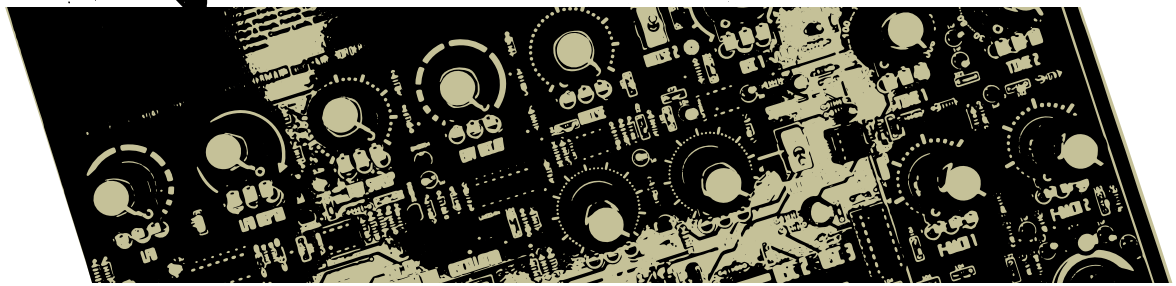
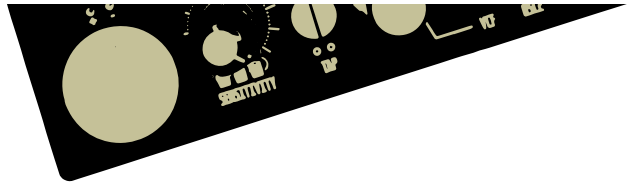
A PLACE TO BURY STRANGERS x DEATH BY AUDIO

SYNTHESIZER



BUILD GUIDE



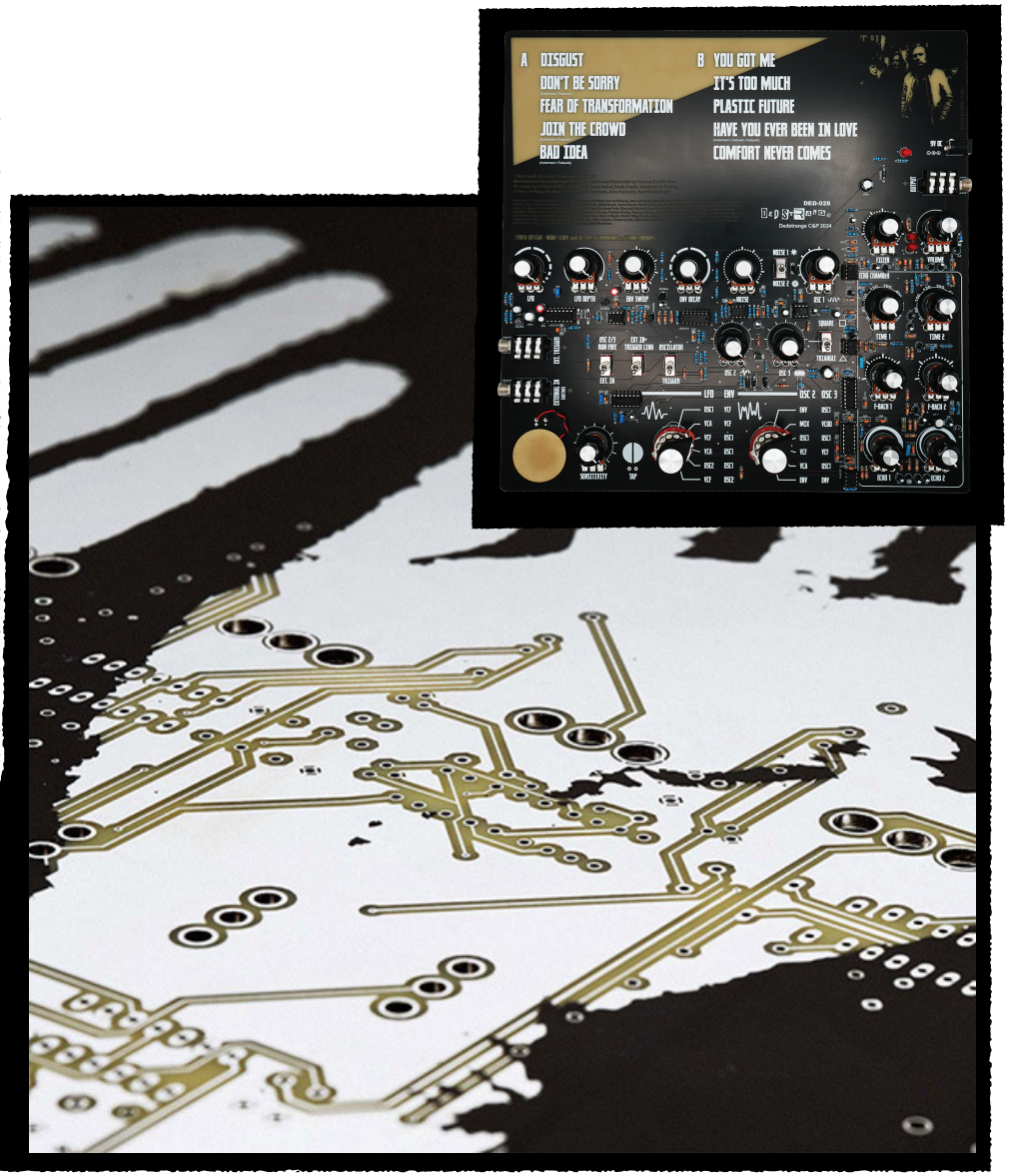
CONTENTS

INTRODUCTION

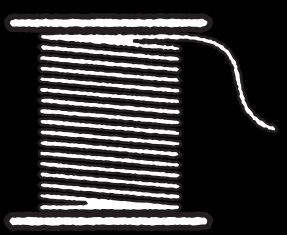
Thank you for purchasing the **DBA/APTBS SYNTHESIZER** record! This incredibly unique device is yours to build, play, and destroy. In an era of music-making in which much of the process is made intangible through using computers and digital effects, we want to allow you to build something deliberately chaotic, messy, and human. We hope you enjoy not only the result of your work but the process of creation as well.

The following pages will describe the process of assembling the **SYNTHESIZER**. Included are pictures for reference of both proper and improper assembly technique, as well as problems you may encounter. Go slowly and double check your work as you proceed!

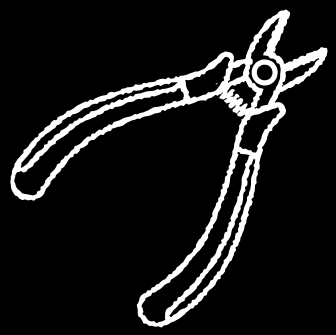
READ THIS DOCUMENT FULLY BEFORE BEGINNING ASSEMBLY!
THIS IS NOT A BEGINNER PROJECT.
IF YOU HAVE NEVER SUCCESSFULLY BUILT A WORKING CIRCUIT, BUILD THIS WITH A FRIEND WHO HAS.



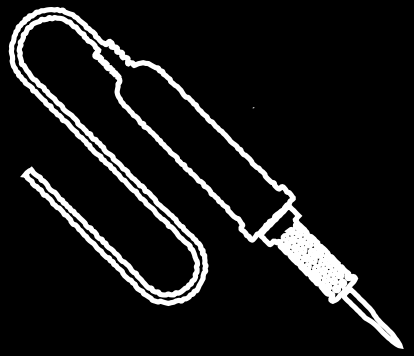
TOOLS YOU WILL NEED



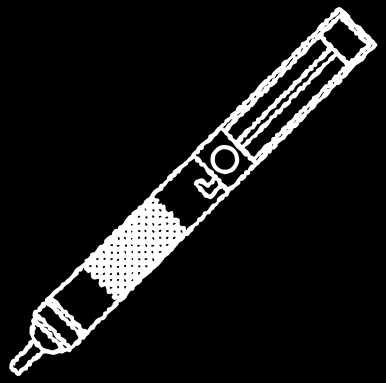
ROSIN CORE SOLDER
(60/40 OR 63/37 RECOMMENDED WITH 3% FLUX.
LEAD IS NOT GOOD FOR YOU!)



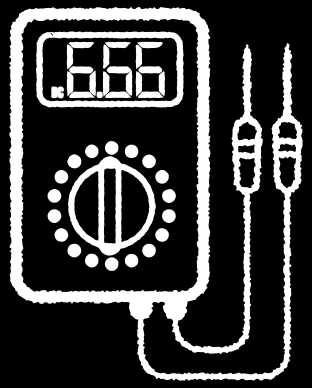
DIAGONAL WIRE CUTTERS



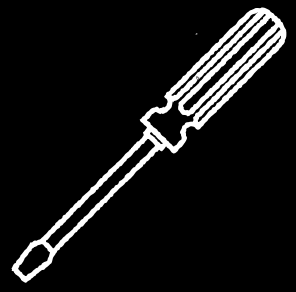
SOLDERING STATION
(30 WATTS OR MORE)



DESOLDERING PUMP/ SOLDER WICK



MULTIMETER



SMALL FLAT HEAD SCREWDRIVER

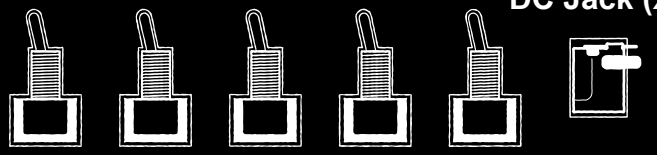
PARTS LIST

FULL BILL OF MATERIALS HERE:
https://killerrockandroll.com/deathbyaudio/APTBS-Synthesizer/SYNTHESIZER-APTBS-BOM.pdf

Pointer Knob (x2)

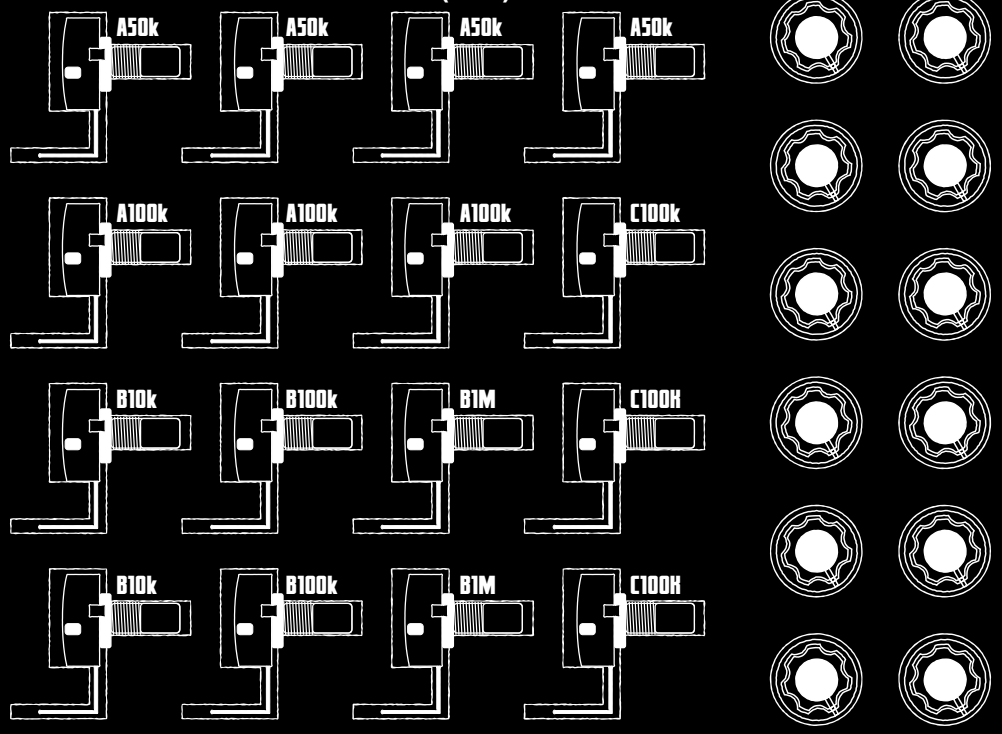
Synth Knobs (x17)

DC Jack (x1)

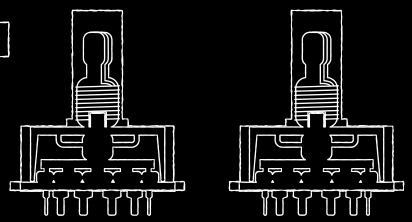


Toggle Switch (x5)

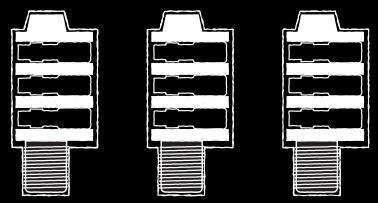
Potentiometer (x17)



Rotary Switch (x2)



1/4” Jack (x3)



PARTS LIST

* Potentiometer (x17)
* Toggle Switch (x5)
* Rotary Switch (x2)
* DC Jack (x1)
* 1/4” Jack (x3)
* Piezo Element (x1)
* Capacitor (x47)
* Polarized Capacitor (x34)
* Resistor (x96)
* Diode (x5)
* LED (x3)
* 2N3906 (x1)
* 2N3904 (x2)
* BC550 (x1)
* TL072 (x3)
* AS3080/LM3080 (x1)
* LM324 (x2)
* UA741 (x1)
* CD40106N (x1)
* 78L05 (x1)
* LM386 (x1)
* PT2399 (x2)
* IC Socket (x11)
* Small Pointer Knob (x2)
* Small Knob (x17)

KNOW YOUR PARTS

Here we will explain how to recognize and place each kind of part in the **SYNTHESIZER.**
Some parts must be placed on the circuit board in a certain orientation, which are marked in this sheet by the **POLARITY [+-]**

WARNING: PARTS WITH A SPECIFIC POLARITY WILL NOT WORK IF INSTALLED THE WRONG WAY

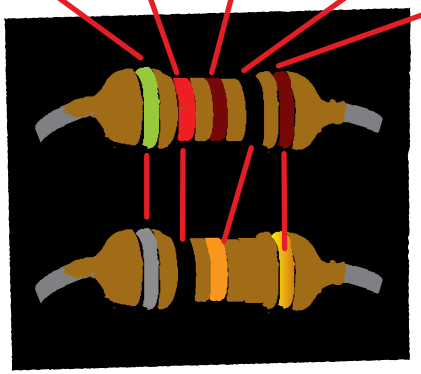
RESISTORS

Resistors will come in either 4 or 5 color band variants. See the adjacent charts for how to read the color codes to determine the value of each resistor.

For example, in the image there is a resistor with the color code: brown, black, orange, and gold; this would translate to 1, 0, 3, and 5%. That means it's the digits "10" with 3 zeros after it and the last gold band means it is a 5% tolerance resistor. Taking those first 3 numbers together, the total value is 10,000Ω or 10KΩ.

If you find you're a natural at this, you can read them directly this way, or if this seems to be a nightmare, the calculator link above should be much easier. If you're ever in doubt of what value a resistor is, you can also measure it with a multimeter.

COLOR	SIGNIFICANT FIGURES			MULTIPLY	TOLERANCE
BLACK	0	0	0	X 1	
BROWN	1	1	1	X 10	1 (F)
RED	2	2	2	X 100	2 (G)
ORANGE	3	3	3	X 1K	
YELLOW	4	4	4	X 10K	
BROWN	5	5	5	X 100K	0.5 (D)
BLUE	6	6	6	X 1M	0.25 (C)
VIOLET	7	7	7	X 10M	0.1 (B)
GREY	8	8	8	X 100M	0.05 (A)
WHITE	9	9	9	X 1G	
GOLD			3RD DIGIT ONLY FOR 5 AND 6 BANDS	X 0.1	5 (J)
SILVER				X 0.01	10 (K)
NONE					20 (M)



RESISTOR COLOR CODE CALCULATOR
https://www.calculator.net/resistor-calculator.html

CAPACITORS

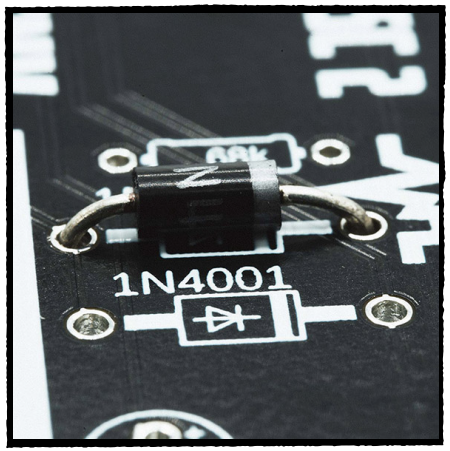
Capacitors may have their value OR part code printed on the part. Generally, capacitors 1uF and greater will have their value written, and smaller values will have a part code. You can also test capacitor values with most multimeters.

[+-]

Polarized Capacitors have a stripe on the negative side of the part. The positive side is marked on the circuit board with a '+'.

SEMICONDUCTORS

DIODES



Diodes have their part number written on the side of the diode. Make sure you are putting the right diode in the right place.

[+-]

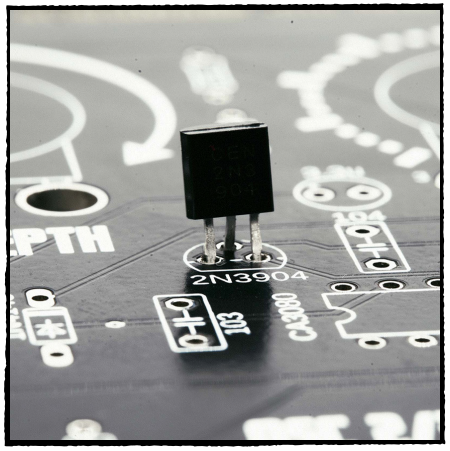
Diodes are marked with a line on the negative side of the part. The circuit board shows a matching stripe.

LEDS

[+-]

LEDs and Transistors have one flat side, which is shown on the circuit board as well.

TRANSISTORS



ICs

[+-]

ICs and Sockets have a small dot or notch on one side of the part, which should be matched to the printed notch on the circuit board.

CAUTION:
ICs CAN BREAK IF INSERTED INCORRECTLY.

RECOMMENDATIONS AND TIPS

This is an intermediate level project! Go slow and double check what you're doing before you do it. It is assumed that you are familiar with soldering before beginning to assemble this kit.

Make sure you are in a well ventilated area when soldering.

The silver hands are the exposed ground plane of the circuit. Take care when soldering that you do not bridge any solder from a signal pad to the surrounding ground plane. If anything does not work this should be the first thing you check for.

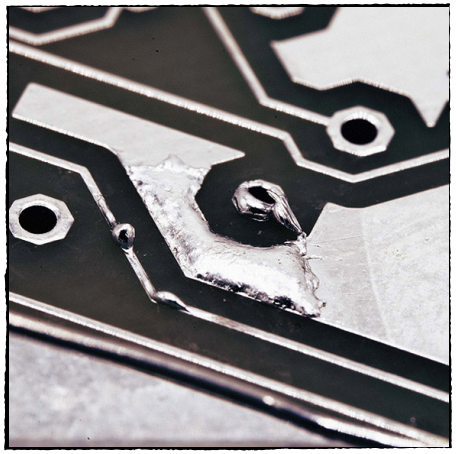


Image of bad bridged solder joint.

It is ok to solder a pad to the ground plane if it has a cross pattern like the image below. These are intentionally grounded and are connected to the larger silver hand ground plane.

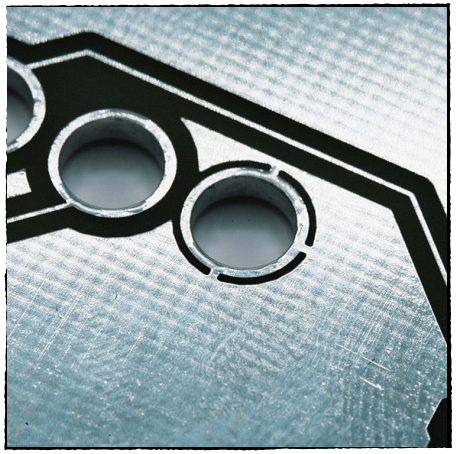


Image of cross ground pad unsoldered.

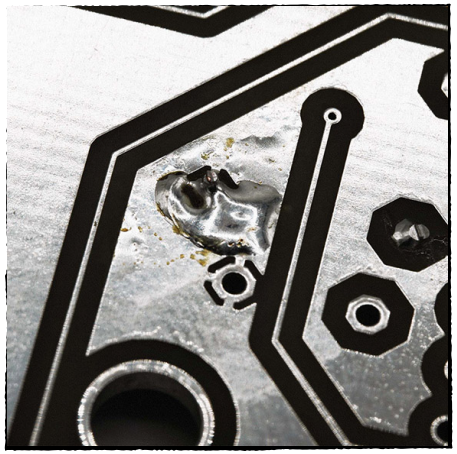


Image of cross ground pad soldered.

Always socket your ICs! Do not solder the ICs directly to the board. Solder the sockets to the board, finish the rest of the assembly, and as the last step, place the ICs in their sockets (mind the orientation!). This will help prevent accidental damage to sensitive chips while working on the board.

Generally, it is easiest to assemble parts in order of shortest to tallest - start with the resistors and capacitors, then IC sockets, and then move onto the hardware once those are all in. It is difficult to work on a solder joint if other parts are in the way!

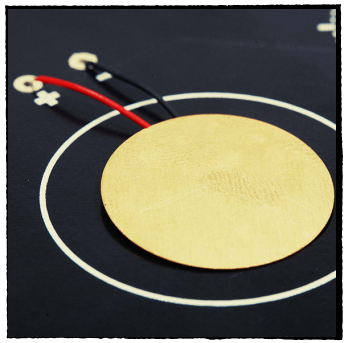
Once you're done, the trimmed leads on the bottom of the circuit board can be sharp! They also may short out if placed on a conductive surface. We recommend placing hardware such as rubber bump-ons on the corners of the synth to avoid this.

POWER

The **SYNTHESIZER** uses a standard guitar pedal power supply: 2.1mm center negative plug, 9V DC.

PIEZO/TAP pad:

The TAP contacts on the **SYNTHESIZER** are the same as the PIEZO contacts - this configuration means you can trigger the envelope whether you have the PIEZO installed or not, simply by touching the TAP pads with your finger. The PIEZO is connected with two wires, and can be affixed to the board or enclosure with tape, hot glue, silicone, etc.



BUILD ORDER

1. Separate out all of the parts before you begin. Assemble each section's parts in order of their value as they appear in the BOM. 220Ω, then 330Ω, etc.

2. DOUBLE and TRIPLE check you are placing the correct value part in each location. You will have a bad time trying to get your part back after you have already placed and soldered it. There are no replacement parts.

3. Insert the part into the circuit board.

[+-]

Always check the orientation of diodes, transistors, ICs, and polarized capacitors.

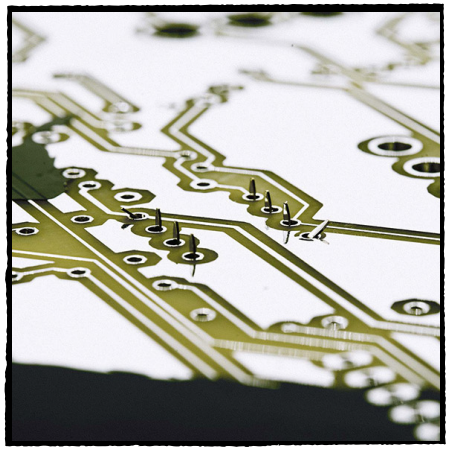
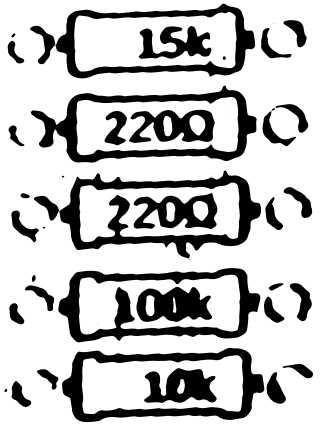


Image of ic socket with lengs bent slightly.

4. When you place small components with long leads (like resistors and capacitors), place the leads through the circuit board and bend the legs slightly away from each other to prevent the part from falling out of the circuit board. DO NOT bend the legs of the pots, jacks, switches, or other hardware, which can damage the part.

After you have placed all the parts for each section, flip the circuit board over and solder all the parts. Use your wire cutters to cut the legs off of the parts. It may be easier to cut the legs off of each individual part as you solder them for ease of access and to prevent bridging of connections. The places where you cut will be sharp so be cautious.

Image of resistor with lengs bent slightly.



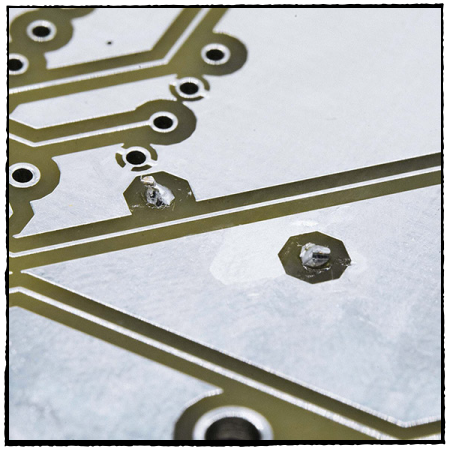
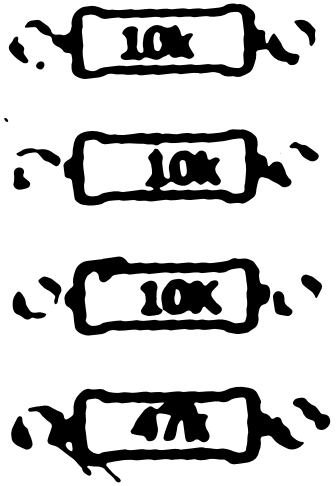


Image of resistor with lengs cut at right height.



1. RESISTORS

Image of resistor placed correctly.

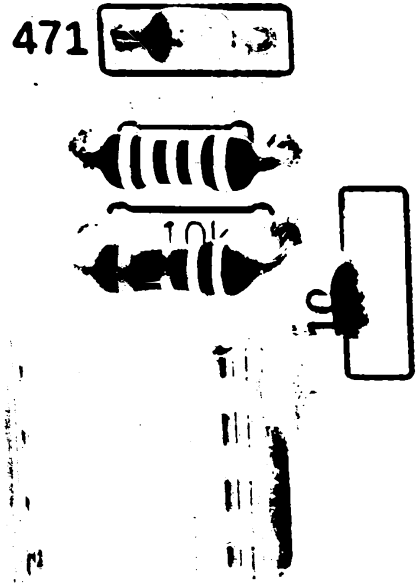


Image of circuit board with resistors outlined in red.

2. NON-POLARIZED CAPACITORS

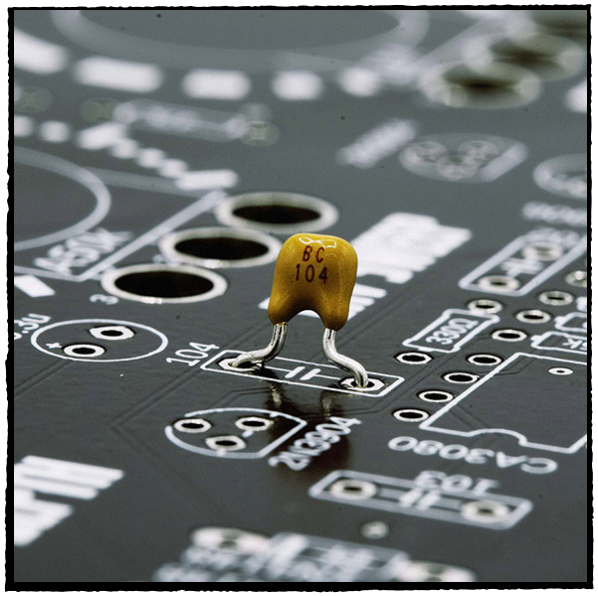


Image of capacitor placed correctly.

NOTE: Some capacitors have other capacitor codes printed on them, so if you're unsure it is best to double check the code online or measure it using a multimeter.

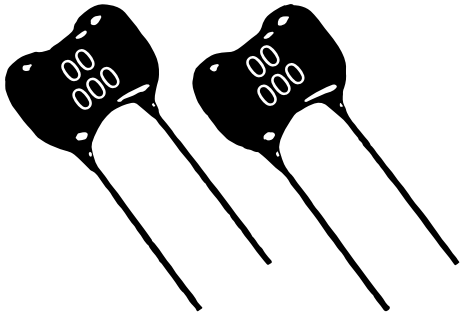


Image of circuit board with non-pol. capacitors outlined in red.

3. POLARIZED CAPACITORS

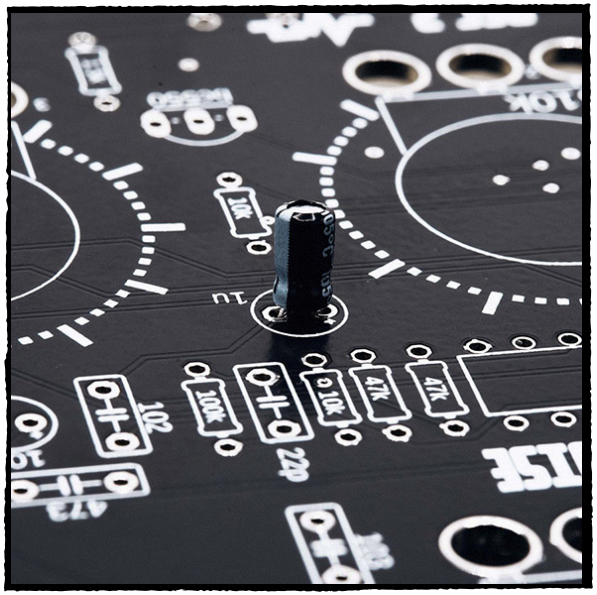


Image of polarized capacitor placed correctly.

[+-]

Polarized Capacitors have a stripe on the negative side of the part. The positive side is marked on the circuit board with a '+'.

NOTE: 2.2uf and 3.3uf capacitors are interchangeable.

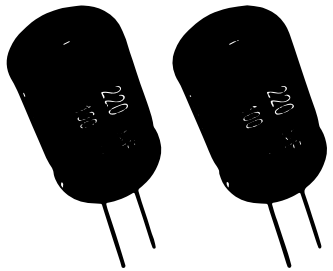


Image of circuit board with polarized capacitors outlined in red.

4. DIODES, LEDS, TRANSISTORS

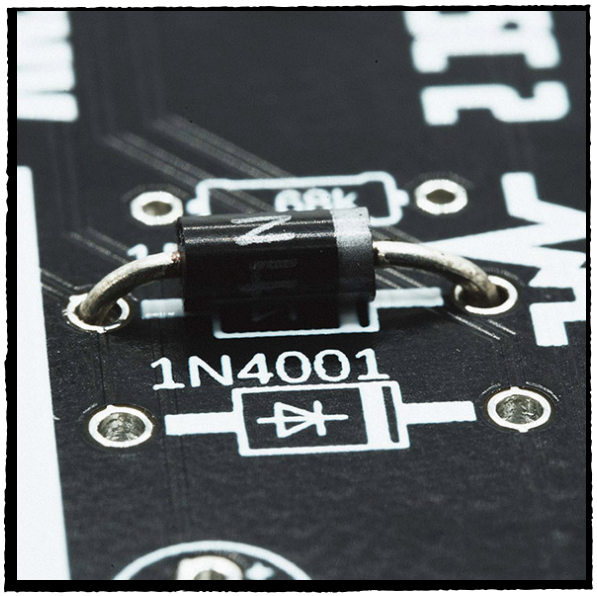


Image of diode placed correctly.

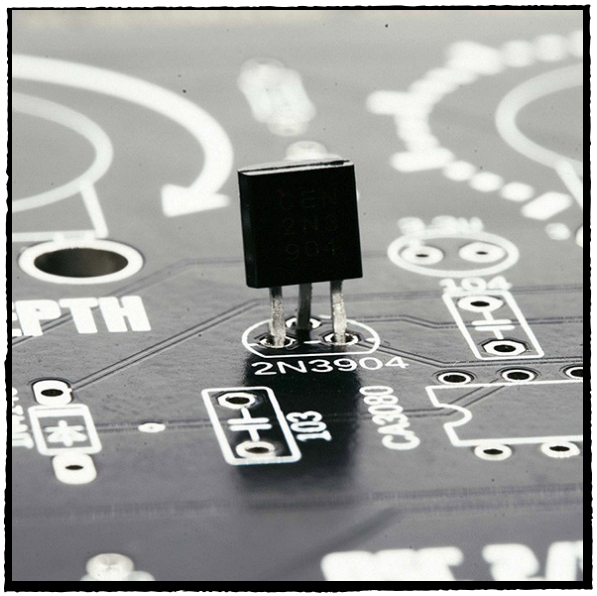


Image of transistor placed correctly.

Image of LED placed correctly.

[+-]

Diodes are marked with a line on the negative side of the part. The circuit board shows a matching stripe. LEDs and Transistors have one flat side, which is printed on the circuit board as well.

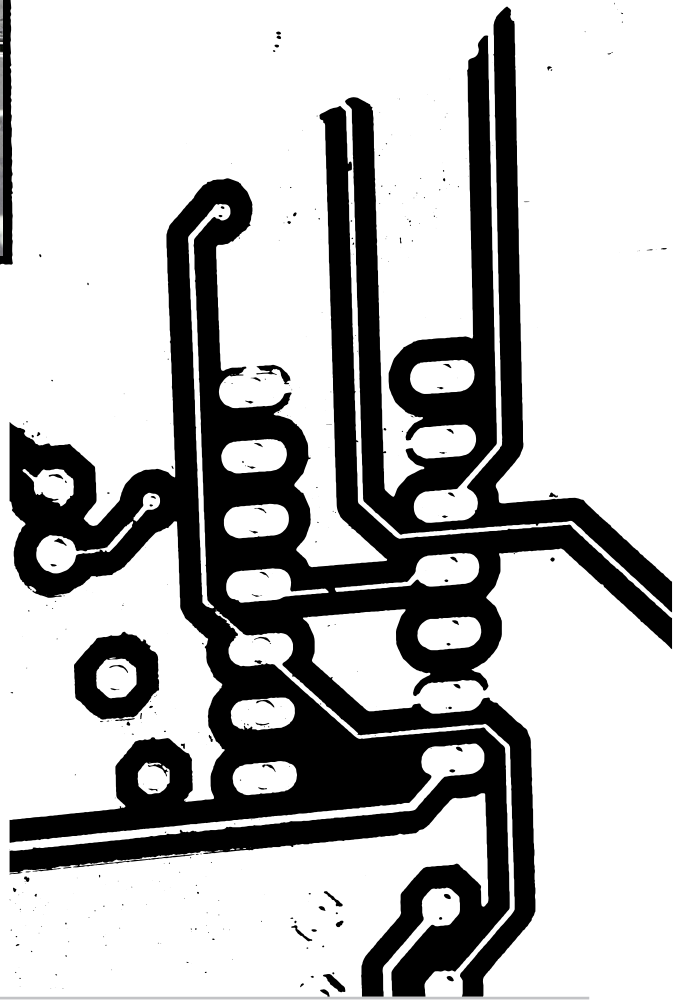


Image of circuit board with diodes and transistors outlined in red.

5. IC SOCKETS

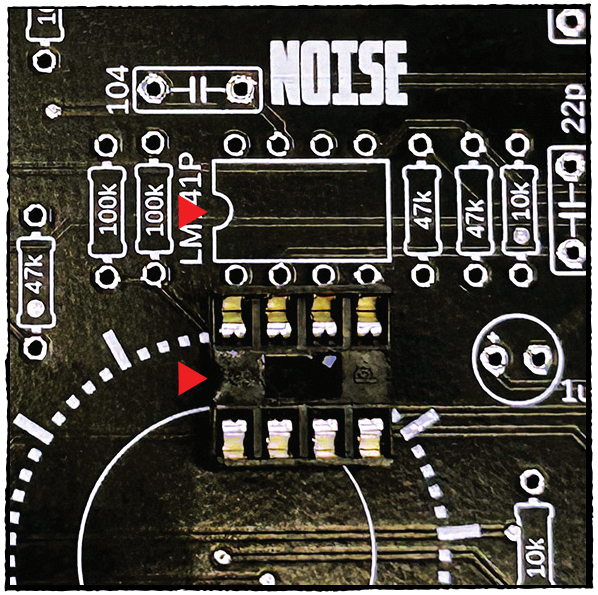


Image of ic socket placed correctly.

[+-]

Sockets have a small notch on one side of the part, which should be matched to the printed notch on the circuit board.

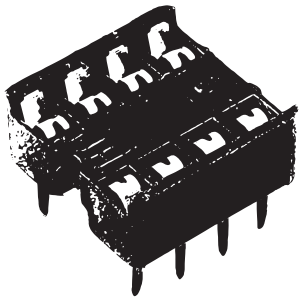


Image of circuit board with ICs outlined in red.

6. HARDWARE

JACKS, TOGGLE SWITCHES, ROTARY SWITCHES

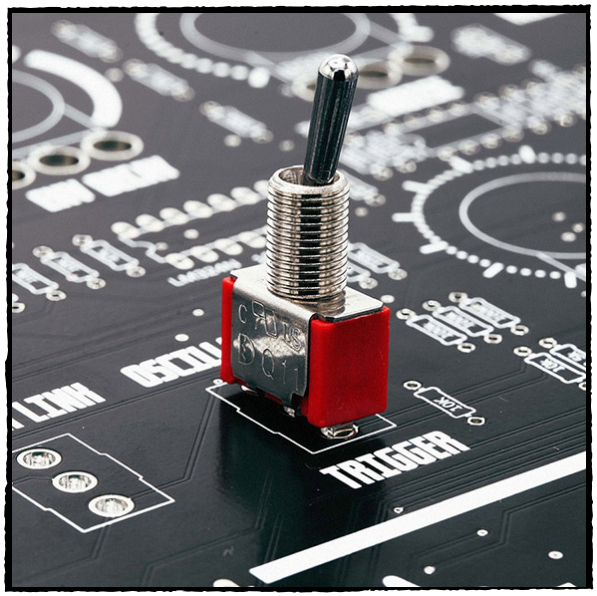
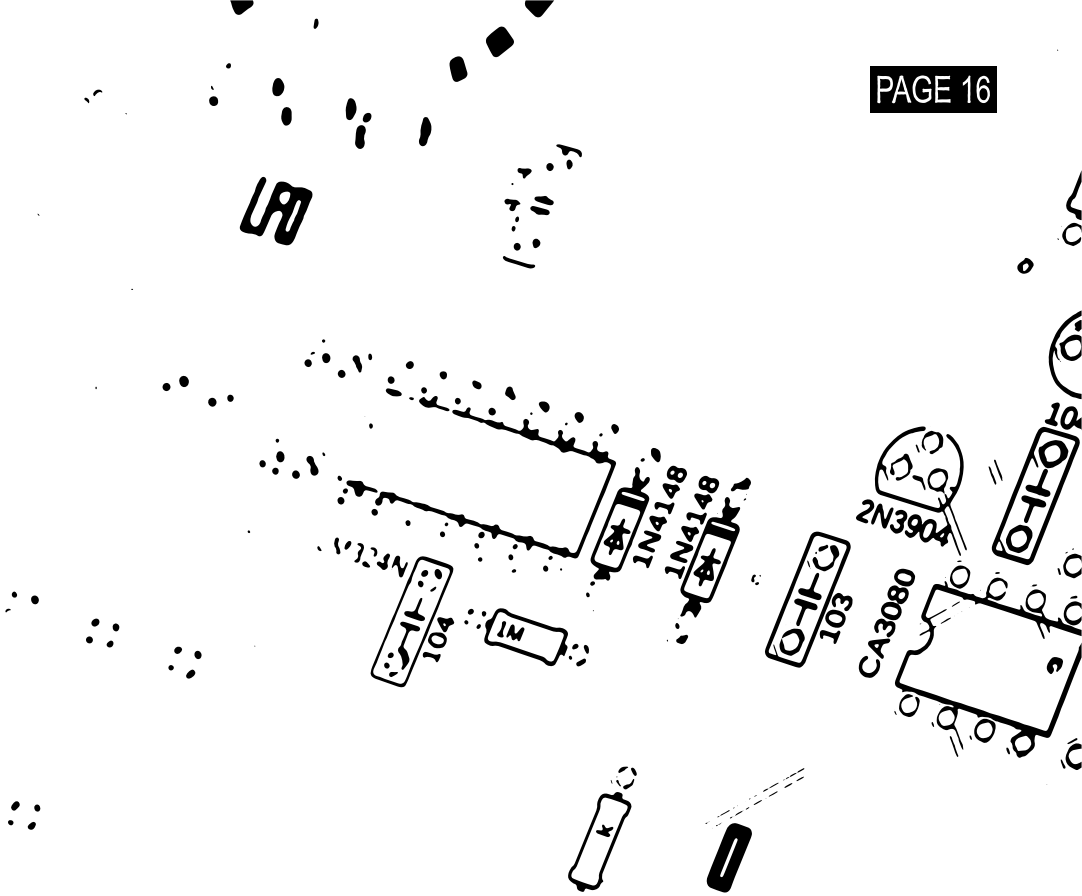


Image of toggle placed correct.



You may have an easier time assembling the hardware by first holding the part flush against the circuit board then soldering only one pin to hold it in the correct position. Then solder the rest of the connections.

DO NOT bend the legs of the jacks, switches or other hardware. This can damage the part. You may want to cut the legs off of the switches to make the **SYNTHESIZER** lay flat. We recommend using heavy duty cutters to not dull your diagonal cutters.

7. POTENTIOMETERS

PLACE FLUSH WITH BOARD

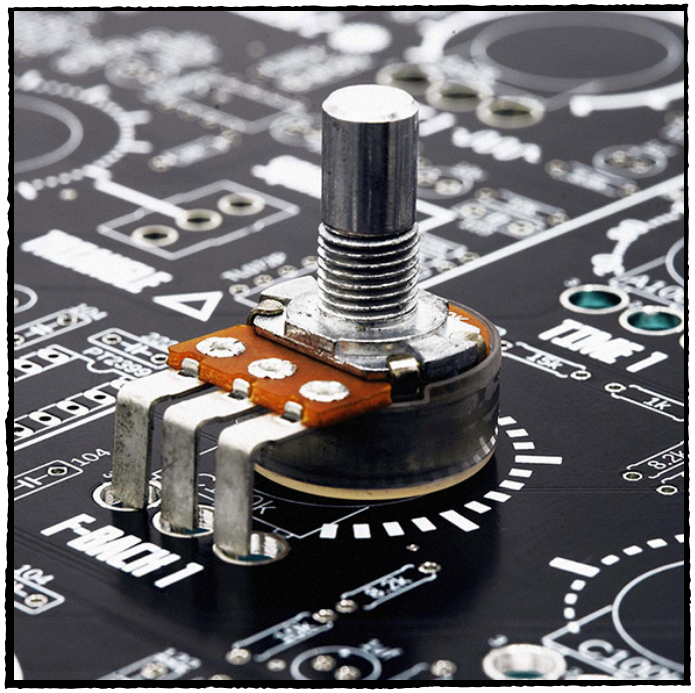
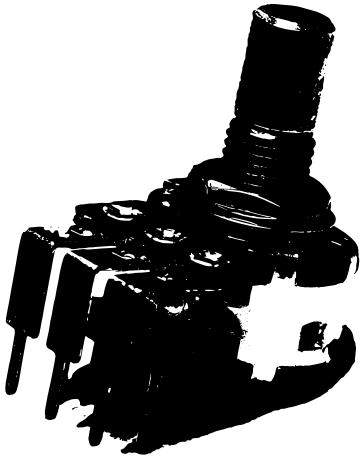


Image of pot placed correctly.



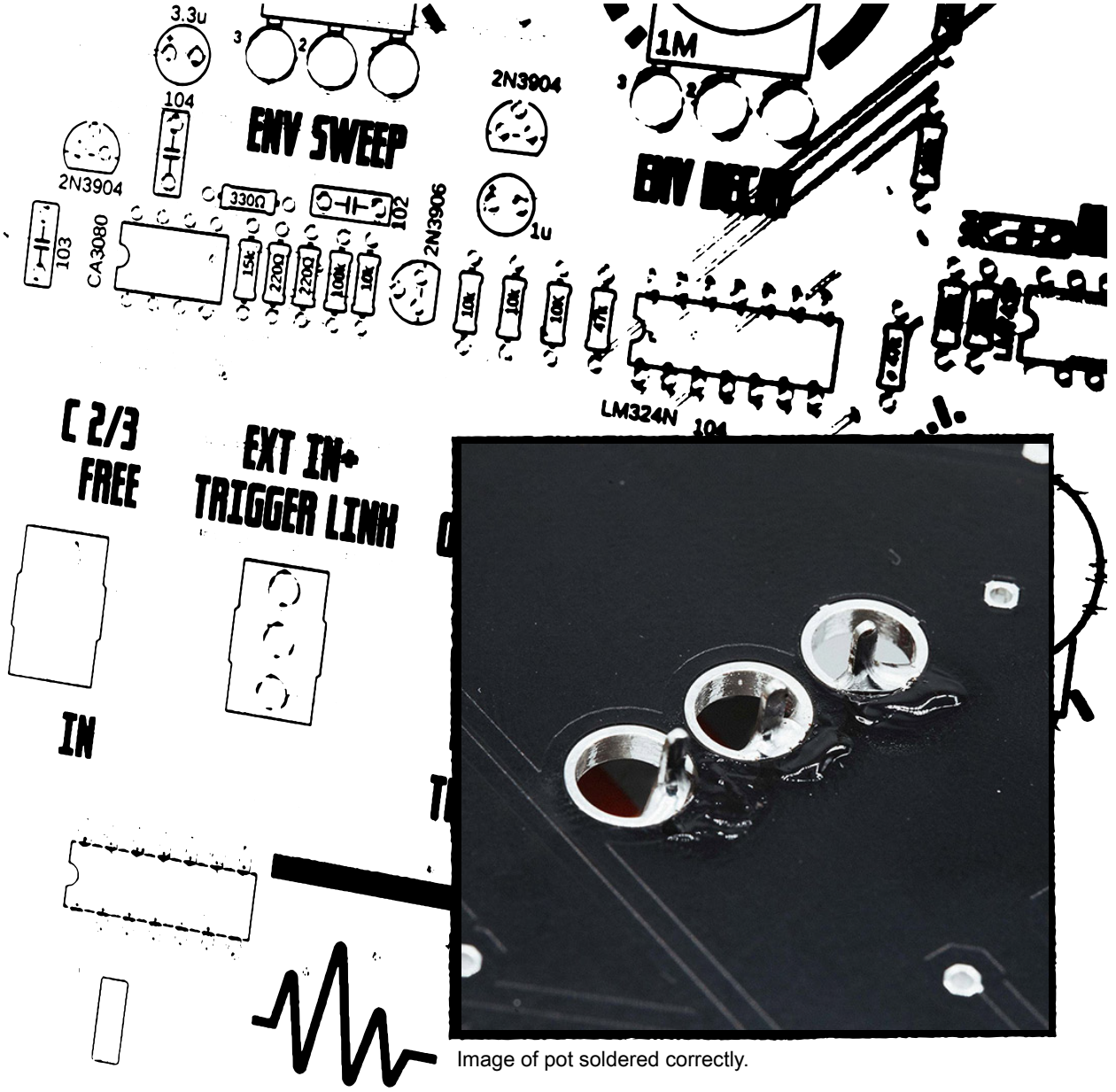


Image of pot soldered correctly.

8. PIEZO

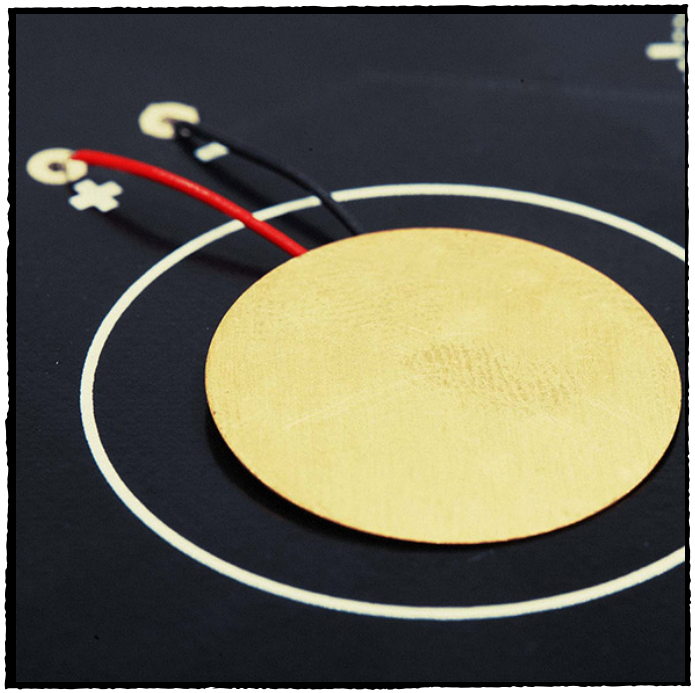


Image of piezo placed correctly.

Use tape, hot glue or adhesive to stick the piezo directly onto the circuit board gold side up.

9. ICs

Image of ic placed correctly.

[+-]

ICs have a small dot or notch on one side of the part, which should be matched to the notch on the socket and the printed notch on the circuit board.

NOTE: Some ICs may have different letters leading to the part number. Look for the number and not the letters to match the ICs. Eg: CA3080 is the same as AS3080.

CAUTION!: ICs can break if inserted incorrectly. IC legs are especially fragile and you should make sure none are bent before pushing the part into the socket.

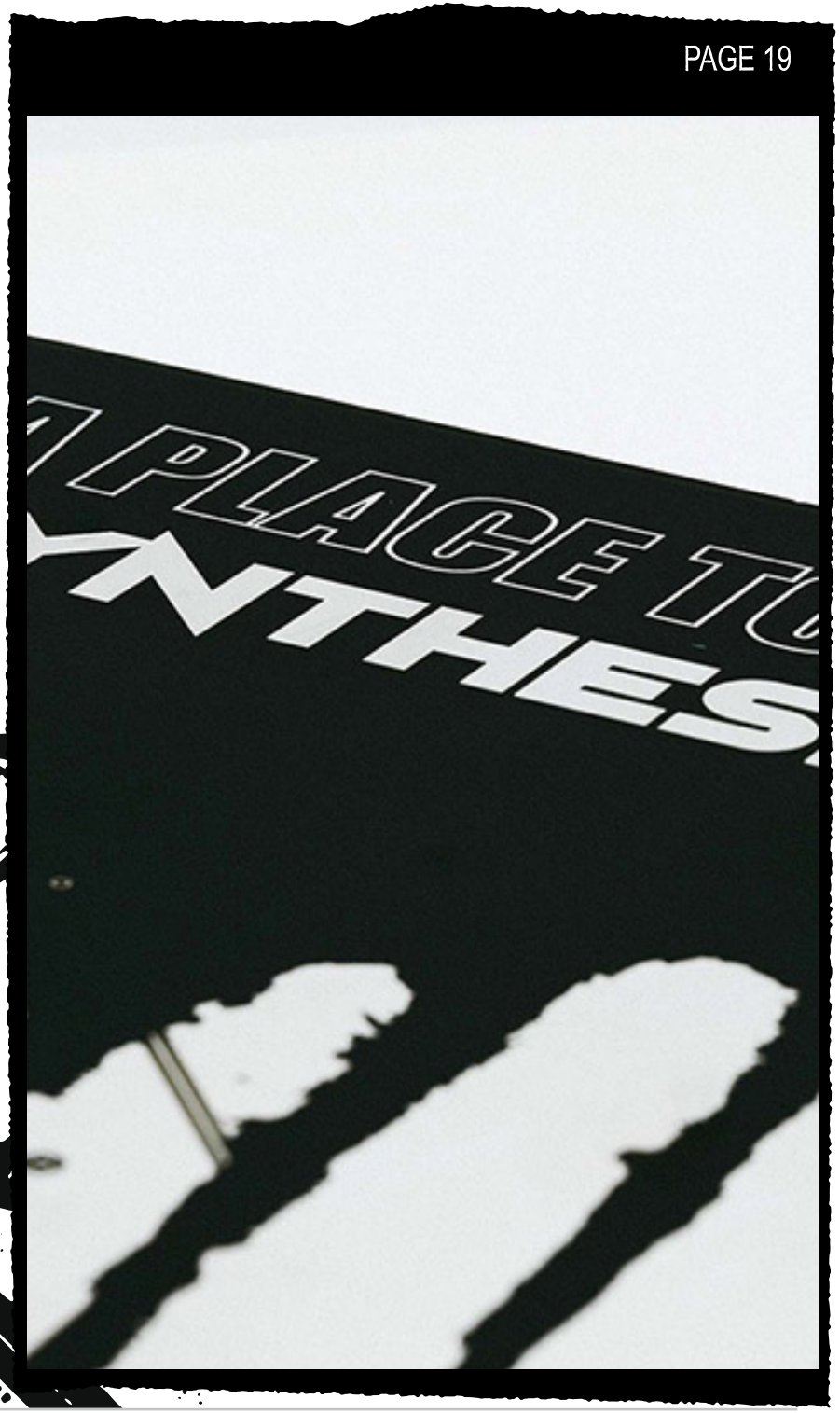
It's recommended you use an IC puller to remove ICs from their socket if needed. You can bend and break their legs if done incorrectly.

10. KNOBS

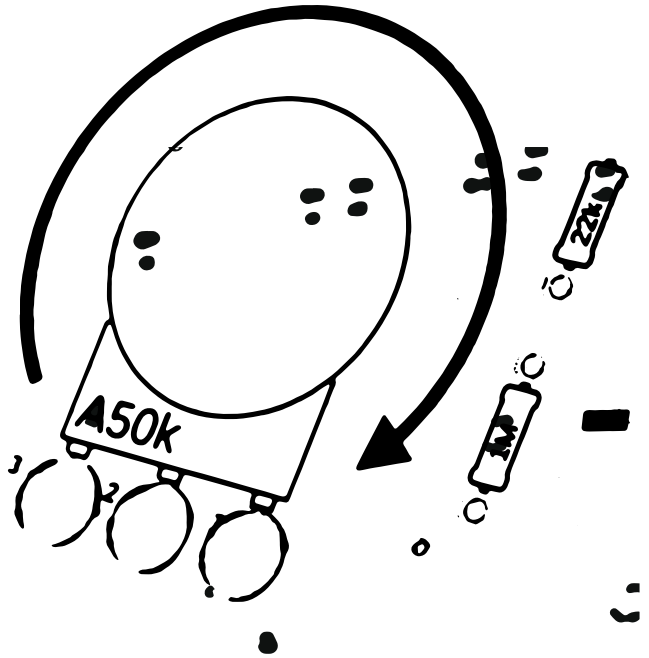
Image of knob placed correctly.

Use a small flathead screwdriver to unscrew the set screw on the side of the knob until you can fit it on the potentiometer shaft.

Turn the potentiometer fully clockwise and place the knob over the shaft with the line pointing at 5 o'clock. Tighten the set screw until it is snug and doesn't slip on the pot.



PLAY!



The **SYNTHESIZER** is an experimental music device. We encourage you to turn the knobs to extreme positions, mangle external audio past recognition, and let the delay circuits oscillate too much. Drones, drums, ripping lead tones, and ambient washes are all hidden somewhere inside the **SYNTHESIZER**. Explore, embrace imperfection, and have fun!

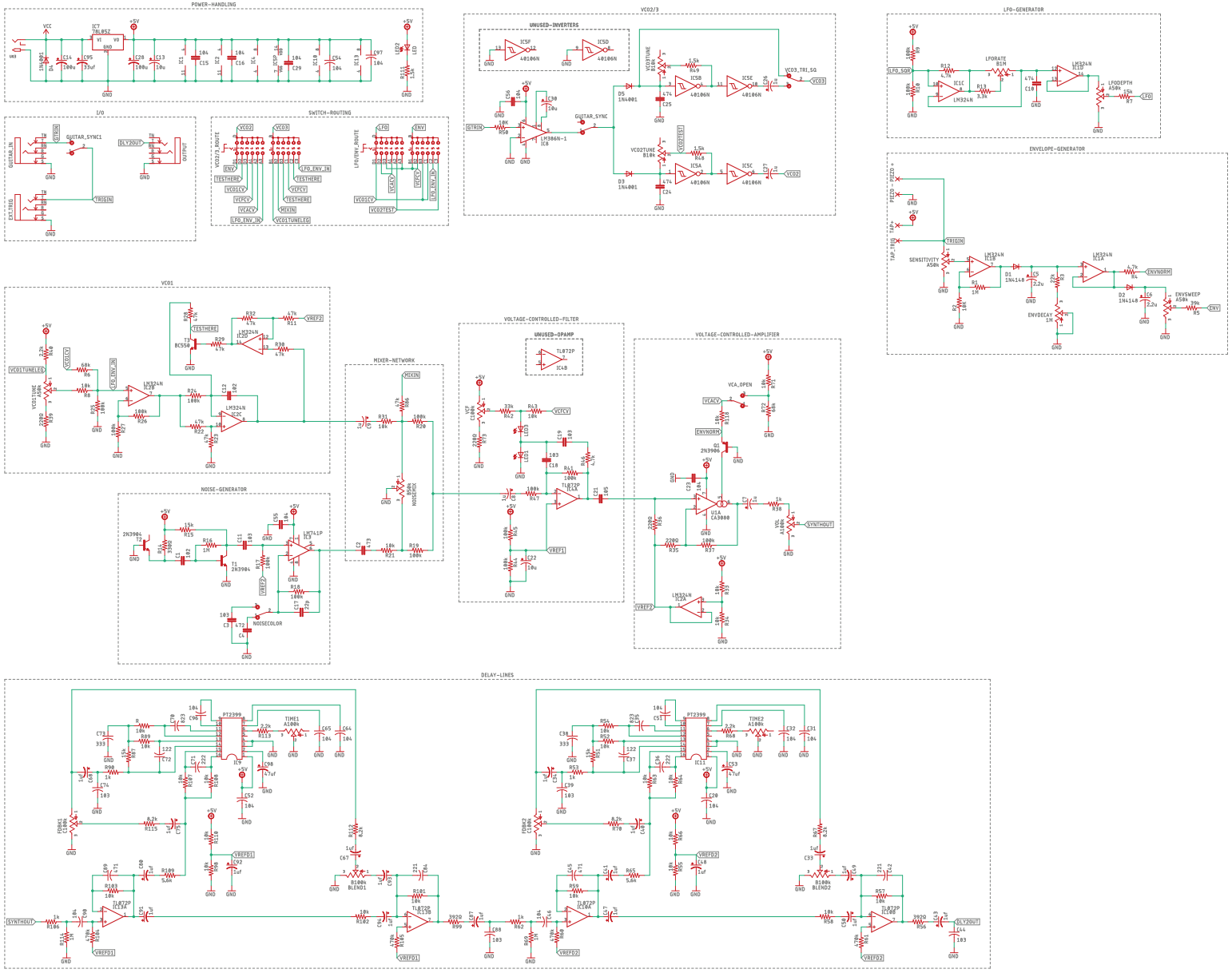
REPLACEMENT PARTS:

Death By Audio is only selling full parts kits for the **SYNTHESIZER** - if you need to purchase any individual components, please refer to our Bill Of Materials, where you can find the part numbers for all parts necessary for the build.

WARRANTY:

Please note as this is a DIY build, this product is not covered by the standard DBA WARRANTY, and we cannot offer free repairs for this product.

SCHEMATIC


POWER-HANDLING
I/O
SWITCH-ROUTING
VCO2/3
UNUSED-INVERTERS
LFO-GENERATOR
ENVELOPE-GENERATOR
VCO1
MIXER-NETWORK
VOLTAGE-CONTROLLED-FILTER
UNUSED-OPAMP
VOLTAGE-CONTROLLED-AMPLIFIER
NOISE-GENERATOR
DELAY-LINES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