PROJECT NAME

LUMITRON

aion DIY GUITAR EFFECTS

BASED ON
Mu-tron® III

BUILD DIFFICULTY
Intermediate

EFFECT TYPE
Envelope filter / auto-wah

DOCUMENT VERSION
1.0.0 (2025-08-30)

PROJECT SUMMARY
The very first commercial envelope filter effect, first released in 1972. Famously used by Bootsy Collins, Jerry Garcia and Stevie Wonder among many others.

IMPORTANT NOTE

This documentation is for the **kit** version of the project. If you purchased the PCB by itself, please use the PCB-only version of the documentation instead. The circuit is the same, but the instructions are completely different due to the specialized parts and assembly methods used in the kit.

TABLE OF CONTENTS

INTRODUCTION

If this is your first pedal, welcome to the hobby and thank you for choosing Aion FX. You've just joined a community of over 100,000 people around the world with a passion for building homemade noise machines using obsolete electronics technology, and we're glad to have you!

If you've done this before, it's great to see you again and we're confident you'll find this build experience an enjoyable one.

Aion FX kits are designed to empower anyone to build a high-quality pedal, no matter the skill level. The pedalbuilding hobby has traditionally had a steep learning curve, but don't be overwhelmed—we've done all the hard work for you. All you need to do is follow these instructions and you'll be on your way to transforming your tone.

There are a few things to go over before you get started.

- **You're going to have to get your hands dirty**—there's no way around it. Nothing here comes preassembled, and you'll have to learn the skills to put it all together. This document will walk you through everything you need, but be prepared to learn a few things along the way.
- **This will take time**. Plan on about two hours start to finish. It may take even longer if it's your first time building. Don't rush it. If you find yourself getting frustrated or overwhelmed, take a break and come back in a couple of hours or the next day.
- **No direct technical support is offered.** There are several DIY forums and Facebook groups with thousands of members who enjoy troubleshooting and teaching. But please be sensitive to the fact that the staff at Aion FX is minimal, and every minute spent helping individuals in private is time that can't be spent on new project development.
- **There is no implied guarantee of a final product.** Aion FX provides the ingredients and the recipe, but you are responsible for putting everything together to make it work. We've tried to make the process as clear and accessible as possible, but it must be expressly stated that purchasing the kit is not a guarantee that you will end up with a working pedal.

It's recommended to read through all of the instructions before you start, particularly if you've never built a pedal before. If you familiarize yourself with the entire process ahead of time and you know what the goal looks like, each step will make more sense.

Now, on to the fun stuff!

PACKING LIST

This is a list of all the parts that are included with the kit, grouped by value. For a list of all the parts based on their PCB part numbers, please see page 26.

If you find that any parts are missing or damaged, please fill out the Missing Parts form.

Film Capacitors

NAME	QTY
1n	2
1n8	2
2n2	2
100n	1
1uF	2
2.2uF	1

Electrolytic Capacitors

NAME	QTY
4.7uF	1
10uF	2
100uF	2

MLCC Capacitors

NAME	QTY
10pF (marked “100”)	1
100pF (marked “101”)	1
100n (marked “104”)	1
470n (marked “474”)	1

Optocouplers

NAME	QTY
VTL5C3	2

Trimmers

NAME	QTY
5k trimmer	1

Resistors

NAME	QTY
330R	1
560R	1
680R	1
1k	2
3k3	1
4k7	1
12k	2
22k	4
47k	1
120k	5
180k	1
220k	2
390k	1
1M	2
2M2	1

Diodes

NAME	QTY
1N5817	1
1N914	2
1N4742A	1

PACKING LIST (CONT.)

ICs

NAME	QTY
RC4558P	3
LT1054CP	1
8-pin socket	4

Other

NAME	QTY
LED bezel	2
LED, white	1
LED, red	1
DC jack	1
Input/output jack	2
Mounting nut, jack, 0.54"	4
Outer washer, jack, 0.6"	2
Lock washer, jack, 0.5" (thin)	2
Enclosure	1
Enclosure screws	4
PCB, main circuit	1
PCB, footswitch	1
PCB, input/output/DC	1

Potentiometers

NAME	QTY
100kA	1
250kA	1
1MC (marked “C105”)	1
Dust cover	3
Knob	3
Mounting nut, potentiometer, 0.44"	3
Lock washer, potentiometer, 0.5"	3
Outer washer, potentiometer, 0.475"	3

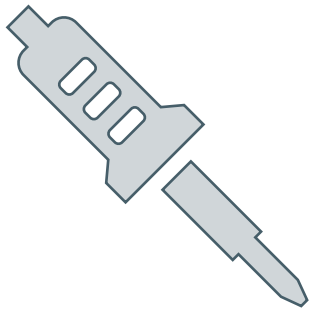
Switches

NAME	QTY
Toggle switch, DPDT on-on	1
Toggle switch, DPDT on-on-on	1
Toggle switch, DPDT on-off-on	1
Mounting nut, toggle switch, 0.36"	3
Lock washer, toggle switch, 0.4"	3
Dress nut, toggle switch, 0.375"	3
Stomp switch, 3PDT	1
Mounting nut, stomp switch, 0.6"	2
Lock washer, stomp switch, 0.6"	1
Dress nut, stomp switch, 0.77"	1

Wiring

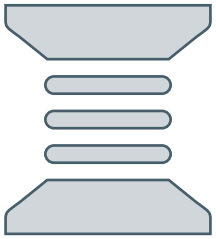
NAME	QTY
3-strand wire assembly, 70mm	2
4-strand wire assembly, 122mm	1
3-pin wire assembly header	2
4-pin wire assembly header	1

TOOLS NEEDED



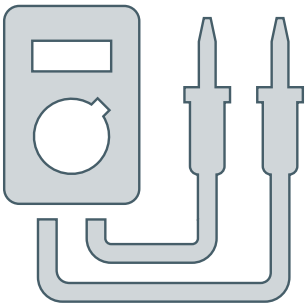
SOLDERING IRON

Temperature-adjustable is recommended. The optimum soldering temperature is 700-725° F (371-385° C) for leaded solder, or 750° F (400° C) for lead-free.



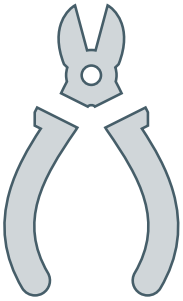
SOLDER

Preferably 63/37 or 60/40 leaded solder. Lead-free is more difficult to use, so if that's the only type you can get, it's best to watch tutorials that are specific to lead-free solder.



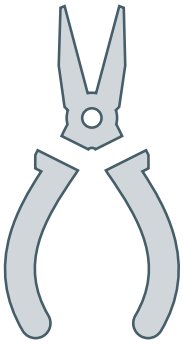
DIGITAL MULTIMETER (DMM)

Most cheap ones in the $10-30 range are fine for what we're doing. Make sure it has audible continuity testing (i.e. it beeps at the lowest resistance) and transistor hFE measurement.



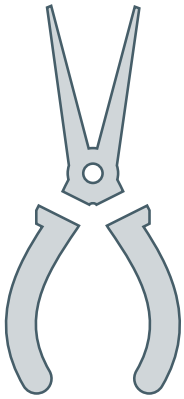
WIRE SNIPPERS

Also called nippers or wire cutters. The Hakko CHP-170 is the best you can get for less than $10.



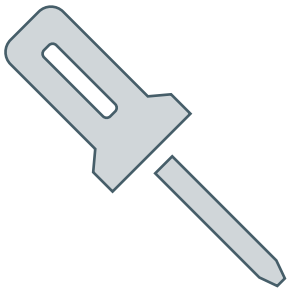
FLAT-NOSE PLIERS

Many general-purpose uses, but particularly tightening the nuts of pots, switches and jacks. Quicker than changing out sockets on a ratchet.



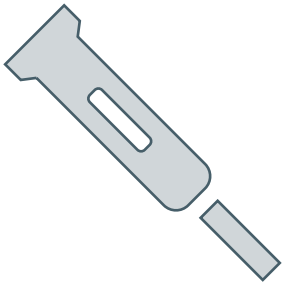
NEEDLE-NOSE PLIERS

These are used for bending leads on components and other general uses. Use the smaller type with a tip that's approximately 0.05" (1.25mm) wide.



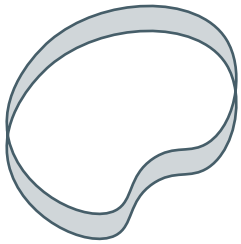
SCREWDRIVER (PHILLIPS)

Used for the enclosure screws. Get a powered driver if you'll be building a lot of pedals!



FLAT SCREWDRIVER (SMALL)

This is used for tightening the set screws on the knobs. The tip should be no more than 0.1" (2.5mm) wide.



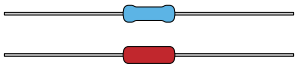
RUBBER BAND

Yes, a plain old rubber band. This is used to tighten the dress nut to avoid scratching or denting it (which can happen with metal tools).

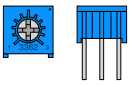
COMPONENT IDENTIFICATION

If you've never built a pedal before, you'll need to know what all the components are. These are shown actual size. (Not all of these types of components may be part of this kit.)

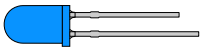
RESISTOR



TRIM POTENTIOMETER

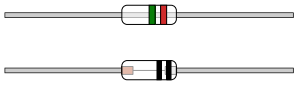


LED



SILICON DIODE

GERMANIUM DIODE



These are very fragile, so be careful when handling them.

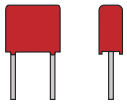
RECTIFIER DIODE

Some Schottky diodes also look like this.

SCHOTTKY DIODE

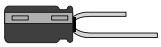
ZENER DIODE

FILM CAPACITOR



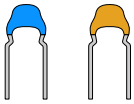
Not polarized. Color may vary by brand and type.

ELECTROLYTIC CAPACITOR



Polarized. The negative side is marked.

MLCC

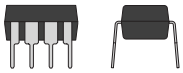


Not polarized. MLCC stands for "multi-layer ceramic capacitor."

TANTALUM CAPACITOR

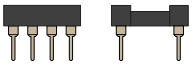
Polarized. The positive side is marked.

IC OR OP-AMP

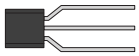


Charge pumps and delay chips also look like this. They may have more than 8 legs.

IC SOCKET

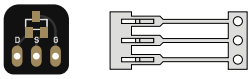


TRANSISTOR OR JFET



Some voltage regulators also look like this.

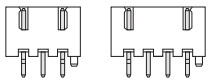
TRANSISTOR WITH ADAPTER



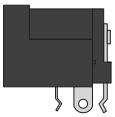
The pins will be soldered to the adapter during kit assembly.

WIRE ASSEMBLY

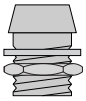
WIRE ASSEMBLY HEADER



DC JACK



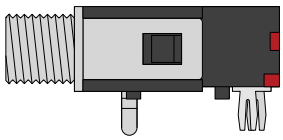
LED BEZEL



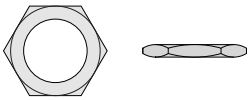
HARDWARE IDENTIFICATION

The hardware comes unassembled, so you'll need to sort & identify each of the pieces. The diagrams below are actual size, so you can set them against the printed page to identify them if needed.

I/O JACK

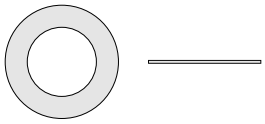


MOUNTING NUT



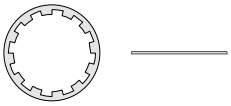
DIAMETER: 0.54" / 13.7mm

OUTER WASHER



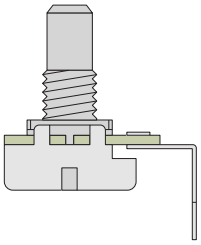
DIAMETER: 0.6" / 15.2mm

LOCK WASHER

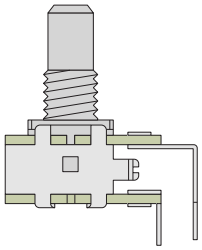


DIAMETER: 0.5" / 12.7mm

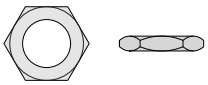
POTENTIOMETER (SINGLE)



POTENTIOMETER (DUAL)

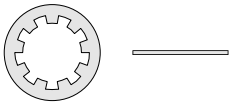


MOUNTING NUT



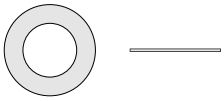
DIAMETER: 0.44" / 11.2mm

LOCK WASHER



DIAMETER: 0.5" / 12.7mm

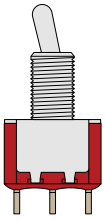
OUTER WASHER



DIAMETER: 0.475" / 12mm

KNOB

TOGGLE SWITCH



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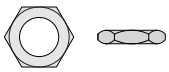
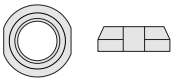


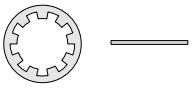
DIAMETER: 0.36" / 9.1mm

DRESS NUT



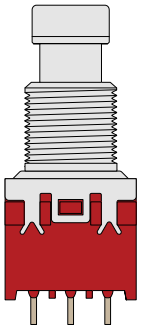
DIAMETER: 0.375" / 9.5mm

LOCK WASHER

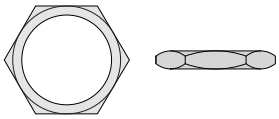


DIAMETER: 0.4" / 10.1mm

FOOTSWITCH

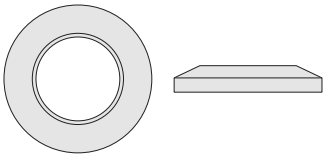


MOUNTING NUT



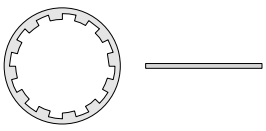
DIAMETER: 0.6" / 15.2mm

DRESS NUT



DIAMETER: 0.77" / 19.6mm

LOCK WASHER



DIAMETER: 0.6" / 15.2mm

PCB ASSEMBLY OVERVIEW

Now it's time to start building!

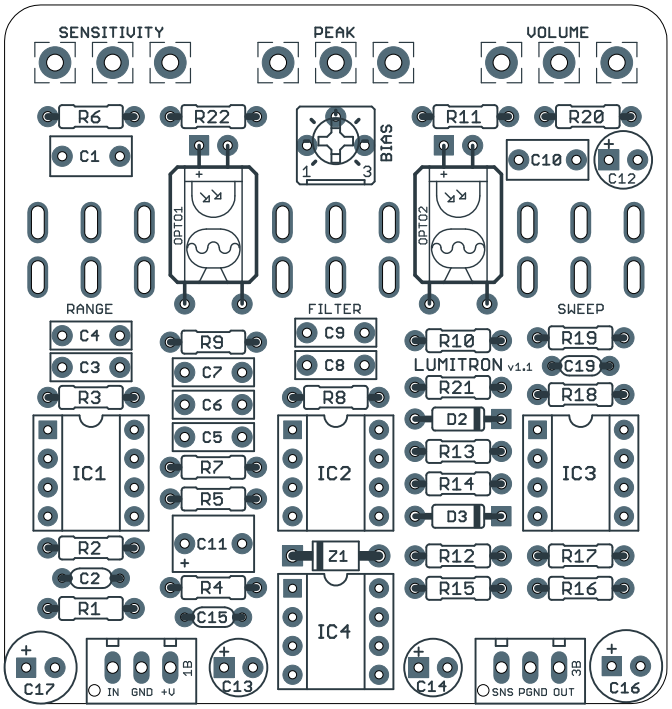
The first thing you need to do is snap apart the PCBs into 3 separate boards (if needed) and break off the tabs from each using needle-nose or flat-head pliers. You should be left with the PCBs shown to the right.

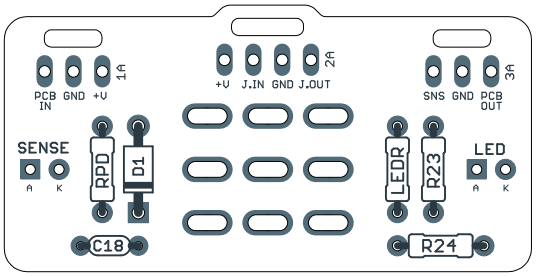
The general principle for PCB population is that you want to work in layers from shortest components (i.e. lowest-profile) to tallest so that when the PCB is upside-down, everything is making contact with the work surface and is held in place.

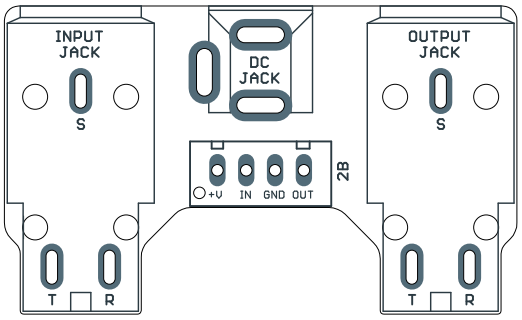
Generally speaking, you should populate the components in this order:

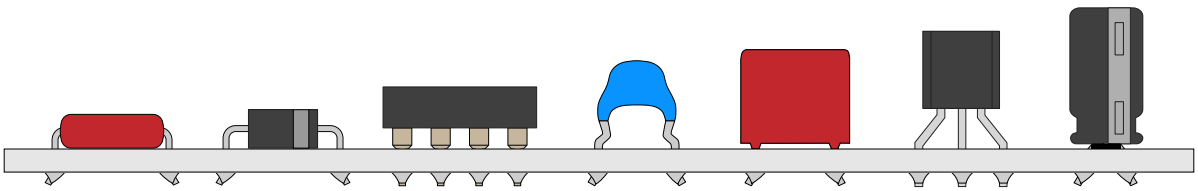
1. Resistors
2. Diodes
3. IC sockets
4. MLCC capacitors
5. Film capacitors
6. Transistors
7. Electrolytic capacitors

Not all of these component types are included in each kit, so skip them if they aren't applicable. Some types of film capacitors are taller than electrolytics, so those can be done last.









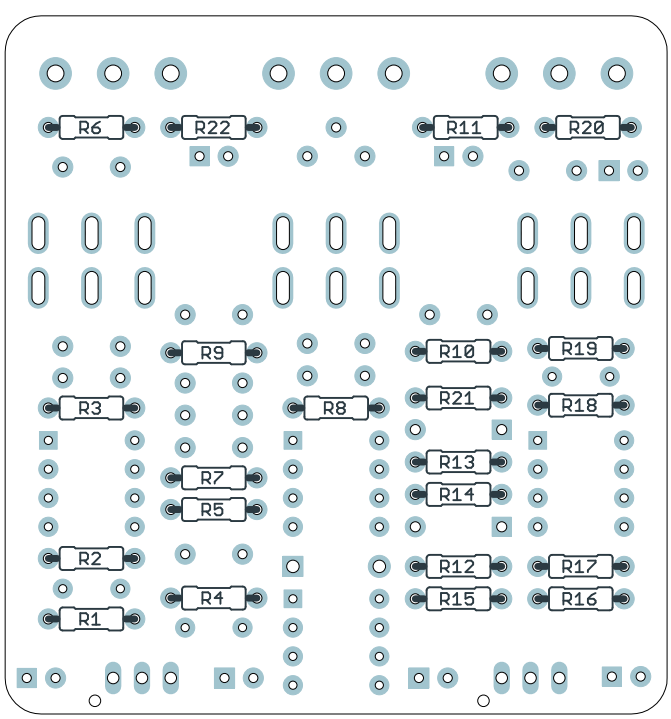
RESISTORS

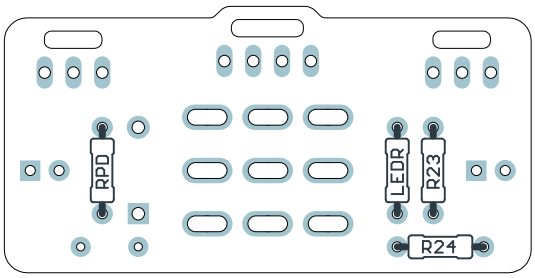
PART	VALUE
R1	3k3
R2	120k
R3	120k
R4	4k7
R5	12k
R6	390k
R7	22k

PART	VALUE
R8	22k
R9	220k
R10	220k
R11	560R
R12	22k
R13	12k
R14	1M

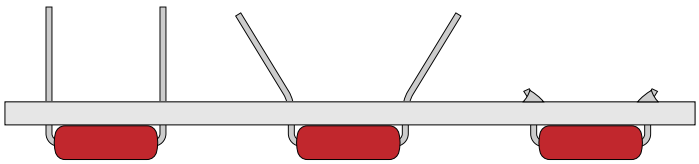
PART	VALUE
R15	1M
R16	330R
R17	47k
R18	120k
R19	180k
R20	120k
R21	120k

PART	VALUE
R22	680R
R23	1k
R24	1k
RPD	2M2
LEDR	22k





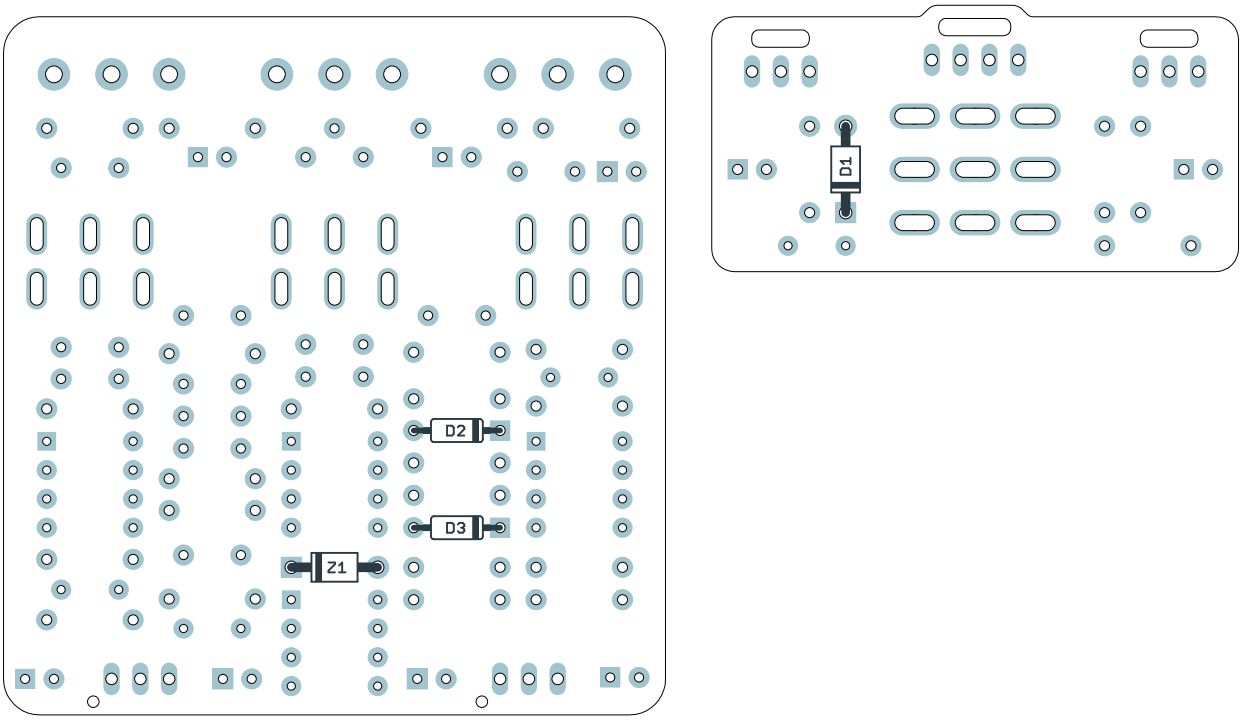
Using the parts list above, populate the resistors by pushing them through the holes and bending the leads outward at an angle to hold them in place. Resistors are not polarized, so they will work in any direction. Turn the board upside-down to keep the components held in place while you solder.



Don't try to do all of the resistors at once. You'll want to stop periodically flip the board and solder everything, then cut the leads using the wire snippers to make room for more.

DIODES

PART	VALUE
D1	1N5817
D2	1N914
D3	1N914
Z1	1N4742A

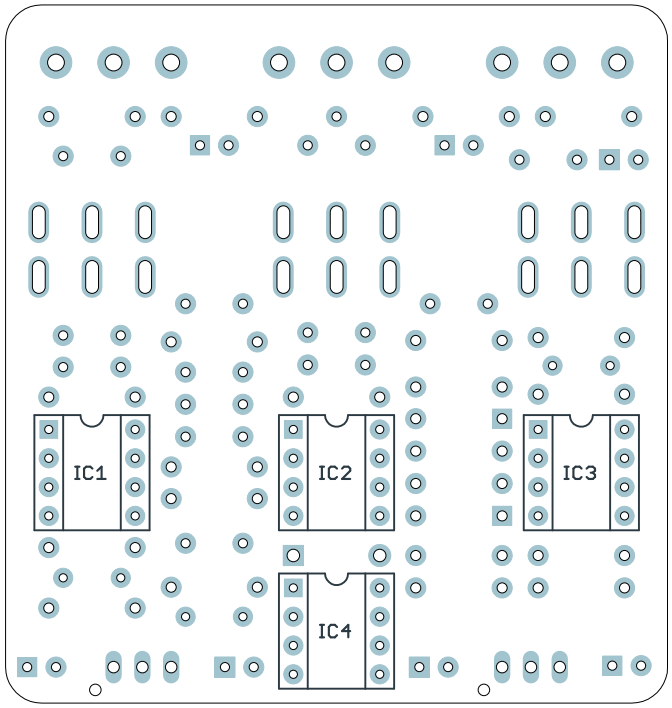


Next, you'll populate the diodes. Diodes are polarized, so make sure to identify the polarity band (which indicates the "cathode", or negative side) and match the band to the footprint on the PCB.

The values can be difficult to read, so they can alternately be identified by appearance. D1 (1N5817) is black and larger in size. D2 and D3 are smaller and will come taped together. Z1 is similar in size to D1, but is orange and black with a glass case.

SOCKETS & ICS

PART	VALUE
IC1	RC4558P
IC2	RC4558P
IC3	RC4558P
IC4	LT1054CP



Next up are the IC sockets. You can't bend the leads of the sockets like you can with the other components, so they won't stay in on their own until they are soldered.

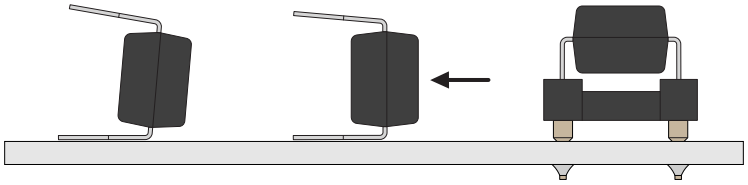
Again, it's much easier to do this with gravity holding it in place for you, so you'll want install the socket before you do any of the taller components.

Installing the ICs

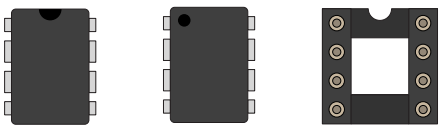
Don't insert the ICs into the sockets just yet. We will do this in a later step, after we've finished soldering the tallest components (the polarized capacitors). This information is just listed here for reference.

The legs of the ICs are bent outward slightly during manufacturing, so they'll need to be bent back inward before they can be inserted into the sockets.

It's easiest to do this by laying the IC legs against the table and bending the body itself so all four legs on the side are straightened out at once. Then, flip it and do the other side.

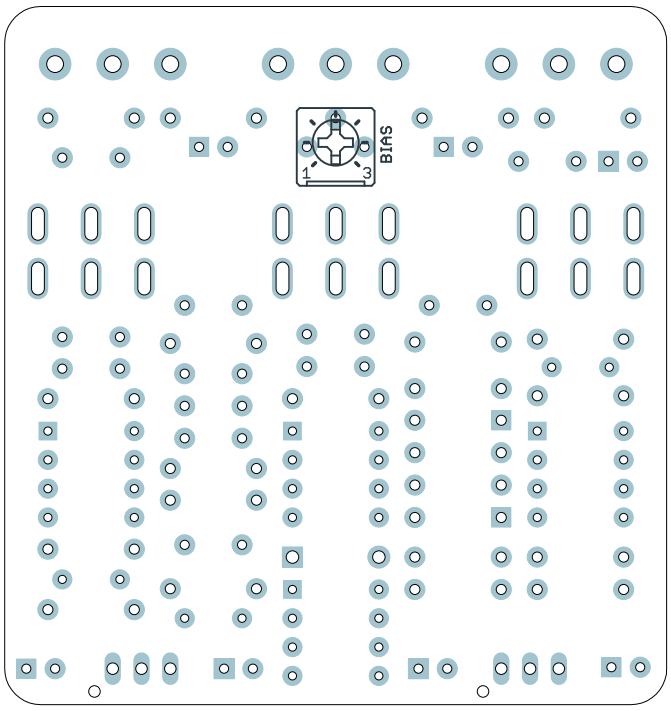


ICs may have two different orientation marks: either a dot in the upper-left or a half-circle notch in the middle of the top side. Some ICs have both marks. This shows which way the IC should be rotated when inserting it into a socket (the socket also has a half-circle notch).

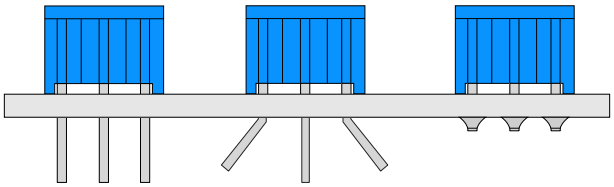


TRIMMER

PART	VALUE
BIAS	5k trimmer



Next, we'll do the trimmer. Bend the legs outward to keep it in place while soldering, as shown:



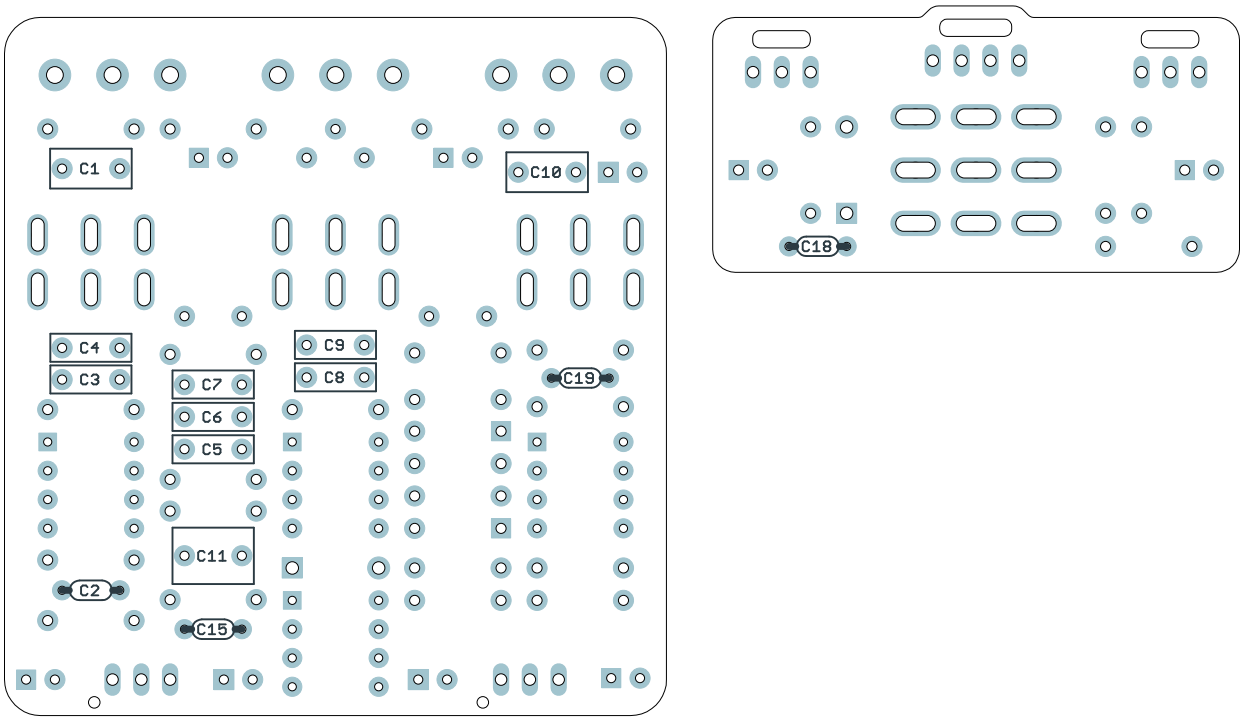
We'll set the bias in a later step. For now, set the trimmer to the minimum position (8:00).

CAPACITORS (NON-POLARIZED)

PART	VALUE
C1	1uF film
C2	10pF MLCC
C3	100n (0.1)
C4	2n2 film
C5	1n film

PART	VALUE
C6	1n8 film
C7	2n2 film
C8	1n film
C9	1n8 film
C10	1uF film

PART	VALUE
C11	2.2uF film
C15	470n MLCC
C18	100n MLCC
C19	100pF MLCC



Next up are the box film and MLCC capacitors. These are all several different heights, so it's recommended to do them shortest to tallest. Bend the leads at an angle to hold them in place.

MLCCs and box capacitors are not polarized, so they will work in any direction, but to keep things neat, it's best to put them all facing the same way.

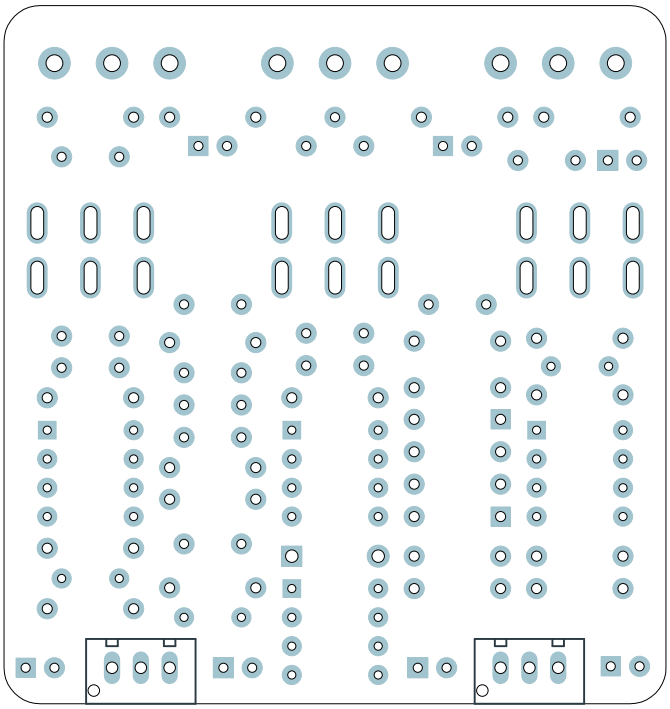
Capacitor identification

Depending on the type, the box film capacitors may have their value printed on either the top or the side. Usually the red ones have it printed on the side while the blue or gray ones have it on the top.

C3 (100n) may read "µ1J100".

All MLCC capacitors except C18 will be taped to cardboard strips with the value written on the cardboard for easy identification. C18 (100n) is yellow and will be the only loose MLCC.

WIRE HEADERS

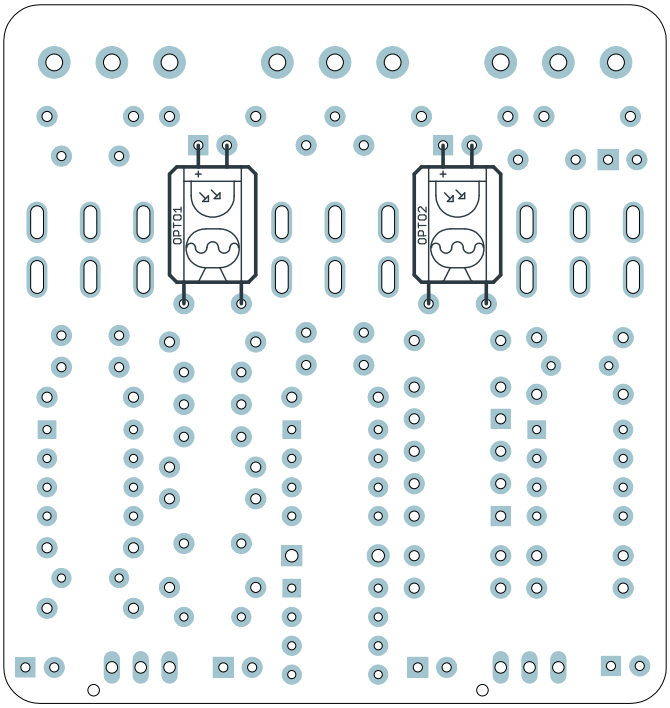


Install the two 3-pin headers (wire connectors) as shown above. These have a polarity pin, so as long as they are pressed all the way down, there's only one possible way to install them. They do fit pretty tightly in the holes, though, so press firmly.

There's also a 4-pin header on the I/O board that we will do in a later step.

OPTOCOUPLERS

PART	VALUE
OPTO1	VTL5C3
OPTO2	VTL5C3



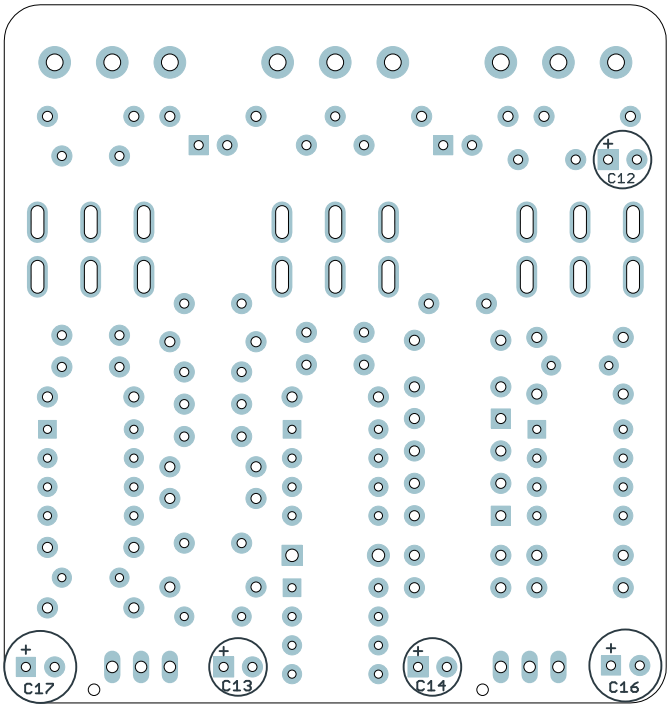
Next, it's time for the optocouplers. An optocoupler, also called a vactrol, consists of an LED and a light-dependent resistor (LDR) that have been epoxied together into a plastic case. The LED is polarized but the LDR is not.

The optocouplers are not marked with the part number (VTL5C3), but they are identical so it doesn't matter which is which.

With the label side face-up, rotate each optocoupler so that the "+" marking aligns with the square hole in the upper-left. Since the LED side and LDR side have different spacing between the leads, it should be clear which way to align it, but verify the orientation before soldering.

CAPACITORS (POLARIZED)

PART	VALUE
C12	4.7uF
C13	10uF
C14	10uF
C16	100uF
C17	100uF

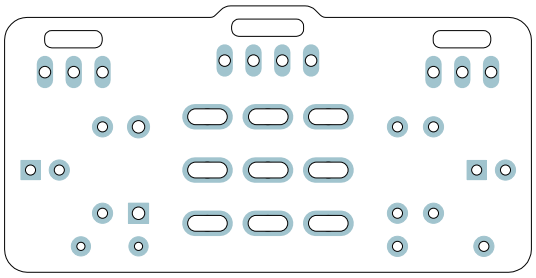


Populate the electrolytic capacitors. These are the tallest components so we save them for last. They are polarized (i.e. they will only work in one direction), so note the vertical mark that indicates the negative side. The longer leg is positive and fits in the square pad.

These are the last of the on-board components on the top side of the PCB. Now is the time to go back to page 12 and insert the ICs into the sockets.

FOOTSWITCH PCB

PARTS
3-strand wire assembly (2)
4-strand wire assembly



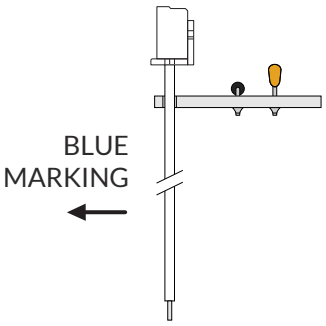
Next, it's time to finish up the footswitch board. You should have done the resistors on this board in a previous step, but if not, go back and do those.

There will be one longer assembly with 4 wires and two shorter ones with 3 wires. The longer one goes in the middle and the shorter ones go on the left and right sides. The wire assemblies should then be soldered to the footswitch board as shown.

STEP 1

First, thread the wire through the strain-relief slots, with the blue side facing outward and the PCB's previously-installed components facing up.

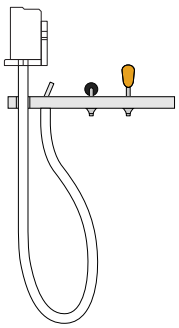
For now, pull it through as far as it can go.



STEP 2

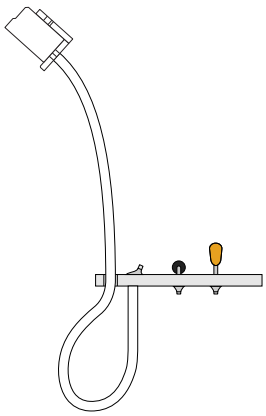
Next, bend the wires back upward and fit the ends of the wires into the solder pads.

On the top side of the PCB, bend the exposed wires backward so it holds the wire in place. Pull the header back up through the slot partway.



STEP 3

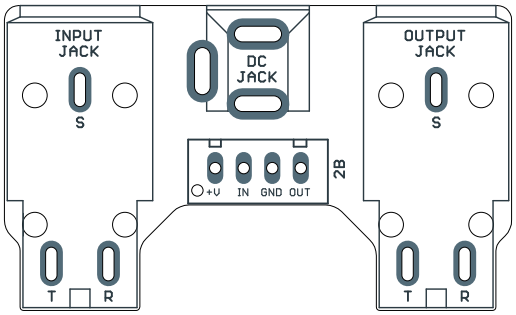
Then, solder the wires from the top. This is the trickiest part of the whole build. You want to solder the pads without touching the iron to the wires themselves and risking burning through the insulation. It helps to use a sharp or narrow tip on the soldering iron.



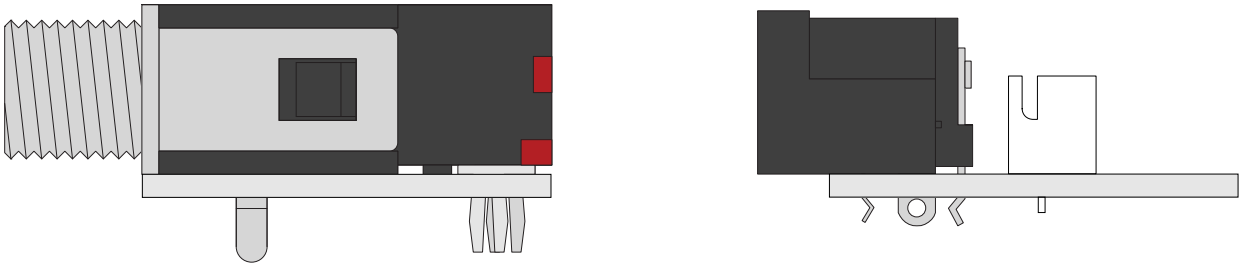
Once all three wire assemblies are soldered, set the footswitch PCB aside. We'll solder the actual footswitch and LED in a later step.

INPUT/OUTPUT PCB

PARTS
Input & output jacks
DC jack
Wire header



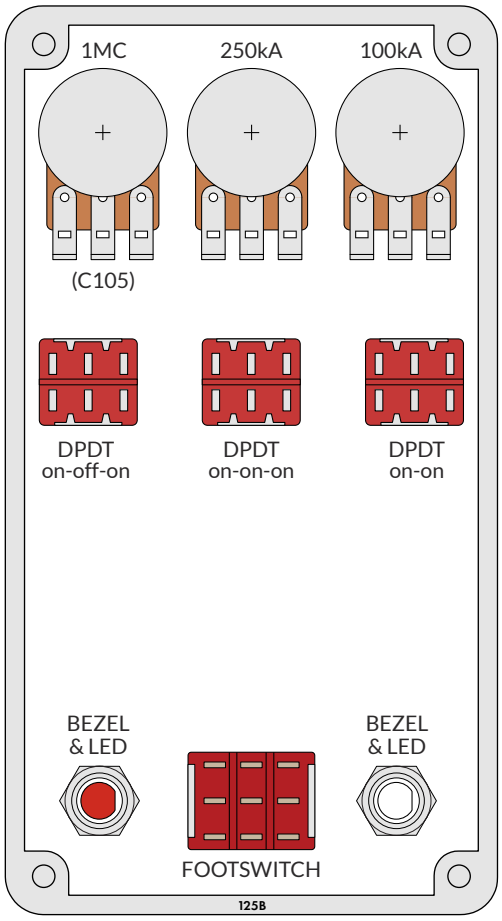
Almost done! Get the two input/output jacks, the DC jack and the wire header and snap them in place. The PCB is designed for them to fit securely, so you can do them all at once before flipping and soldering.



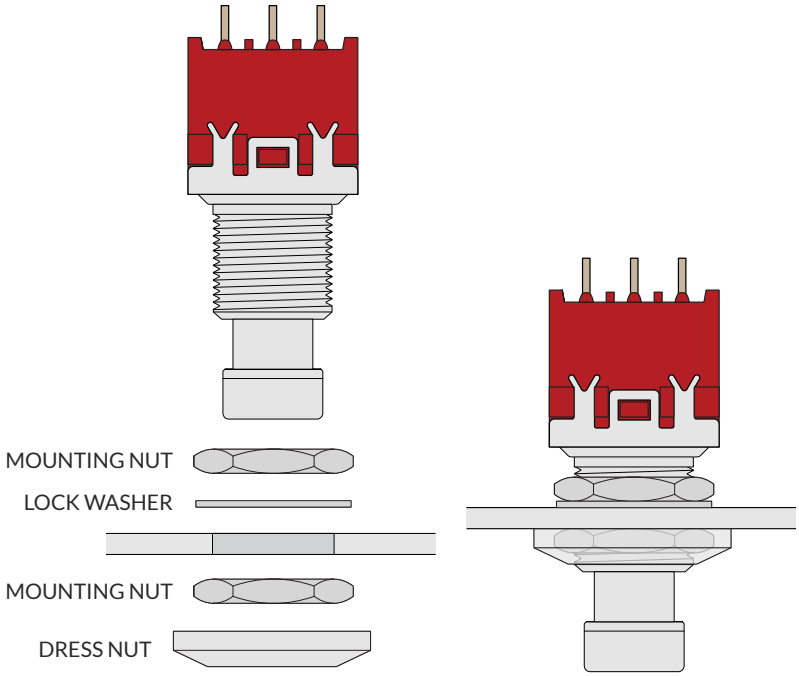
After you've soldered everything, make sure to **snip the leads on the I/O jacks as close as possible to the PCB**. There's not a lot of clearance between the bottom of this board and the top of the main PCB once everything is in place, and you don't want the pins to short against anything on accident.

ENCLOSURE LAYOUT: PANEL MOUNTS

Attach the hardware to the inside of the enclosure as shown. (The I/O board is done in a later step.) **Be very careful to correctly identify the toggle switches!** All three look identical except for the label on the side panel that says “ON-ON”, “ON-OFF-ON” or “ON-ON-ON”.

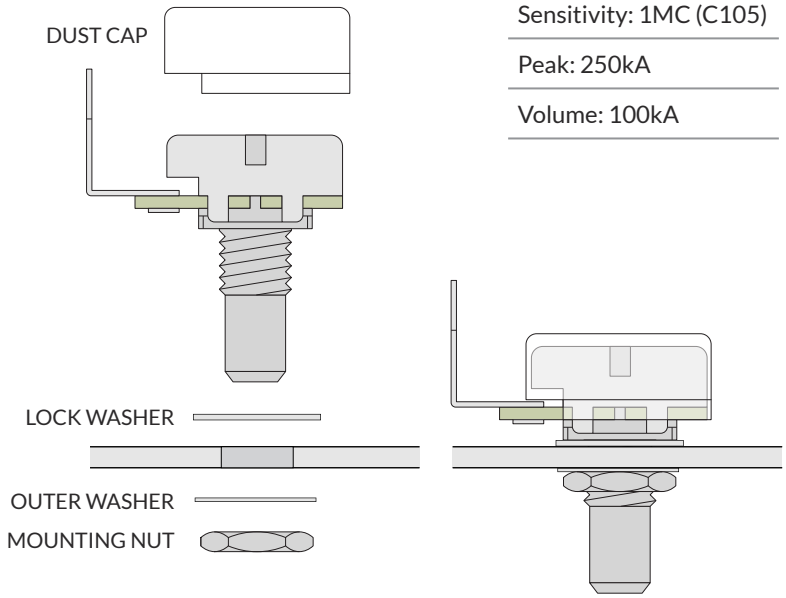


FOOTSWITCH



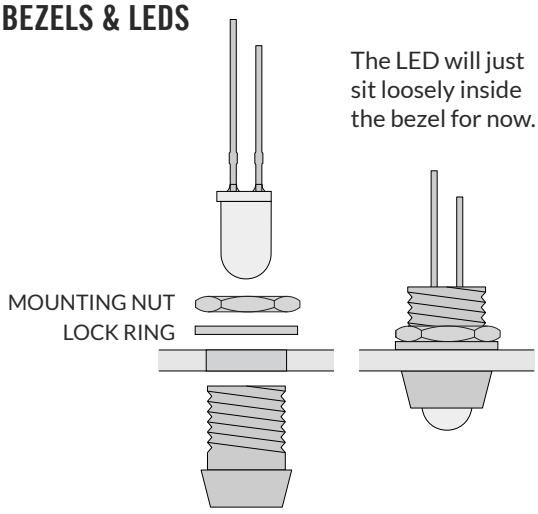
The dress nut fits over the top of the mounting nut and is for aesthetic purposes only. Wrap a rubber band around it to use as a grip when tightening. Avoid using metal tools on it or you run the risk of scratching or denting it.

POTENTIOMETERS



Sensitivity: 1MC (C105)
Peak: 250kA
Volume: 100kA

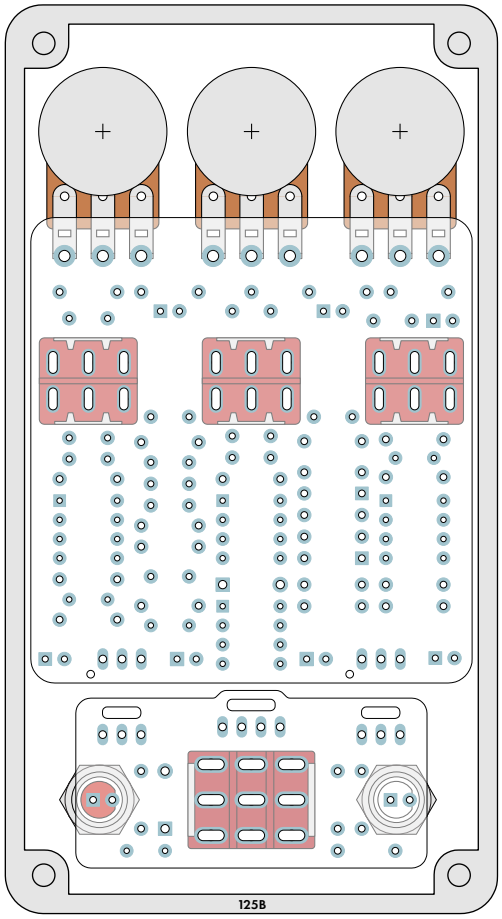
BEZELS & LEDS



The LED will just sit loosely inside the bezel for now.

You’ll need to hold the bezel in place when tightening the nut. Be aware that the bezel is fairly sharp. Try using a rubber band for grip instead of just pressing your finger against the bottom.

ENCLOSURE LAYOUT: MAIN & FOOTSWITCH PCBS



Before anything else, triple-check that the toggle switches are in the correct positions shown on the previous page since they are easy to mix up. It's all but impossible to desolder them once the PCBs are installed, and the kit will not work correctly if the switches are in the wrong place.

If everything's good to go, place the main PCB on top of the potentiometers and toggle switches as in the diagram to the left, with the component side facing up. You may need to adjust the position of the potentiometers and switches slightly if they are not aligned straight.

Once all of the pins are through and the PCB is laying flat, solder each of the pins from the top, being careful not to touch any of the surrounding components with the soldering iron.

After you've finished soldering the pots, **clip the leads as close as you can to the main PCB**. This is important because the input/output PCB overlaps them and you need to avoid any of the components shorting.

Next, do the same thing with the footswitch board—the 3PDT footswitch and the two LEDs. Before soldering, double-check to **make sure the flat side of the LEDs are facing to the right**, as shown in the diagram, and that the short leg is coming through the pad on the right. They won't work if they're backwards.

Why solder everything inside the enclosure before testing it?

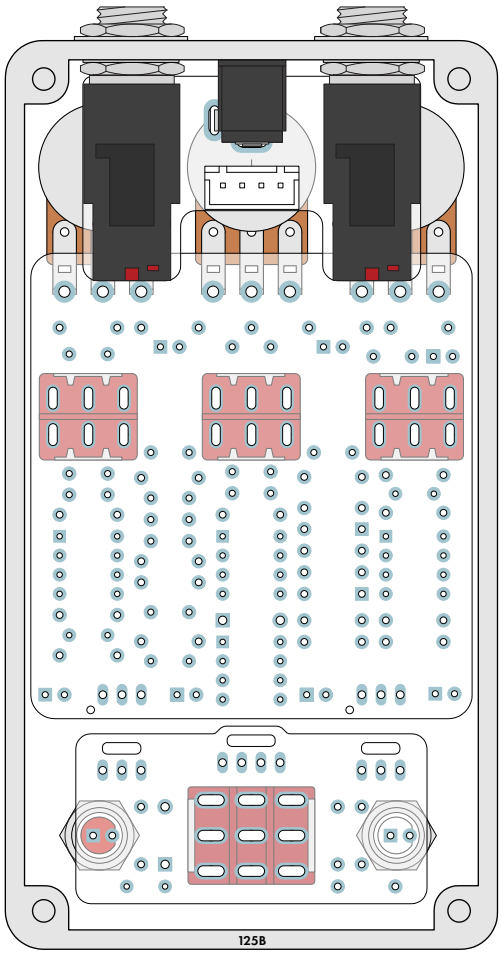
"Rock it before you box it" is conventional wisdom in pedalbuilding, and you'll often hear it recommended that builders should test the circuit before putting everything inside the enclosure. However, Aion FX projects are designed to be extremely easy to remove from the enclosure for troubleshooting, with no desoldering required—so with these kits, it's actually much easier to "box it before you rock it".

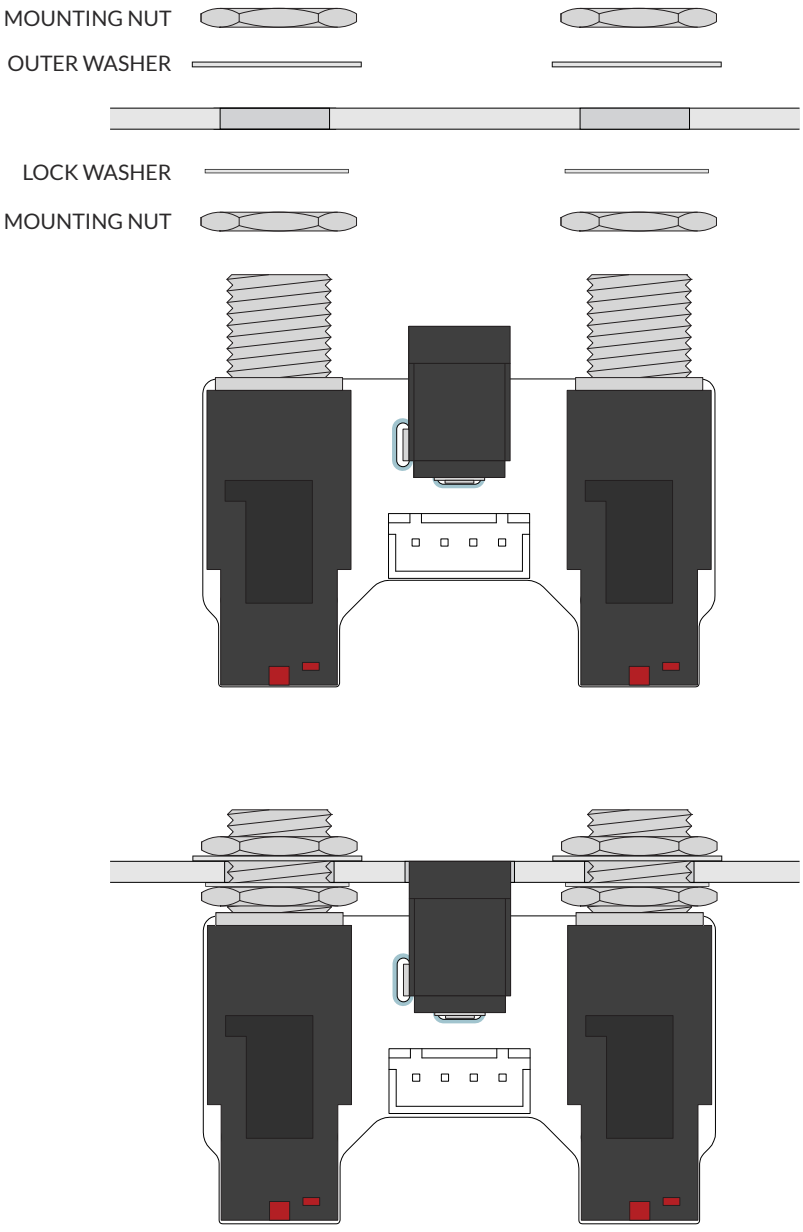
If you've read the documentation carefully and followed all the instructions, there's a good chance you will get it right the first time!

ENCLOSURE LAYOUT: INPUT/OUTPUT PCB

Affix the input/output PCB to the north-facing panel of the enclosure as shown.

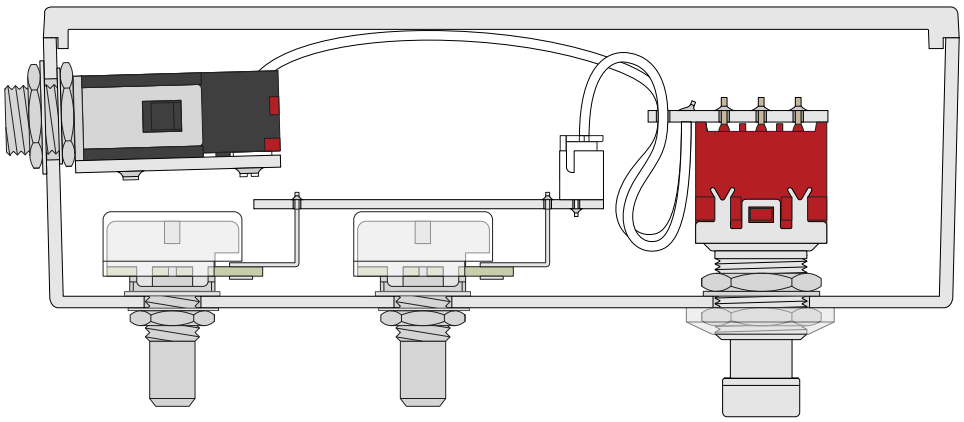
Note the use of two mounting nuts on each of the jacks, one inside and one outside. The inner nut acts as a spacer to set the DC jack flush with the outside of the enclosure. The inner nuts should be threaded as far down as they can go.





FINAL TESTING & ASSEMBLY

After everything is in place, just plug the 3 wire assemblies into their respective headers and make sure they're secure. Here is a cross-section of the inside of the completed pedal.



At this point, you have completed the full circuit as far as the electrons are concerned. Plug in a 9-volt supply and test it out with a guitar and an amplifier.

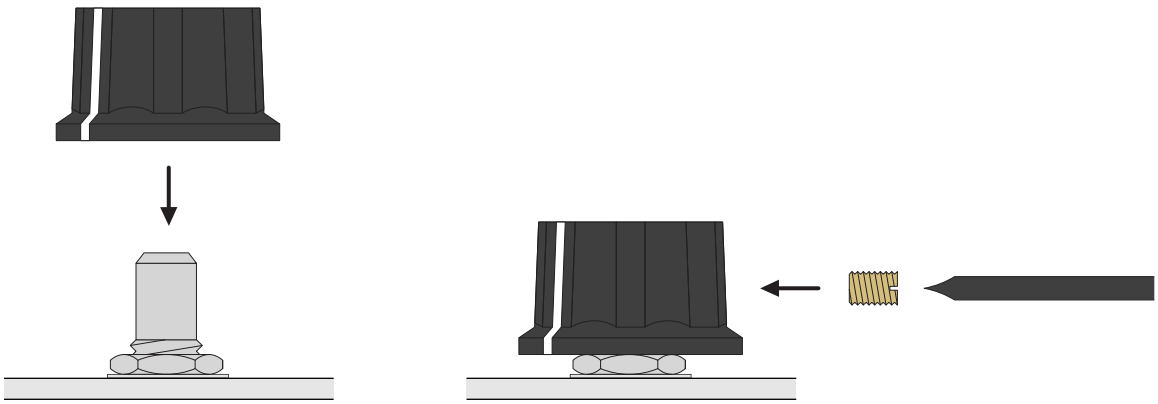
Test the bypass switch a few times, then leave it in effect mode and listen while you turn the knobs. Note that it has not been biased yet, so we're only testing to make sure it passes signal so we can proceed to the next step. We'll evaluate the sound as part of the biasing process.

Installing the knobs

Even though we're not finished, it's helpful to have the knobs installed for the calibration process. Turn the potentiometer shafts all fully counter-clockwise, then put on the knob and rotate until the indicator line is aligned with the dot on the enclosure that shows the zero point. Affix the knobs to each of the potentiometer shafts as shown in the diagram below.

Using a small flat-head screwdriver (no more than 0.1" / 2.5mm in diameter), firmly tighten the set screw until it presses against the shaft of the potentiometer and holds the knob in place.

Be careful not to over-tighten or you may damage the set screw. But if it's not tight enough, the knob will be more likely to fall off or lose its alignment with the markings on the enclosure.



SETTING THE BIAS

The bias trimmer adjusts the optocouplers' internal LED brightness, which impacts the filter's responsiveness to the input signal.

The bias is adjusted by ear. Start with the trimmer at minimum and then turn it up gradually while playing to hear how it changes the sound. Higher settings will be more intense with less of a dynamic range. Often the ideal setting is low on the trimmer, between minimum and 10:00.

Test it across a variety of knob and switch settings, particularly the Sensitivity control and both Sweep modes, and leave it where it sounds best. The Sensitivity control has a much greater impact on the functionality once the trimmer is set, so don't worry too much about getting it exactly right.

A disclaimer along with this: even when it's dialed in perfectly, the Mu-tron circuit is finicky and takes some time to learn if you haven't played one before. Its behavior is greatly dependent on your playing style, guitar pickups, and surrounding pedals. Make sure to read the next section carefully so you understand what each of the controls are supposed to do.

USAGE

The Lumitron has the following controls:

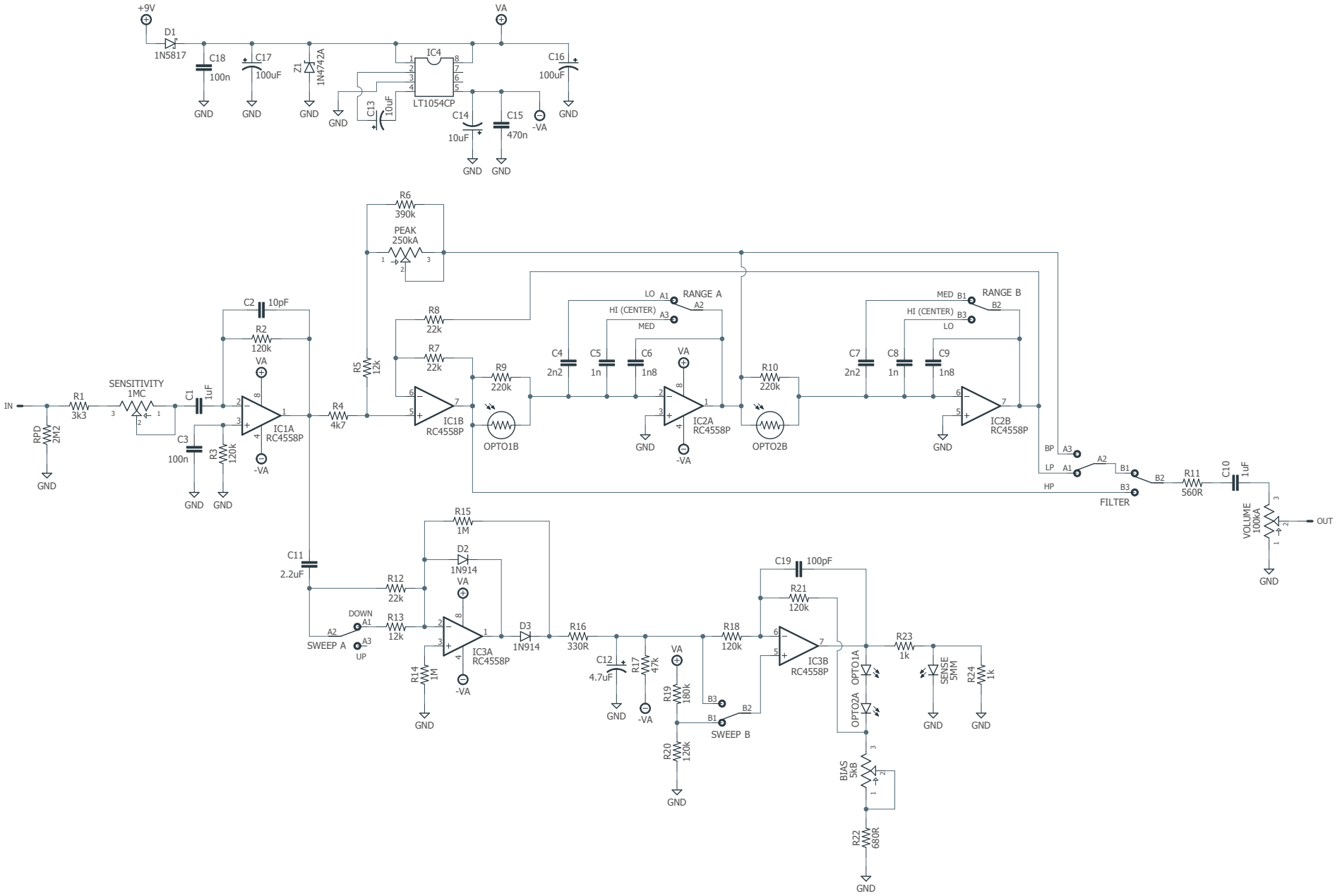
- **Sensitivity** boosts the signal level at the input, which drives the envelope detector as well as the main audio signal path.
- **Peak** is a feedback control that sets the sharpness or intensity of the filter.
- **Volume** is the output volume of the effect, which compensates for high Sensitivity levels.
- **Filter** (toggle switch) selects the filter type.
    - LP (lowpass) accentuates lows.
    - BP (bandpass) cuts lows and highs while accentuating the peak frequency.
    - HP (highpass) accentuates highs.
- **Sweep** (toggle switch) selects the direction of the sweep.
    - "Up" starts with a hi-cut and adds highs with the intensity of the signal, which is indicated by the red LED. This is the traditional auto-wah sound.
    - "Down" starts with a low-cut and adds lows with the intensity. In this mode, the red LED's behavior will be inverted, so it's lit by default and turns off when it senses an input signal.
- **Range** (toggle switch) sets the input frequency of the envelope detector. "Lo" is more sensitive to bass signals while "Hi" is more sensitive to treble signals.

FINAL ASSEMBLY

If everything sounds good after biasing, you're all done! Affix the back panel with the four screws provided and make some music.

If it isn't working, don't be discouraged. See page 27 for troubleshooting info.

SCHEMATIC


+9V
D1
1N5817
C18
100n
C17
100uF
Z1
1N4742A
IC4
LT1054CP
C13
10uF
C14
10uF
C15
470n
-VA
C16
100uF
VA
GND
R6
390k
PEAK
250kA
C2
10pF
R2
120k
R8
22k
R7
22k
R5
12k
R9
220k
OPTO1B
IC1B
RC4558P
C4
2n2
C5
1n
C6
1n8
IC2A
RC4558P
R10
220k
OPTO2B
C7
2n2
C8
1n
C9
1n8
IC2B
RC4558P
RANGE A
LO
HI (CENTER)
MED
RANGE B
IN
R1
3k3
SENSITIVITY
1MC
C1
1uF
RPD
2M2
C3
100n
R3
120k
IC1A
RC4558P
R4
4k7
BP
LP
HP
FILTER
R11
560R
C10
1uF
VOLUME
100kA
OUT
C11
2.2uF
R15
1M
D2
1N914
R12
22k
R13
12k
DOWN
SWEEP A
UP
IC3A
RC4558P
R14
1M
D3
1N914
R16
330R
C12
4.7uF
R17
47k
R19
180k
R20
120k
SWEEP B
C19
100pF
R21
120k
R18
120k
IC3B
RC4558P
OPTO1A
OPTO2A
R23
1k
SENSE
5MM
R24
1k
BIAS
5kB
R22
680R

FULL PARTS LIST

Resistors

PART	VALUE
R1	3k3
R2	120k
R3	120k
R4	4k7
R5	12k
R6	390k
R7	22k

PART	VALUE
R8	22k
R9	220k
R10	220k
R11	560R
R12	22k
R13	12k
R14	1M

PART	VALUE
R15	1M
R16	330R
R17	47k
R18	120k
R19	180k
R20	120k
R21	120k

PART	VALUE
R22	680R
R23	1k
R24	1k
RPD	2M2
LEDR	22k

Capacitors

PART	VALUE
C1	1uF film
C2	10pF MLCC
C3	100n film
C4	2n2 film
C5	1n film

PART	VALUE
C6	1n8 film
C7	2n2 film
C8	1n film
C9	1n8 film
C10	1uF film

PART	VALUE
C11	2.2uF film
C12	4.7uF electro
C13	10uF electro
C14	10uF electro
C15	470n MLCC

PART	VALUE
C16	100uF electro
C17	100uF electro
C18	100n MLCC
C19	100pF MLCC

ICs

PART	VALUE
IC1	RC4558P
IC2	RC4558P
IC3	RC4558P
IC4	LT1054CP
DIP-8 socket (4)	

Diodes

PART	VALUE
D1	1N5817
D2	1N914
D3	1N914
Z1	1N4742A

Potentiometers

PART	VALUE
Sensitivity	1MC (C105)
Peak	250kA
Volume	100kA

Optocouplers

PART	VALUE
OPTO1	VTL5C3
OPTO2	VTL5C3

Switches

PART
3PDT stomp
DPDT on-on
DPDT on-off-on
DPDT on-on-on

Trimmer

PART
5k trimmer

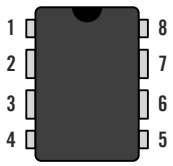
TROUBLESHOOTING INFORMATION

If you finish building the kit and find that it doesn't work right, we've written a separate in-depth Troubleshooting Guide that applies to all of our kits. The main troubleshooting process is covered there. Here you will find information specific to this kit that will help with that process.

Voltages

The following voltages are taken from our prototype unit using a **9.6V** supply. Your measured voltages won't be exactly the same due to variance in power supplies and component tolerances. However, if you see anything more than +/-0.5V from the listed voltages, it's a good indicator of an issue, and the exact voltages can help narrow it down.

Note that IC pins are labeled counter-clockwise from the upper-left, as shown in the diagram to the right. Transistors have their pins labeled on the PCB.



IC1

PIN	VOLTAGE
1	0
2	0
3	0.01
4	-8.94
5	0
6	0
7	-0.03
8	9.35

IC2

PIN	VOLTAGE
1	-0.03
2	0
3	0
4	-8.94
5	0
6	0
7	0.02
8	9.35

IC3

PIN	VOLTAGE
1	0.39
2	0.14
3	0.13
4	-8.87
5	*(see note)*
6	*(see note)*
7	*(see note)*
8	9.33

IC4

PIN	VOLTAGE
1	9.28
2	5.07
3	0
4	-4.02
5	-8.81
6	2.55
7	1.40
8	9.28

Note: The voltages of IC3 pins 5, 6 and 7 will vary greatly depending on the position of the Sweep toggle and the Sensitivity control, so they are not provided here.

SUPPORT

Aion FX does not offer direct support for these projects beyond the provided documentation. Replacements and refunds cannot be offered unless it can be shown that the circuit or documentation are in error or that the included components are non-functional.

Where to get help

The three best places to ask for help are the DIY Stompboxes forum, the DIY Stompboxes Facebook group, and the r/diypedals subreddit. These communities have more than 150,000 members between them and they are very accommodating to new builders.

When posting a troubleshooting request, always include the following:

1. A thorough description of the problem you are experiencing
2. A photo of the inside of the pedal
3. A list of all the measured voltages of each of the pins, described on the previous page

While we cannot offer direct, private support, you may send a link to your public troubleshooting thread to Aion FX using the contact form on the website. There is no guarantee that we will be able to join the discussion and help solve your problem, but this improves the chances.

It benefits the whole community if the troubleshooting process is public because then people who have the same issue in the future may come across it when searching. And if you do get help, remember to pay it forward! The best way to learn new skills is to help others. Even if you've only built one pedal, you have more experience than someone who is brand new, so you have something to offer.

RESALE TERMS

These kits may be used for commercial endeavors in any quantity unless otherwise noted. It's okay to sell individual builds locally or online, or even to offer a service to build pedals based on these kits.

No direct attribution is necessary, though a link back is always greatly appreciated. The only usage restriction is that you cannot "goop" the PCB or otherwise obscure the source. In other words: you don't have to go out of your way to advertise the fact that you use Aion FX kits, but please don't go out of your way to hide it. The guitar effects industry needs more transparency, not less!

LEGAL INFORMATION

All trademarks are property of their respective owners.

Any use of trademarks is for comparative advertising purposes only under fair use. It is not an endorsement of this product by the trademark holders.

These kits are intended to be built by the customer. Aion FX is not responsible for language that may be used by the customer in the marketing or resale of the finished product.

DOCUMENT REVISIONS

1.0.0 (2025-08-29)
Initial release.