

# DIY



**Knight School  
Synth Kit**

# HELLO PEDAL BUILDER!

Yes, you, after finishing and executing the contents of these instructions, you will have earned that title. The information contained herein will let you know how we can go about accomplishing that goal.

## YOU WILL NEED THE FOLLOWING EQUIPMENT:

- A soldering iron (not a “gun,” preferably one with a variable temp)
  - Solder (lead-free or the standard stuff, it’s up to you)
  - Wire cutters (nail clippers will work in a pinch)
  - Sockets or a pair of pliers (for tightening nuts)
- A well-ventilated workspace (don’t breathe solder fumes)

## OPTIONAL BUT HELPFUL:

- A “third hand” tool or PCB vise/holder (to hold the board, soldering is typically a two-handed job)
  - A “solder sucker” (in case you make mistakes)

## AND BEFORE WE GET INTO IT:

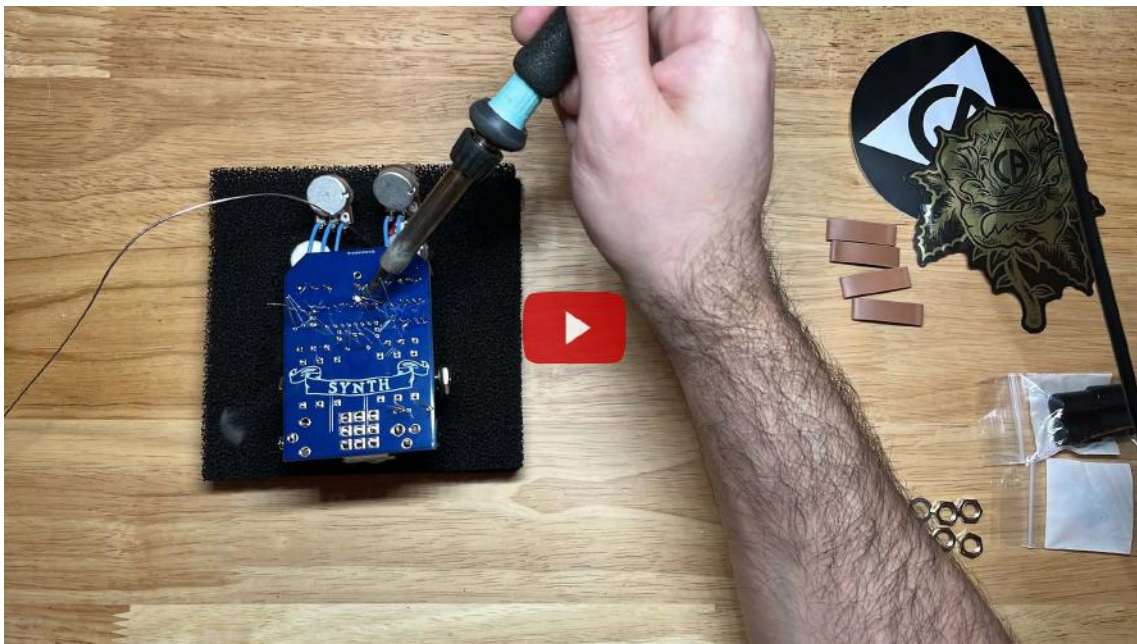
Neither I nor Catalinbread, LLC, will be held responsible for any personal harm, property damage, or any other kind of liability stemming from the assembly of this device from instructional materials found on this site or elsewhere. This includes the included componentry as well as the use of tools specified as necessary for the assembly of this kit, such as soldering irons, ventilation devices, hand tools, etc.

# SOLDERING: QUICK AND DIRTY

Before we start, I want to say that there are plenty of fine videos on YouTube that can cover this in great detail. However, in the interest of space, I will keep it quick.

1. Whatever solder type you are using will dictate the temp at which you should run your iron. If you're using leaded (standard) solder, you can keep it between 600 and 650 degrees. Lead-free solder requires a slightly higher temperature, between 650 and 700 degrees.
2. Use your iron tip to heat the pad around the part and not the part itself. Heat the pad with one hand holding the iron and the other feeding the solder to the pad. With any luck, the solder will flow. Make sure the pad is completely covered in solder but not bubbled over into a huge glob. Think concave, not convex.

## ASSEMBLY VIDEO



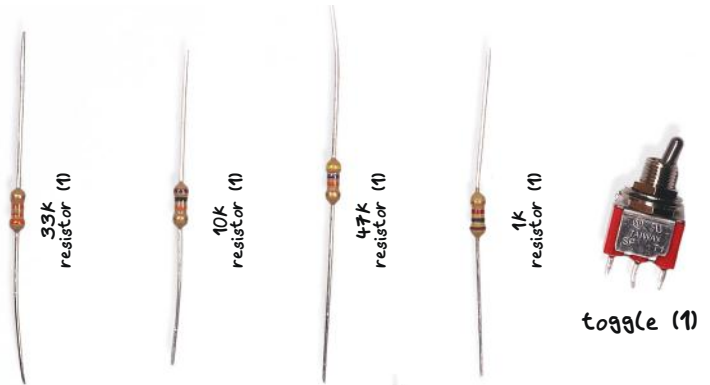
# PARTS LIST



circuit board (1)



knobs (4)



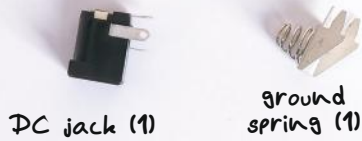
33K resistor (1)

10K resistor (1)

47K resistor (1)

1K resistor (1)

toggle (1)



DC jack (1)

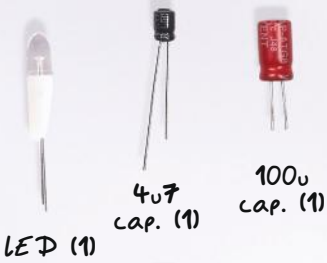
ground spring (1)



2N3904 trans. (1)

47u cap. (1)

1N4001 diode (1)



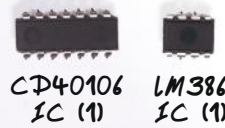
LED (1)

4u7 cap. (1)

100u cap. (1)



backplate screws (4)

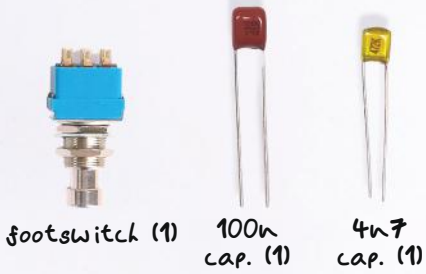


CD40106 IC (1)

LM386 IC (1)



wire



footswitch (1)

100n cap. (1)

4n7 cap. (1)



1/4" jack (2)



A100K pot. (1)

B10K pot. (1)

B500K pot. (1)

A500K pot. (1)



enclosure (1)



backplate (1)

# ASSEMBLY INSTRUCTIONS

Generally speaking, when I'm assembling a board, I install components by height, so that when I flip the board over to solder the components, the board is relatively flat on my workspace, and then I don't have to use a third hand/PCB vise. In many cases, this means that resistors and diodes are first, any ICs/chips are second, non-electrolytic capacitors are third, transistors are fourth (there are none in this build), electrolytic capacitors are fifth, and potentiometers/hardware are last. Lastly, you can assemble the components in any order you wish and it has no bearing on the final product. The instructions below will assume you are following my preferences.

1. Insert the resistors into their indicated positions, and bend the leads outward such that they stay in the board when you flip it over to solder. Trim excess component leads off after soldering. The orientation of the resistors on the board does not matter. Resistors are measured in Ohms, "K" is shorthand for "kiloohms." The values are written on the PCB itself, but unfortunately resistor values are not normally printed on the part. The color bands correspond to the value, and you are welcome to look up a decoder chart, but here's the quick and dirty:

1K: brown/black/red/gold  
10K: brown/black/orange/gold  
33K: orange/red/red/gold  
47K: yellow/black/orange/gold

2. Insert the diode into its indicated position, making note of the stripe on the part itself, and match it to the picture on the board. Unlike resistors, the direction of this does matter. Bend the leads out to secure them, solder them in, then trim off the excess.

- 3. Insert the ICs into their positions, with the IC notches/dots aligned according to the PCB graphic. Make sure that each pin is in a pad, sometimes if an IC that isn't properly aligned, it can smooch the pins up onto itself rather than going into the board. Verify that all pins are inside the pads, then solder them in. The pins are short, don't worry about trimming them after soldering. These ship to us (and thus, you) with the legs slightly fanned outward, so they will not drop directly in without some coercion. To make this work, hold the sides of the IC (don't worry, you can touch the legs) and then gently bend the pins inward. With some gentle shaping, the IC will drop right in.**
  
- 4. Insert the capacitors into their indicated positions and bend the leads out. Solder them in and trim off the excess. The orientation of the non-electrolytic capacitors on the board does not matter. Capacitors are technically measured in Farads, but we work with very small values, typically in picofarads (p, pF), nanofarads (n, nF) and microfarads (u, uF). All nano- and microfarad parts will have the value printed right on them.**
  
- 5. Insert the transistor into its position, bend the leads outward, solder them in and trim off the excess.**
  
- 6. Insert the electrolytic capacitors into their position, (shorter leg is negative, it is also printed on the part itself), bend leads outward, solder them in and trim off the excess.**
  
- 7. Add the hardware, which includes the LED (the shorter of the two legs is negative), the footswitch (make sure the flat footswitch lugs are parallel with the board's bottom edge, not perpendicular), jacks, DC jack and ground spring. Solder them in and trim off the nubs.**
  
- 8. Solder the wires to the potentiometer lugs, then orient the other ends of the wires into the pads onto the board. Match the value (printed on the pots) to the writing on the board and with the potentiometer shafts pointing up, align them such that the lugs are pointing in the direction of the arrow pointing near each. On this particular board, the outer two potentiometers should be pointing down, and the center is pointing up.**

9. Solder the wires to the toggle switch, then solder those wires into the pads on the board. You don't need to worry about which switch lugs to use, so long as the middle lug is wired to the middle pad and either other lug is wired to the bottom one on the board. The hole nearest the top edge of the board is not connected to the circuit.

*At this point, you can try the pedal out without putting it in the enclosure. If you followed these instructions exactly, it will work, and if it does, congratulations, put it in the enclosure and let it rip! If it doesn't work, it's not a big deal! But some fixes are easier than others. If you own a desoldering pump, you're going to get some usage out of it.*

## TROUBLESHOOTING

### ISSUE: NO SOUND WHATSOEVER AND NO LED LIGHT

Potential problems: 1N4001 backwards, 47u capacitor backwards, footswitch inserted with lugs perpendicular to bottom board edge

Solutions: Make sure the first two components are oriented correctly. If it's the footswitch, you can desolder it but it will be a challenge. Unfortunately it is emboldened within the instructions for this reason.

### ISSUE: NO SOUND, LED LIT

Potential problems: ICs/transistor not inserted correctly, missing component

Solutions: Make sure the parts are inserted in accordance with the shape printed on the board, and make sure all component slots are filled (some boards for other effects purposefully omit components but not this one).

### ISSUE: SOUNDS "WEIRD"

Potential problems: IC backwards, wrong parts in pads

Solutions: Verify the placement of each part and ensure they match the board footprint.

Other issues? Email us! [help@catalinbread.com](mailto:help@catalinbread.com)