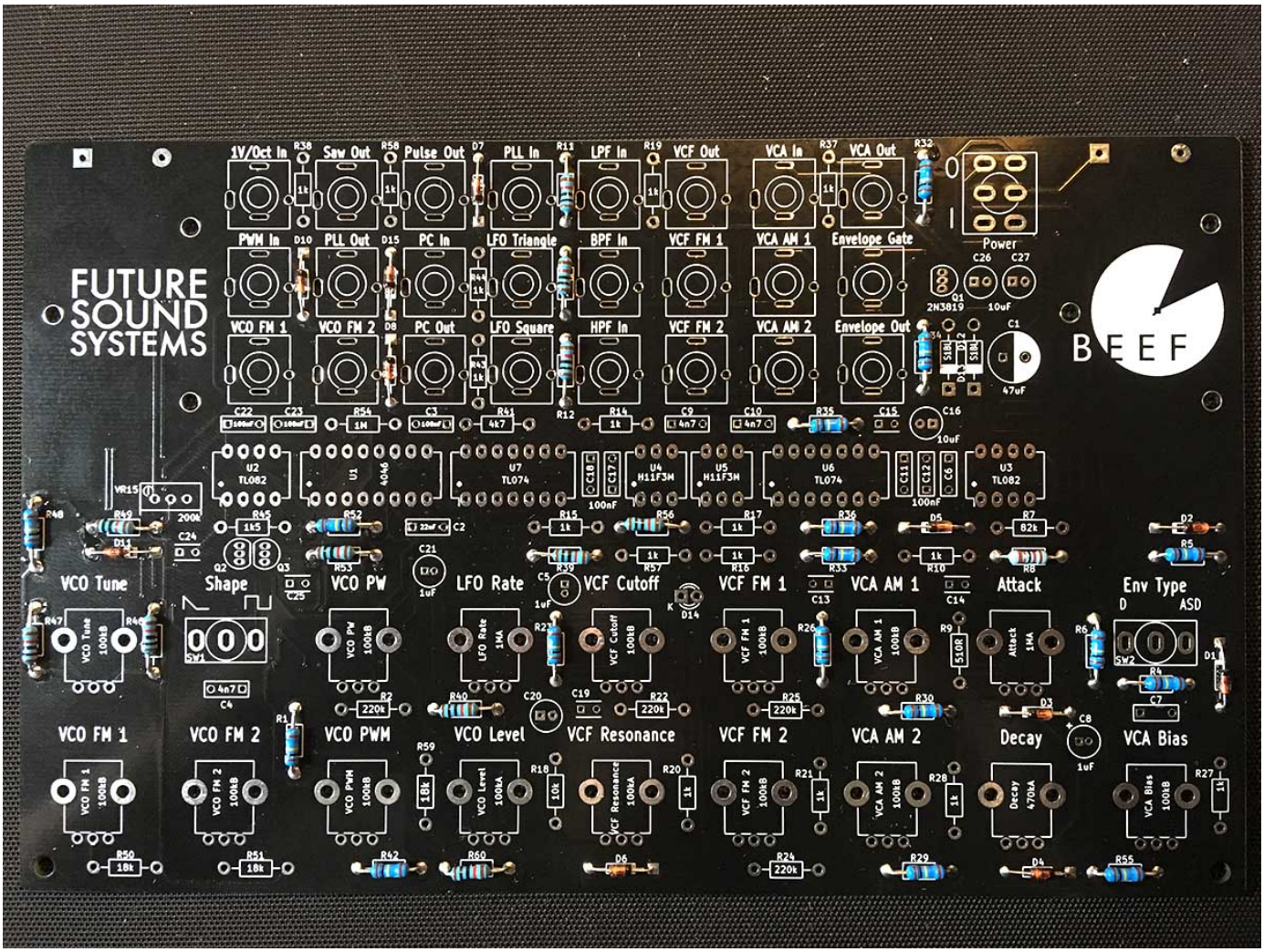

06 - Place and solder the 10k resistors (R11, R12, R13, R18, R39, R40, R46, R47, R49, R53, R56, R60)

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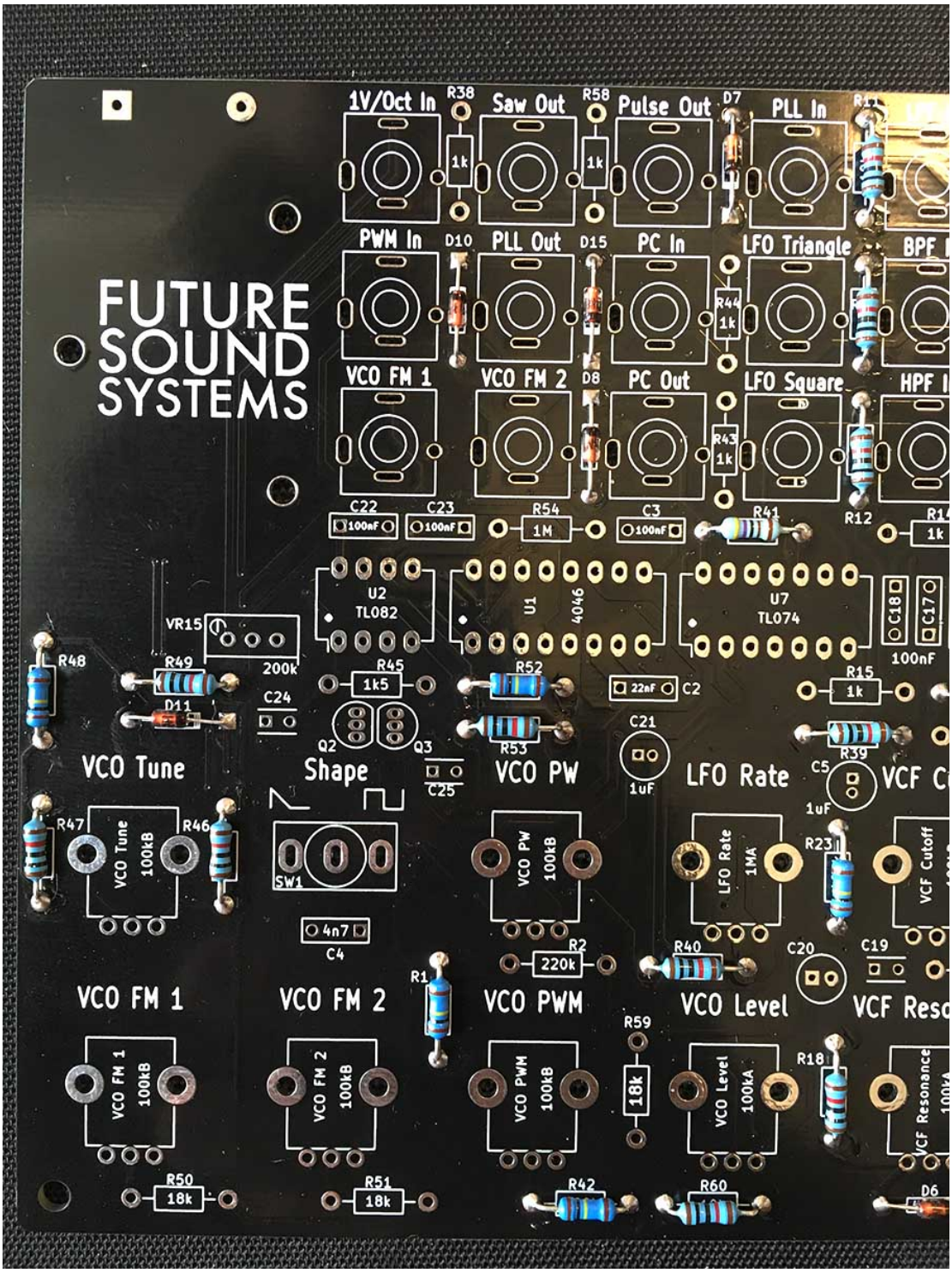

07 - Place and solder the 4k7 resistor at R41, located just above the leftmost TL074 (U7)

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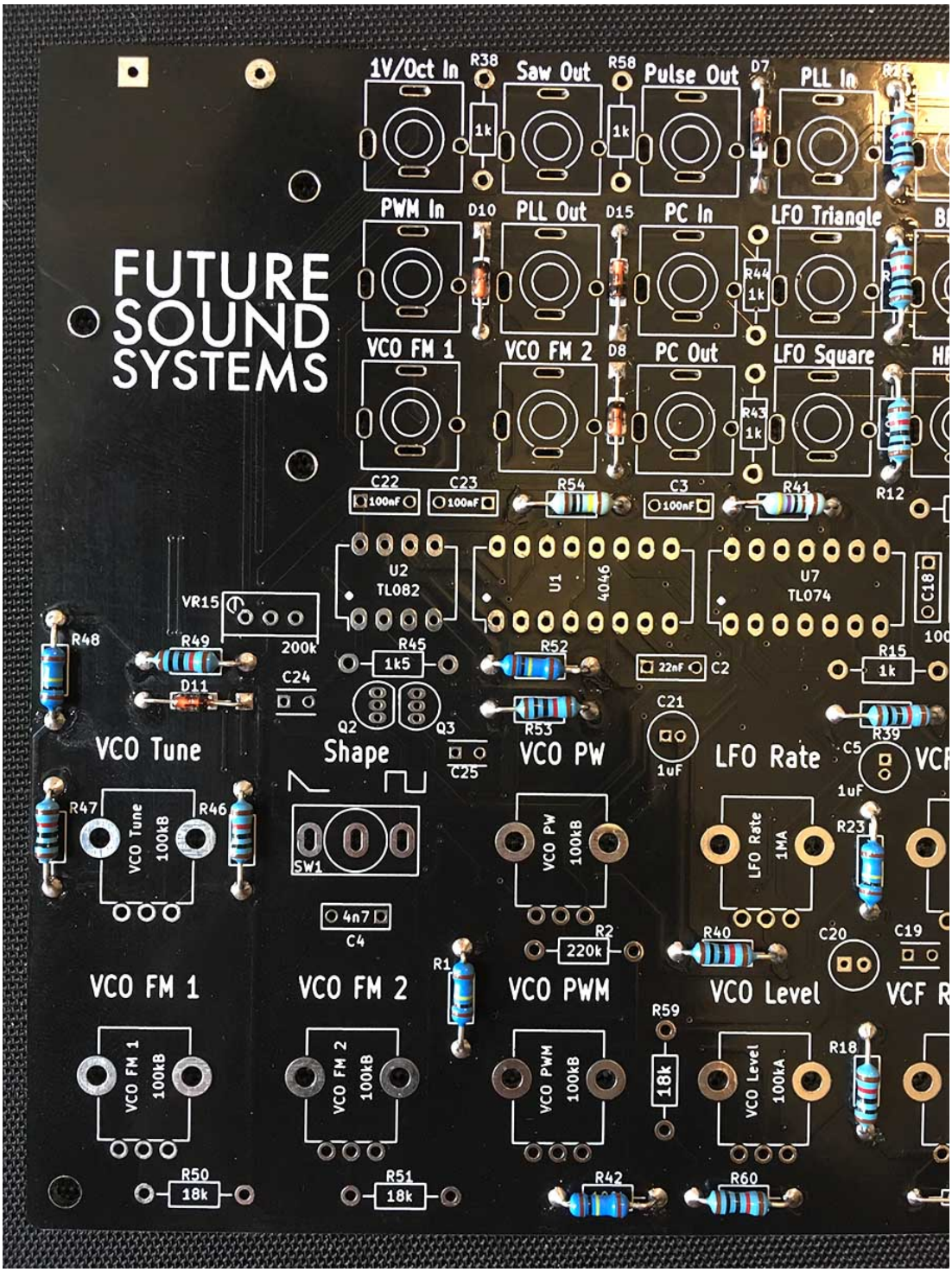

08 - Place and solder the 1M resistor at R54, located just above the 4046 (U1)

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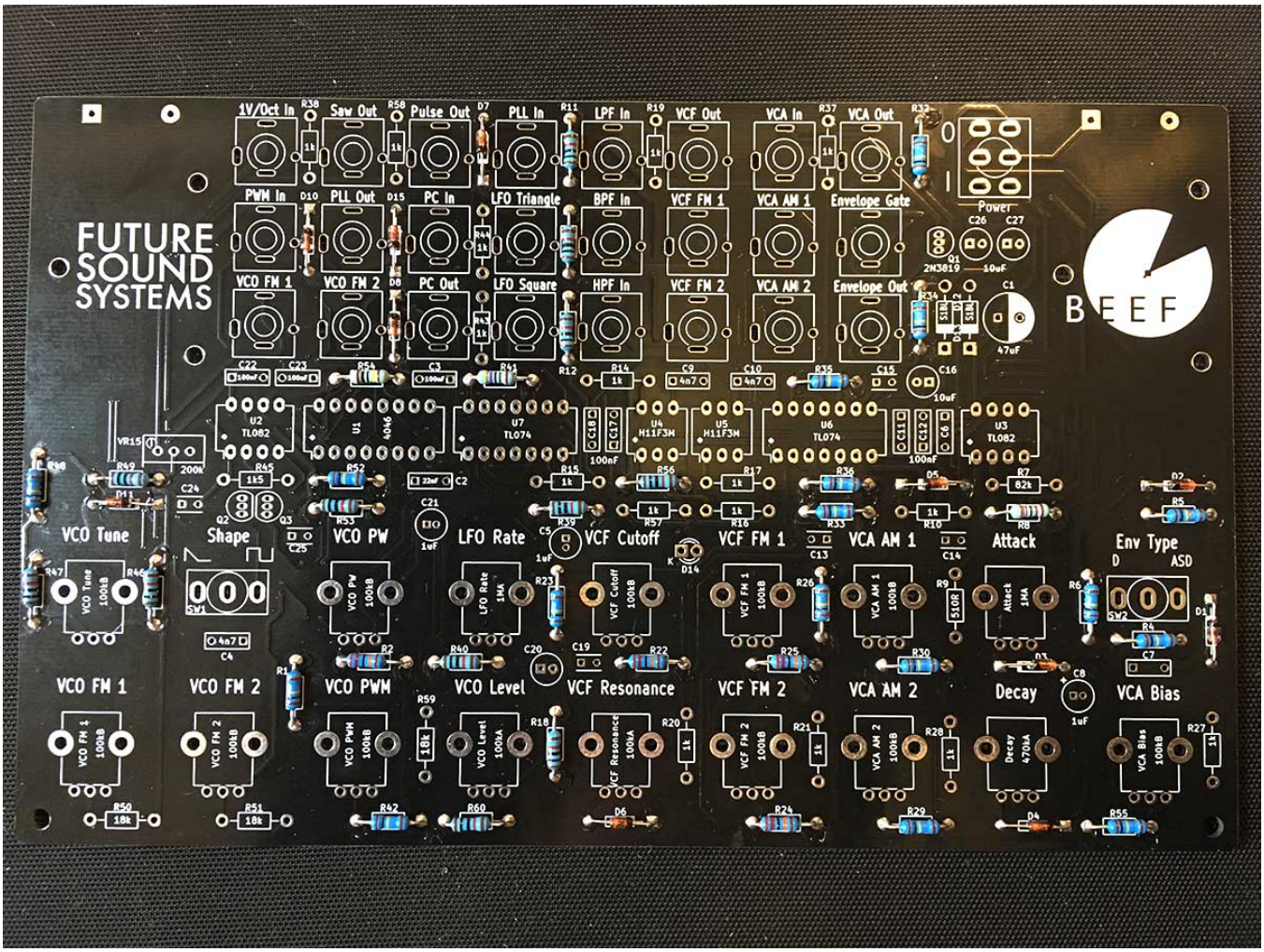

09 - Place and solder the 220k resistors (R2, R22, R24, R25)

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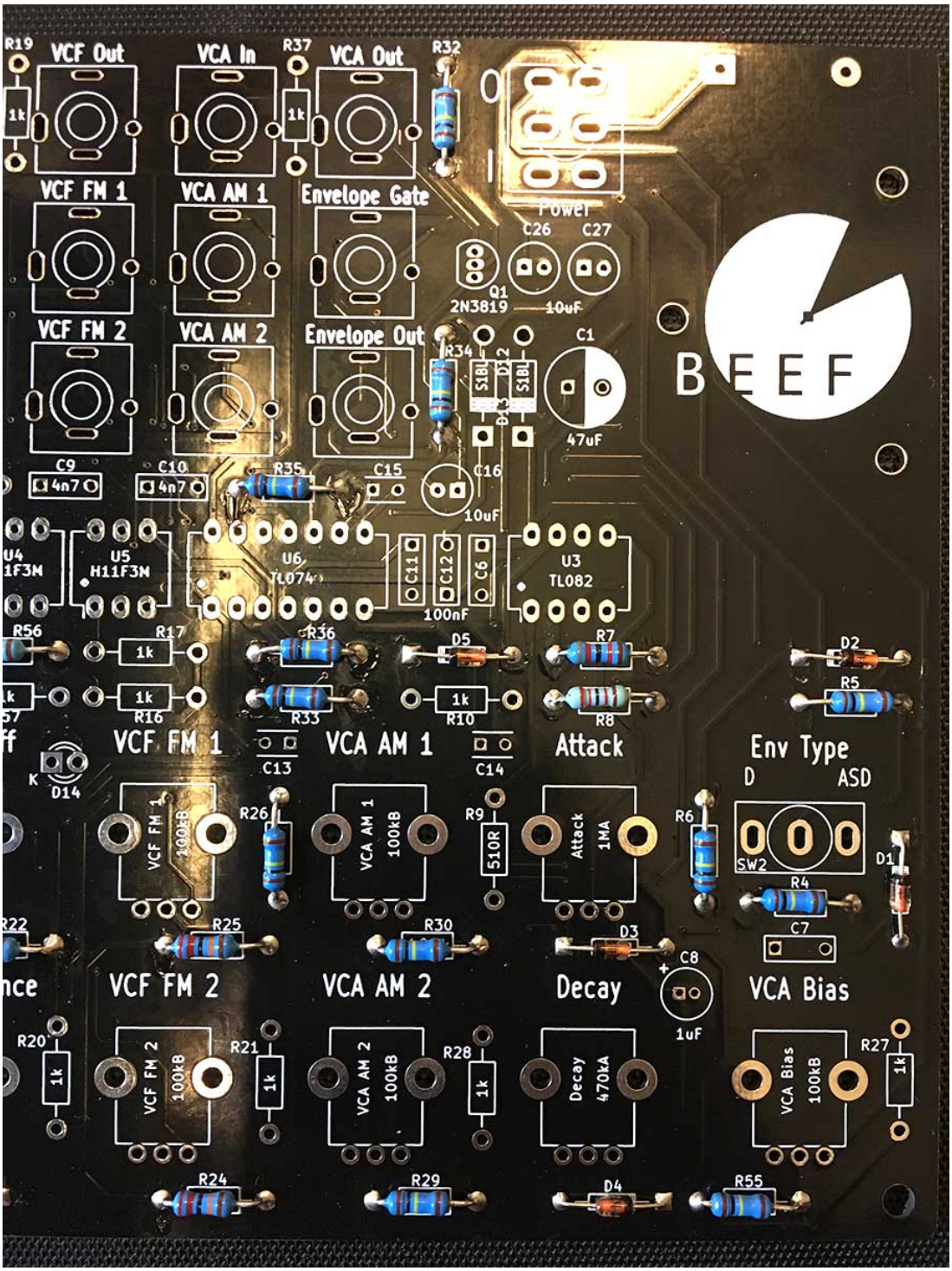

10 - Place and solder the 82k resistor at R7, located just below the rightmost TL082 (U3)

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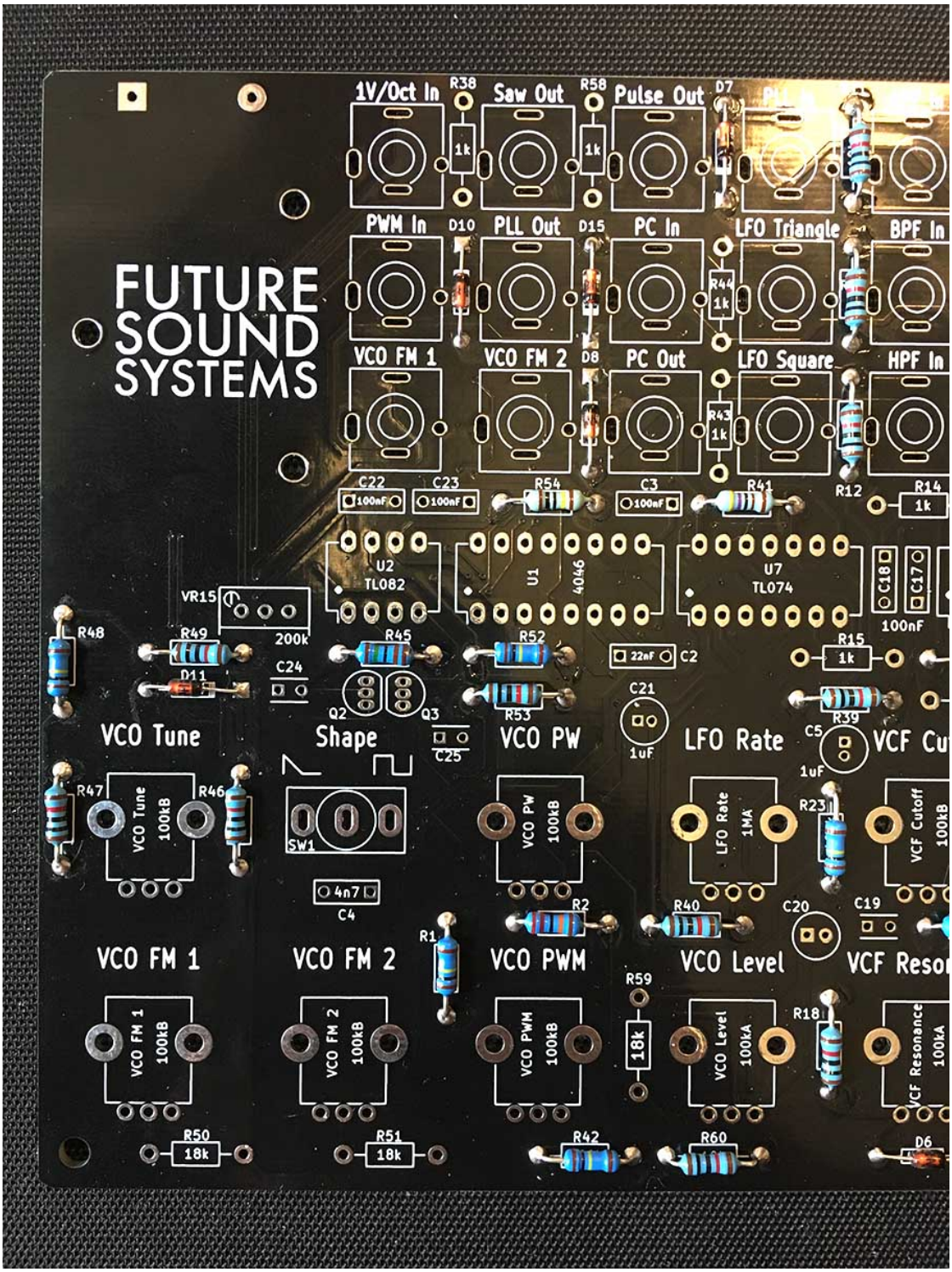

11 - Place and solder the 1k5 resistor at R45, this is located just below the leftmost TL082 (U2)

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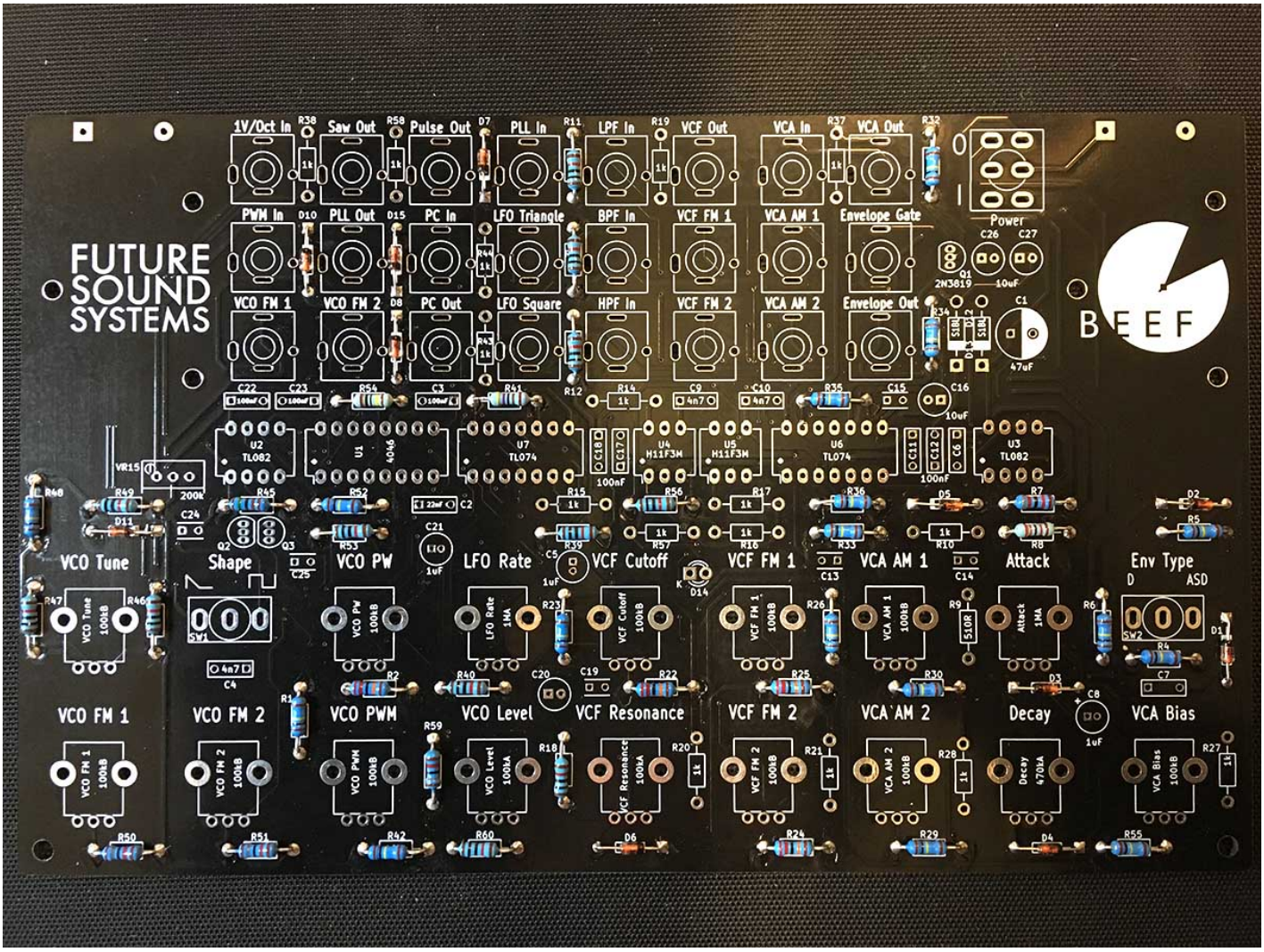

12 - Place and solder the 18k resistors (R50, R51, R59)

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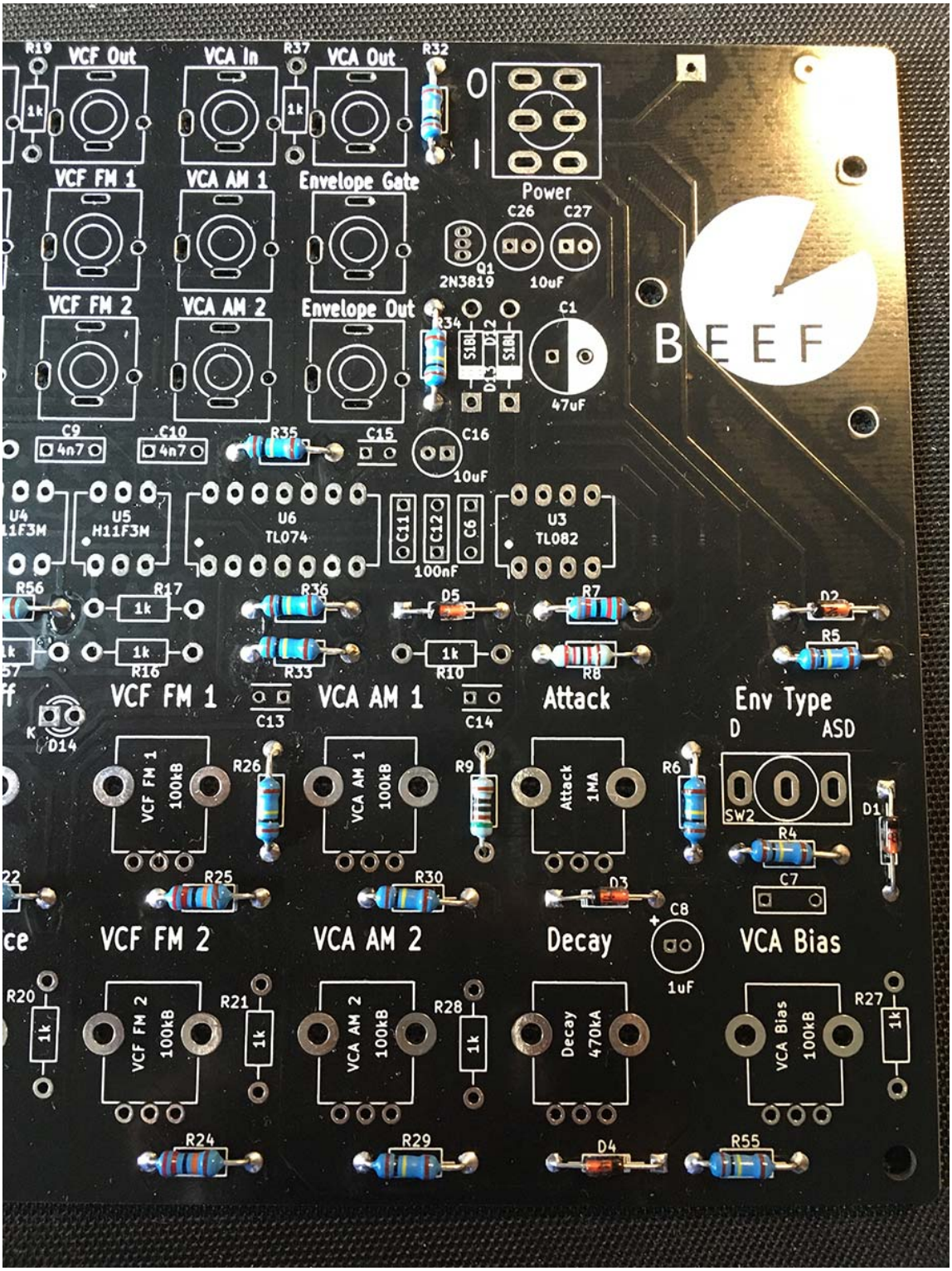

13 - Place and solder the 510R resistor at R9, located between the VCA AM 1 and Attack pots

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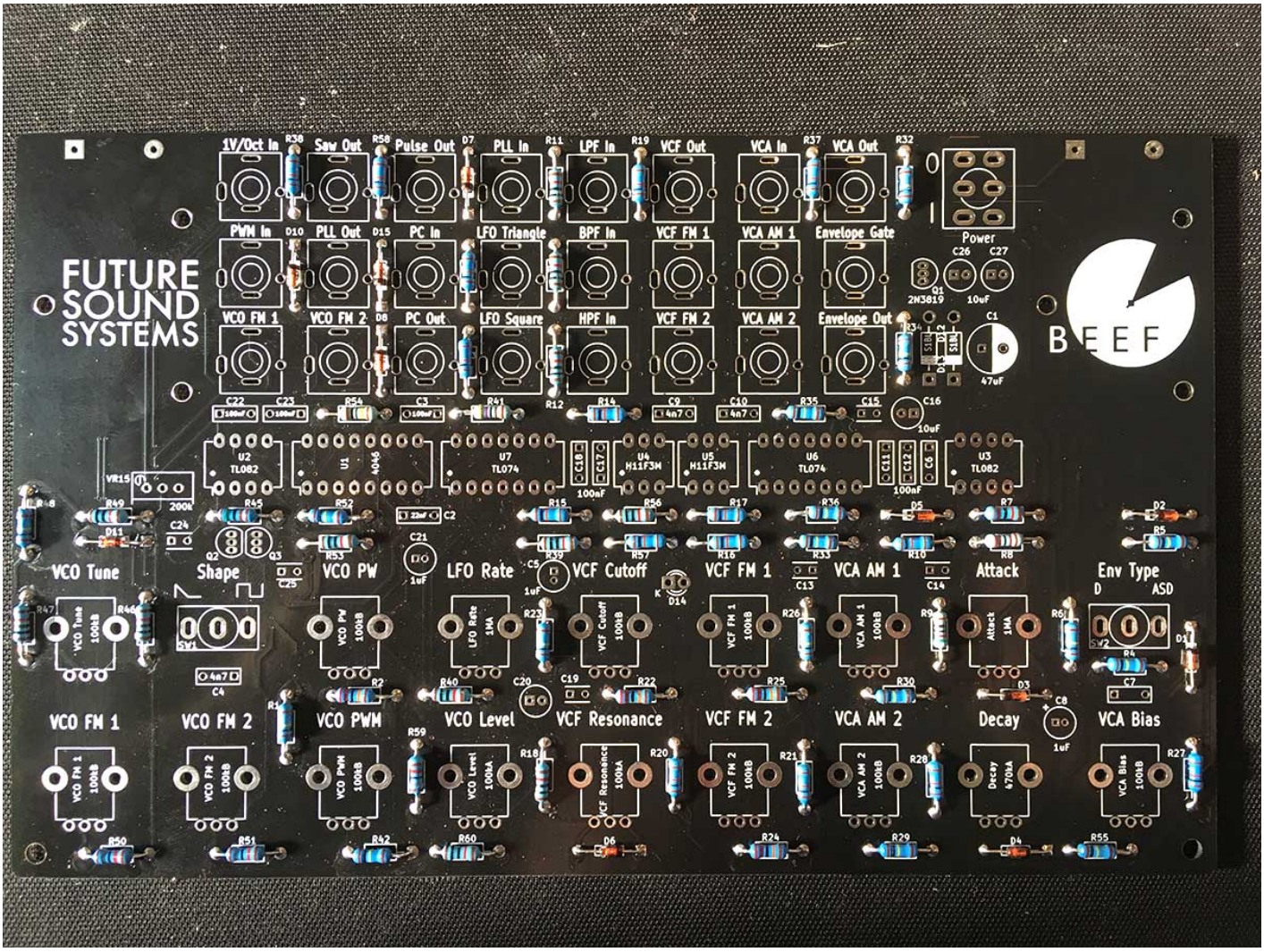

14 - Place and solder the 1k resistors - these are the final resistors (R10, R14, R15, R16, R17**,** R19, R20, R21, R27, R28**,** R37, R38, R43, R44, R57, R58)

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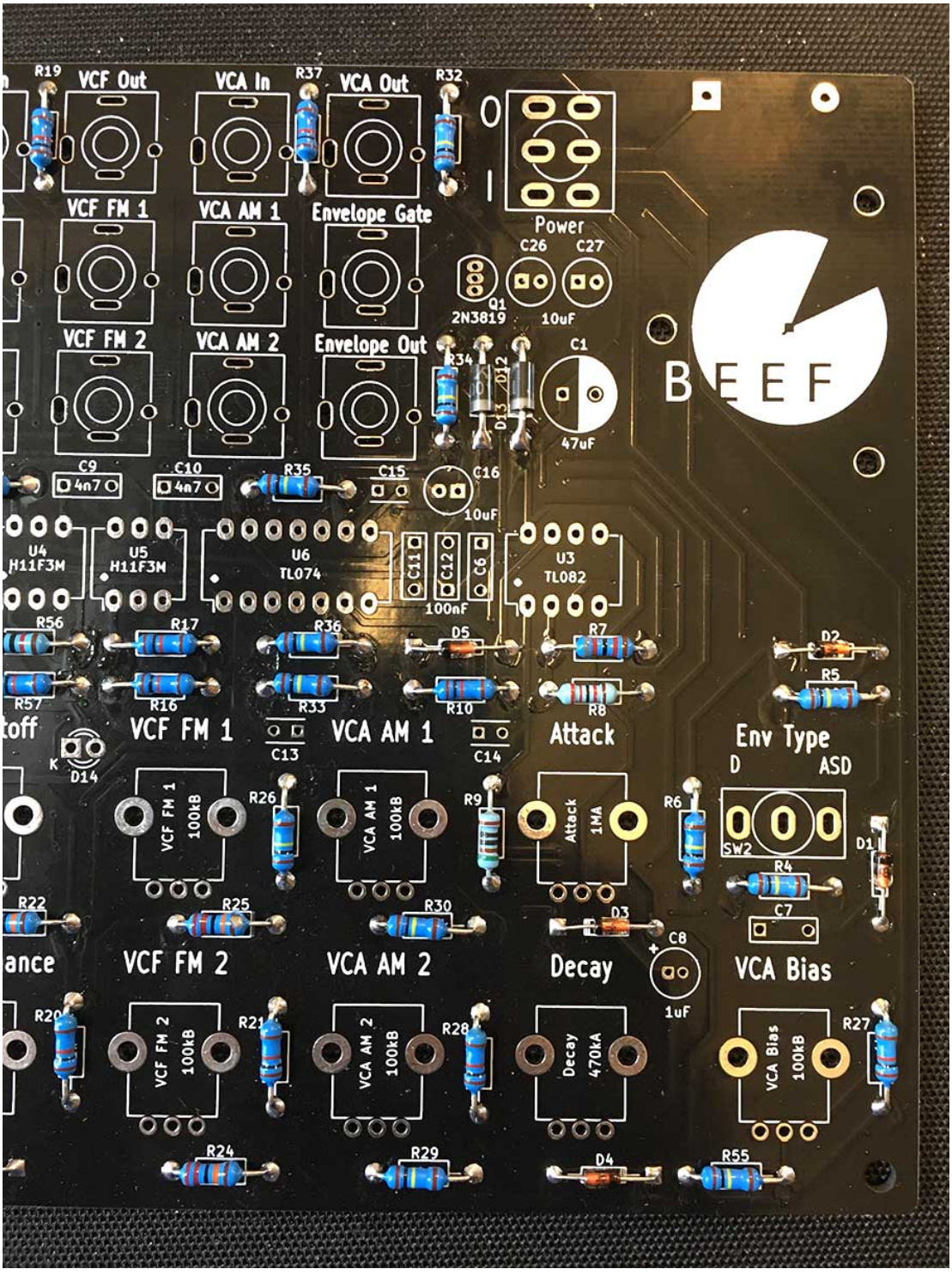

15 - Place and solder 2 x 1N4001 diodes (D12, D13) located above the rightmost TL082 (U3)

Note: Orientation is vital! Be sure to match the diodes stripe with the PCB silkscreen as in the photo above

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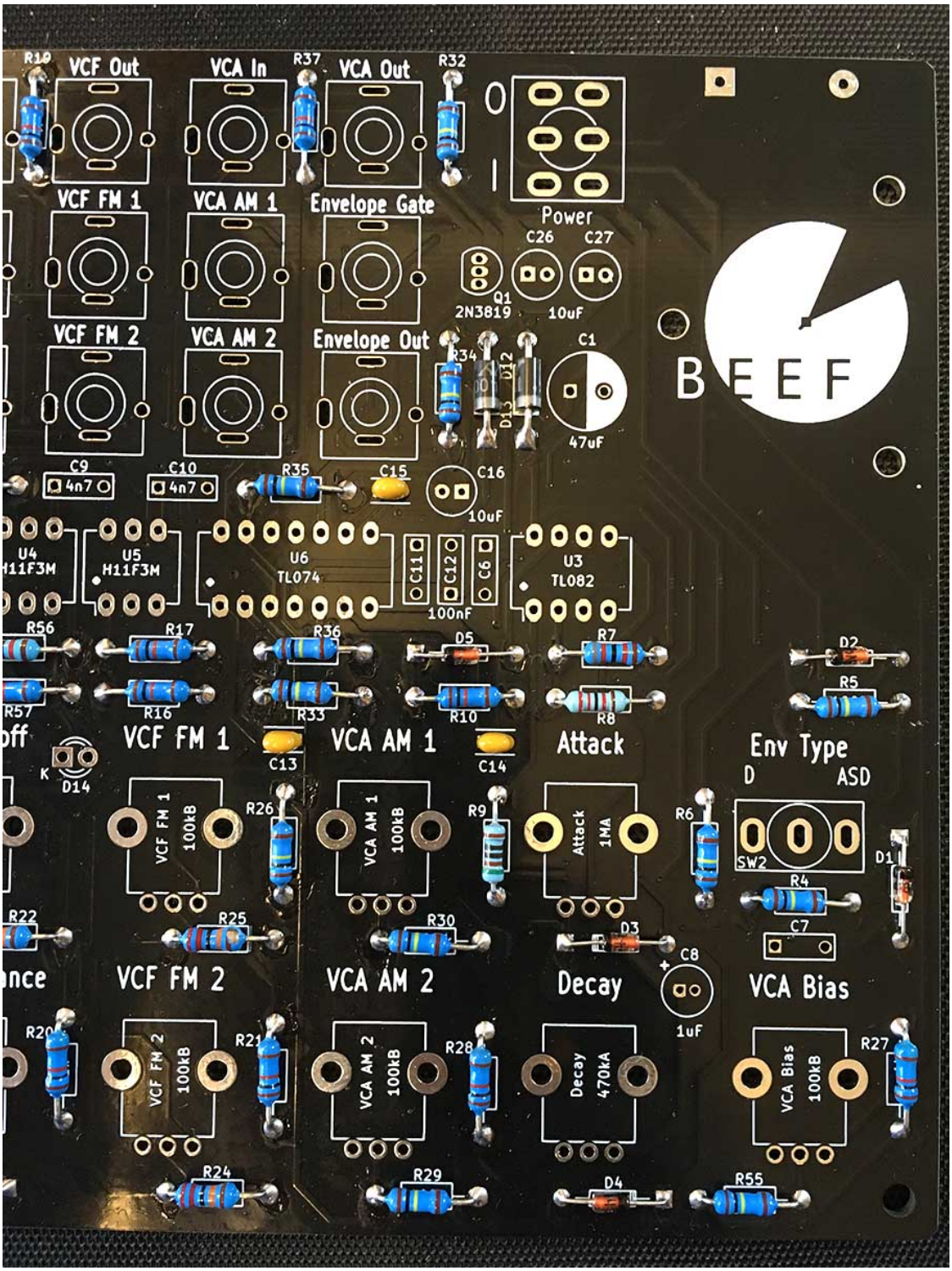

16 - Place and solder 3 x 47pF caps at C13, C14, C15

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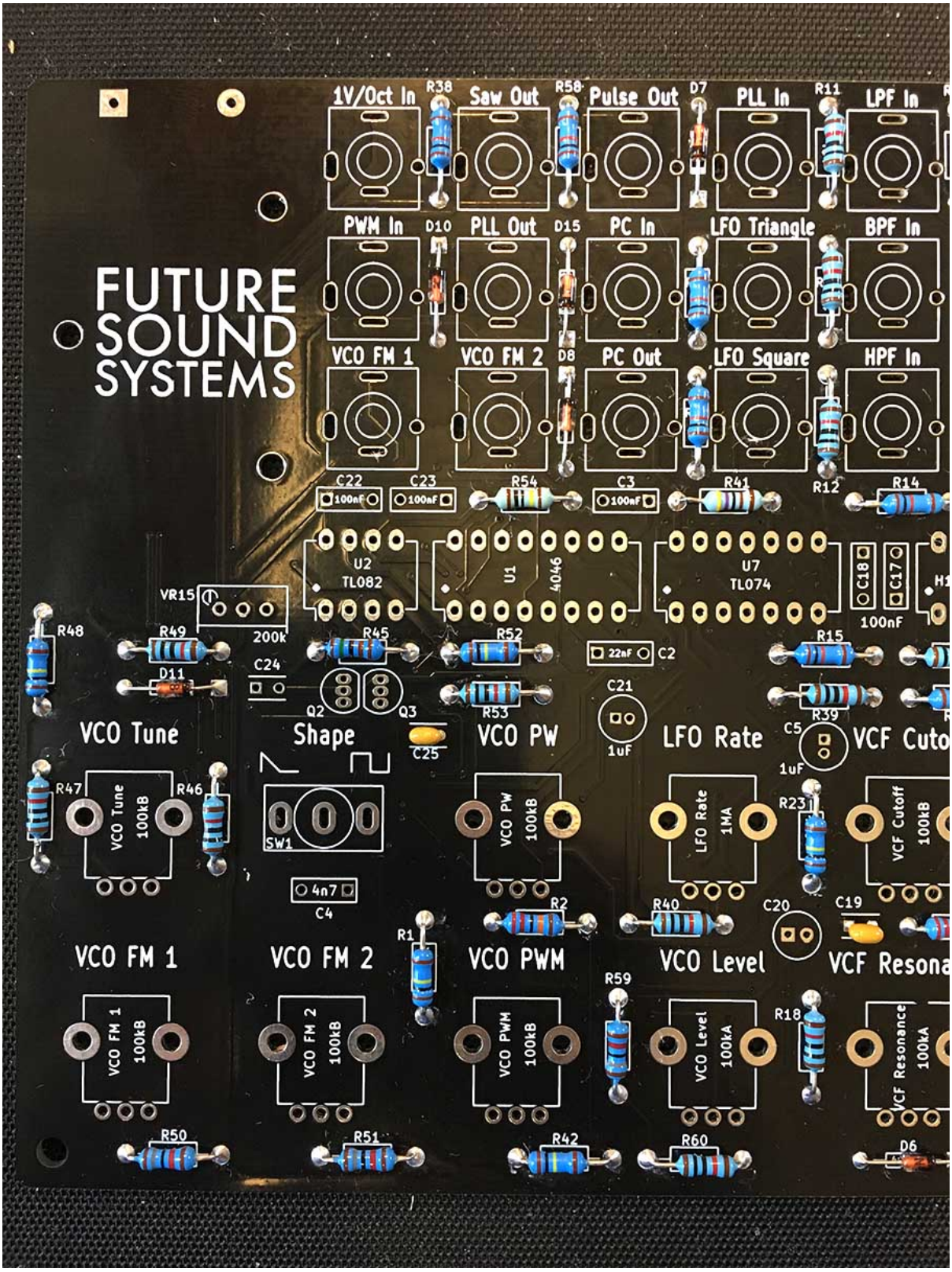

17 - Place and solder 2 x 100pF caps at C19 and C25

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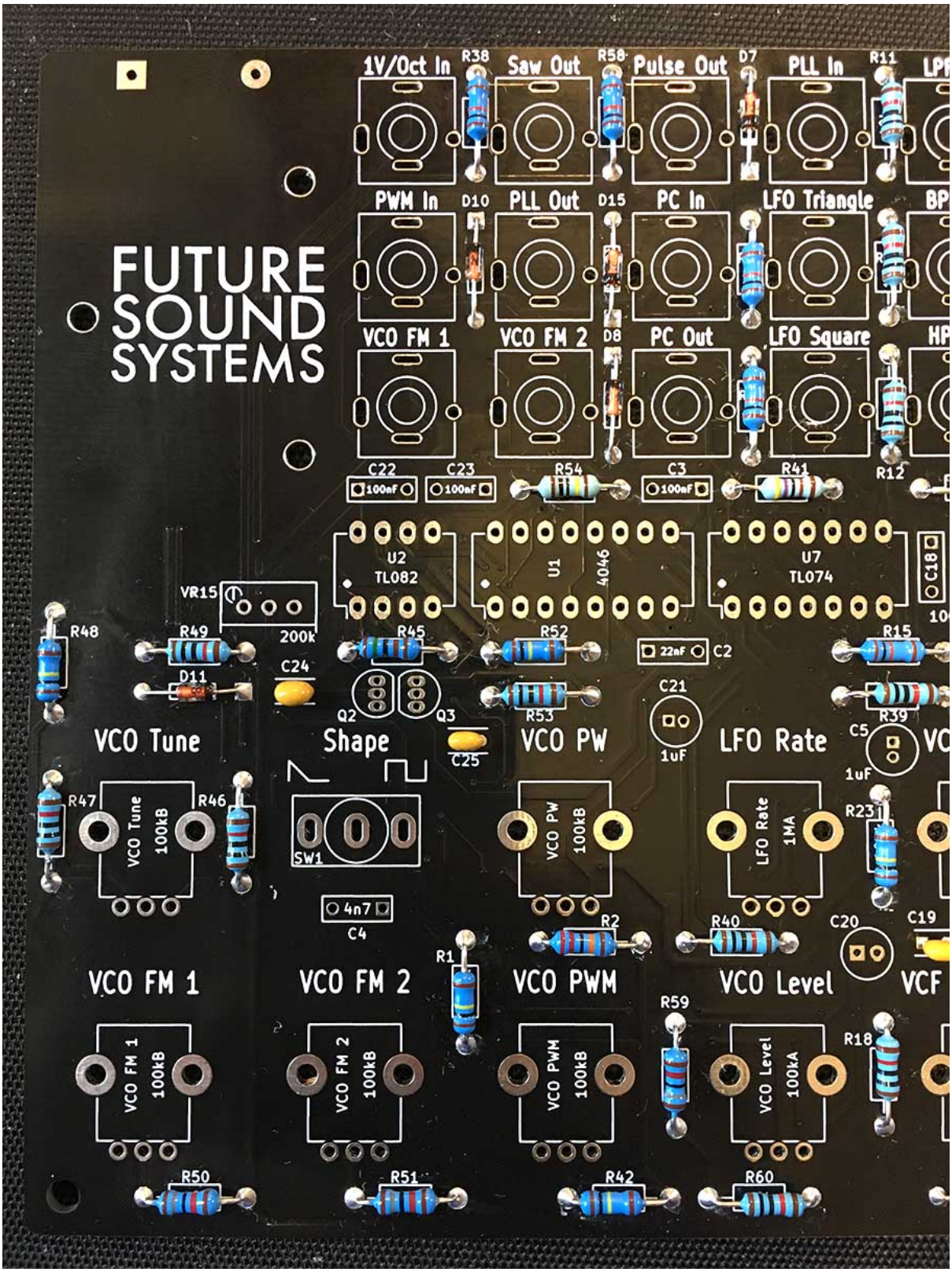

18 - Place and solder the 4.7nF CERAMIC cap at C24, located below the VR15 trimmer

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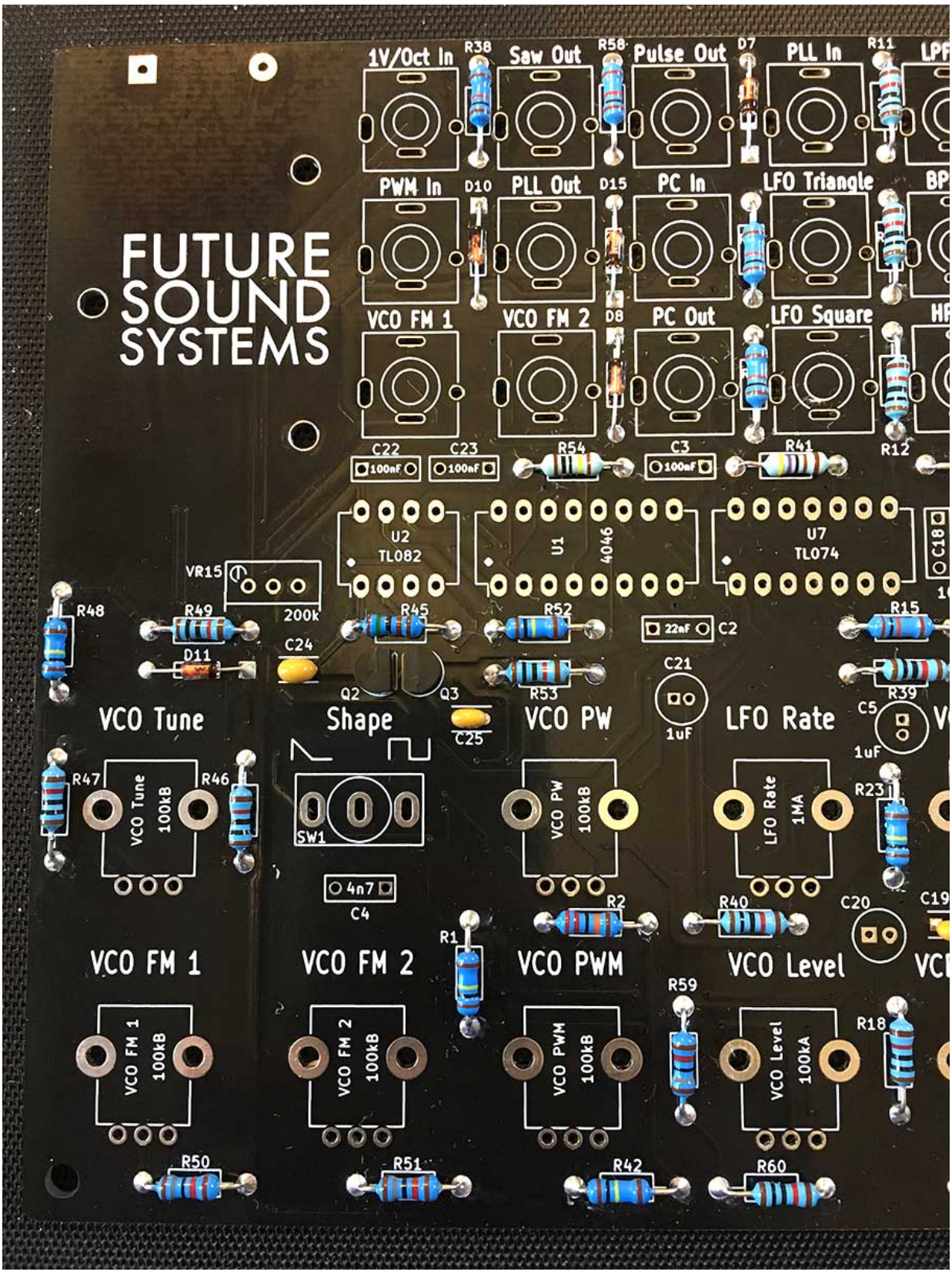

19 - Now place and solder the 2 x 2N3904 transistors at Q2 and Q3 – Note: Orientation is vital! Be sure to match the curve of the transistor body with the PCB silkscreen.

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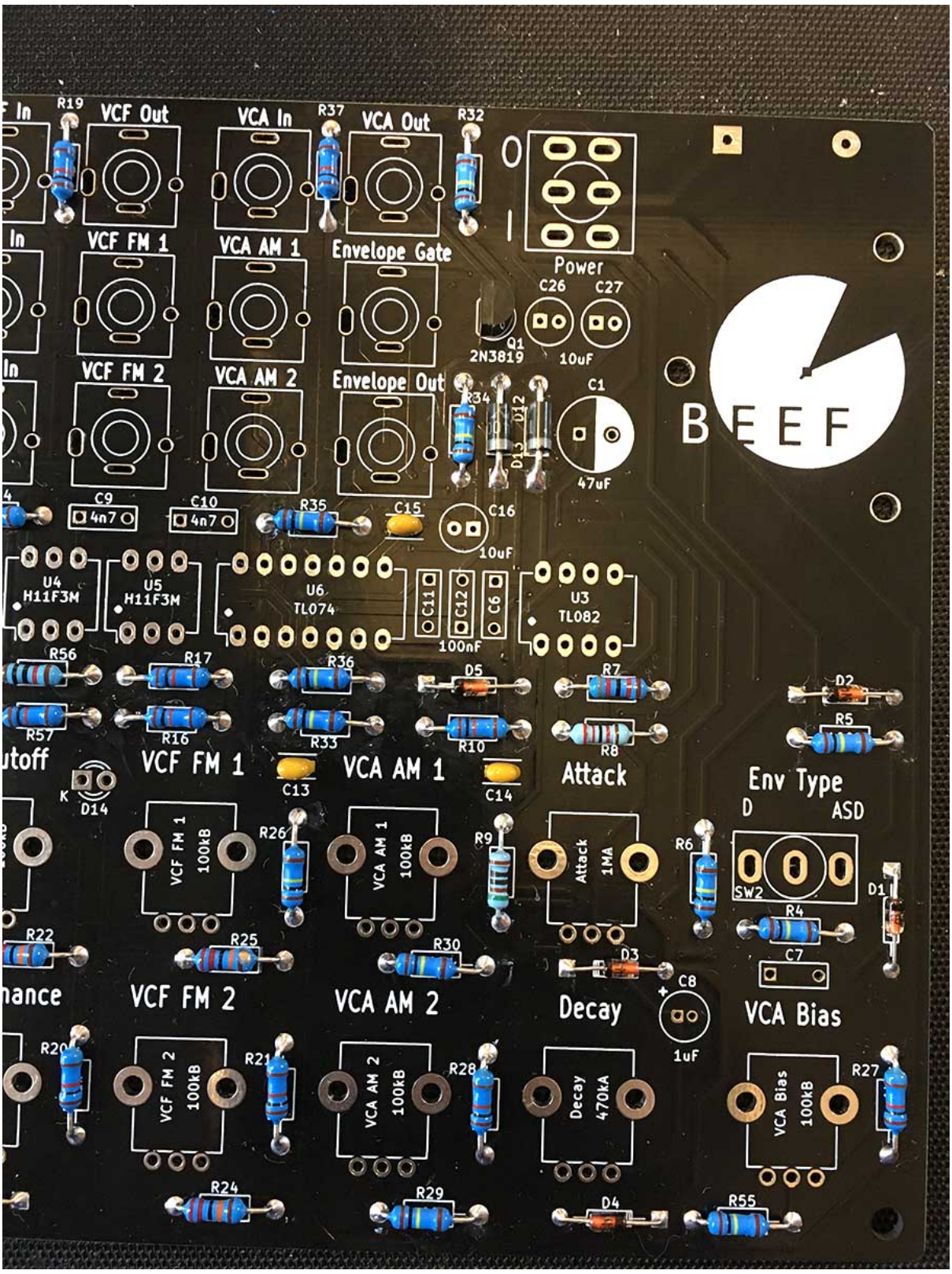

20 - Next place and solder the single 2N3819 at Q1. Note: Orientation is vital! Be sure to match the curve of the transistor body with the PCB silkscreen. The 2N3819 can be found in the Silver IC bag.

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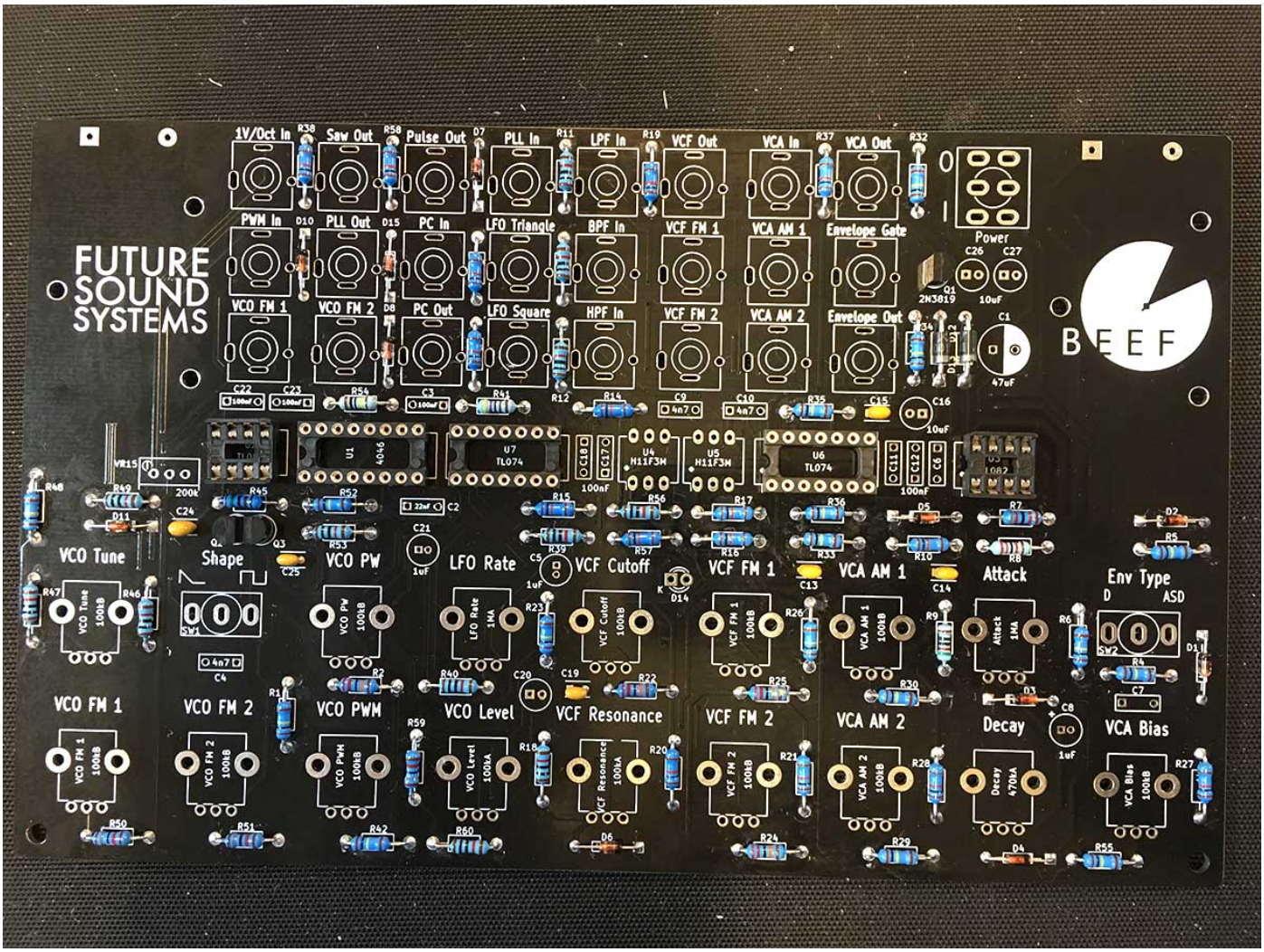

21 - Now place and solder the IC sockets. Note: Thonk kit includes 6 pin IC sockets for U4 and U5, solder these in as well. Be sure to match the notch on each socket with the dot on the PCB silkscreen.

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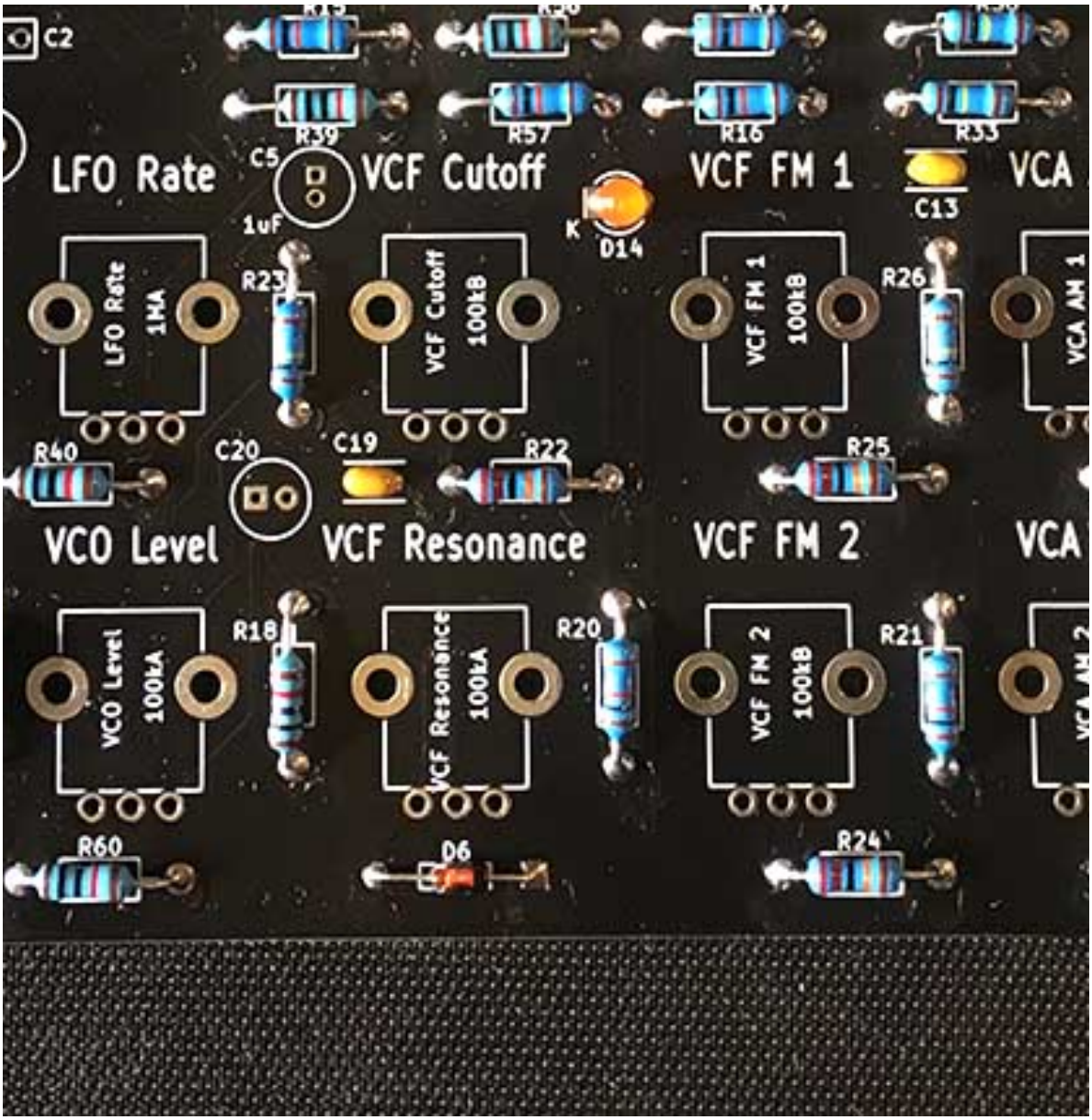

22 - Now place and solder the 3mm LED at D14. Note: Orientation is vital! The short leg must go to the square pad labelled K

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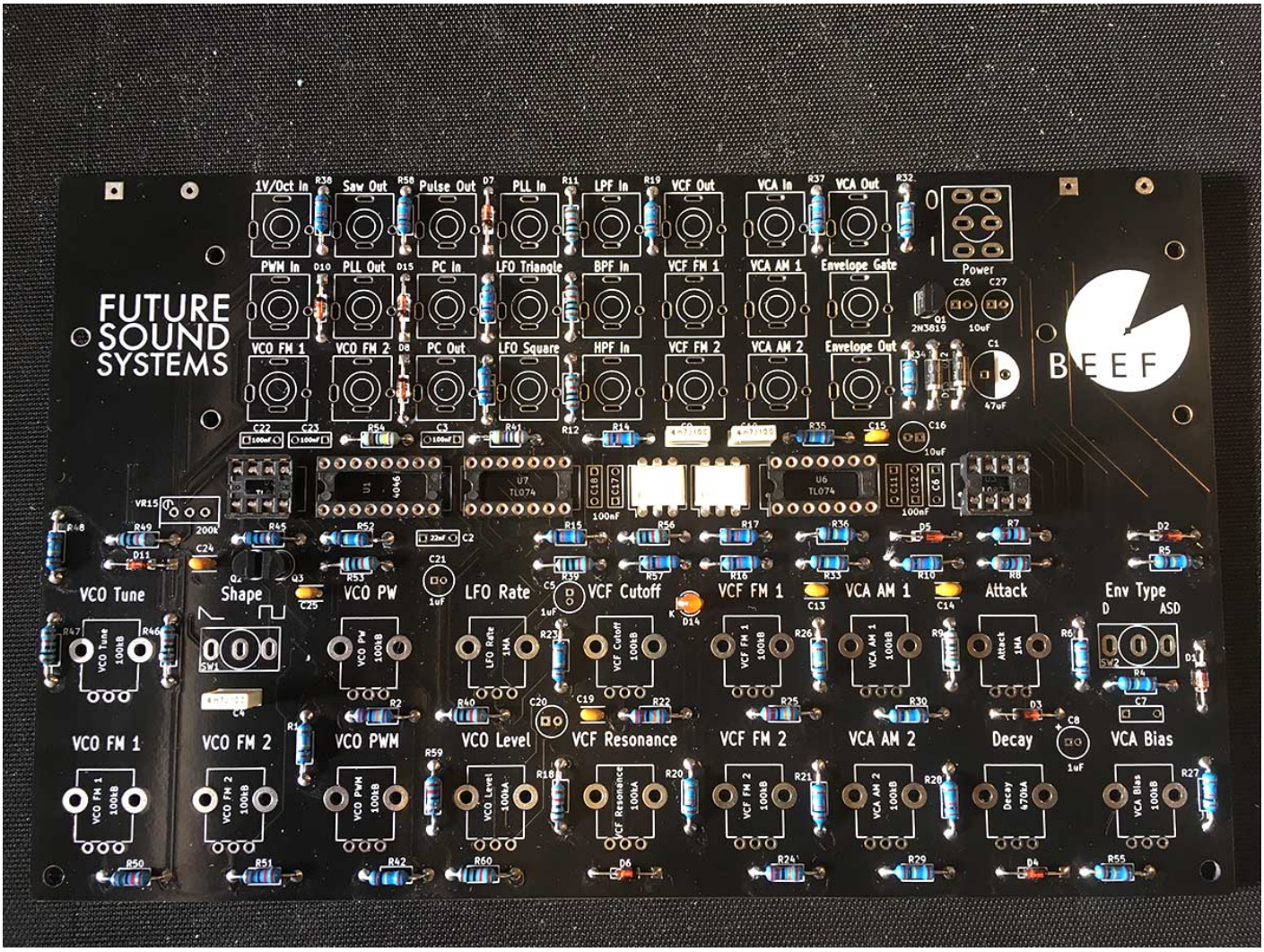

23 - Now place and solder the 3 x 4.7nF BOX caps (C4, C9, C10)

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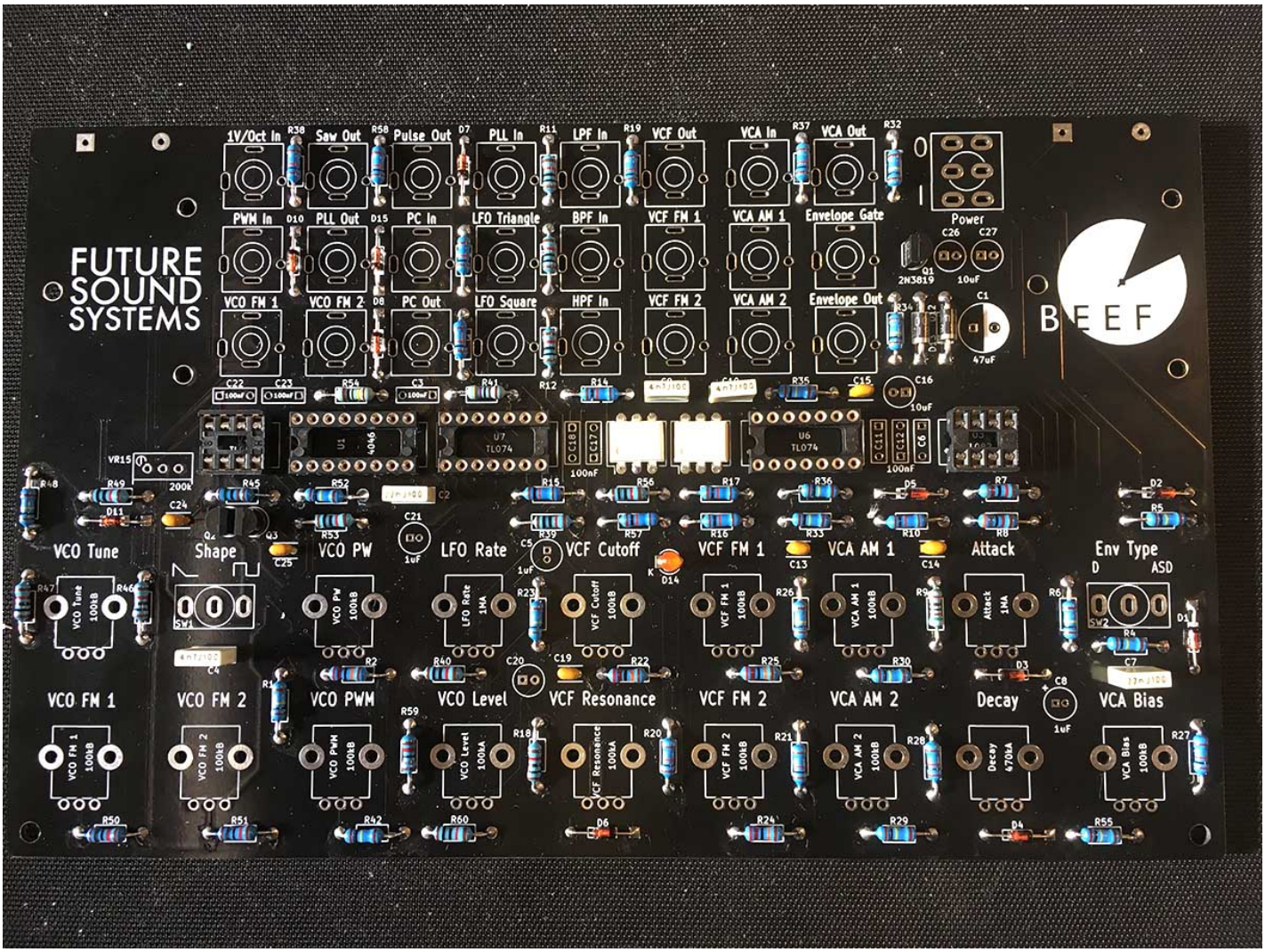

24 - Next place and solder the 2 x 22nF box caps at C2 and C7

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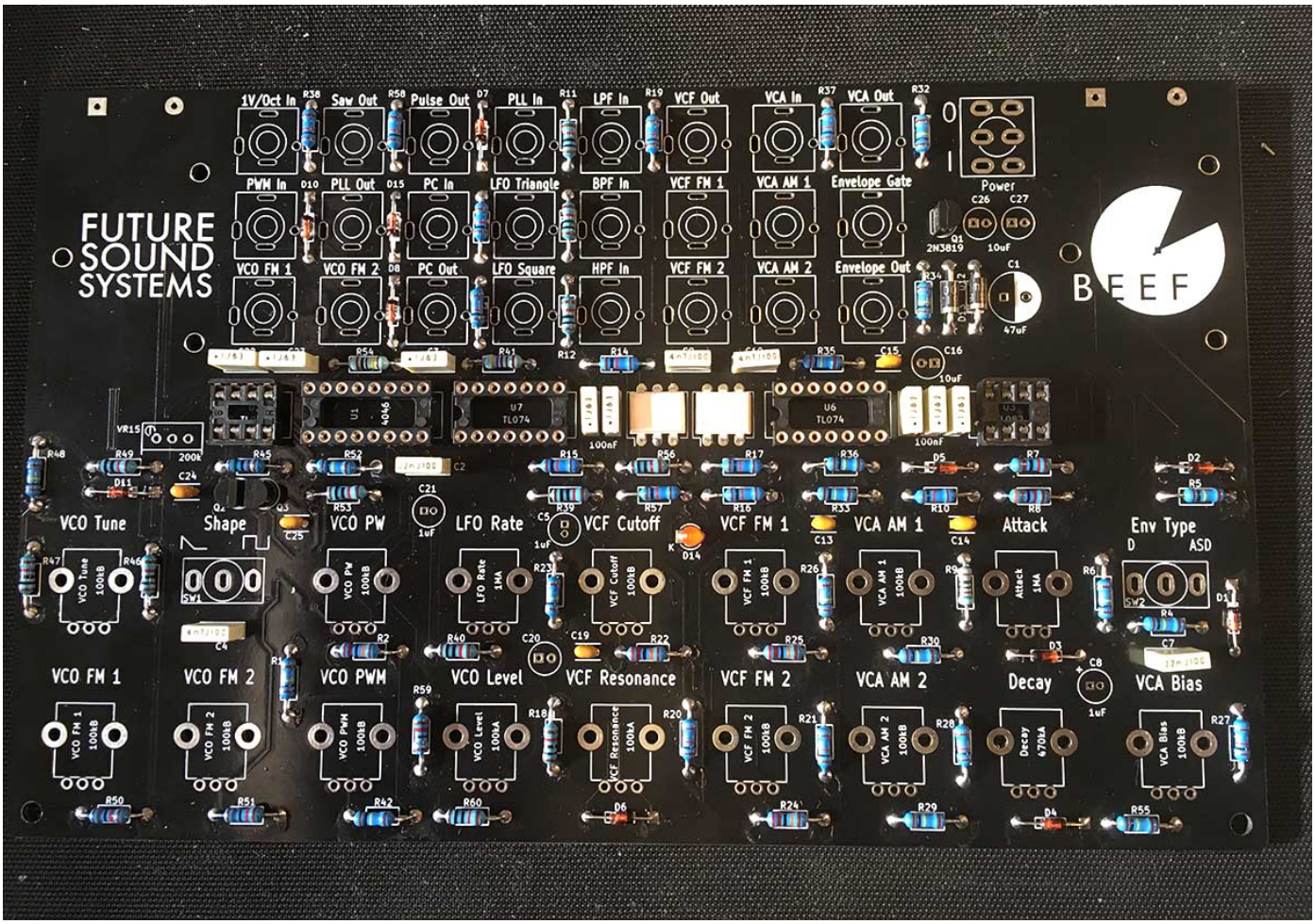

25 – Now place and solder the 100nF box caps at the 8 remaining box cap locations (C3, C6, C11, C12, C17, C18, C22, C23)

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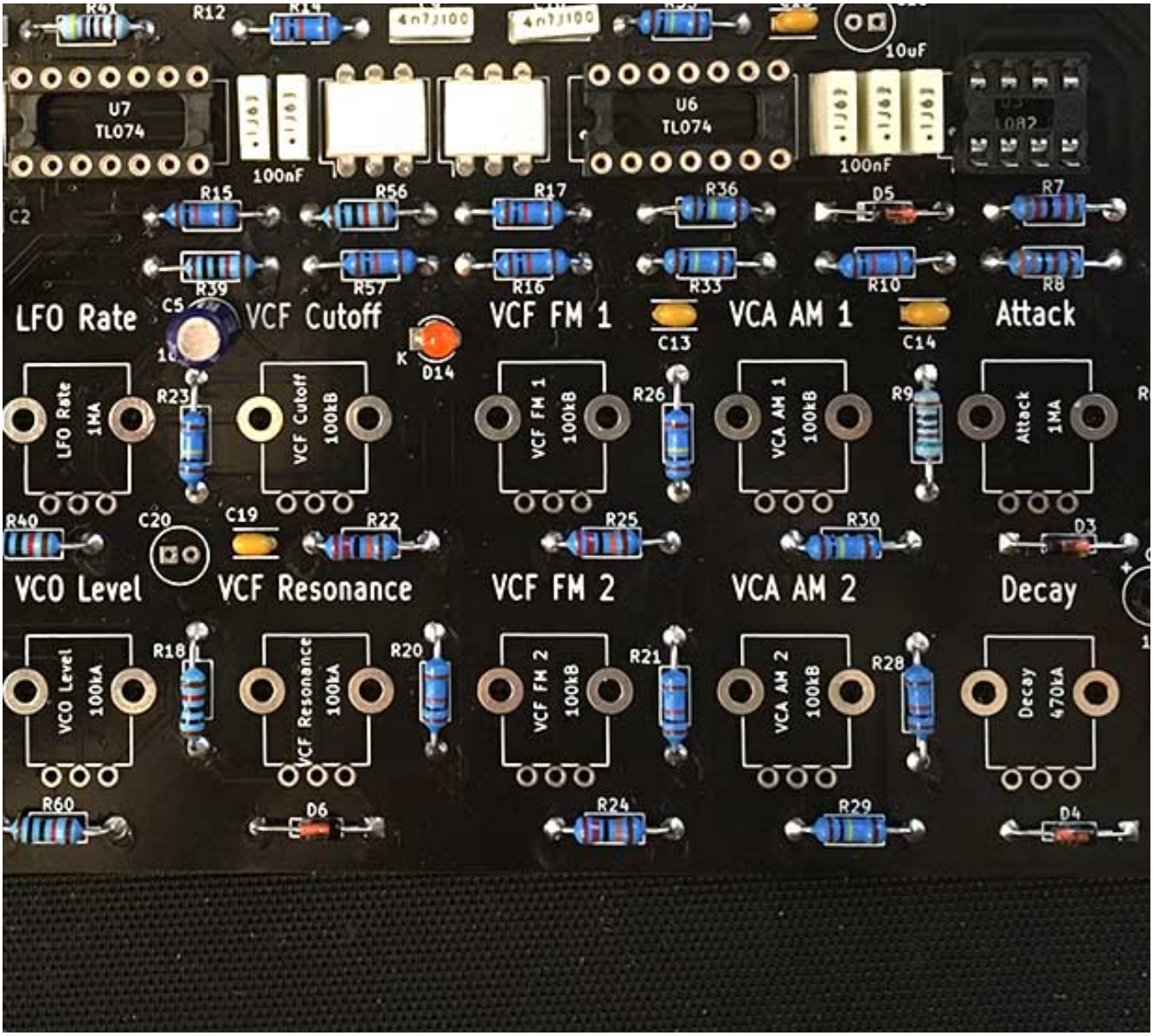

26 - Place and solder the single 2.2uF BIPOLAR cap at C5, located to the right of the LFO Rate text

Note: C5 is labelled as 1uF on the PCB but 2.2uF is the correct value to use

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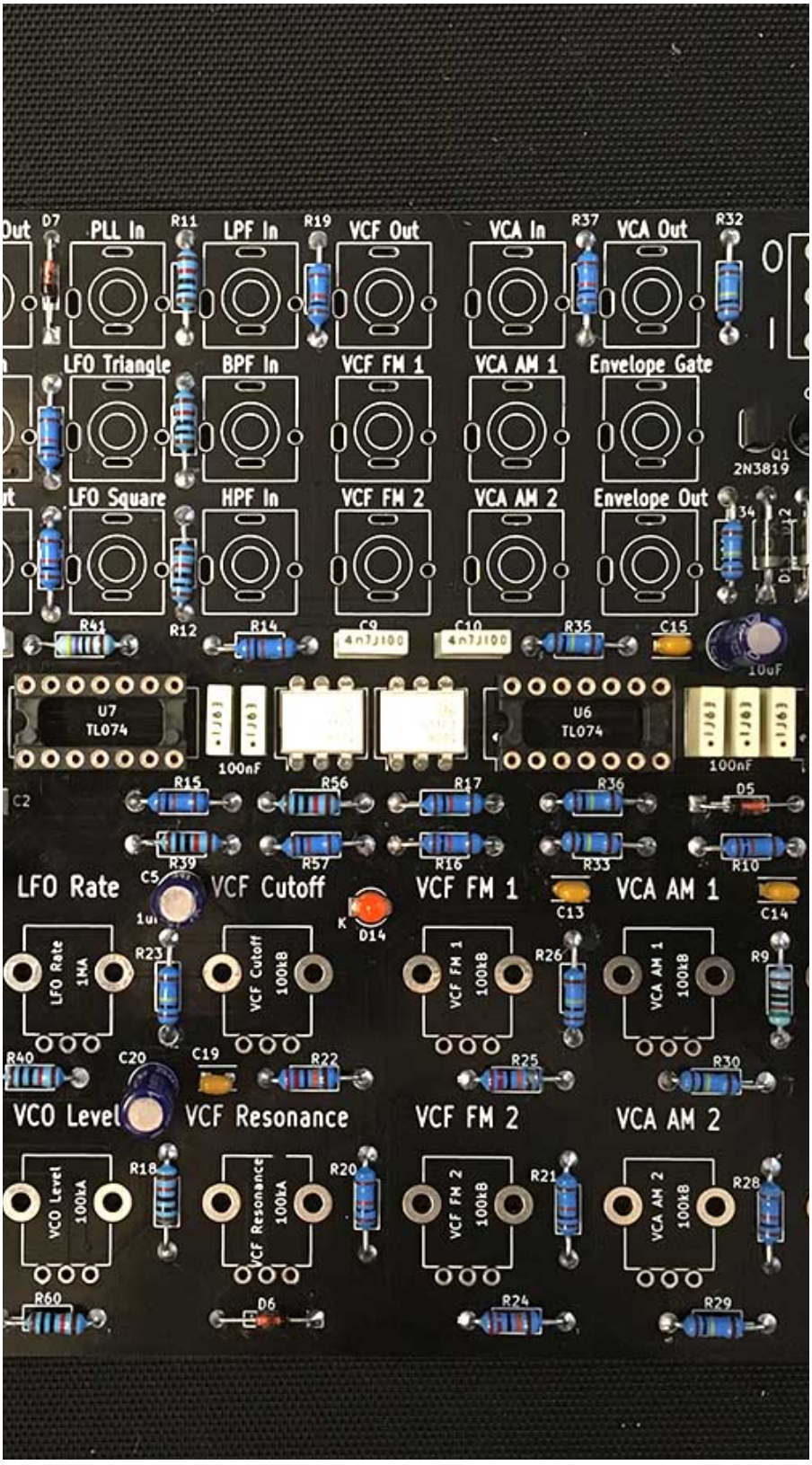

27 - Now place and solder the 2 x 10uF BIPOLAR caps at C16 and C20

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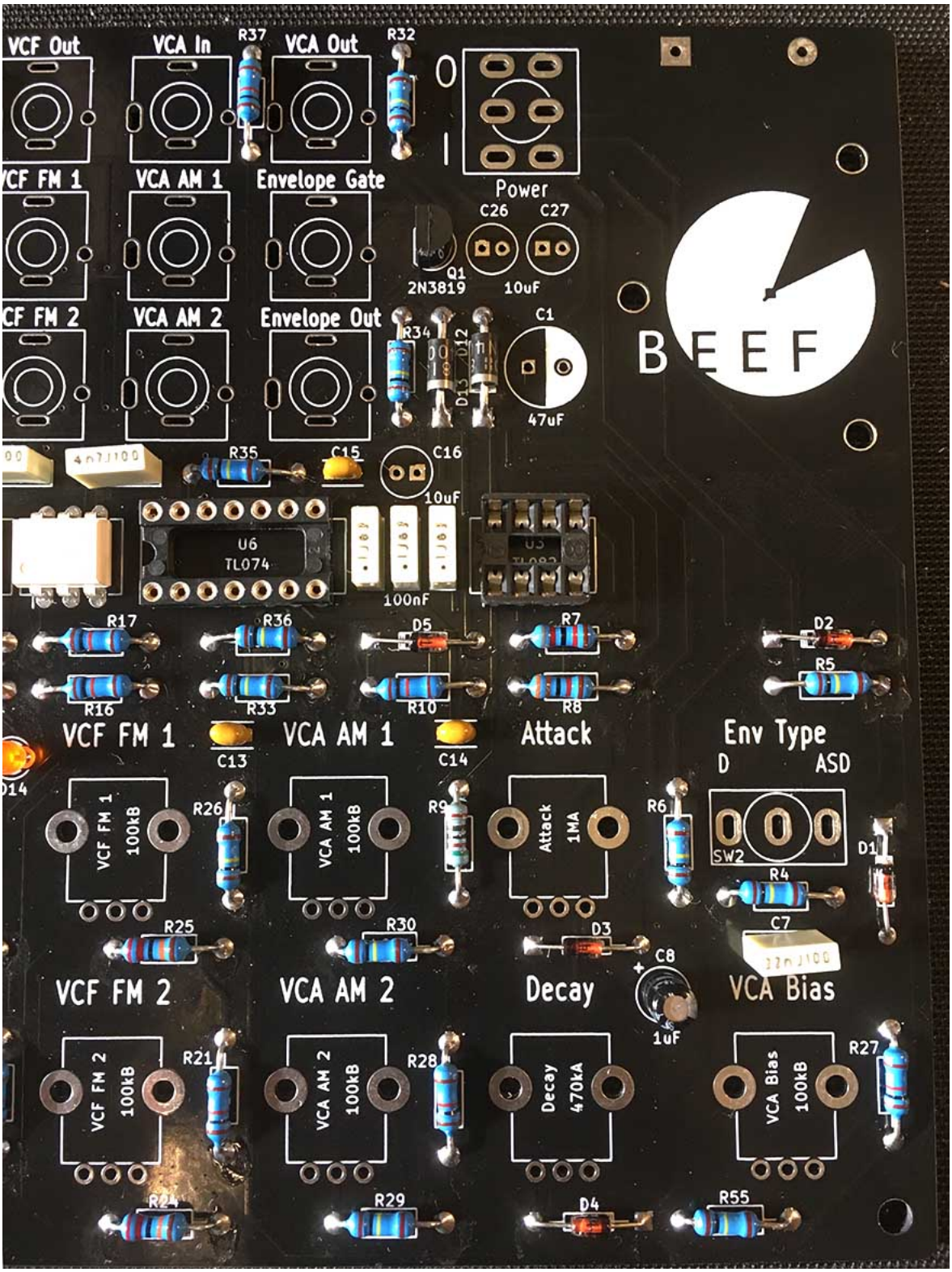

28 - Now place and solder the UNIPOLAR 1uF capacitor at C8. Note: orientation is vital for UNIPOLAR caps! The longer leg must go on the side of the + on the PCB silkscreen.

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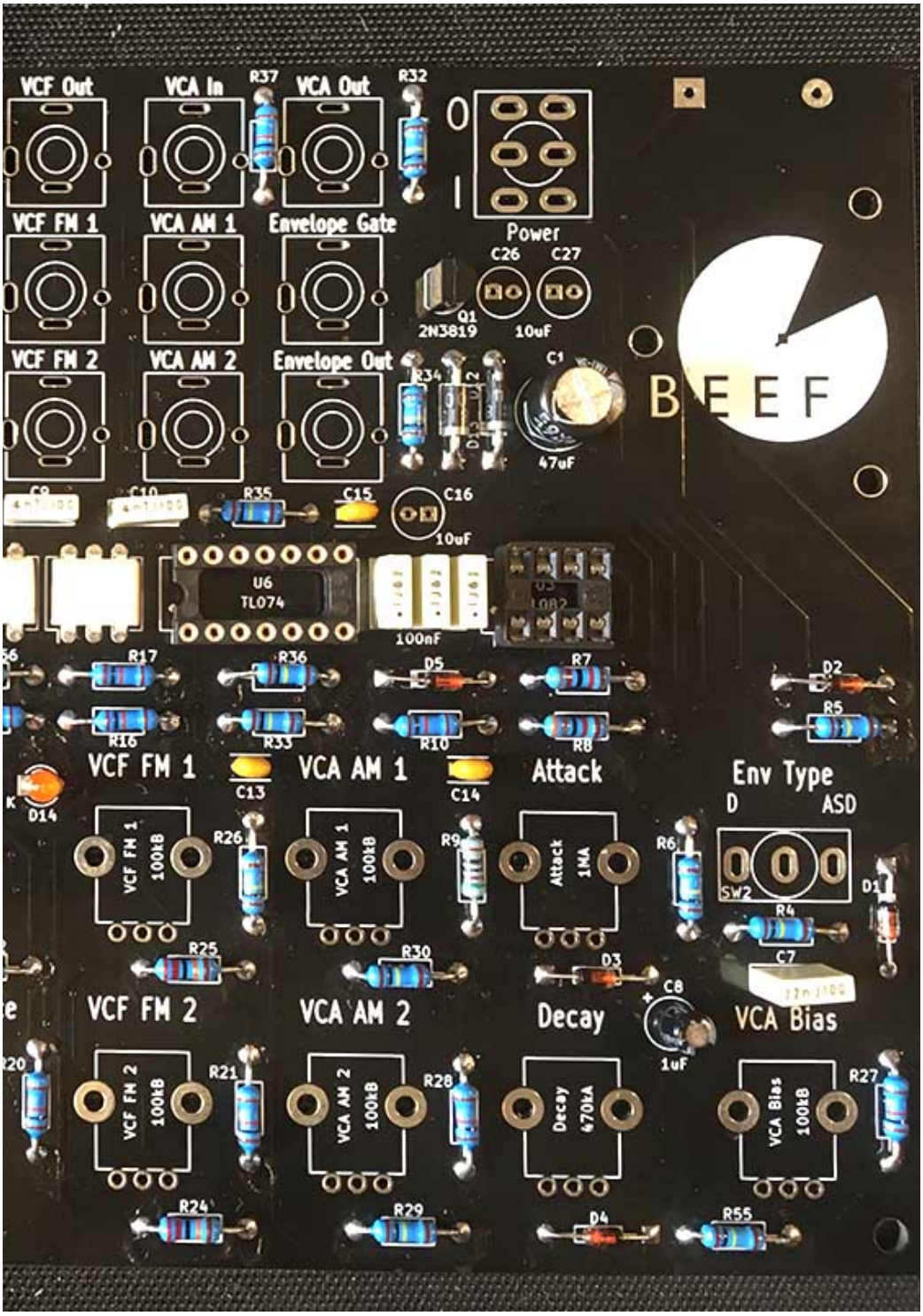

29 - Next place and solder 47uF cap at C1. Note: orientation is vital for UNIPOLAR caps! The longer leg must go to the square pad (black) the short leg to the round pad (white)

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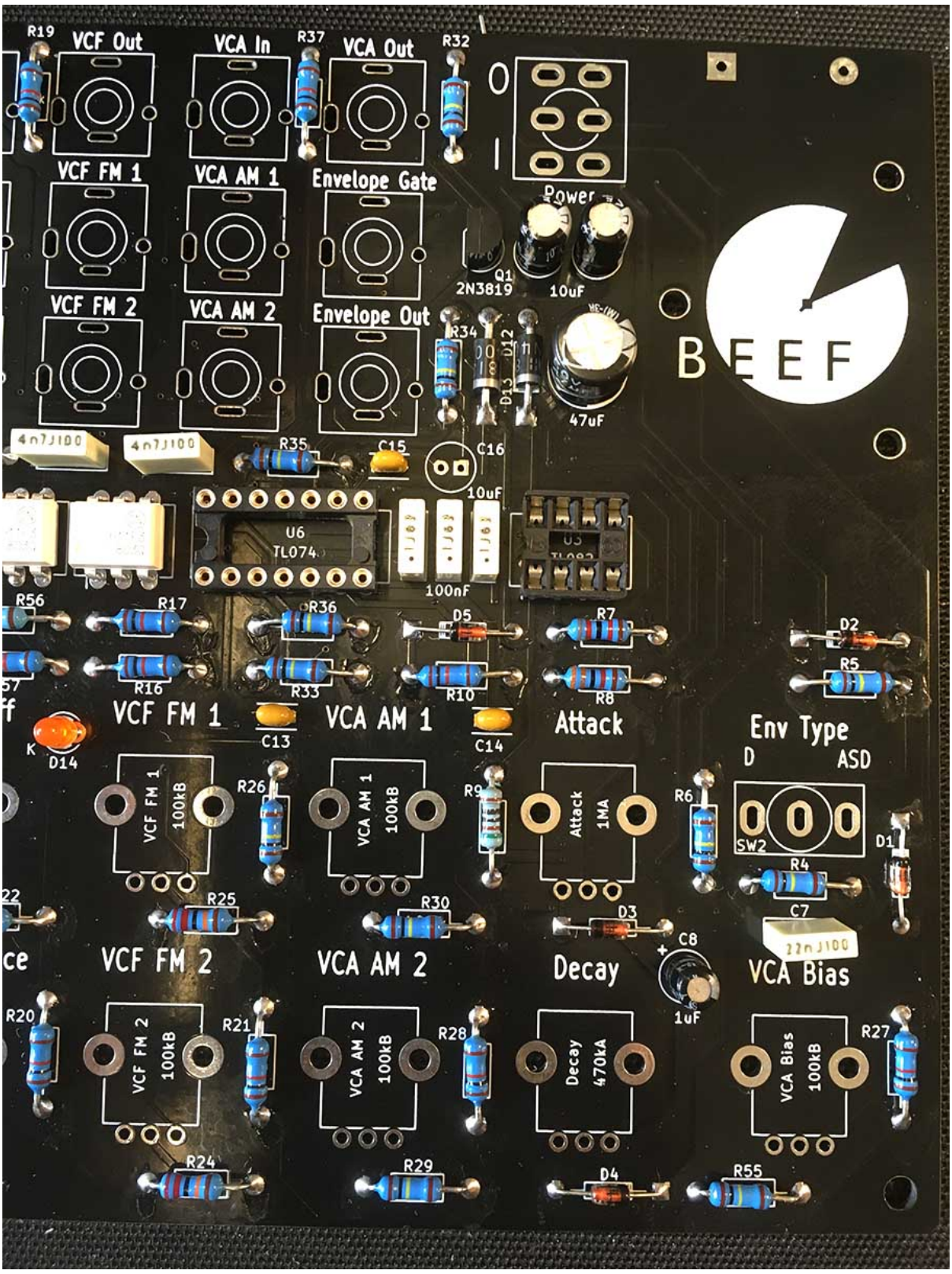

30 - Now place and solder 2 x 10uF UNIPOLAR caps at C26 and C27. Note: orientation is vital for UNIPOLAR caps! The longer leg must go to the square pad.

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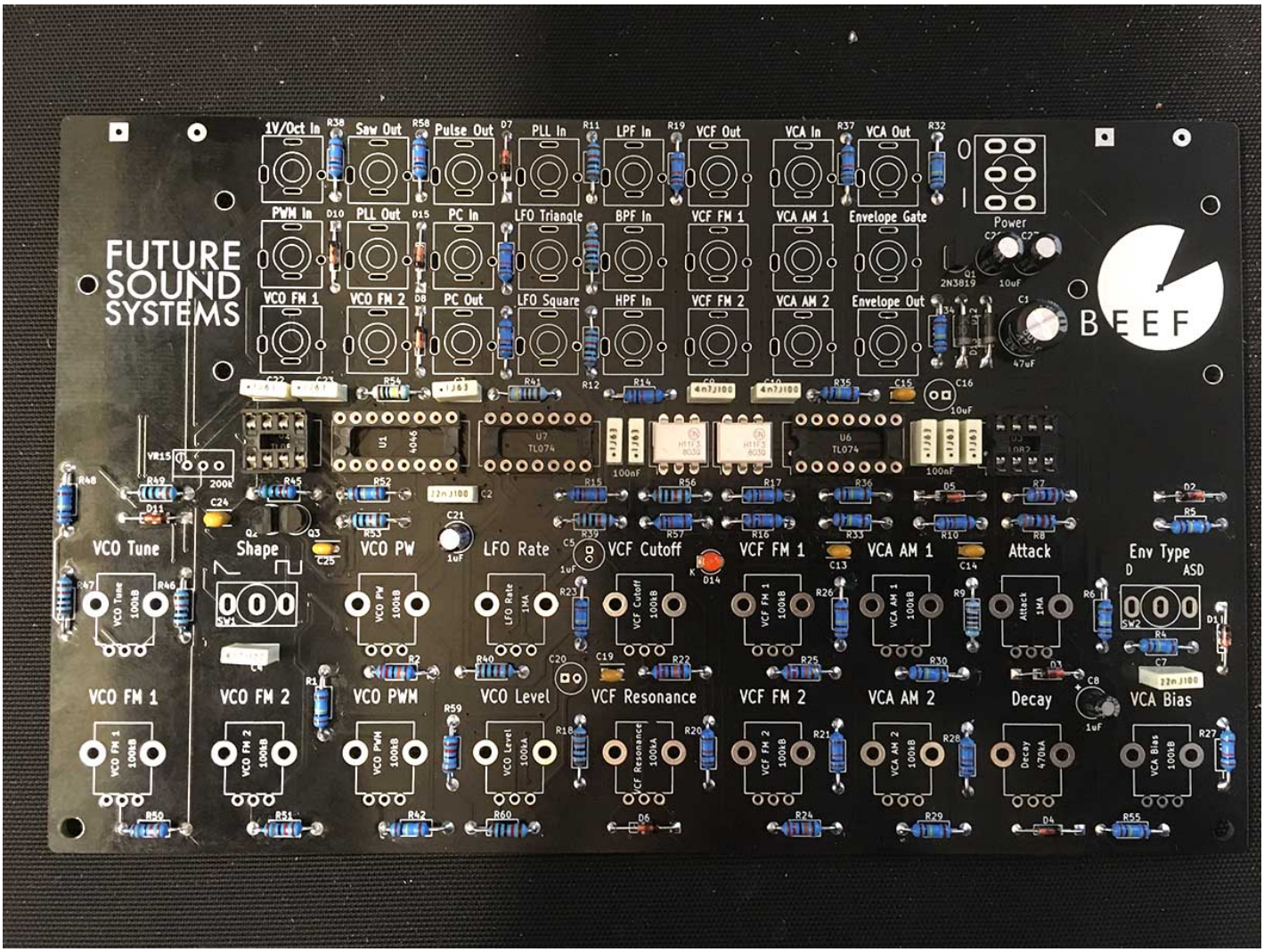

31 - Now place and solder the UNIPOLAR 2.2uF cap at C21. Note: orientation is vital for UNIPOLAR caps! The longer leg must go to the square pad.

Note: C21 PCB silkscreen is wrong - 2u2 is the correct value.

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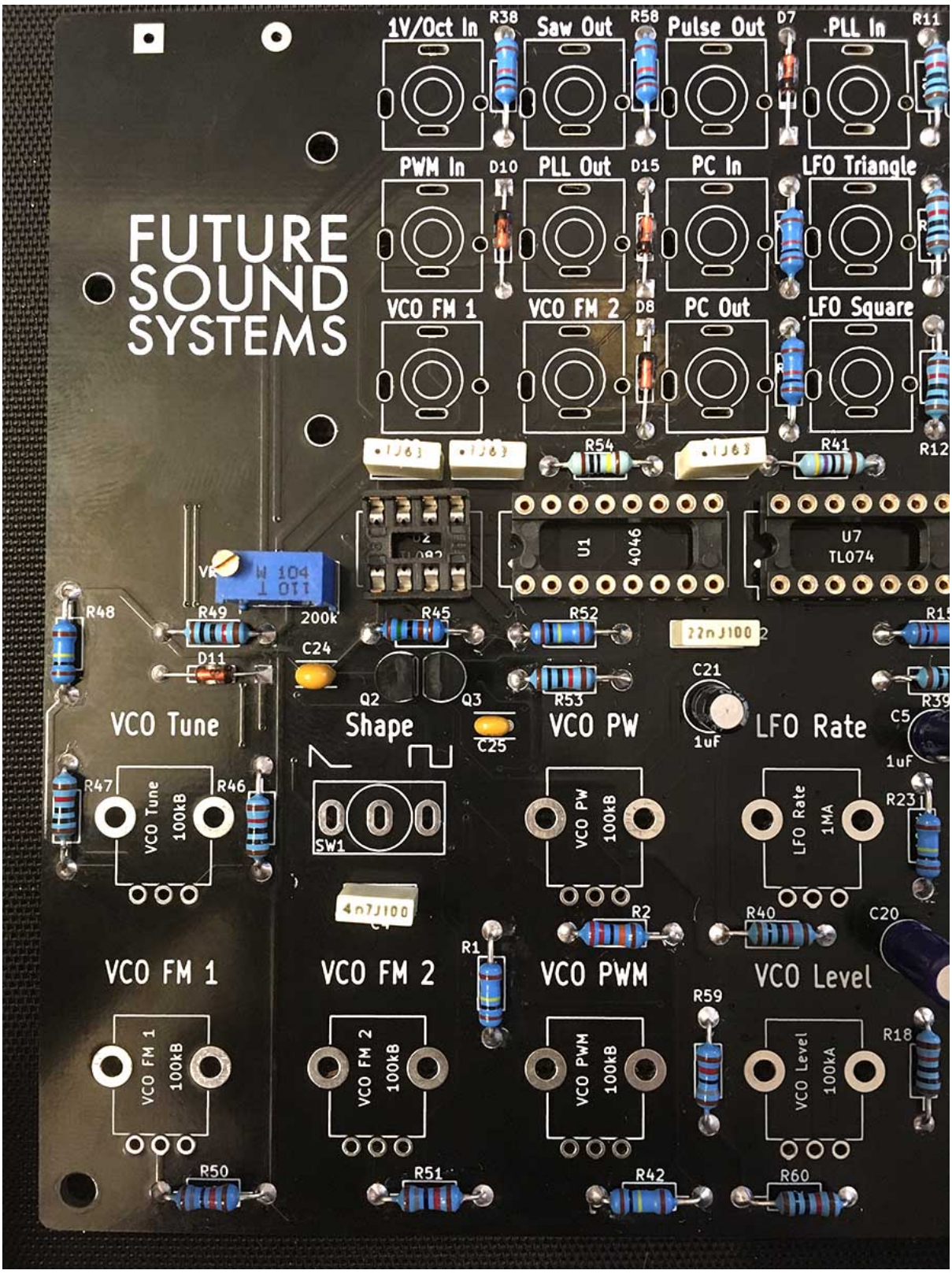

31 - Next place and solder the blue trimmer at VR15 (trimmer can be 100k or 200k as per silkscreen)

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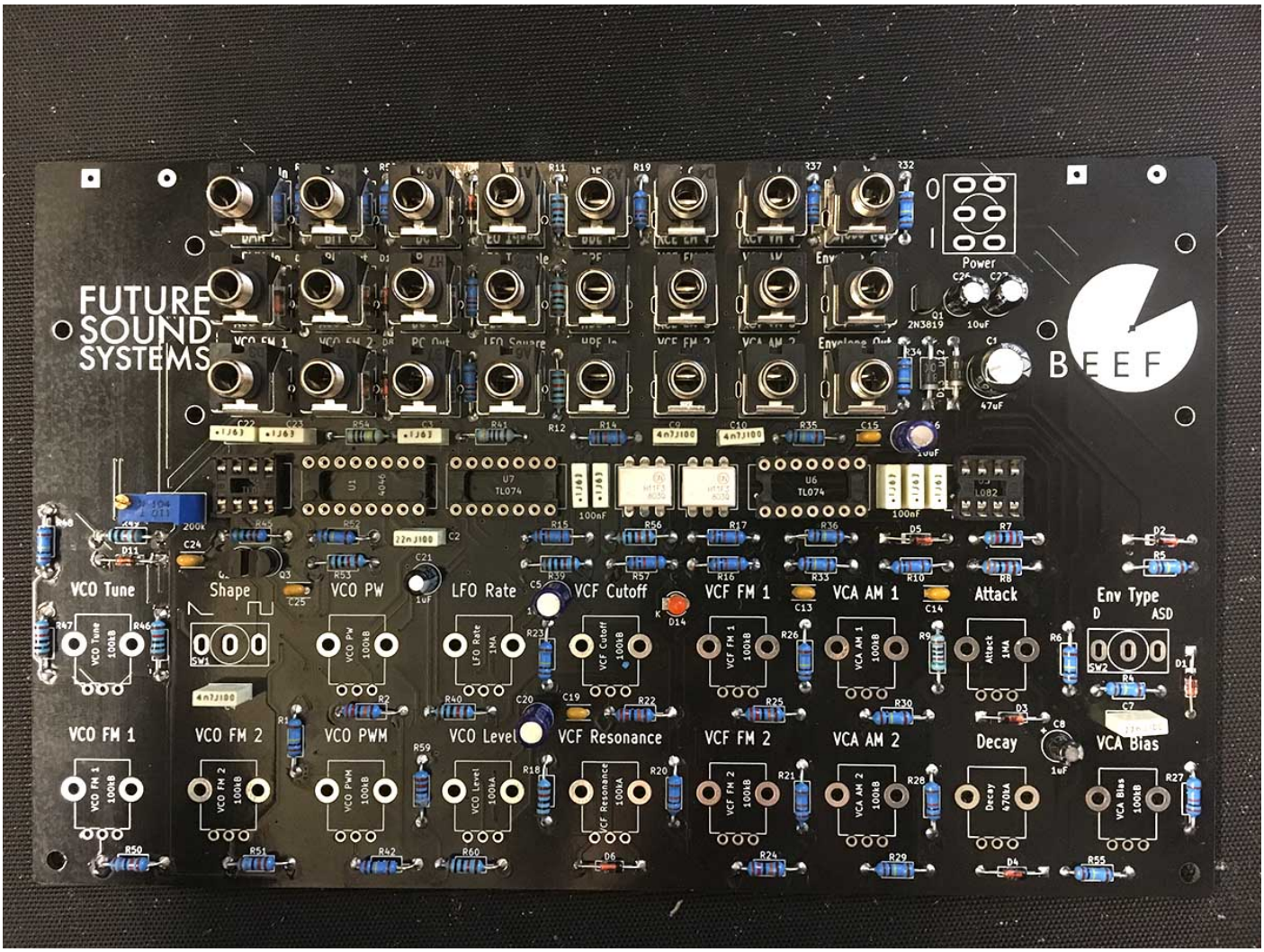

32 - Next place but DO NOT solder all 24 jacks

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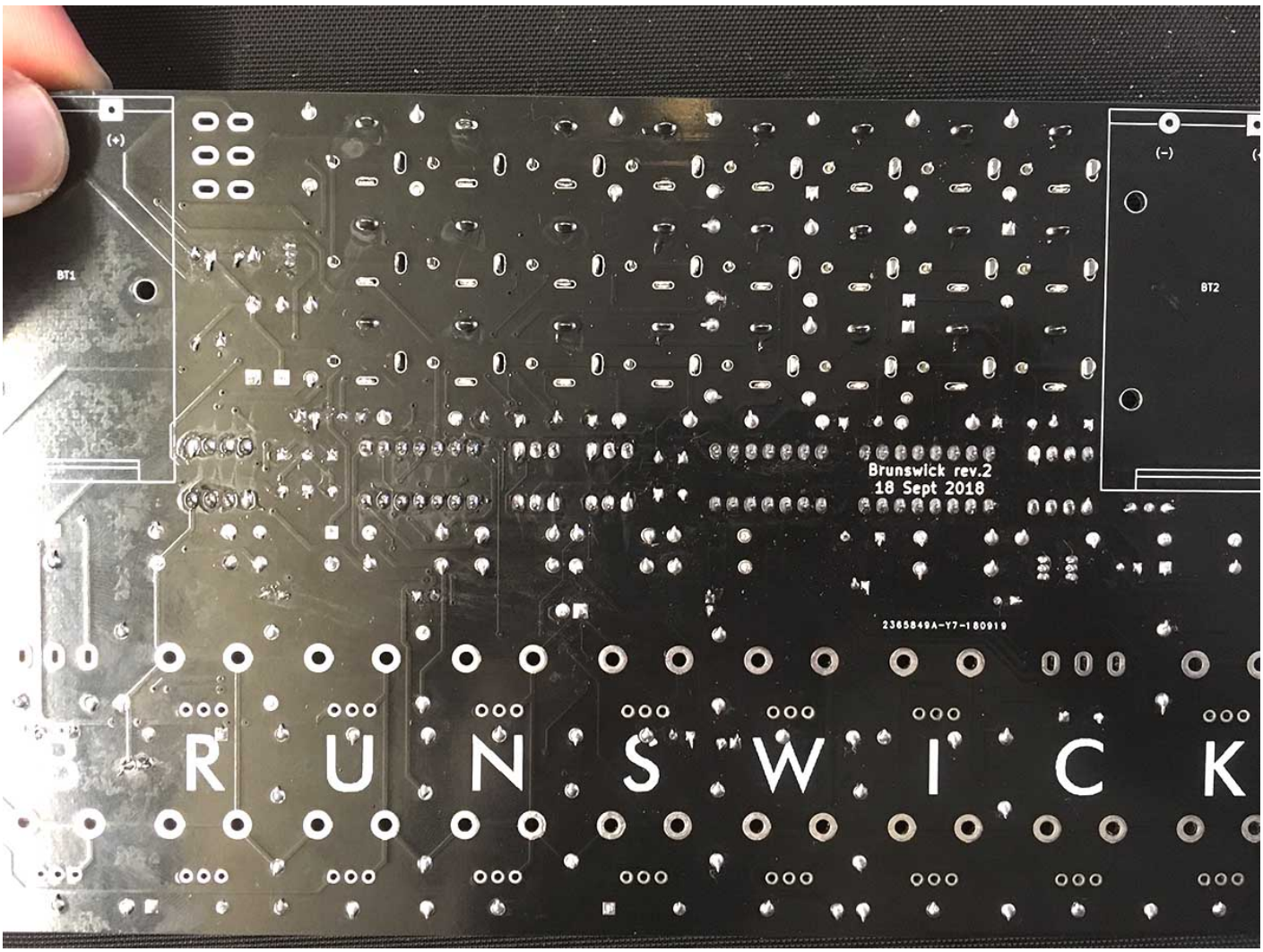

33 – Now solder only the signal pin (top) lug of each jack for now – this makes them easier to desolder if there is something wrong with the build

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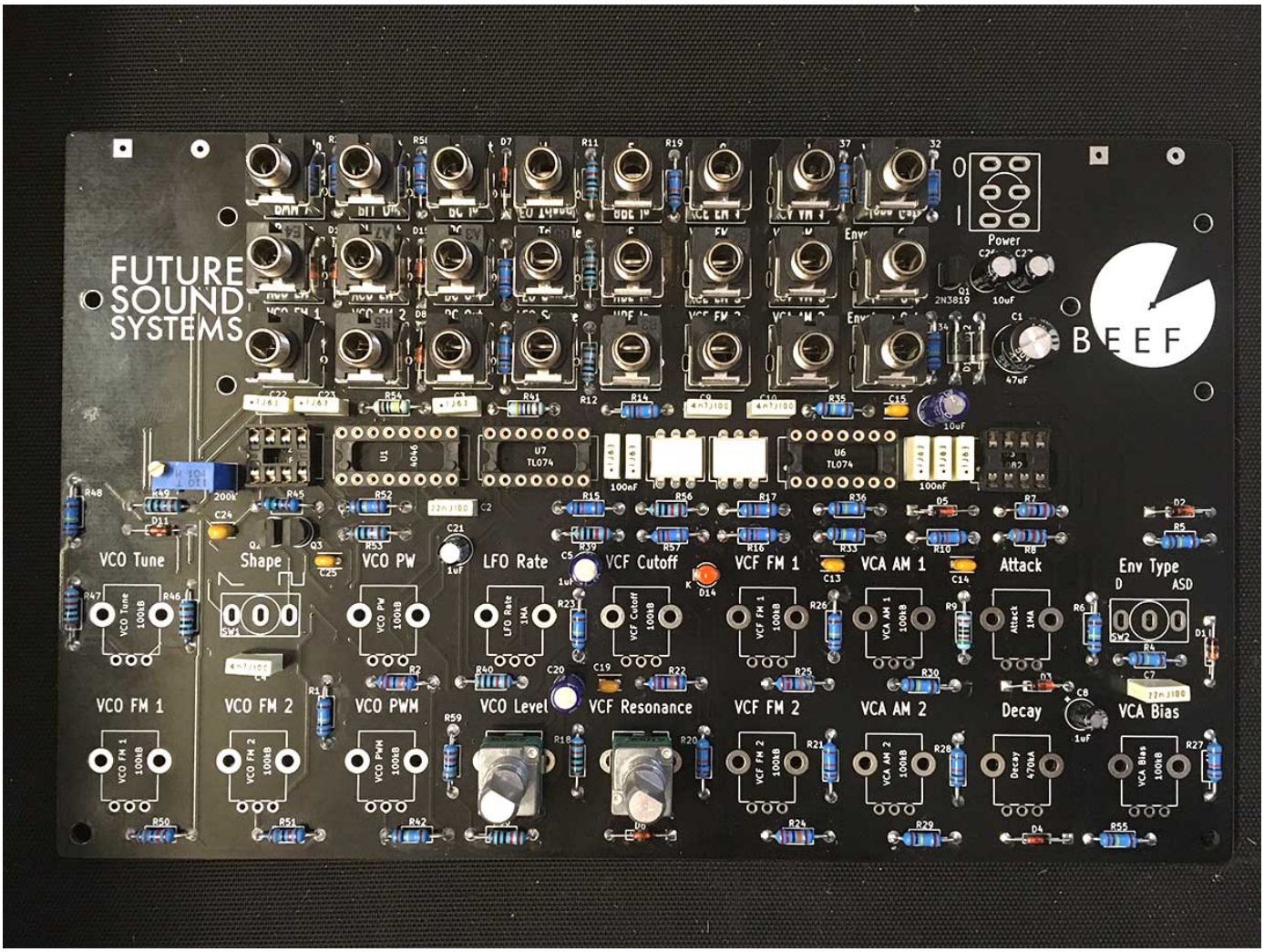

34 - Next place and solder ONLY THE BOTTOM THREE LEGS of the A100k pots for VCO Level and VCF Res

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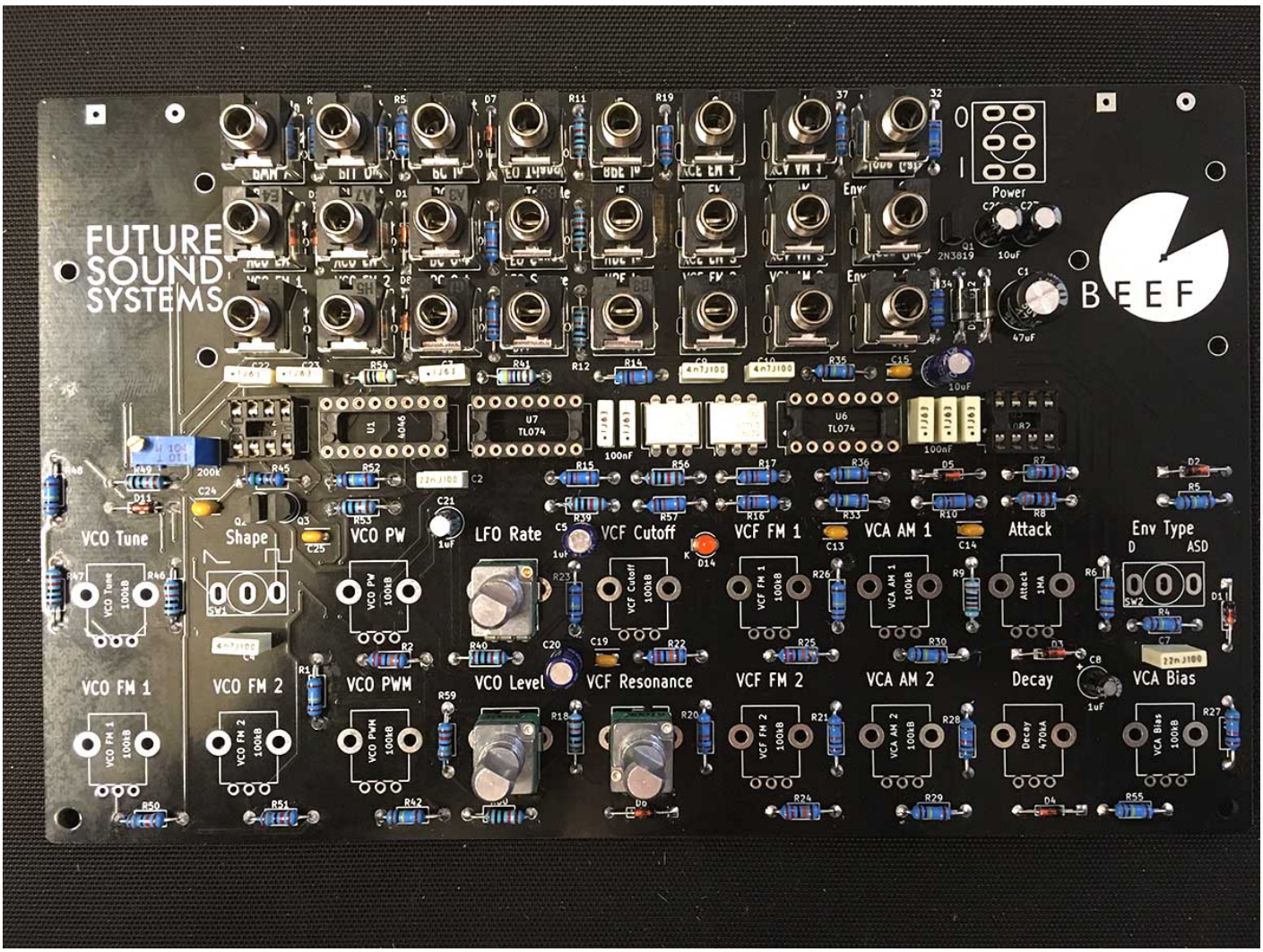

35 - Now place and solder the BOTTOM THREE LEGS of B1M pot for LFO Rate

Note: LFO Rate is labelled as A1M on the PCB, but B1M is the correct value to use

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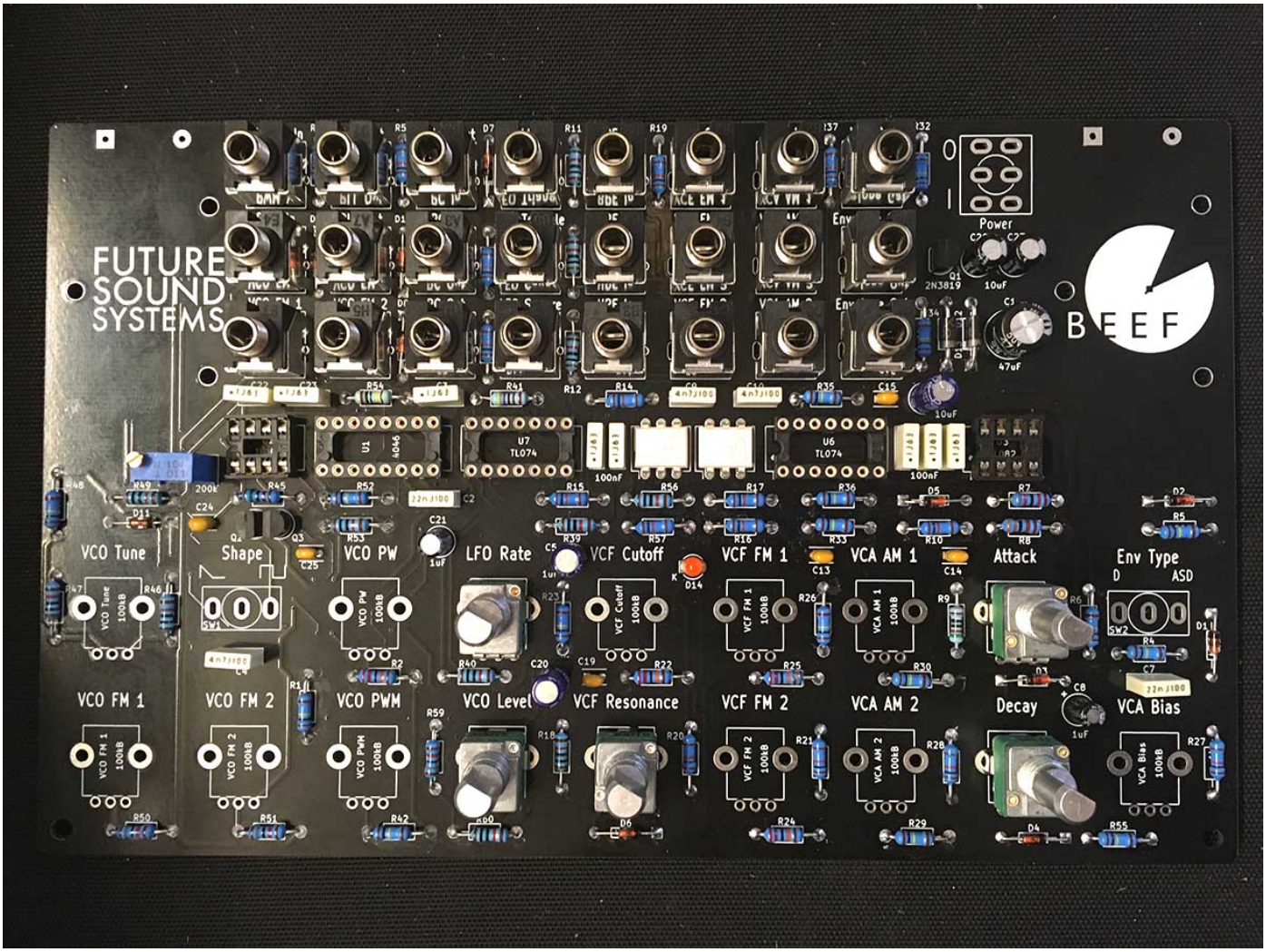

36 – Now place and solder the BOTTOM THREE LEGS of the A1M pots for Attack and Decay

Note: Decay on the PCB is labelled as A470K, but A1M is the correct value to use

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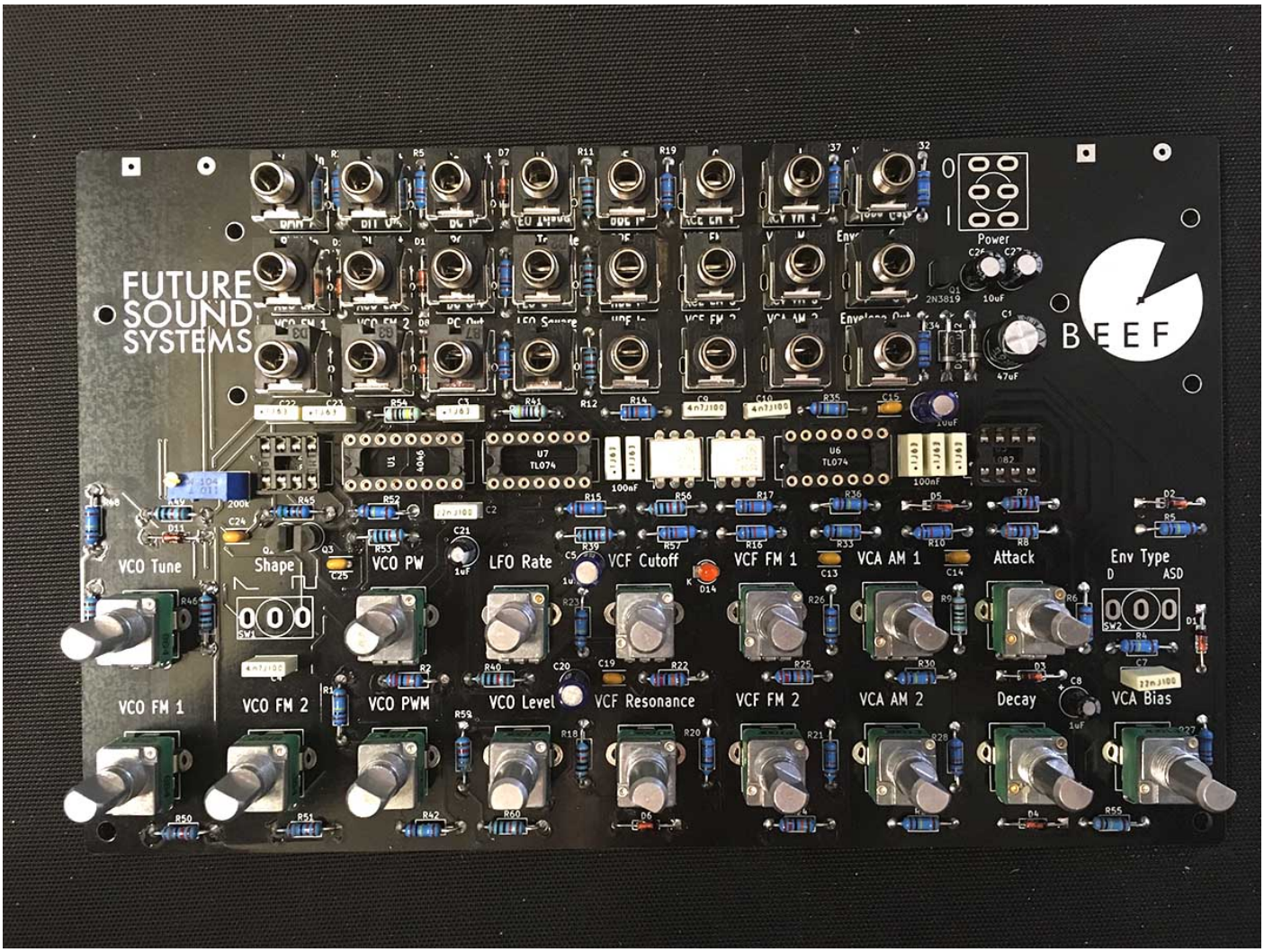

37 - Now place and solder the BOTTOM THREE LEGS for the 11 x B100K pots for all other pot locations

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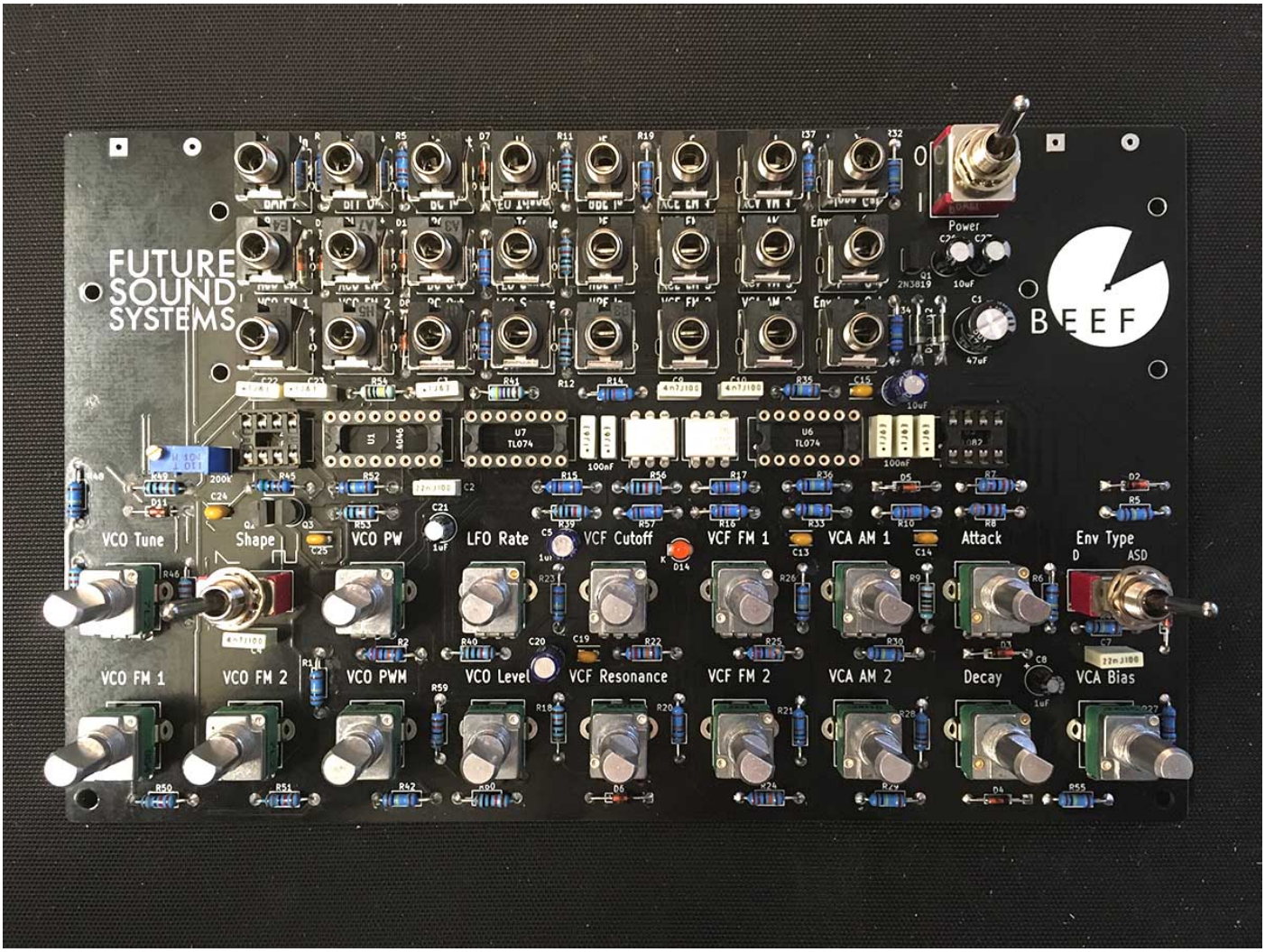
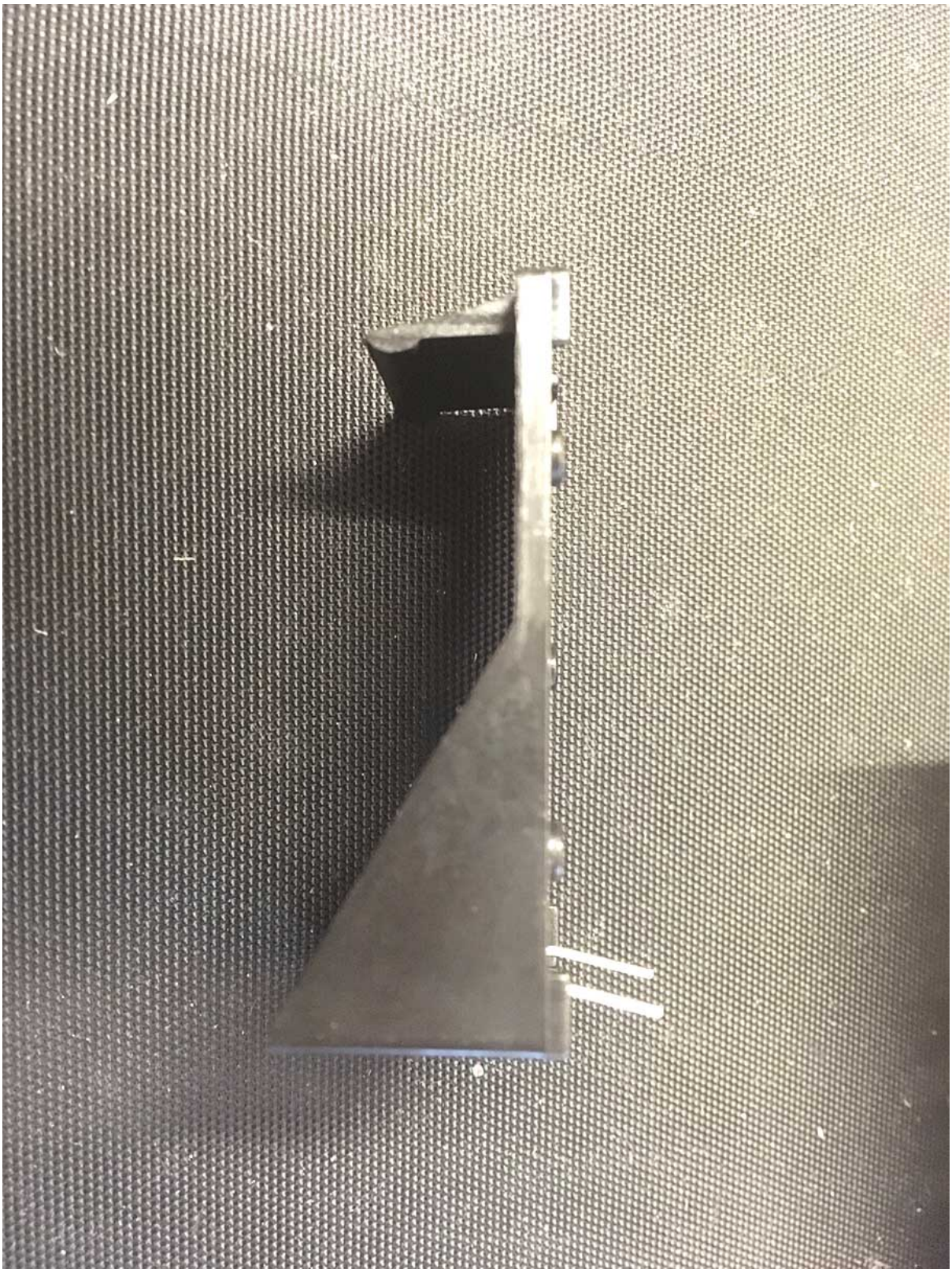


38 - Now place and solder 2 x SPDT switches and 1 x DPDT switch - ensure they sit as flat as possible against PCB



39 – Now take both battery holders and carefully bend the pins slightly towards the nearest edge

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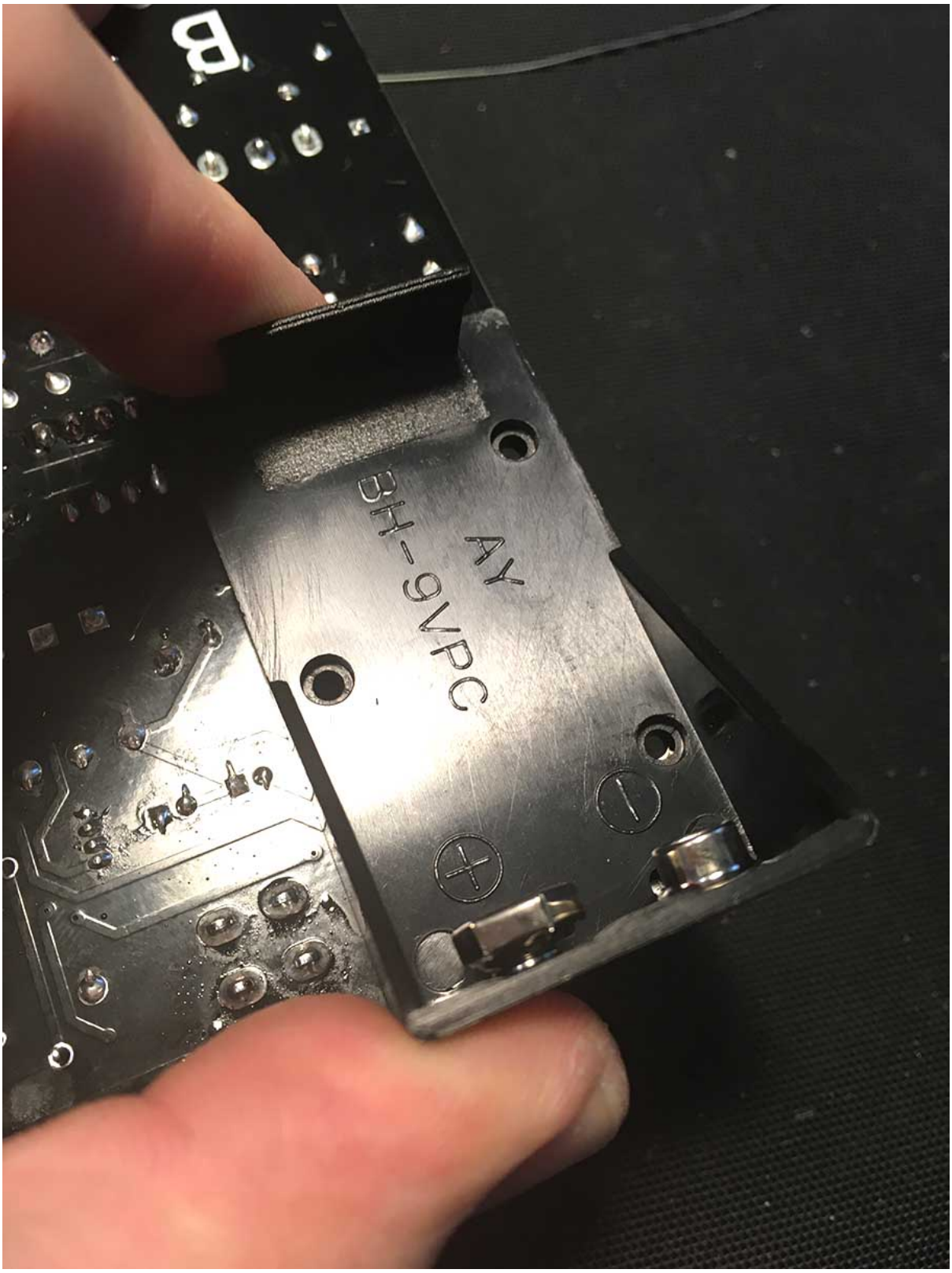

40 – Now fit the battery holder to the back of the PCB - ensuring that the mounting holes line up as well as possible

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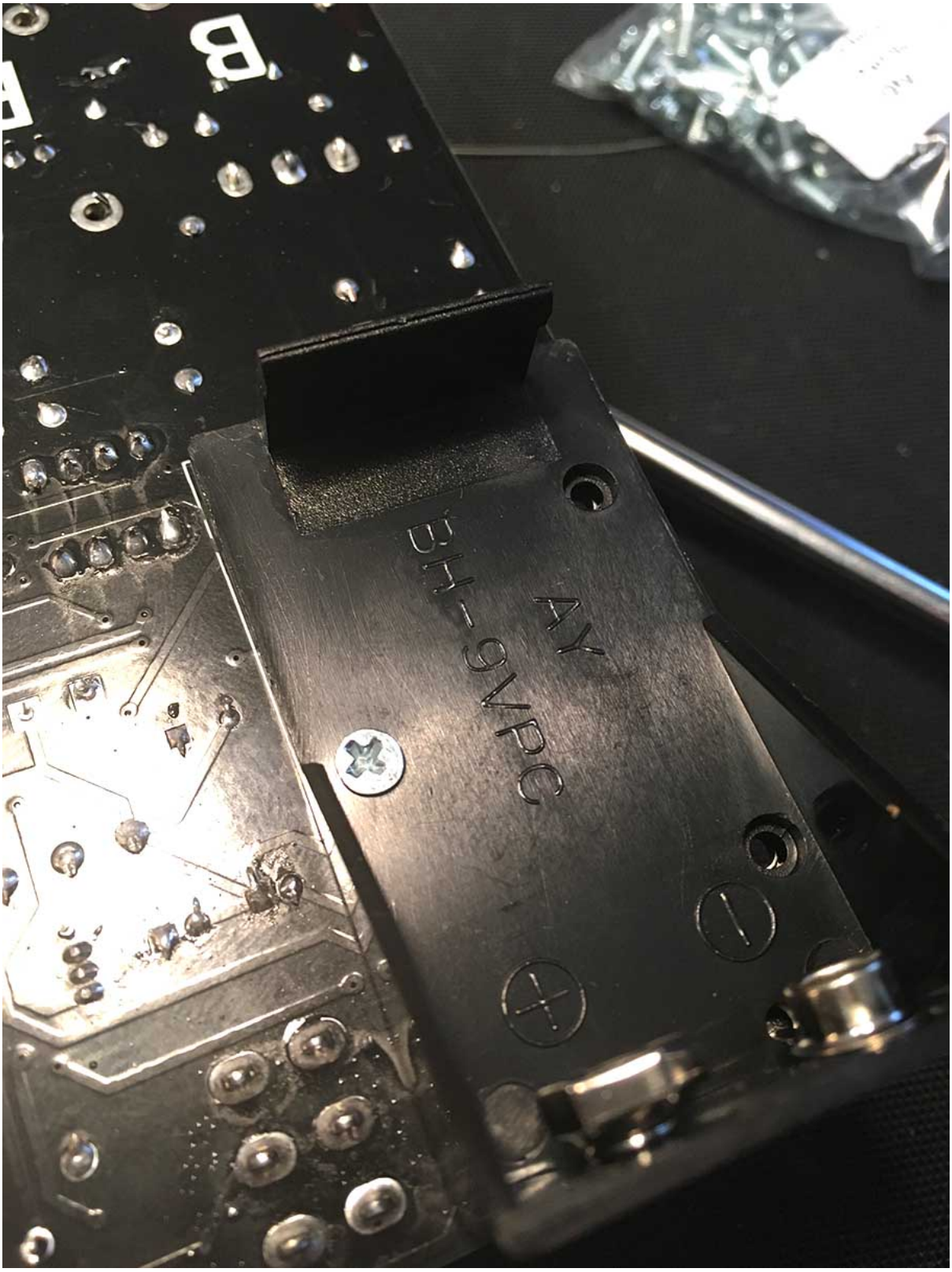
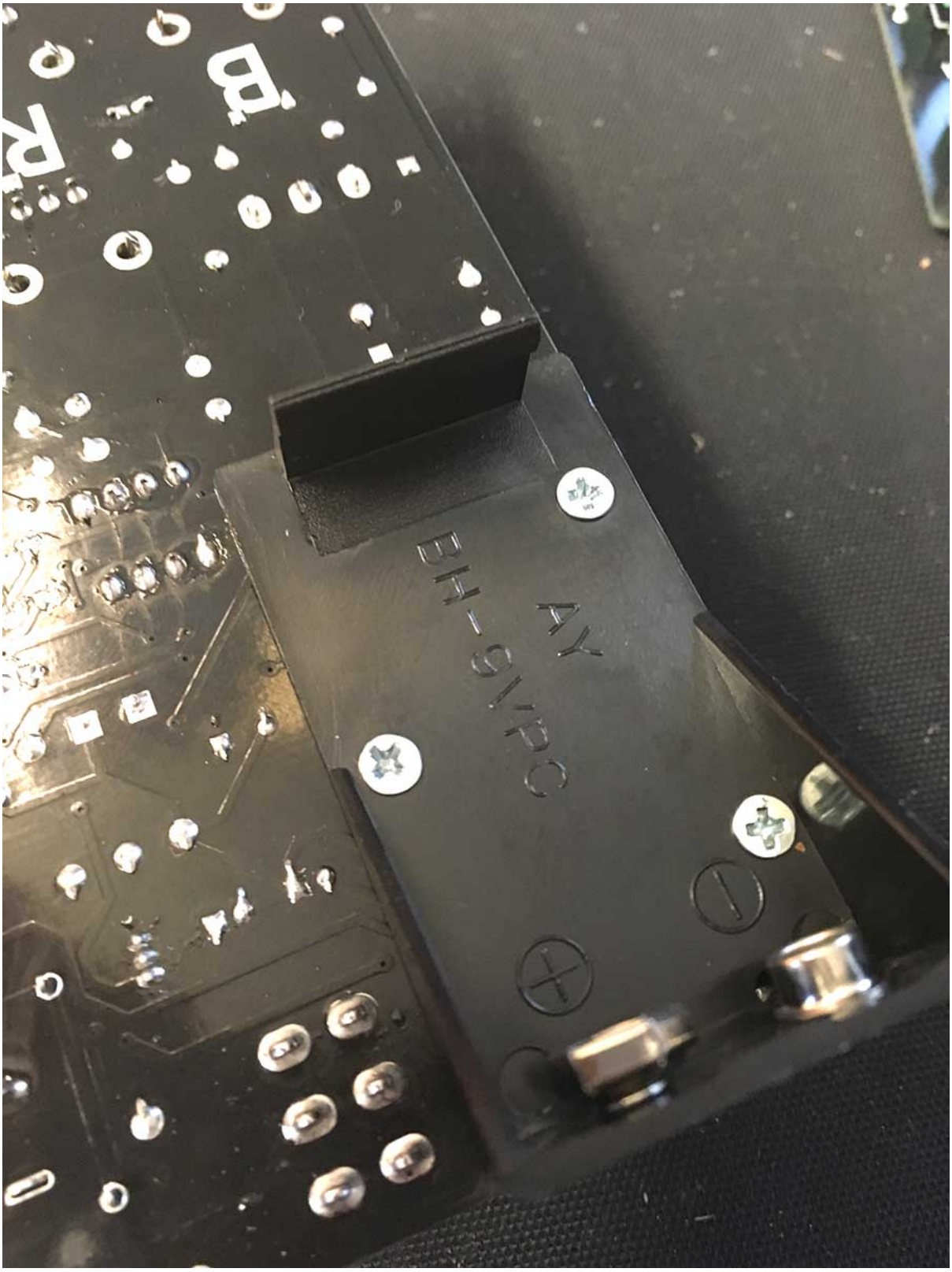


41 - Now fit an M2.5 screw to one hole to secure - you may have to thread through the PCB pad

42 - The top side of the PCB should still look good once threaded



43 - Now fit the two remaining screws into each battery holder

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44 – Next add the M2.5 washers to each screw on the front side of the PCB. Thonk kit washers may be plastic.

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45 – Now you can fit the M2.5 nuts to each screw - a nut driver can make this easier

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46 – Now solder the battery holder leads and snip off the excess legs

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47 - Once soldered the battery holders should look as above

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48 - Now paying attention to orientation, fit all the ICs into their sockets as shown and fit batteries

Note: Orientation is vital for all IC’s

It is recommended to use a fresh pair of batteries when testing your build.

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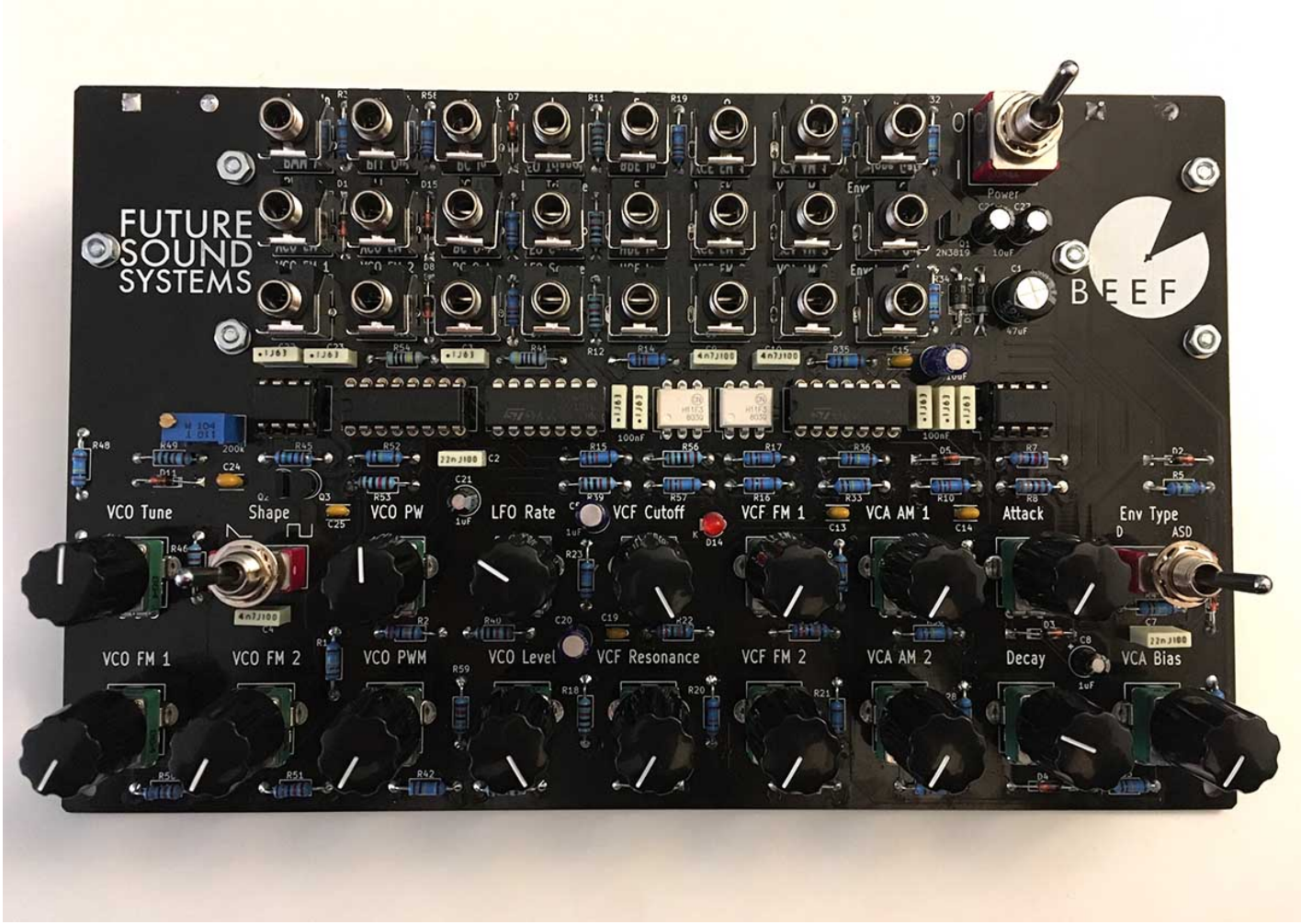

49 - Once you have tested that your build works, you can solder all the remaining legs on the jacks and pots, and then fit the knob caps

50 – Calibration – The V/Oct input is calibrated using the trimmer at VR15. This is done by plugging in a pitch source to the V/oct input and playing octaves of the same note until you get stable octaves out of the Brunswick. When using matched transistors there should be about 4 octaves of stable v/oct tracking.

FOR THOSE WITH GOOD ELECTRONICS EXPERIENCE ONLY!

A DC-DC converter could be used to add a DC power inlet. It is recommended that a 100mA per rail supply is available so that the Brunswick has plenty of current “headroom” in which to operate. The outputs of this converter should be +9V and -9V, so should be able to run from a +12VDC supply. See the below part as an example, and read the datasheet for example supply circuitry: https://uk.farnell.com/xp-power/iv1209s/dc-dc-converter-2-o-p-1w/dp/2536112