BASED ON
Univox ${ }^{\circledR}$ Superfuzz
EFFECT TYPE
Octave Fuzz

BUILD DIFFICULTY
IIIIU Intermediate
DOCUMENT VERSION
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PROJECT SUMMARY
A classic untamed fuzz from the 1970s that adds an octave-up overtone, famous for its use by Pete Townshend of The Who.


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.

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## 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 24.

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

## Film Capacitors

| NAME | QTY |
| :--- | ---: |
| 1 n | 1 |
| 2 n 2 | 1 |
| 100 n | 2 |

Electrolytic Capacitors

| NAME | QTY |
| :--- | ---: |
| 10 uF | 11 |
| 100 uF | 1 |

MLCC Capacitors

| NAME | QTY |
| :--- | ---: |
| 100n (marked "104") | 1 |

## Diodes

| NAME | QTY |
| :--- | ---: |
| 1N5817 | 1 |
| Germanium (glass case, no marking) | 2 |

Resistors

| NAME | QTY |
| :--- | ---: |
| 470 R | 2 |
| 1 k | 1 |
| $1 k 8$ | 2 |
| $3 k 3$ | 1 |
| 10 k (see note) | 8 |
| 15 k | 1 |
| 22 k | 4 |
| 47 k | 3 |
| 100 k | 6 |
| 150 k | 1 |
| 220 k | 1 |
| 470 k | 1 |
| $2 M 2$ | 1 |

Note: Kits purchased prior to February 2024 will have a $4 k 7$ resistor instead of 10k for LEDR.

Transistors

| NAME | QTY |
| :--- | ---: |
| 2N3904 | 3 |
| 2N3903 (matched) | 2 |
| 2N3903 (unmatched) | 1 |

## PACKING LIST (CONT.)

| Potentiometers |  |
| :---: | :---: |
| NAME | QTY |
| 10k trimmer potentiometer | 1 |
| 50kB | 3 |
| Dust cover | 3 |
| Knob | 3 |
| Mounting nut, potentiometer, 0.44" | 3 |
| Lock washer, potentiometer, 0.5" | 3 |
| Outer washer, potentiometer, $0.475^{\prime \prime}$ | 3 |
| Other |  |
| NAME | QTY |
| LED bezel | 1 |
| LED, blue | 1 |
| 9 V battery snap | 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 |

## 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, 70 mm | 2 |
| 4-strand wire assembly, 108 mm | 1 |
| 3-pin wire assembly header | 2 |
| 4-pin wire assembly header | 1 |



SOLDERING IRON
Temperature-adjustable is recommended. The optimum soldering temperature is $700-725^{\circ}$ F (371-385 $\left.{ }^{\circ} \mathrm{C}\right)$ for leaded solder, or $750^{\circ} \mathrm{F}\left(400^{\circ} \mathrm{C}\right)$ for lead-free.


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


## SCREWDRIVER (PHILLIPS)

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


## 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.


## 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.


FLAT SCREWDRIVER (SMALL)
This is used for tightening the set screws on the knobs. The tip should be no more than $0.1^{\prime \prime}(2.5 \mathrm{~mm})$ wide.


## 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.


## 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 $0.05^{\prime \prime}$ ( 1.25 mm ) 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).

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.)


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

FILM CAPACITOR


Not polarized. Color may vary by brand and type.

TRIMMER POTENTIOMETER


## RECTIFIER DIODE <br> $\qquad$

Some Schottky diodes also look like this.


MLCC


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

TRANSISTOR OR JFET


Some voltage regulators also look like this.

SILICON DIODE

ZENER DIODE


TANTALUM CAPACITOR


Polarized. The positive side is marked.

SNAP-APART SOCKET


It's recommended to use a razor blade to separate these cleanly.

WIRE ASSEMBLY


WIRE ASSEMBLY HEADER


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 | OUTER WASHER | LOCK WASHER |
| :---: | :---: | :---: | :---: |
|  |  | $\qquad$ <br> DIAMETER: $0.6^{\prime \prime} / 15.2 \mathrm{~mm}$ |  |

\begin{tabular}{|c|c|c|c|}
\hline \multirow[t]{2}{*}{POTENTIOMETER (SINGLE)} \& POTENTIOMETER (DUAL) \& \begin{tabular}{l}
MOUNTING NUT
\(\infty\) \\
DIAMETER: \(0.44^{\prime \prime} / 11.2 \mathrm{~mm}\)
\end{tabular} \& LOCK WASHER \\
\hline \&  \& \begin{tabular}{l}
OUTER WASHER
\(\qquad\) \\
DIAMETER: \(0.475^{\prime \prime} / 12 \mathrm{~mm}\)
\end{tabular} \& KNOB \\
\hline TOGGLE SWITCH \& \begin{tabular}{l}
MOUNTING NUT
\(\square>\) \\
DIAMETER: 0.36 " \(/ 9.1 \mathrm{~mm}\)
\end{tabular} \& \begin{tabular}{l}
DRESS NUT
\(\square \quad \square\) \\
DIAMETER: 0.375 " / 9.5 mm
\end{tabular} \& \begin{tabular}{l}
LOCK WASHER

$\qquad$ <br>
DIAMETER: 0.4" / 10.1mm
\end{tabular} <br>

\hline
\end{tabular}

| FOOTSWITCH | MOUNTING NUT | DRESS NUT | LOCK WASHER |
| :---: | :---: | :---: | :---: |
|  |  $x x$ <br> DIAMETER: $0.6^{\prime \prime} / 15.2 \mathrm{~mm}$ |  |  $\qquad$ <br> DIAMETER: $0 . \mathbf{6}^{\prime \prime}$ / 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.


| PART | VALUE |
| :--- | :--- |
| R1 | 22 k |
| R2 | 100 k |
| R3 | 100 k |
| R4 | 1 k 8 |
| R5 | 47 k |
| R6 | 470 k |
| R7 | 10 k |
| R8 | 47 k |


| PART | VALUE |
| :--- | :--- |
| R9 | $3 k 3$ |
| R10 | $220 k$ |
| R11 | $150 k$ |
| R12 | $10 k$ |
| R13 | $10 k$ |
| R14 | $470 R$ |
| R15 | $470 R$ |
| R16 | 100k |


| PART | VALUE |
| :--- | :--- |
| R17 | $22 k$ |
| R18 | $10 k$ |
| R19 | $1 k 8$ |
| R20 | $22 k$ |
| R21 | $100 k$ |
| R22 | $47 k$ |
| R23 | $10 k$ |
| R24 | $22 k$ |


| PART | VALUE |
| :--- | :--- |
| R25 | 10 k |
| R26 | 100 k |
| R27 | 15 k |
| R28 | 10 k |
| R29 | 1 k |
| R30 | 100 k |
| RPD | 2 M 2 |
| LEDR | 10 k or 4 k 7 |



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.


You'll use this same technique for most of the other components as well.
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. Generally you don't want to do more than 10 or 15 resistors at a time or the bottom of the board will get too crowded.

If this is your first time soldering, watch tutorial videos on YouTube and make sure you get it down before you begin. You don't want to practice or experiment on this board!

## DIODES

| PART | VALUE |
| :--- | :--- |
| D1 | 1N5817 |
| D3 | Germanium |
| D4 | Germanium |



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.

Germanium diodes will sometimes have more than one band. In these cases, the larger or wider band is the one that indicates the cathode side.

## Precautions with germanium diodes

Germanium diodes are fragile and require more care than the other components. Make sure to observe the following precautions when working with them.

- To prevent stress on the glass body of the diode, when bending the leads, use needle-nose pliers or tweezers to clamp the lead as close to the body as possible while you bend it down. The bend should be about 0.05-0.08" from the body of the diode, so make sure to use pliers that are narrow enough.
- Old-stock diodes can sometimes develop corrosion on the leads, making them
 difficult to solder. It's recommended to use sandpaper or a small file to gently rough up the leads where they will make contact with the solder. This will make adhesion much easier.
- Be quick when soldering. Germanium diodes can easily be damaged by overheating. Contact with the soldering iron should be limited to 1-2 seconds maximum. If you don't have a good solder joint, wait a minute or two for it to cool before trying again.

The germanium diodes included with this kit have been individually tested and verified as working. Unless they arrive damaged, free replacements will not be offered, so please be careful!

| PART | VALUE |
| :--- | :--- |
| OCTAVE | 10 k trimmer |



Next up is the trimmer potentiometer. As with other types of components, after installing it on the PCB, the three legs should be bent outwards to hold it in place while soldering.

## Adjusting the octave trimmer

The octave trimmer should be set to the 12:00 position to start with. It controls the balance between Q4 and Q5, the two transistors that produce the octave effect, and was originally implemented in the Superfuzz to compensate for the transistors being mismatched.

Since the Q4 and Q5 transistors are closely matched in this kit already, the trimmer likely will not need further adjusting from the 12:00 position, but it's there so you can make tweaks if needed. You may find you prefer the octave to be slightly less pronounced.

| PART | VALUE |
| :--- | :--- |
| Q1 | $2 N 3904$ |
| Q2 | $2 N 3904$ |
| Q3 | $2 N 3904$ |
| Q4 | $2 N 3903^{* *}$ |
| Q5 | $2 N 3903^{* *}$ |
| Q6 | $2 N 3903$ |

${ }^{* *}$ matched pair


Now we'll do the six transistors:

- The three 2N3904s should be used for Q1-3.
- Two of the 2N3903 transistors should be paired inside a small inner bag. These are the matched set for Q4 and Q5. It's recommended to install these two first so they aren't inadvertently mixed with the other 2N3903 that is unmatched.
- The remaining 2N3903 is used for Q6.

If the legs are not already bent into 0.1 " spacing, use your needle-nose pliers to bend the outer two legs as shown.


Bend the outer leads to hold it in place on the board. Then, solder them and clip the leads.


CAPACITORS (NON-POLARIZED)

| PART | VALUE |
| :--- | :--- |
| C 2 | 2 n 2 |
| C 4 | $100 \mathrm{n}(0.1)$ |$\quad$| PART <br> C 13 <br> C 17 | $100 \mathrm{n}(0.1)$ |
| :--- | :--- |



After the sockets come the box film and MLCC capacitors. These are all several different heights, but there aren't as many, so just do them all at once. Bend the leads at an angle to hold them in place.

C2 and C12 are blue and the value is printed on the top. C4 and C13 are red and the value is printed on the side.

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

## 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 |
| :--- | :--- |
| C1 | 10uF electro |
| C3 | 10uF electro |
| C5 | 10uF electro |
| C6 | 10uF electro |
| C7 | 10uF electro |
| C8 | 10uF electro |


| PART | VALUE |
| :--- | :--- |
| C9 | 10uF electro |
| C10 | 10uF electro |
| C11 | 10uF electro |
| C14 | 10uF electro |
| C15 | 10uF electro |
| C16 | 100uF electro |



Populate the electrolytic capacitors. These are the tallest components so we save them for last. They are polarized (in other words, 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.

## 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 cango.

## 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.

| PARTS |
| :--- |
| Input \& output jacks |
| DC jack |
| Wire header |
| 9 V battery snap |



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.

Next, we'll hook up the 9 V battery connector. This is optional. Not everyone uses batteries. But, if you do, this pedal should last a long time on a single 9 V so you won't need to change it very often.

## STEP 1

Thread the battery snap leads through the strainrelief hole twice so it forms a single loop.


## STEP 2

Bend the exposed wires back down and solder them into the pads. Red is positive (+), black is negative (-). After soldering, pull it tight.

For even more strain relief, you can thread the snap through the loop to form a knot. (not shown)


## ENCLOSURE LAYOUT: PANEL MOUNTS

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




## 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 shown in the diagram to the left. You may need to adjust the position of the potentiometers slightly if they are not aligned straight.

Note that the toggle switch is not used in the kit and will be left empty on the PCB. It is replaced by the Tone control that pans between the two switch settings of the original Superfuzz for better control over the tone.

Once all of the pins are through their holes and the PCB is laying flat, solder each of the pins from the top. Be 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 more important with the two uppermost pots because the input/output PCB overlaps them and you need to avoid any of the components shorting.

Next, move to the footswitch board and solder the 3PDT switch.
The LED is last. Before soldering the LED, 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. Then, clip the leads of the LED.

## 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. 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 start turning the knobs and see if everything sounds OK. If it works, great! If not, don't be discouraged. See page 25 for troubleshooting info.

## Finishing touches

Now, just a couple of things for the final assembly. Turn the 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 $0.1^{\prime \prime}$ / 2.5 mm 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.


Last, just close the panel on the back using the four screws. Before that, though, grab a permanent marker and write your name and the completion date on the inside of the back panel. This is an accomplishment!


## 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 | $22 k$ |
| R2 | $100 k$ |
| R3 | $100 k$ |
| R4 | $1 k 8$ |
| R5 | $47 k$ |
| R6 | $470 k$ |
| R7 | $10 k$ |
| R8 | $47 k$ |


| PART | VALUE |
| :--- | :--- |
| R9 | 3 k 3 |
| R10 | 220 k |
| R11 | 150 k |
| R12 | 10 k |
| R13 | 10 k |
| R14 | 470 R |
| R15 | 470 R |
| R16 | 100 k |

Capacitors

| PART | VALUE |
| :--- | :--- |
| C1 | 10uF electro |
| C2 | 2 n 2 |
| C3 | 10 uF electro |
| C4 | 100 n |
| C5 | 10uF electro |
| C6 | 10uF electro |
| C7 | 10uF electro |
| C8 | 10uF electro |
| C9 | 10uF electro |

Potentiometers

| PART | VALUE |
| :--- | :--- |
| Expander | 50 kB |
| Balance | 50 kB |
| Tone | 50 kB |
| Octave | 10 k trim |

Switches

| PART |
| :--- |
| 3PDT stomp |


| PART | VALUE |
| :--- | :--- |
| R17 | $22 k$ |
| R18 | $10 k$ |
| R19 | $1 k 8$ |
| R20 | $22 k$ |
| R21 | $100 k$ |
| R22 | $47 k$ |
| R23 | $10 k$ |
| R24 | $22 k$ |


| PART | VALUE |
| :--- | :--- |
| R25 | 10 k |
| R26 | 100 k |
| R27 | 15 k |
| R28 | 10 k |
| R29 | 1 k |
| R30 | 100 k |
| RPD | 2 M 2 |
| LEDR | 10 k or 4 k 7 |

## Diodes

| PART | VALUE |
| :--- | :--- |
| D1 | 1N5817 |
| D3 | Germanium |
| D4 | Germanium |

Transistors

| PART | VALUE |
| :--- | :--- |
| Q1 | $2 N 3904$ |
| Q2 | $2 N 3904$ |
| Q3 | $2 N 3904$ |
| Q4 | $2 N 3903^{*}$ |
| Q5 | Q4 and Q5 are supplied as a matched set. |
| Q6 | $2 N 3903^{*}$ |

## TROUBLESHOOTING INFORMATION

What happens if you finish building the kit and find that it doesn't work right? Here are a few common problems people have with this pedal and how to solve them.

## The LED doesn't light up.

First, does the pedal sound right? If you aren't getting any sound, you probably have a power issue with the whole circuit that is not specific to the LED, so you'll want to look elsewhere for the problem.

If it does pass a signal, it's probably just the LED itself. Is the flat side facing to the right (looking in the enclosure from the back)? If it's reversed, it won't work. You'll have to re-solder it the right way.

## All other issues

For any other problems, the first course of action is to measure the voltages on each pin of the transistors using a digital multimeter. Set the multimeter to DC mode with a range of 20 V or higher.

To start, touch the black lead to a ground point for the circuit. The easiest spot is inside a tapped screw hole in one of the corners of the enclosure. This way the probe stays in place without needing to use alligator clips. The circuit must be fully installed in the enclosure for this to work.

Then, touch the red probe to the first leg of Q1 (marked "E" for emitter) and read the voltage. Compare it to the table below and note if it's more than around 0.5 V higher or lower. Continue through the remaining pins of each of the transistors.

These baseline voltages are taken using a 9.7 V supply. Your measured voltages won't be exactly the same due to variance in power supplies and component tolerances. However, if you see anything that's significantly different than these listed voltages, it's a good indicator of an issue, and the test voltages can help you or someone else narrow it down.

| Q1 |  |
| :--- | :--- |
| PIN | VOLTAGE |
| E | 0.13 V |
| B | 0.73 V |
| C | 5.86 V |


| Q2 |  |
| :--- | :--- |
| PIN | VOLTAGE |
| E | 5.21 V |
| B | 5.86 V |
| C | 9.48 V |


| Q3 |  |
| :--- | :--- |
| PIN | VOLTAGE |
| E | 3.02 V |
| B | 3.64 V |
| C | 6.48 V |

Q4

| PIN | VOLTAGE |
| :--- | :--- |
| E | 1.33 V |
| B | 1.98 V |
| C | 2.00 V |

Q5

| PIN | VOLTAGE |
| :--- | :--- |
| E | 1.33 V |
| B | 1.96 V |
| C | 2.00 V |

Q6

| PIN | VOLTAGE |
| :--- | :--- |
| E | 0.54 V |
| B | 1.18 V |
| C | 4.10 V |

## 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!

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## DOCUMENT REVISIONS

1.0.3 (2024-02-15)

Updated LEDR (LED current-limiting resistor) to 10 k to reduce brightness.

### 1.0.2 (2021-07-07)

Added octave trimmer to packing list on pg. 5.
1.0.1 (2021-06-26)

Corrected resistor values on p. 10 (the p. 24 values and schematic were correct).
1.0.0 (2021-06-13)

Initial release.

