PROJECT NAME

AZURE

aion
DIY GUITAR EFFECTS

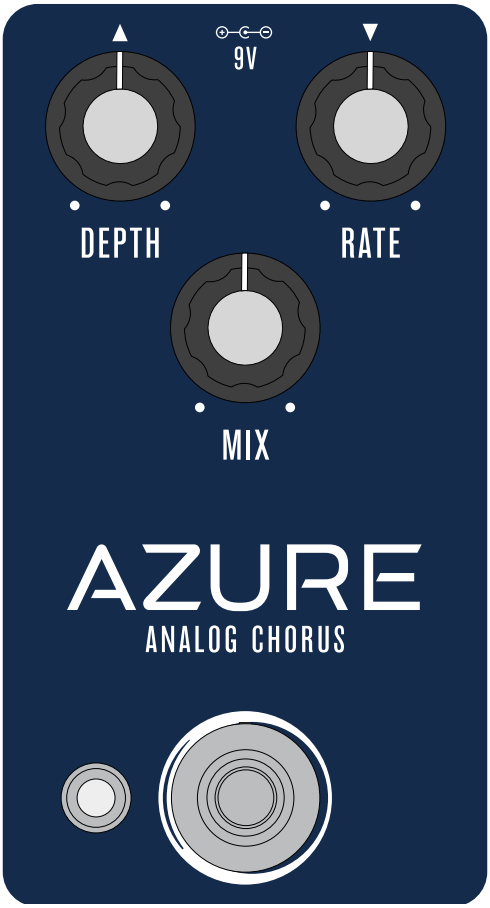
BASED ON
BOSS® CE-2 Chorus

BUILD DIFFICULTY
Intermediate

EFFECT TYPE
Chorus

DOCUMENT VERSION
1.0.0 (2024-06-01)

PROJECT SUMMARY
One of the most revered chorus pedals of all time, it uses analog BBDs to modulate the signal, resulting in the warm, rounded tone characteristic of this era.



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 40,000 people around the world with a passion for building homemade noise machines using obsolete electronics technologies, 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 27.

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

Film Capacitors

NAME	QTY
3n3	2
6n8	2
8n2	2
10n (0.01)	1
33n (0.033)	3
47n (0.047)	1
100n (0.1 or “µ1J100”)	1
470n (0.47)	1
1uF	1

Electrolytic Capacitors

NAME	QTY
47uF	2
100uF	1
220uF	1

Tantalum Capacitors

NAME	QTY
1uF	1

MLCC Capacitors

NAME	QTY
47pF (marked “470”)	1
100pF (marked “101”)	2
470pF (marked “471”)	2
100n (marked “104”)	1

Resistors

NAME	QTY
33R	1
470R	1
1k	1
2k7	1
4k7	5
10k	15
22k	1
33k	2
47k	6
56k	1
100k	2
150k	1
220k	1
330k	1
470k	1
1M	2
2M2	1

Diodes

NAME	QTY
1N5817	1
1N914	2
1N4739A	1

Transistors

NAME	QTY
2N5088	5

PACKING LIST (CONT.)

ICs

NAME	QTY
JRC4558D	1
v3207	1
v3102	1
TL022	1
8-pin socket	4

Trimmer

NAME	QTY
10k trimmer	1

Other

NAME	QTY
LED bezel	1
LED, white	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
100kB	2
250kC	1
Dust cover	3
Knob	3
Mounting nut, potentiometer, 0.44"	3
Lock washer, potentiometer, 0.5"	3
Outer washer, potentiometer, 0.475"	3

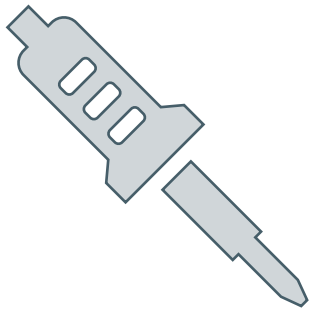
Switches

NAME	QTY
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

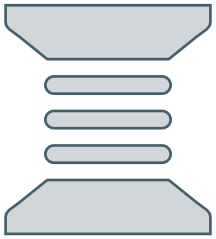
NAME	QTY
3-strand wire assembly, 70mm	2
4-strand wire assembly, 122mm	1
3-pin wire assembly header	2
4-pin wire assembly header	1

TOOLS NEEDED



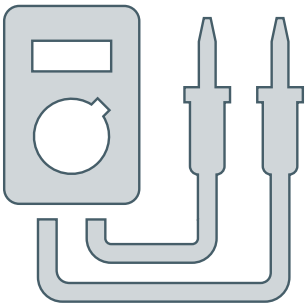
SOLDERING IRON

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.



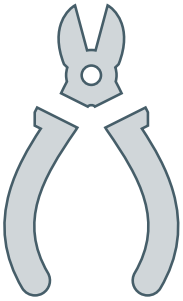
SOLDER

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.



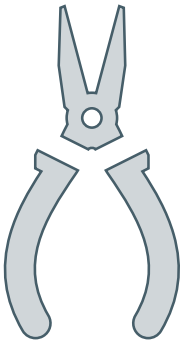
DIGITAL MULTIMETER (DMM)

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.



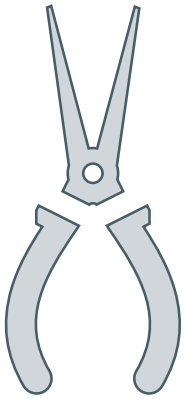
WIRE SNIPPERS

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



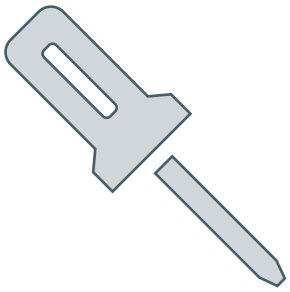
FLAT-NOSE PLIERS

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



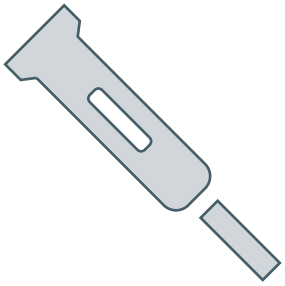
NEEDLE-NOSE PLIERS

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.



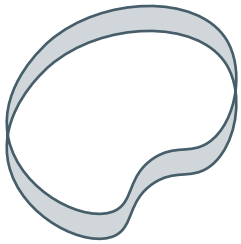
SCREWDRIVER (PHILLIPS)

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.



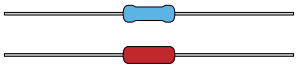
RUBBER BAND

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).

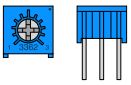
COMPONENT IDENTIFICATION

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.)

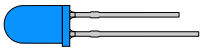
RESISTOR



TRIM POTENTIOMETER

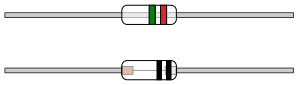


LED



SILICON DIODE

GERMANIUM DIODE



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

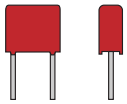
RECTIFIER DIODE

Some Schottky diodes also look like this.

SCHOTTKY DIODE

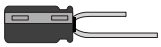
ZENER DIODE

FILM CAPACITOR



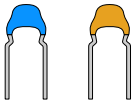
Not polarized. Color may vary by brand and type.

ELECTROLYTIC CAPACITOR



Polarized. The negative side is marked.

MLCC

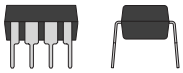


Not polarized. MLCC stands for "multi-layer ceramic capacitor."

TANTALUM CAPACITOR

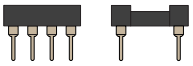
Polarized. The positive side is marked.

IC OR OP-AMP

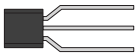


Charge pumps and delay chips also look like this. They may have more than 8 legs.

IC SOCKET

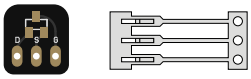


TRANSISTOR OR JFET



Some voltage regulators also look like this.

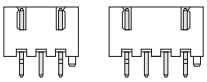
TRANSISTOR WITH ADAPTER



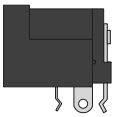
The pins will be soldered to the adapter during kit assembly.

WIRE ASSEMBLY

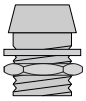
WIRE ASSEMBLY HEADER



DC JACK



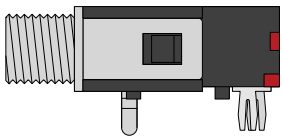
LED BEZEL



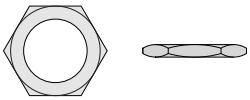
HARDWARE IDENTIFICATION

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

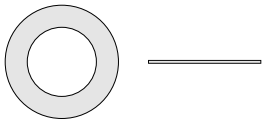


MOUNTING NUT



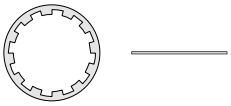
DIAMETER: 0.54" / 13.7mm

OUTER WASHER



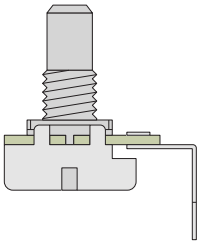
DIAMETER: 0.6" / 15.2mm

LOCK WASHER

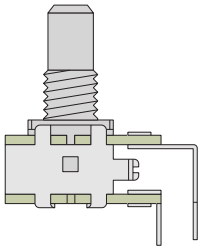


DIAMETER: 0.5" / 12.7mm

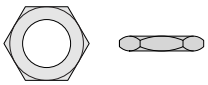
POTENTIOMETER (SINGLE)



POTENTIOMETER (DUAL)

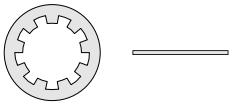


MOUNTING NUT



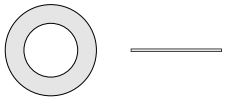
DIAMETER: 0.44" / 11.2mm

LOCK WASHER



DIAMETER: 0.5" / 12.7mm

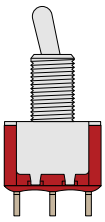
OUTER WASHER



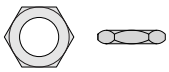
DIAMETER: 0.475" / 12mm

KNOB

TOGGLE SWITCH

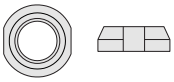


MOUNTING NUT



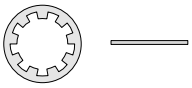
DIAMETER: 0.36" / 9.1mm

DRESS NUT



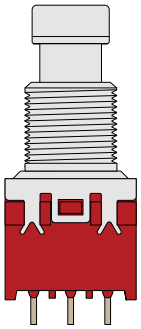
DIAMETER: 0.375" / 9.5mm

LOCK WASHER

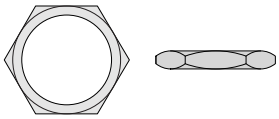


DIAMETER: 0.4" / 10.1mm

FOOTSWITCH

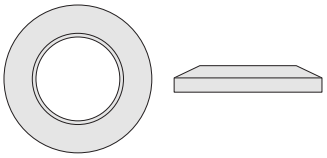


MOUNTING NUT



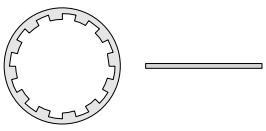
DIAMETER: 0.6" / 15.2mm

DRESS NUT



DIAMETER: 0.77" / 19.6mm

LOCK WASHER



DIAMETER: 0.6" / 15.2mm

PCB ASSEMBLY OVERVIEW

Now it's time to start building!

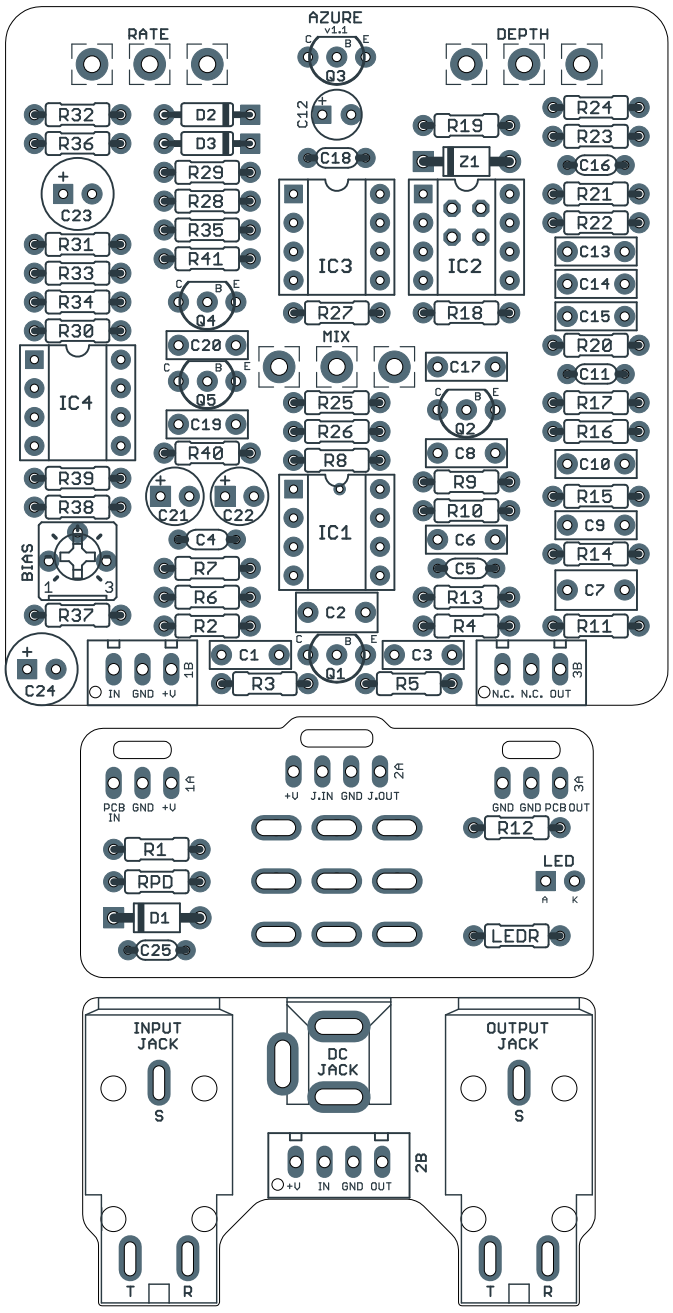
The first thing you need to do is snap apart the PCBs into 3 separate boards (if needed) and break off the tabs from each using needle-nose or flat-head pliers. You should be left with the PCBs shown to the right.

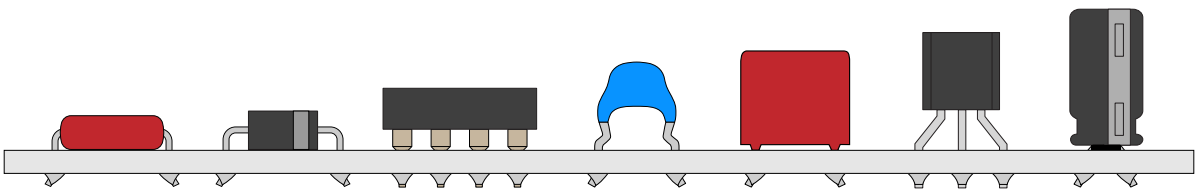
The general principle for PCB population is that you want to work in layers from shortest components (i.e. lowest-profile) to tallest so that when the PCB is upside-down, everything is making contact with the work surface and is held in place.

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.





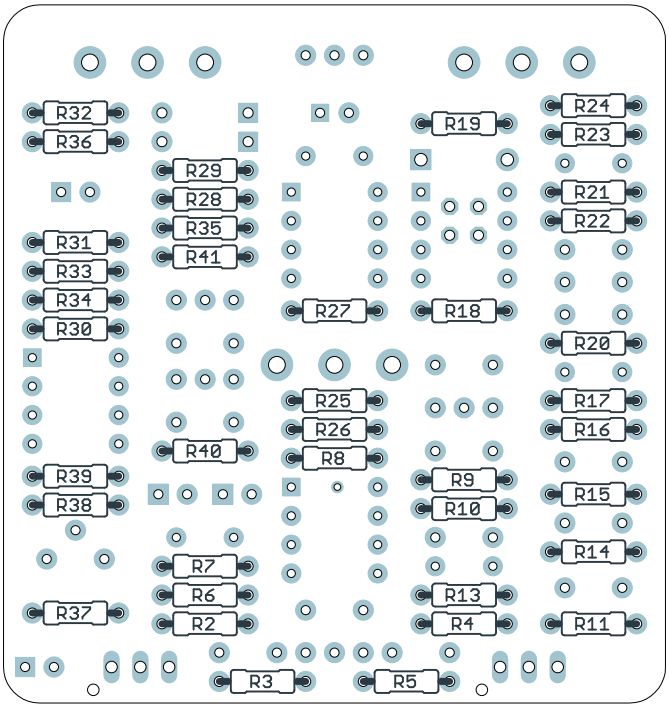
RESISTORS

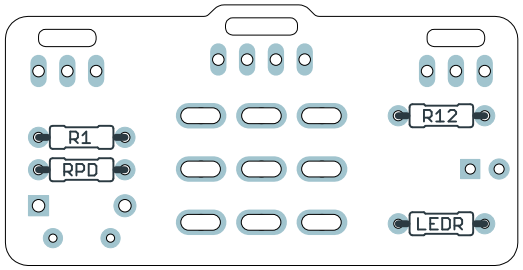
PART	VALUE
R1	1k
R2	470k
R3	10k
R4	10k
R5	47k
R6	10k
R7	47k
R8	47k
R9	47k
R10	10k
R11	470R

PART	VALUE
R12	100k
R13	100k
R14	10k
R15	10k
R16	10k
R17	10k
R18	4k7
R19	56k
R20	330k
R21	10k
R22	10k

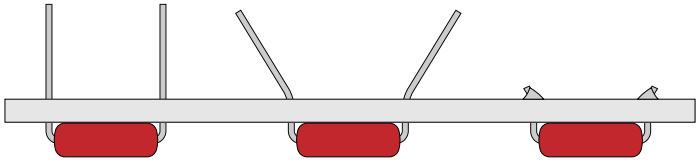
PART	VALUE
R23	10k
R24	10k
R25	1M
R26	47k
R27	33k
R28	2k7
R29	150k
R30	47k
R31	33k
R32	10k
R33	1M

PART	VALUE
R34	220k
R35	4k7
R36	4k7
R37	4k7
R38	4k7
R39	10k
R40	10k
R41	33R
RPD	2M2
LEDR	22k





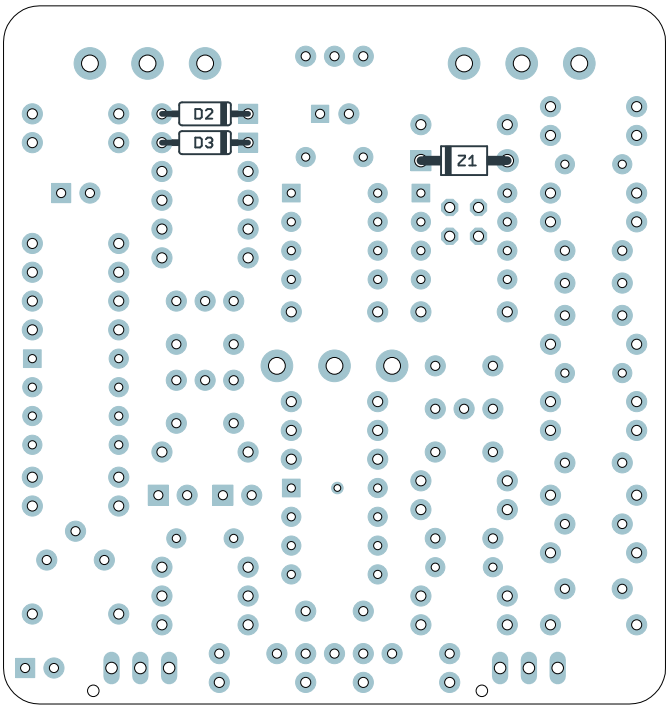
Using the parts list above, populate the resistors by pushing them through the holes and bending the leads outward at an angle to hold them in place. Resistors are not polarized, so they will work in any direction. Turn the board upside-down to keep the components held in place while you solder.

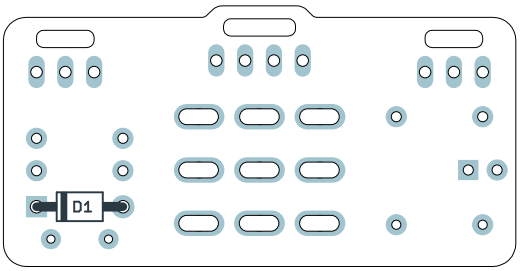


Don't try to do all of the resistors at once. You'll want to stop periodically flip the board and solder everything, then cut the leads using the wire snippers to make room for more.

DIODES

PART	VALUE
D1	1N5817
D2	1N914
D3	1N914
Z1	1N4739A



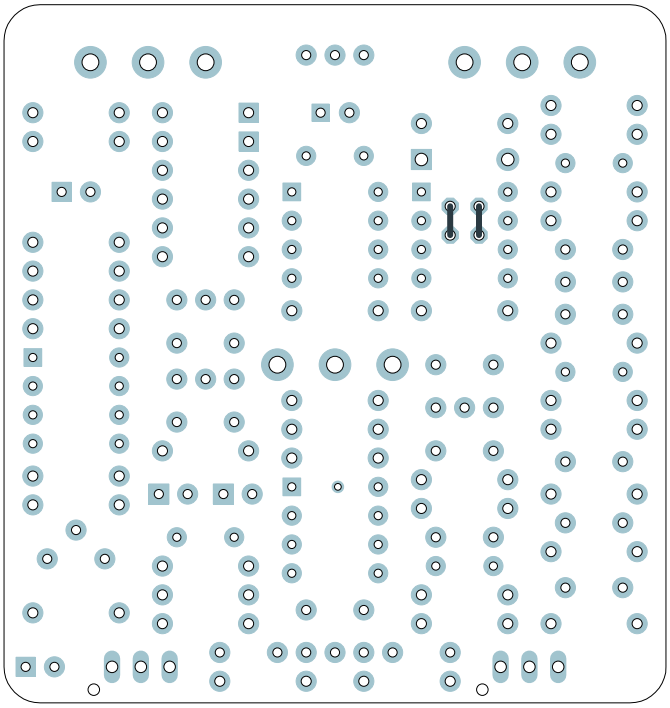


Next, you'll populate the diodes. Diodes are polarized, so make sure to identify the polarity band (which indicates the "cathode", or negative side) and match the band to the footprint on the PCB.

The value can be difficult to read, so they can alternately be identified by appearance. D1 (1N5817) is black. D2 and D3 (1N914) are the two smaller orange and black ones. The larger orange and black one is Z1, the 1N4739A.

When trimming the leads after soldering, set aside two of the leftover leads from the 1N914 diodes. We will use these in the next step.

JUMPERS



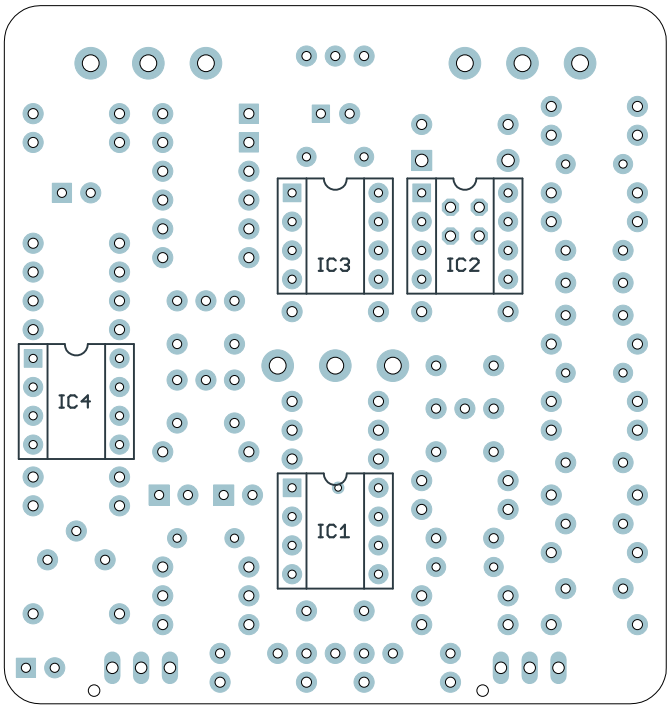
Before we get to the ICs, we need to solder two small jumper wires, which are located underneath IC2. These jumpers configure the PCB for the type of BBDs that are used in the kit. Each of the two top pads needs to be connected to the corresponding bottom pad as shown in the diagram above.

It's easiest to use the leftover leads from the 1N914 diodes in the previous step. The leads from these diodes are thinner than those of the resistors, so they are easier to form into the right shape. Bend them into a tight "U" shape and then solder them to the PCB like normal components.

Note that the jumper pads are much smaller than normal pads, so use caution when soldering. Since these pads carry power and ground, a short between the two adjacent jumpers would likely cause permanent damage to the circuit.

If you want to be extra careful, you can use your multimeter in continuity test mode to ensure that there is no connection between the two vertical pairs of pads before moving onto the next step.

PART	VALUE
IC1	JRC4558D
IC2	v3207
IC3	v3102
IC4	TL022

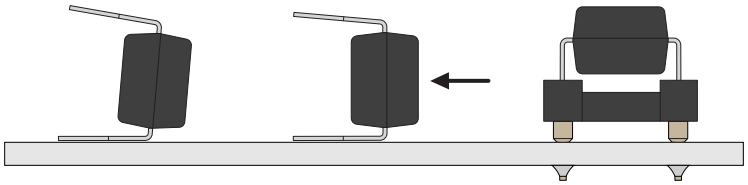


Next up are the IC sockets. You can't bend the leads of the sockets as with the other components, so they won't stay in on their own until they are soldered. Flip the PCB over and use gravity to hold them in place.

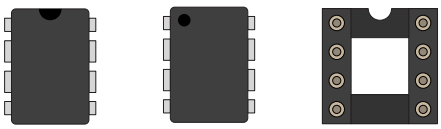
Installing the ICs

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.

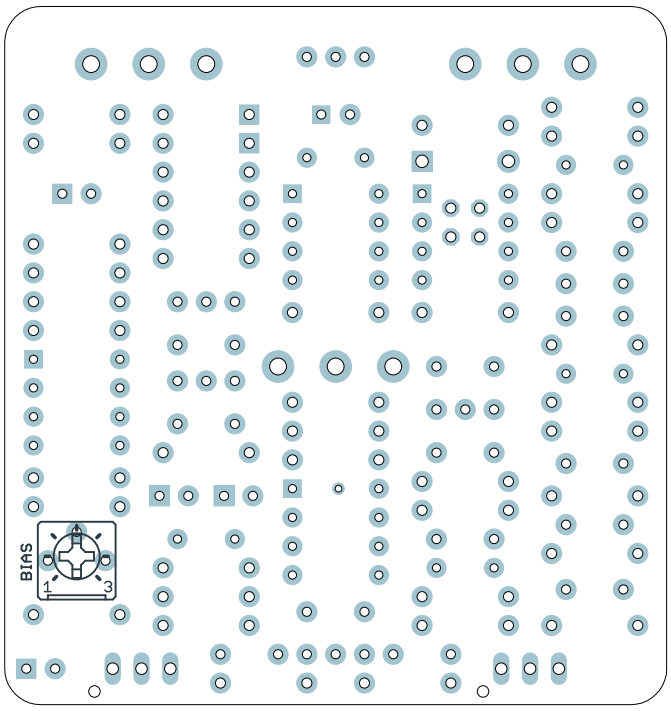


ICs may have two different orientation marks: either a dot in the upper-left or a half-circle notch in the middle of the top side. Some ICs have both marks. This shows which way the IC should be rotated when inserting it into a socket (the socket also has a half-circle notch).



TRIMMER

PART	VALUE
BIAS	10k trimmer



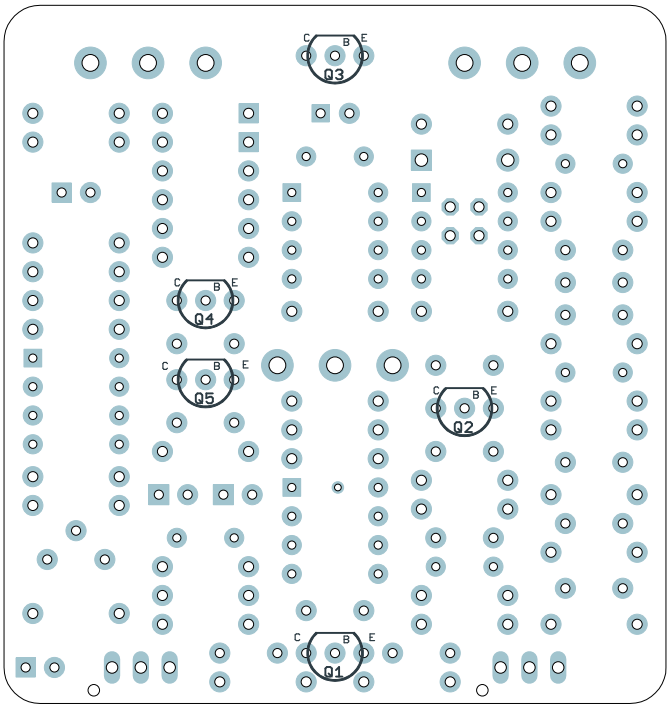
Next, we'll do the trimmer. Bend the legs outward to keep it in place while soldering.

Setting the trimmer

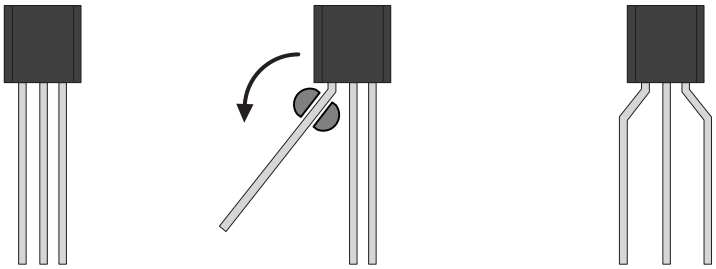
This trimmer will be used for the calibration process on page 25 and should not be adjusted once this is completed. For now, set it to the 50% position (12:00 noon).

TRANSISTORS

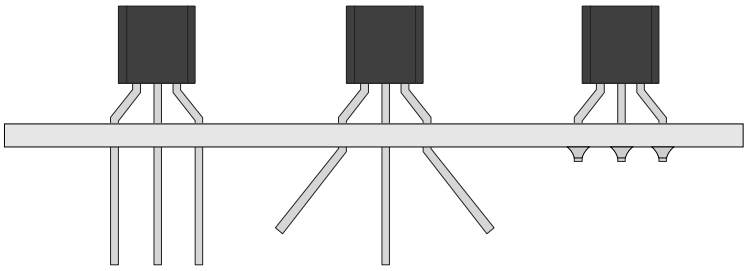
PART	VALUE
Q1	2N5088
Q2	2N5088
Q3	2N5088
Q4	2N5088
Q5	2N5088



Now we'll do the five transistors. For each, if the legs are not already bent into 0.1" spacing, use your needle-nose pliers to bend the outer two legs as shown.



Once installed, bend the two outer legs to hold it in place on the board. Then, solder them in place and clip the leads.



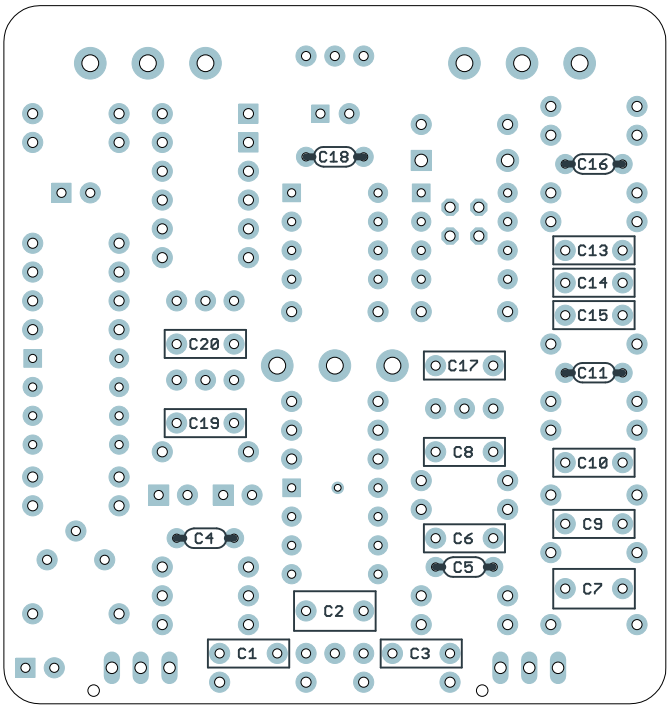
CAPACITORS (NON-POLARIZED)

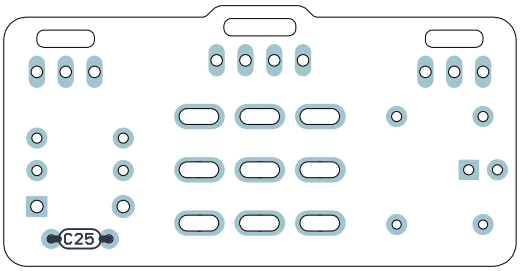
PART	VALUE
C1	47n film
C2	470n film
C3	6n8 film
C4	100pF MLCC
C5	100pF MLCC

PART	VALUE
C6	6n8 film
C7	1uF film
C8	33n film
C9	3n3 film
C10	8n2 film

PART	VALUE
C11	470pF MLCC
C13	33n film
C14	3n3 film
C15	8n2 film
C16	470pF MLCC

PART	VALUE
C17	33n film
C18	47pF MLCC
C19	100n film
C20	10n film
C25	100n MLCC





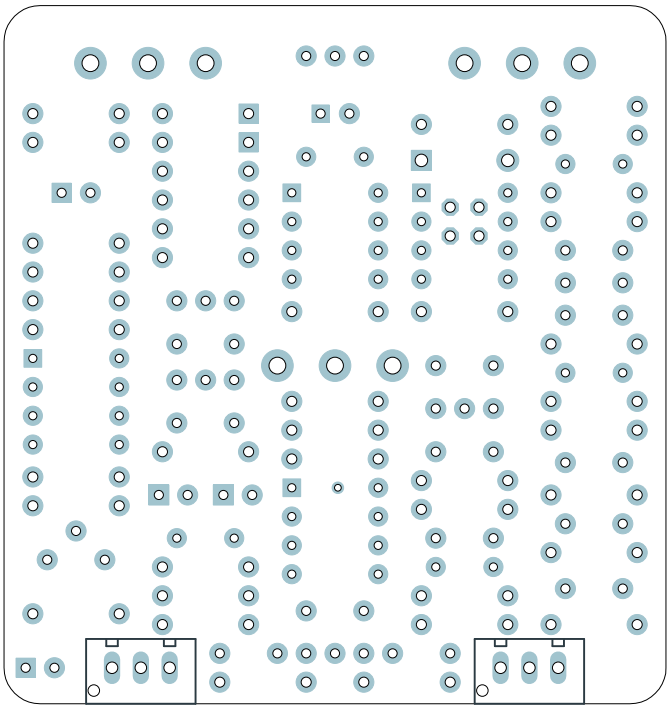
After the sockets come the box film and MLCC capacitors. These are all several different heights, so it's recommended to do them shortest to tallest. Bend the leads at an angle to hold them in place.

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.

Note: 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.

C4, C5, C11, C16, and C18 are blue MLCC capacitors taped to cardboard. For these, the value will be written on the cardboard. C25 (100n MLCC) is always yellow. It can be hard to read the code since it's so small, so it's easier to identify this one by color.

WIRE HEADERS

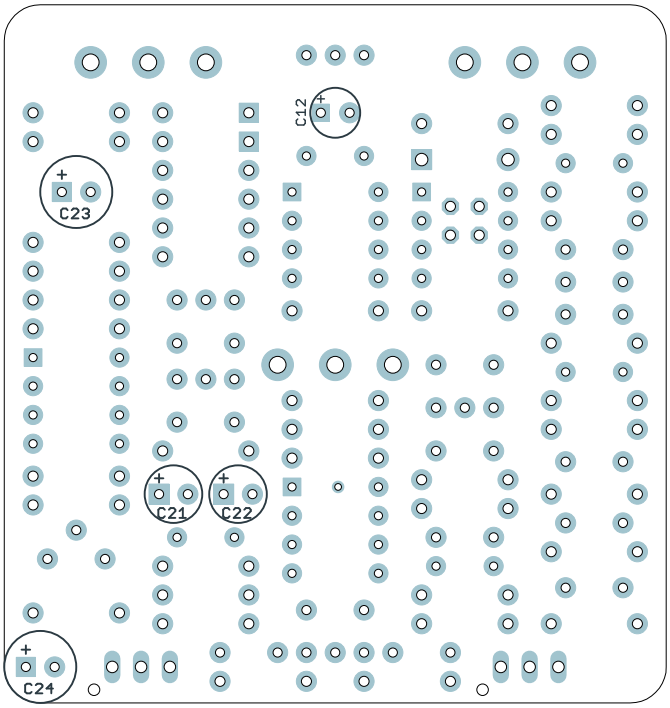


Install the two 3-pin headers (wire connectors) as shown above. These have a polarity pin, so as long as they are pressed all the way down, there's only one possible way to install them. They do fit pretty tightly in the holes, though, so press firmly.

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

CAPACITORS (POLARIZED)

PART	VALUE
C12	1uF tantalum
C21	47uF electro
C22	47uF electro
C23	220uF electro
C24	100uF electro



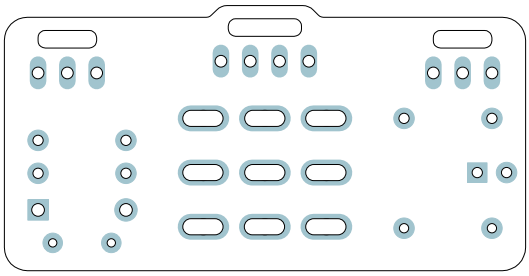
Populate the electrolytic capacitors. These are the tallest components so we save them for last. They are polarized (i.e. they will only work in one direction), so note the vertical mark that indicates the negative side. If one leg is longer, this is the positive leg and it fits in the square pad.

Next, populate the yellow tantalum capacitor (C12). Be very careful with this: unlike electrolytic capacitors, tantalum capacitors have the "+" (positive) side marked instead of the negative. Since tantalum capacitors aren't commonplace in guitar pedals, many people instinctively reverse them, and as a result, their build has issues. Like electrolytics, the longer leg still goes in the square pad.

These are the last of the on-board components. Now is the time to go back to page 13 and insert the ICs into the sockets.

FOOTSWITCH PCB

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



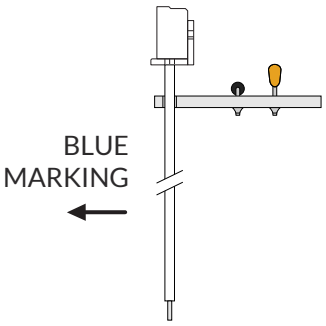
Next, it's time to finish up the footswitch board. You should have done most of the on-board components on this board in a previous step, but if not, go back and do those.

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.

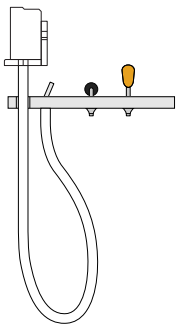
For now, pull it through as far as it can go.



STEP 2

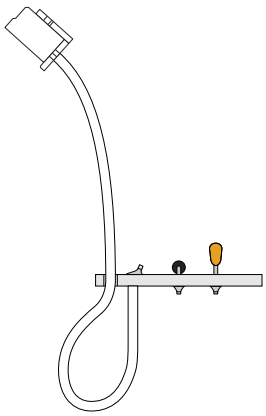
Next, bend the wires back upward and fit the ends of the wires into the solder pads.

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

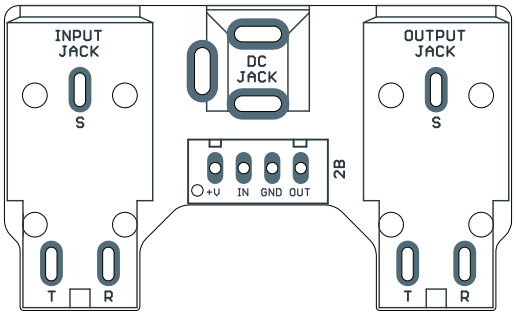
Then, solder the wires from the top. This is the trickiest part of the whole build. You want to solder the pads without touching the iron to the wires themselves and risking burning through the insulation. It helps to use a sharp or narrow tip on the soldering iron.



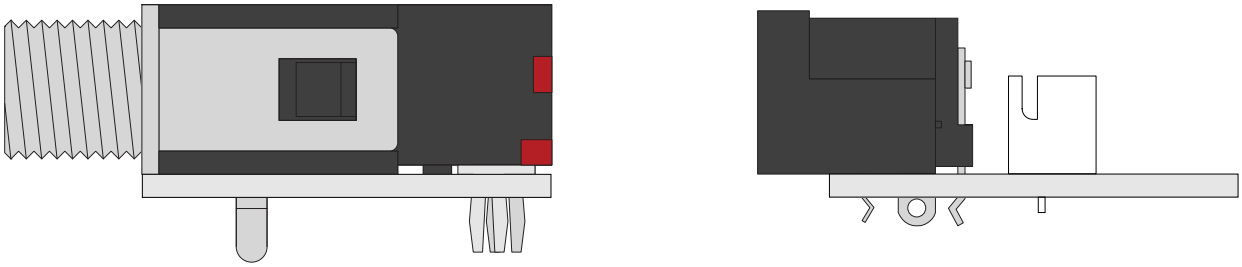
Once all three wire assemblies are soldered, set the footswitch PCB aside. We'll solder the actual footswitch and LED in a later step.

INPUT/OUTPUT PCB

PARTS
Input & output jacks
DC jack
Wire header



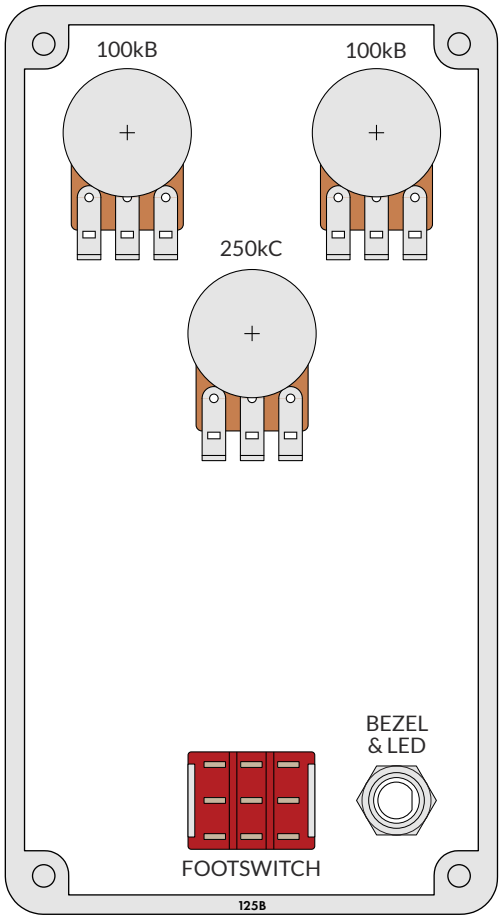
Almost done! Get the two input/output jacks, the DC jack and the wire header and snap them in place. The PCB is designed for them to fit securely, so you can do them all at once before flipping and soldering.



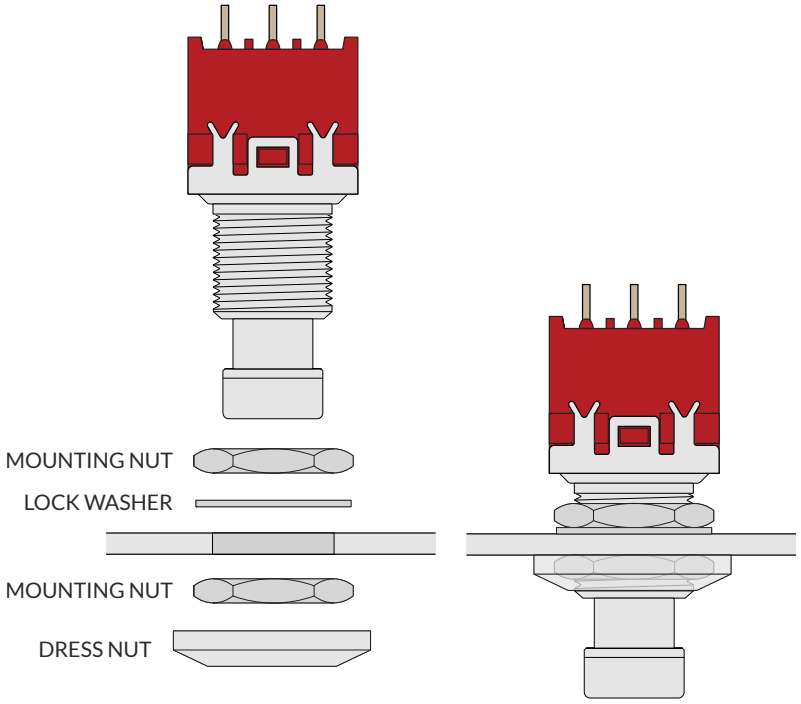
After you've soldered everything, make sure to **snip the leads on the I/O jacks as close as possible to the PCB**. There's not a lot of clearance between the bottom of this board and the top of the main PCB once everything is in place, and you don't want the pins to short against anything on accident.

ENCLOSURE LAYOUT: PANEL MOUNTS

Attach the hardware to the enclosure as shown. (The I/O board is done in a later step.)



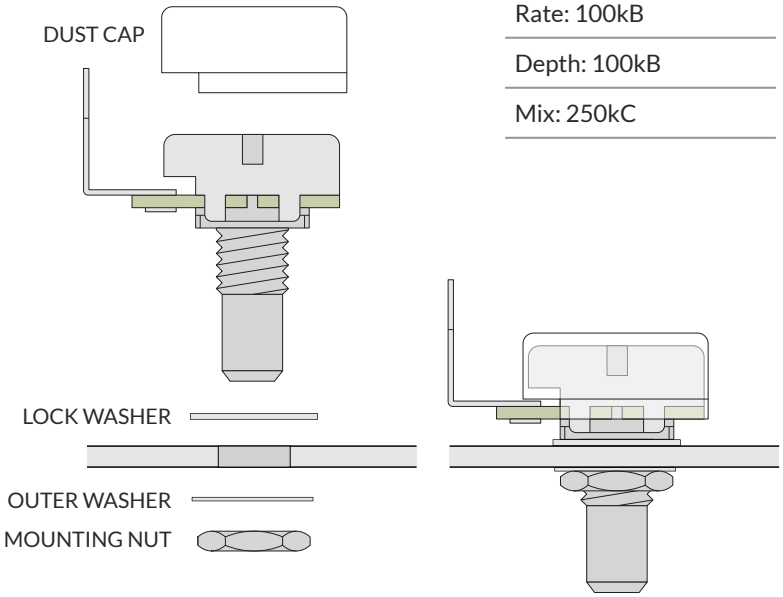
FOOTSWITCH



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.

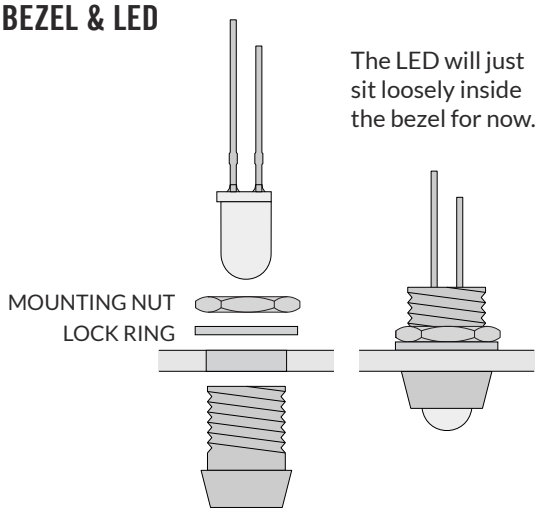
POTENTIOMETERS

Rate: 100kB
Depth: 100kB
Mix: 250kC



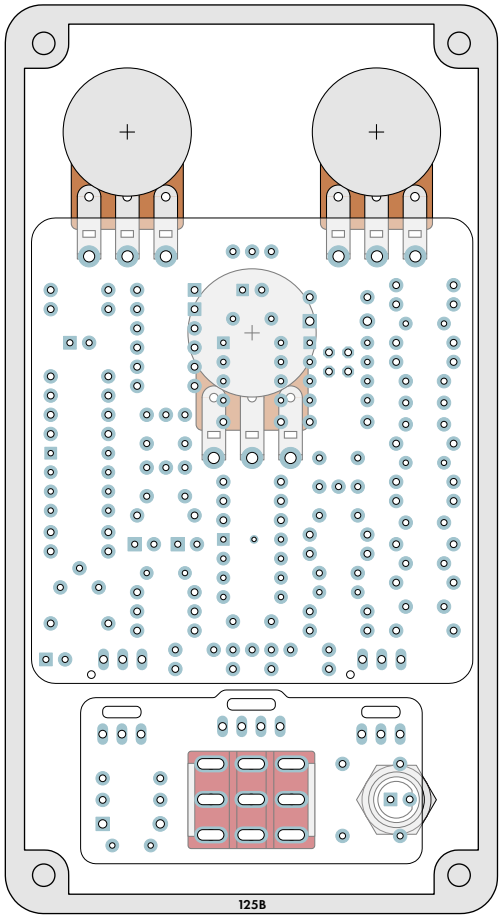
BEZEL & LED

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



After all the components are affixed to the enclosure as shown on the previous page, place the main PCB on top of the potentiometers as in the diagram to the left.

You may need to adjust the position of the potentiometers 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 LED.

Before soldering, double-check to **make sure the flat side of the LED is facing to the right**, as shown in the diagram, and that the short leg is coming through the pad on the right. It won't work if it's turned the other way.

Why solder everything inside the enclosure before testing it?

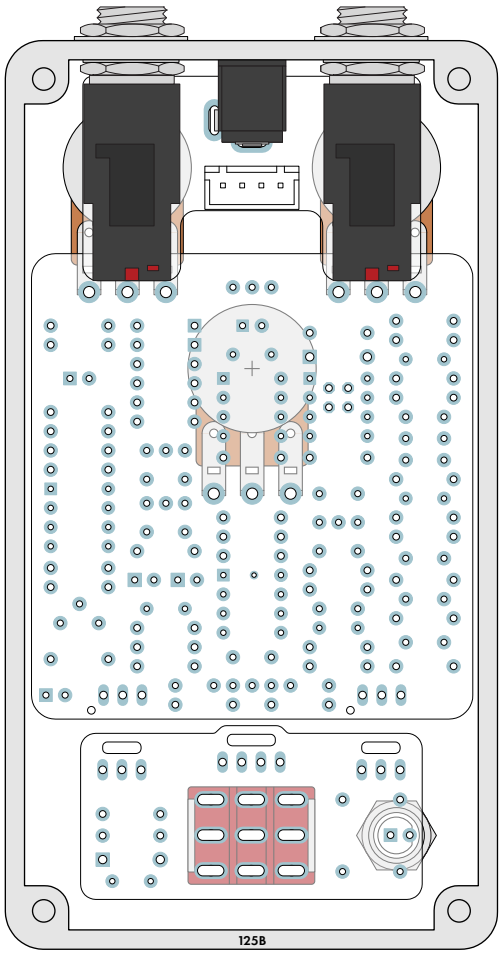
"Rock it before you box it" is conventional wisdom in pedalbuilding, and you'll often hear it recommended that builders should test the circuit before putting everything inside the enclosure. However, Aion FX projects are designed to be extremely easy to remove from the enclosure for troubleshooting,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

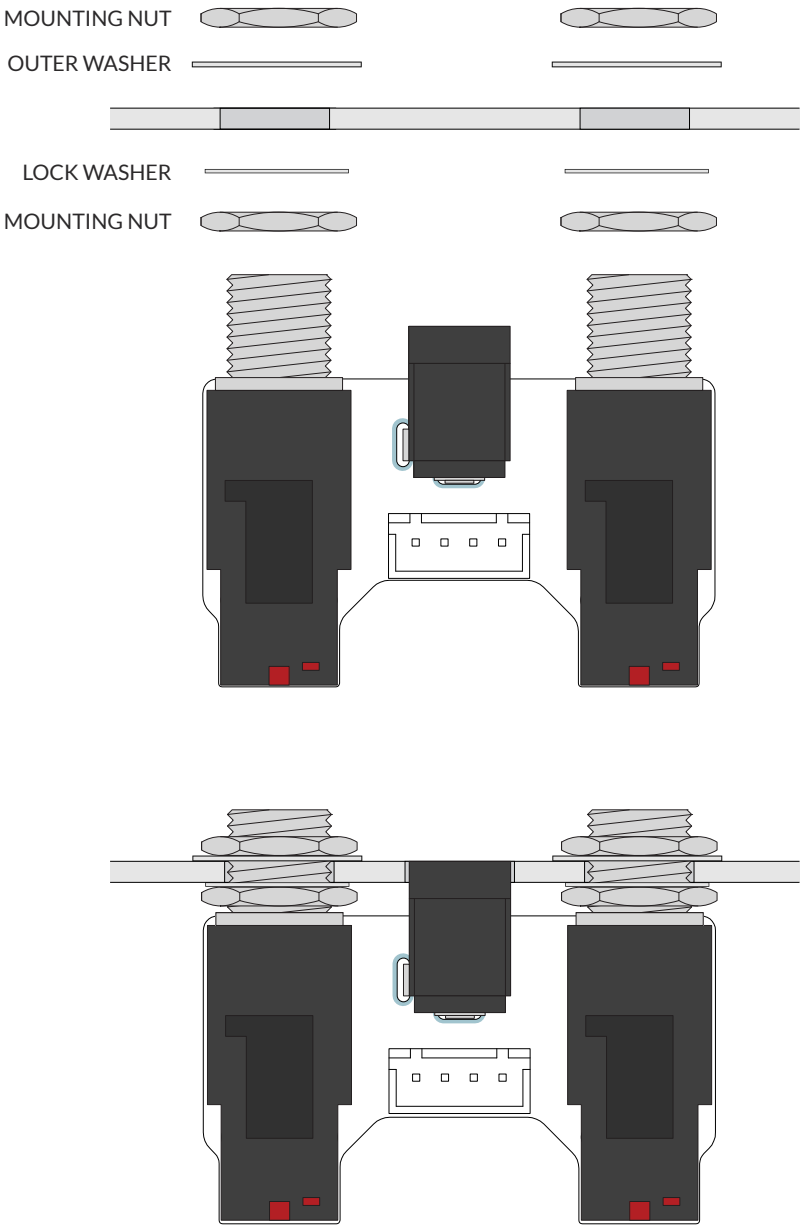
If you've read the documentation carefully and followed all the instructions, there's a good chance you will get it right the first time!

ENCLOSURE LAYOUT: INPUT/OUTPUT PCB

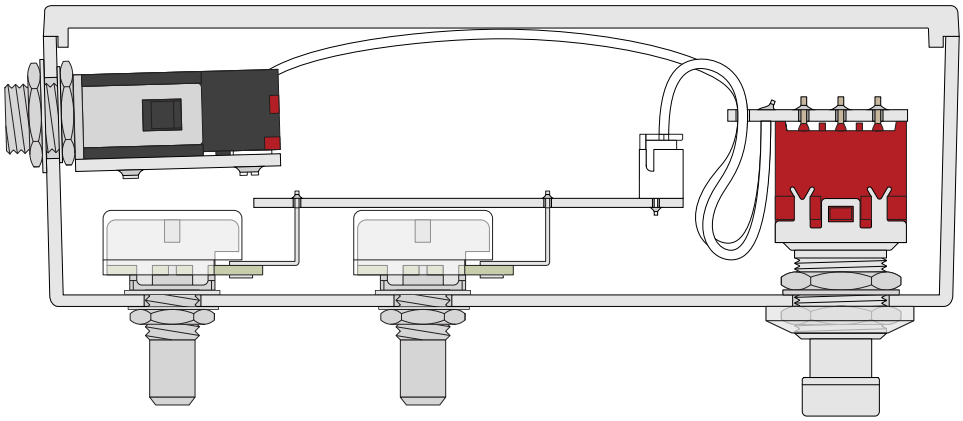
Affix the input/output PCB to the north-facing panel of the enclosure as shown.

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.





After everything is in place, just plug the 3 wire assemblies into their respective headers and make sure they're secure. That's it! 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.

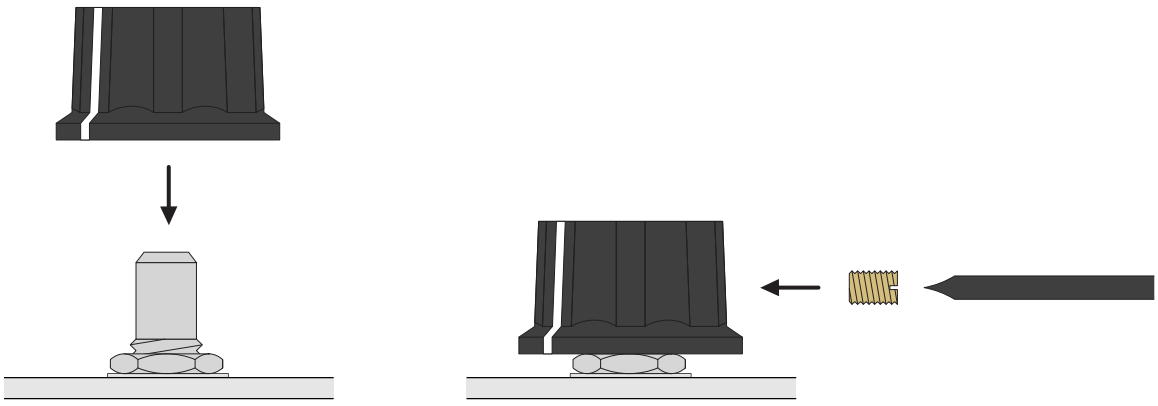
Test the bypass switch a few times, then leave it in effect mode and listen while you turn the knobs. Note that it has not been calibrated yet, so we're only testing to make sure it passes signal so we can proceed to the next step. We'll evaluate the sound as part of the biasing process.

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), tighten the set screw until it presses against the shaft of the potentiometer and holds the knob in place.

Don't over-tighten or you could damage the set screw. But on the other hand, if it's not tight enough then the knob will be prone to falling off or losing its alignment with the markings on the enclosure.



SETTING THE BIAS

Calibration is done by adjusting the Bias trimmer in the lower left corner of the PCB. It's a simple procedure that can be done by ear. However, if you do have access to an oscilloscope and signal generator, then you can use the calibration procedure from the factory service manual for the best possible results.

Setting the bias by ear

The trimmer adjusts the bias voltage to get optimum performance from the BBD. Set the Depth knob all the way up and set Rate to a medium speed, around 12:00. Start with the bias control at halfway, then adjust it up or down until you hear the strongest chorus and the least audible distortion.

In our experience, the optimum bias for the v3207 BBDs tends to be around 1:00 on the trimmer, so if you're not sure, just set it there.

Setting the bias with an oscilloscope

If you've got an oscilloscope, you can look at the waveform and fine-tune the bias visually rather than by ear. Connect the oscilloscope to the emitter of Q3 or the left leg of R24. Use a signal generator to create a sine wave at 200 Hz, 3V peak to peak (1V RMS), and send this to the pedal's input.

Make sure the oscilloscope is set to AC mode, then adjust the bias trimmer until the waveform is equally clipped on the top and bottom. The waveform is not symmetrical, so you're not necessarily looking for equal-shape clipping, just equal-width.

The test signal is intended to be much larger than what the pedal will deal with in normal use, so the waveform will not clip like this in practice. It's just easier to dial the symmetry when you're looking for peaks of equal width.

FINAL ASSEMBLY

If everything calibrated OK, you're all done! Affix the back panel with the four screws provided and make some music.

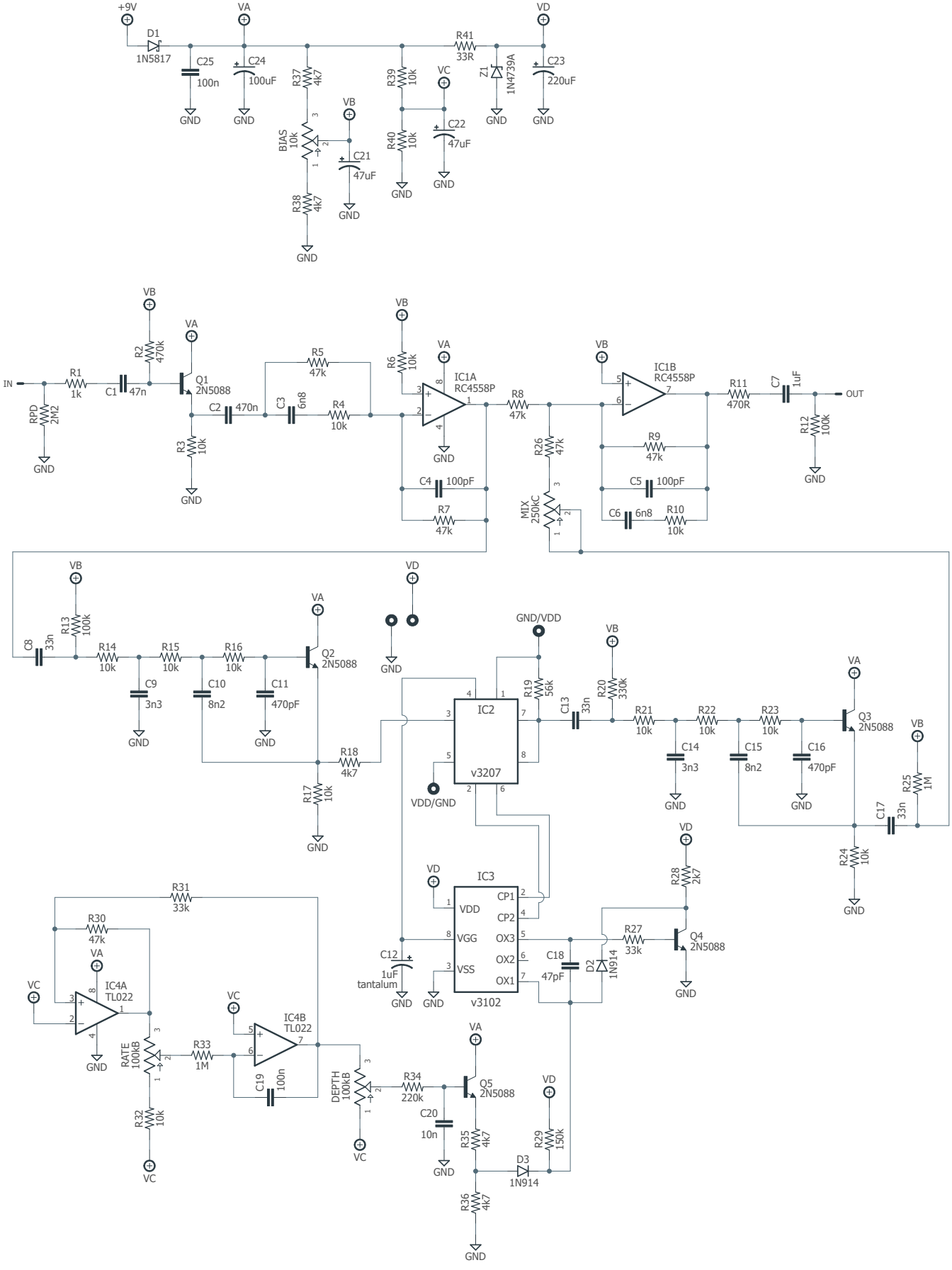
If doesn't work, or doesn't sound quite right after calibration didn't work, don't be discouraged. See page 28 for troubleshooting info.

USAGE

The Azure has three controls:

- **Rate** sets the speed of the chorus effect.
- **Depth** sets the intensity of the chorus effect.
- **Mix** adjusts the amount of modulated signal that is blended with the clean signal to create the chorus effect. This is especially useful for bass guitar so the low-end is preserved. The default CE-2 mode is all the way up.

SCHEMATIC


+9V
VA
VD
D1
1N5817
C25
100n
C24
100uF
R37
4k7
R39
10k
VC
R41
33R
Z1
1N4739A
C23
220uF
GND
VB
BIAS
10k
C21
47uF
R40
10k
C22
47uF
R38
4k7
VB
VA
R2
470k
IN
R1
1k
C1
47n
Q1
2N5088
RPD
2M2
R3
10k
C2
470n
C3
6n8
R4
10k
R5
47k
R6
10k
IC1A
RC4558P
C4
100pF
R7
47k
R8
47k
IC1B
RC4558P
R26
47k
MIX
250kC
R9
47k
C5
100pF
C6
6n8
R10
10k
R11
470R
C7
1uF
OUT
R12
100k
VB
VA
VD
R13
100k
C8
33n
R14
10k
R15
10k
R16
10k
Q2
2N5088
C9
3n3
C10
8n2
C11
470pF
R18
4k7
R17
10k
GND/VDD
IC2
v3207
VDD/GND
R19
56k
C13
33n
R20
330k
R21
10k
R22
10k
R23
10k
Q3
2N5088
C14
3n3
C15
8n2
C16
470pF
R25
1M
C17
33n
R24
10k
R31
33k
R30
47k
IC4A
TL022
RATE
100kB
R33
1M
IC4B
TL022
C19
100n
R32
10k
IC3
CP1
CP2
VDD
VGG
VSS
OX3
OX2
OX1
v3102
C12
1uF
tantalum
C18
47pF
D2
1N914
R28
2k7
R27
33k
Q4
2N5088
DEPTH
100kB
R34
220k
Q5
2N5088
C20
10n
R35
4k7
R29
150k
D3
1N914
R36
4k7

FULL PARTS LIST

In this document, the parts list is spread out across several pages by step. For more experienced builders, though, it may be easier to have everything in one place.

Resistors

PART	VALUE
R1	1k
R2	470k
R3	10k
R4	10k
R5	47k
R6	10k
R7	47k
R8	47k
R9	47k
R10	10k
R11	470R

PART	VALUE
R12	100k
R13	100k
R14	10k
R15	10k
R16	10k
R17	10k
R18	4k7
R19	56k
R20	330k
R21	10k
R22	10k

PART	VALUE
R23	10k
R24	10k
R25	1M
R26	47k
R27	33k
R28	2k7
R29	150k
R30	47k
R31	33k
R32	10k
R33	1M

PART	VALUE
R34	220k
R35	4k7
R36	4k7
R37	4k7
R38	4k7
R39	10k
R40	10k
R41	33R
RPD	2M2
LEDR	22k

Capacitors

PART	VALUE
C1	47n film
C2	470n film
C3	6n8 film
C4	100pF MLCC
C5	100pF MLCC
C6	6n8 film
C7	1uF film
C8	33n film
C9	3n3 film

PART	VALUE
C10	8n2 film
C11	470pF MLCC
C12	1uF tantalum
C13	33n film
C14	3n3 film
C15	8n2 film
C16	470pF MLCC
C17	33n film
C18	47pF MLCC

PART	VALUE
C19	100n film
C20	10n film
C21	47uF electro
C22	47uF electro
C23	220uF electro
C24	100uF electro
C25	100n MLCC

Transistors

PART	VALUE
Q1	2N5088
Q2	2N5088
Q3	2N5088
Q4	2N5088
Q5	2N5088

IC

PART	VALUE
IC1	JRC4558D
IC2	v3207D
IC3	v3102D
IC4	TL022

Diodes

PART	VALUE
D1	1N5817
D2	1N914
D3	1N914
Z1	1N4739A

Potentiometers

PART	VALUE
Rate	100kB
Depth	100kB
Mix	250kC

Switches

PART	VALUE
3PDT stomp	

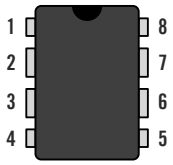
TROUBLESHOOTING INFORMATION

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'll 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 and JFETs have their pins labeled on the PCB.



All voltages taken with Rate at minimum and Depth at maximum. The "~" symbol denotes a voltage range that oscillates with the speed of the Rate control.

IC1

PIN	VOLTAGE
1	5.16 *(see note)*
2	5.16
3	5.16
4	0
5	5.16
6	5.16
7	5.16
8	9.35

IC2

PIN	VOLTAGE
1	0
2	3.93
3	4.46
4	7.63
5	8.16
6	3.92
7	6.31
8	6.32

IC3

PIN	VOLTAGE
1	8.17
2	3.93
3	0
4	3.93
5	0.33
6	7.60 ~ 7.80
7	2.40 ~ 3.20
8	7.64

IC4

PIN	VOLTAGE
1	8.69
2	4.40 ~ 4.90
3	1.00 ~ 8.00
4	0
5	4.50 ~ 4.80
6	4.94
7	2.00 ~ 8.00
8	9.35

Note: The voltages of IC1 pins 1-3 and 5-7 are set directly by the Bias trimmer and will vary depending on the optimum bias point.

Q1

PIN	VOLTAGE
C	9.35
B	4.60
E	4.20

Q2

PIN	VOLTAGE
C	9.35
B	4.99
E	4.47

Q3

PIN	VOLTAGE
C	9.35
B	4.71
E	4.28

Q4

PIN	VOLTAGE
C	6.00 ~ 7.00
B	0.43 ~ 0.50
E	0

Q5

PIN	VOLTAGE
C	9.36
B	2.00 ~ 7.00
E	1.50 ~ 6.50

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 two best places to ask for help are the DIY Stompboxes forum and the DIY Stompboxes Facebook group. Both communities have thousands upon thousands of members 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

BOSS® is a registered trademark of Roland Corporation.

All other 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 (2024-06-01)
Initial release.