PROJECT NAME

TITAN

aion
DIY GUITAR EFFECTS

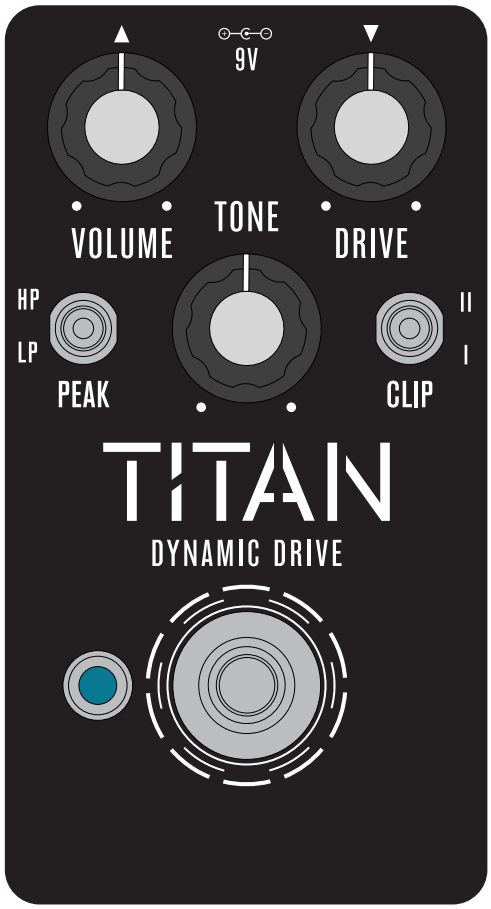
BASED ON
Fulltone® OCD®

BUILD DIFFICULTY
▮▮▯▯▯ Easy

EFFECT TYPE
Overdrive / distortion

DOCUMENT VERSION
1.0.2 (2024-08-08)

PROJECT SUMMARY
A legendary hard-clipping overdrive pedal that makes almost any rig sound better.



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.

TRADEMARK USAGE

Fulltone® and OCD® are registered trademarks of Fulltone Musical Products LLC. Any use of these trademarks is for comparative purposes only. Aion FX has no affiliation with Fulltone Musical Products and this project is not endorsed by them.

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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 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 28.

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

Film Capacitors

NAME	QTY
1n	1
10n (0.01)	1
22n (0.022)	1
33n (0.033)	1
47n (0.047)	3
68n (0.068)	1
100n (0.1)	1
1uF	1

Electrolytic Capacitors

NAME	QTY
47uF	1
100uF	1

MLCC Capacitors

NAME	QTY
220pF (marked “221”)	2
100n (marked “104”)	1

Diodes

NAME	QTY
1N5817	1
Germanium (1N34A or similar)	2
LED, 3mm red	2

Resistors

NAME	QTY
100R	1
1k	1
2k2	1
10k	6
18k	1
22k	1
33k	1
39k	1
150k	1
470k	1
1M	1

ICs

NAME	QTY
TL082	1
8-pin socket	1

Other

NAME	QTY
DIP switch, 3-position	2

Transistors

NAME	QTY
2N7000	2

PACKING LIST (CONT.)

Potentiometers

NAME	QTY
10kB	1
100kB	1
1MA	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, SPDT on-on	2
Mounting nut, toggle switch, 0.36"	2
Lock washer, toggle switch, 0.4"	2
Dress nut, toggle switch, 0.375"	2
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

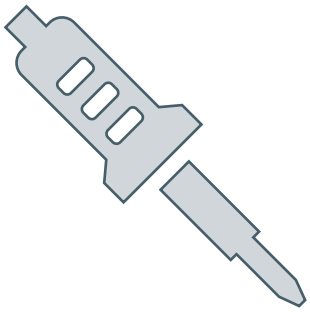
Other

NAME	QTY
LED bezel	1
LED, blue	1
9V 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

Wiring

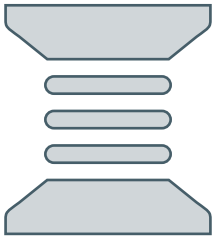
NAME	QTY
3-strand wire assembly, 70mm	2
4-strand wire assembly, 108mm	1
3-pin wire assembly header	2
4-pin wire assembly header	1

TOOLS NEEDED



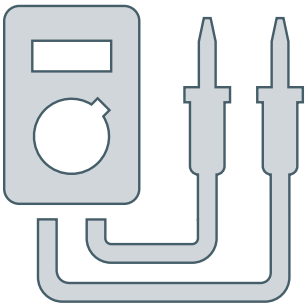
SOLDERING IRON

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.



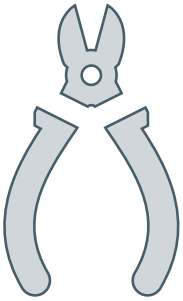
SOLDER

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.



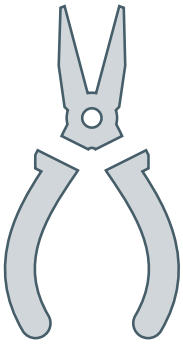
DIGITAL MULTIMETER (DMM)

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.



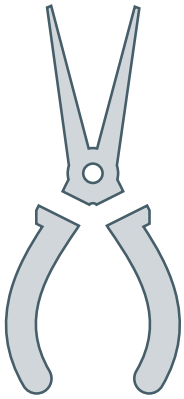
WIRE SNIPPERS

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



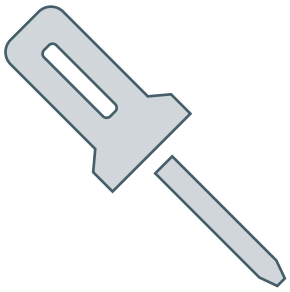
FLAT-NOSE PLIERS

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



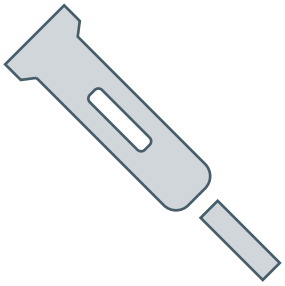
NEEDLE-NOSE PLIERS

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.



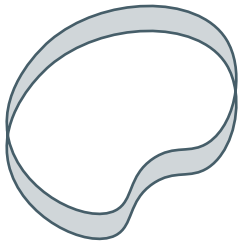
SCREWDRIVER (PHILLIPS)

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.



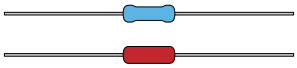
RUBBER BAND

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).

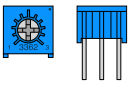
COMPONENT IDENTIFICATION

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.)

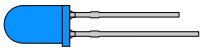
RESISTOR



TRIMMER POTENTIOMETER

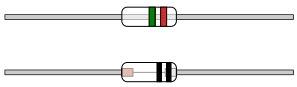


LED



SILICON DIODE

GERMANIUM DIODE



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

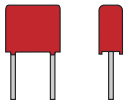
RECTIFIER DIODE

Some Schottky diodes also look like this.

SCHOTTKY DIODE

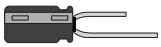
ZENER DIODE

FILM CAPACITOR



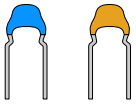
Not polarized. Color may vary by brand and type.

ELECTROLYTIC CAPACITOR



Polarized. The negative side is marked.

MLCC

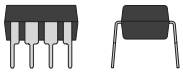


Not polarized. MLCC stands for "multi-layer ceramic capacitor."

TANTALUM CAPACITOR

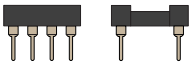
Polarized. The positive side is marked.

OP-AMP / IC

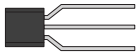


Charge pumps and delay chips also look like this. They may have more than 8 legs.

IC SOCKET



TRANSISTOR OR JFET



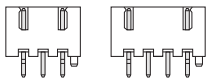
Some voltage regulators also look like this.

DIP SWITCH

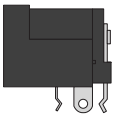
The number of switch positions may vary.

WIRE ASSEMBLY

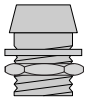
WIRE ASSEMBLY HEADER



DC JACK



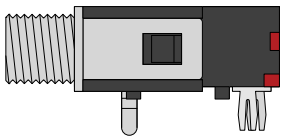
LED BEZEL



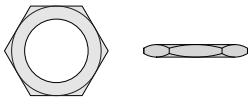
HARDWARE IDENTIFICATION

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

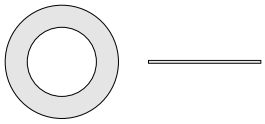


MOUNTING NUT



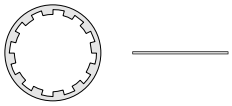
DIAMETER: 0.54" / 13.7mm

OUTER WASHER



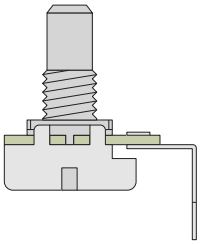
DIAMETER: 0.6" / 15.2mm

LOCK WASHER

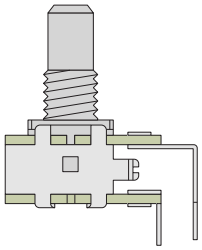


DIAMETER: 0.5" / 12.7mm

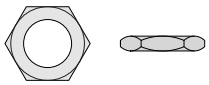
POTENTIOMETER (SINGLE)



POTENTIOMETER (DUAL)

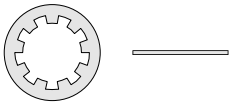


MOUNTING NUT



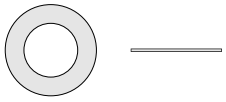
DIAMETER: 0.44" / 11.2mm

LOCK WASHER



DIAMETER: 0.5" / 12.7mm

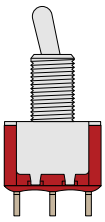
OUTER WASHER



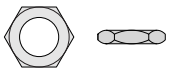
DIAMETER: 0.475" / 12mm

KNOB

TOGGLE SWITCH

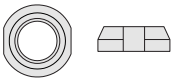


MOUNTING NUT



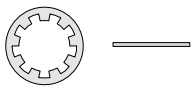
DIAMETER: 0.36" / 9.1mm

DRESS NUT



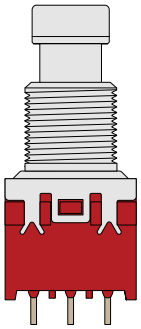
DIAMETER: 0.375" / 9.5mm

LOCK WASHER

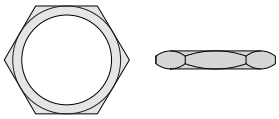


DIAMETER: 0.4" / 10.1mm

FOOTSWITCH

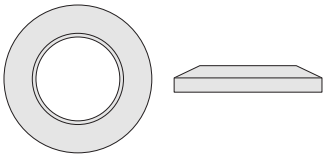


MOUNTING NUT



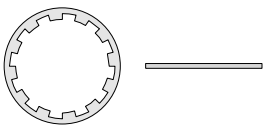
DIAMETER: 0.6" / 15.2mm

DRESS NUT



DIAMETER: 0.77" / 19.6mm

LOCK WASHER

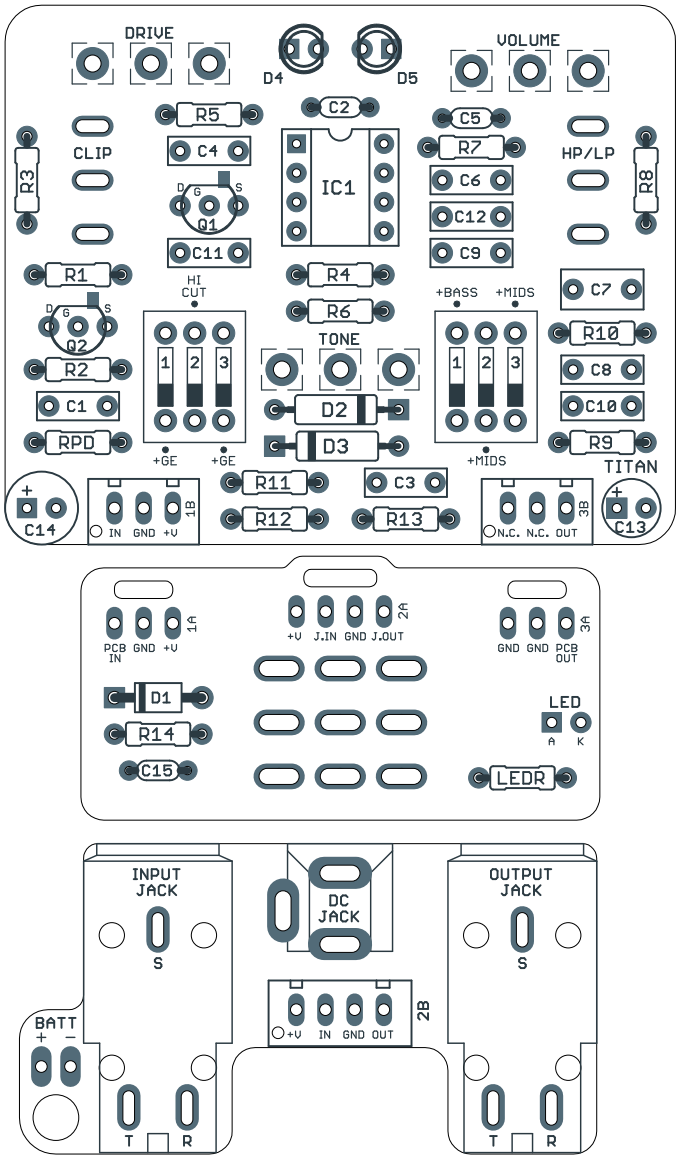


DIAMETER: 0.6" / 15.2mm

PCB ASSEMBLY OVERVIEW

Now it's time to start building!

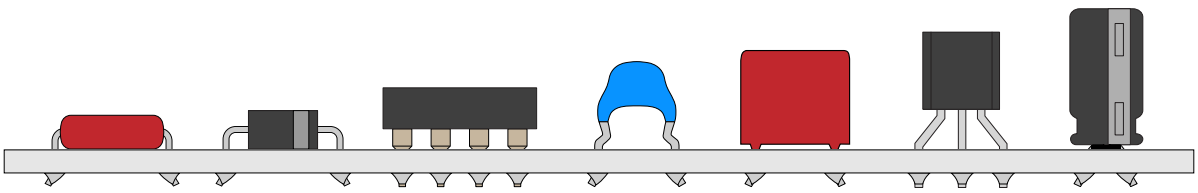
Before you begin, separate the PCBs into individual boards and break off the tabs from each using needle-nose or flat-head pliers. You should be left with the three PCBs shown to the right.



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.

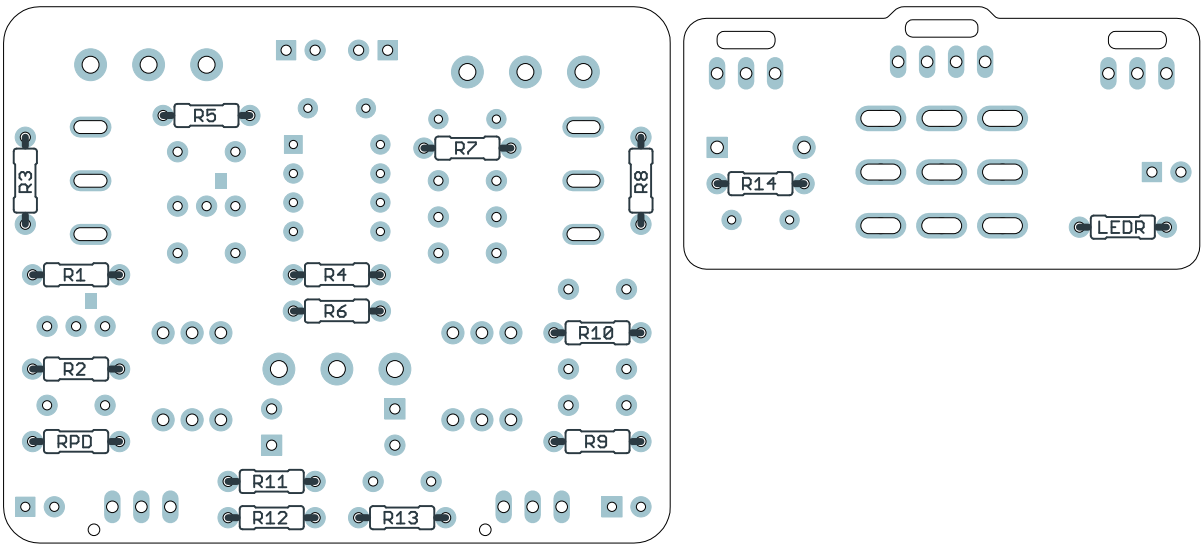


RESISTORS

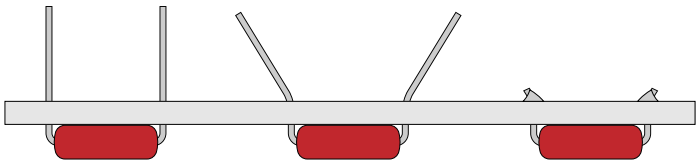
PART	VALUE
R1	10k
R2	470k
R3	18k
R4	2k2
R5	10k
R6	10k

PART	VALUE
R7	150k
R8	39k
R9	33k
R10	22k
R11	1k
R12	10k

PART	VALUE
R13	10k
R14	100R
RPD	1M
LEDR	10k



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.

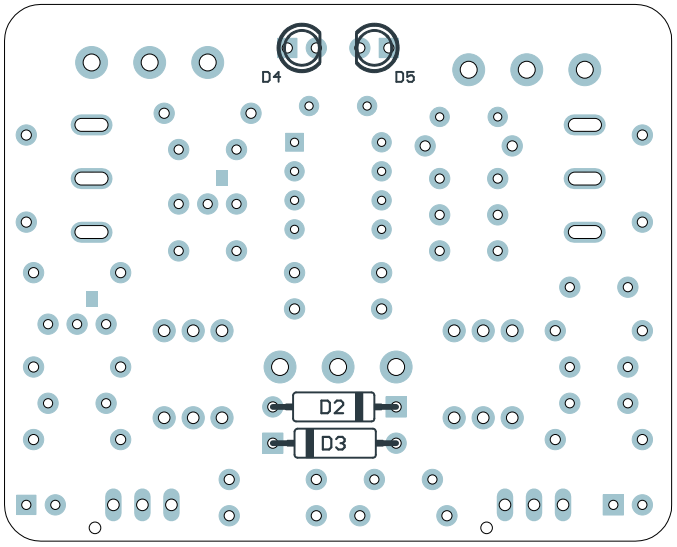


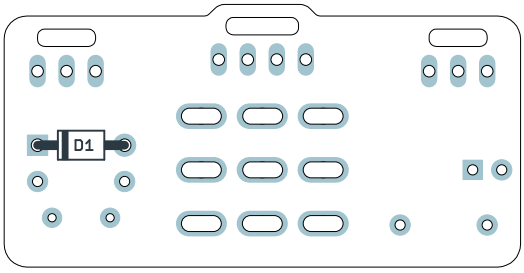
You'll use this same technique for most of the other components as well.

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 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 & LEDS





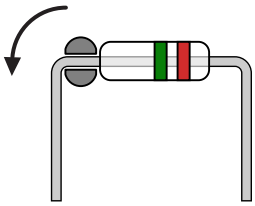
PART	VALUE
D1	1N5817
D2	Germanium
D3	Germanium

PART	VALUE
D4	3mm red LED
D5	3mm red LED

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.

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.

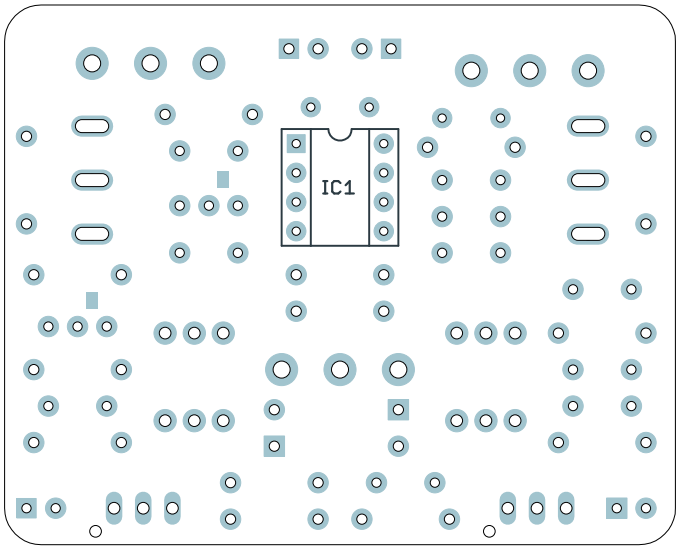
If you damage them during installation, send us a note via our missing parts form and we can send a replacement for the cost of shipping.

Installing the LEDs

The D4 and D5 LEDs act as clipping diodes in this circuit. As with polarized capacitors, the long leg goes in the square pad and the short leg in the round pad. Each LED has a flat side which represents the cathode (negative side) and they should be installed so that the flat sides face each other. The orientation is shown on the PCB silkscreen if you look carefully, but it's partially obscured by the pads so it can be hard to make out.

SOCKET & IC

PART	VALUE
IC1	TL082



Next up is the IC socket. You can't bend the leads of the socket like you can with the other components, so it won't stay in on its own until it is soldered.

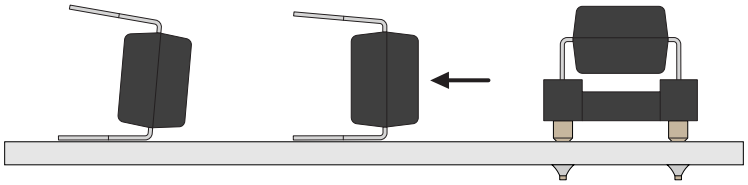
Again, it's much easier to do this with gravity holding it in place for you, so you'll want install the socket before you do any of the taller components.

Installing the IC

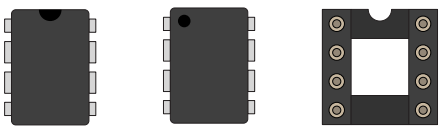
Don't insert the IC into the socket just yet. We will do this in a later step, after we've finished soldering the tallest components (the polarized capacitors). This information is just listed here for reference.

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

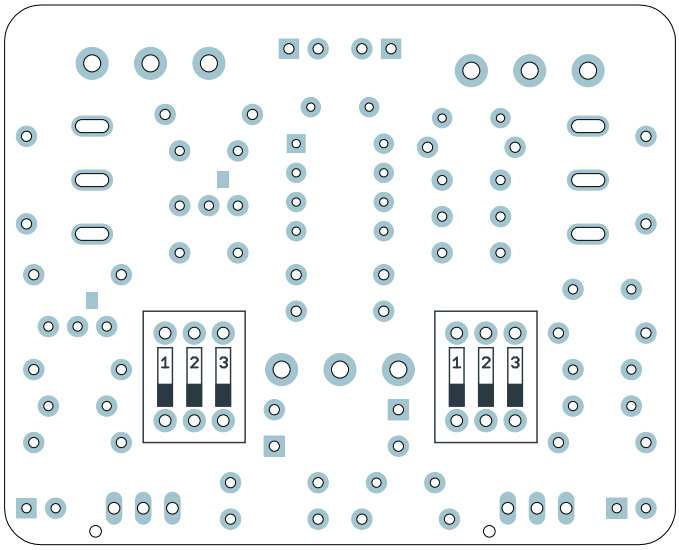
It's easiest to do this by laying the IC legs against the table and bending the body itself so all four legs on the side are straightened out at once. Then, flip it and do the other side.



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).



3-position DIP switch (2)



Now we'll do the DIP switches. These are both very slightly taller than the IC socket, so they should be done after the socket is soldered, but the process is the same.

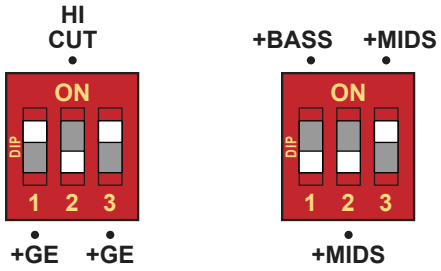
The legs of the DIP switches aren't long enough to be bent, so just turn the PCB upside down and let it hold the DIP switch in place while you solder.

Make sure the "ON" text faces toward the toggle switch pads and the top of the PCB. If it's installed backwards, it will still work, but the switch positions will be inverted.

Using the DIP switches

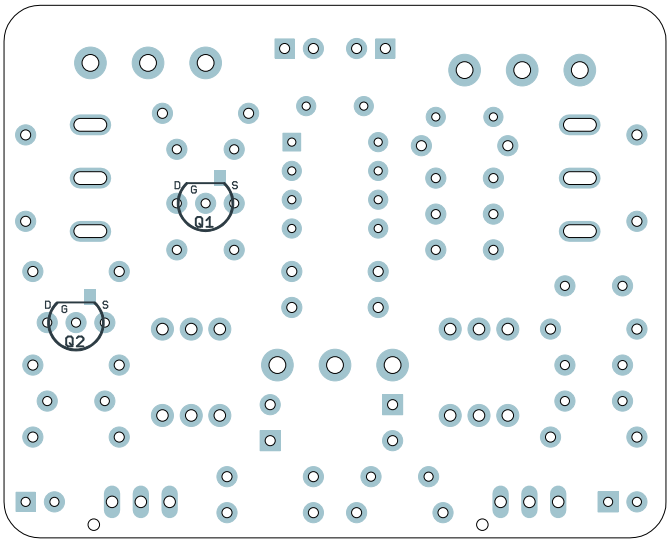
The DIP switches incorporate most of the circuit changes throughout the original run of OCDs prior to V2, and with different combinations of settings you can get the characteristics of these versions.

There is more in-depth information about the switch settings on page 25, as well as a quick reference on page 26. For now, it's recommended to setting them to these positions, which replicates version 1.7:



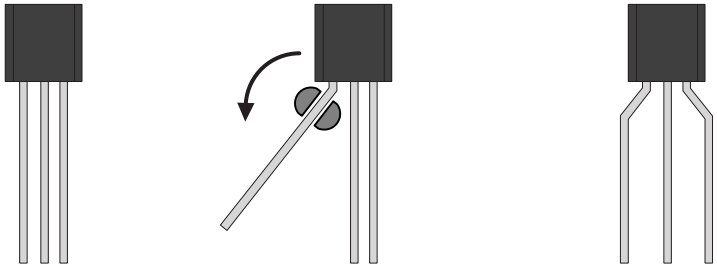
TRANSISTORS AND REGULATOR

PART	VALUE
Q1	2N7000
Q2	2N7000

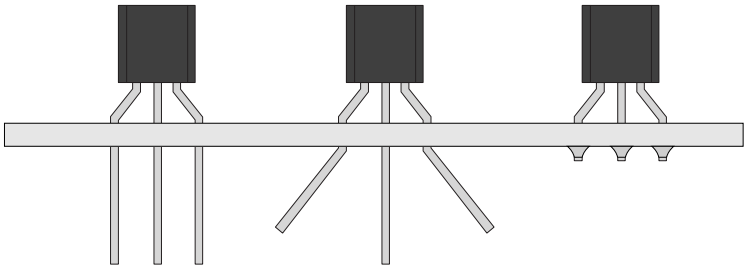


Now we'll do the transistors as well as the regulator, which is not a transistor but looks like one.

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.



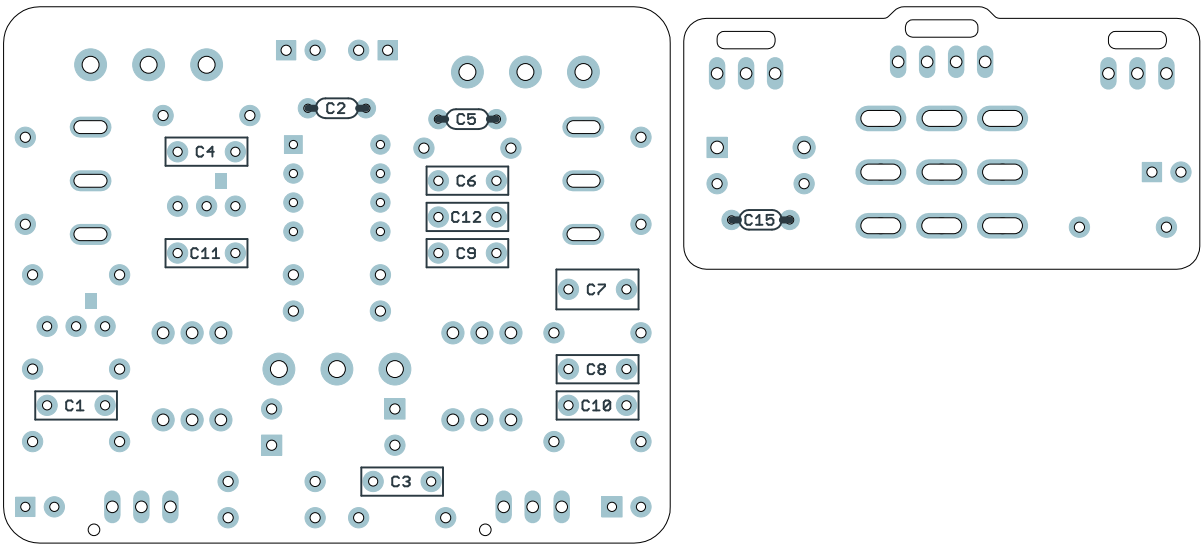
Once installed, bend the two outer legs to hold it in place on the board. Then, solder them and clip the leads. Be very careful of the orientation since the four parts face in three different directions.



CAPACITORS (NON-POLARIZED)

PART	VALUE
C1	22n (0.022)
C2	220pF MLCC
C3	68n (0.068)
C4	1n
C5	220pF MLCC
C6	100n (0.1)
C7	1uF

PART	VALUE
C8	47n (0.047)
C9	47n (0.047)
C10	47n (0.047)
C11	10n (0.01)
C12	33n (0.033)
C15	100n MLCC



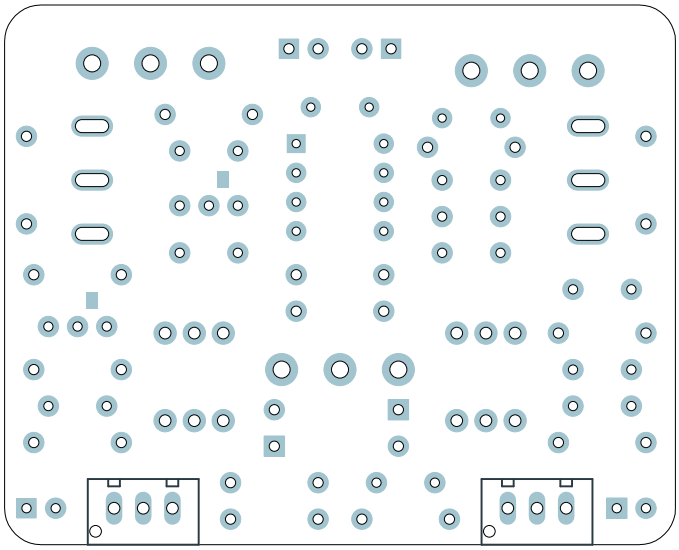
After the sockets come the box film and MLCC capacitors. These are all several different heights, but there aren't as many, so just do them all at once. Bend the leads at an angle to hold them in place.

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.

Note: C4 and C11 are usually blue box-film capacitors. For these, the value is printed on the top rather than the side. C6 is usually red, but may read "µ1J100" on the top rather than the side.

C2 and C5 (220pF MLCCs) are blue and taped to cardboard. C15 (100n MLCC) is always yellow. For both of these, the value is hard to read on the side, but they can be identified by color since they are the only two values of MLCC used in the kit.

WIRE HEADERS

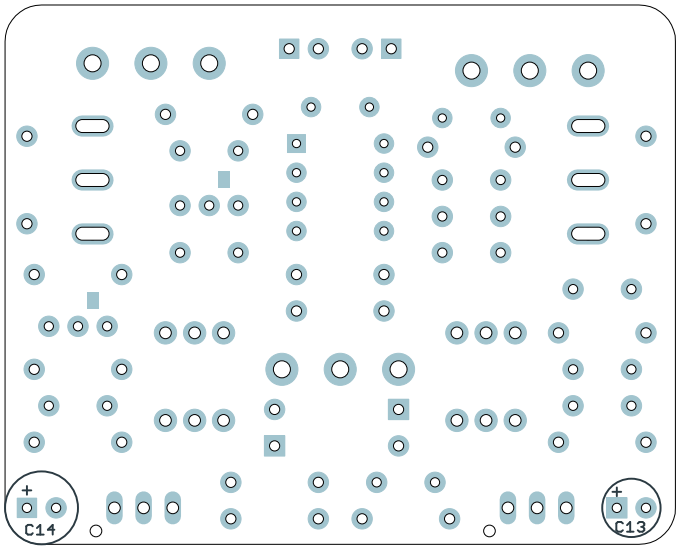


Install the two 3-pin headers (wire connectors) as shown above. These have a polarity pin, so as long as they are pressed all the way down, there's only one possible way to install them. They do fit pretty tightly in the holes, though, so press firmly.

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

CAPACITORS (POLARIZED)

PART	VALUE
C13	47uF electro
C14	100uF electro

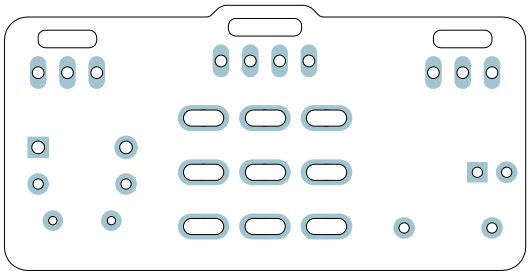


Populate the electrolytic capacitors. These are the tallest components so we save them for last. They are polarized (i.e. they will only work in one direction), so note the vertical mark that indicates the negative side. The longer leg is positive and fits in the square pad.

These are the last of the on-board components. Now is the time to go back to page 12 and insert the IC into the socket.

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.

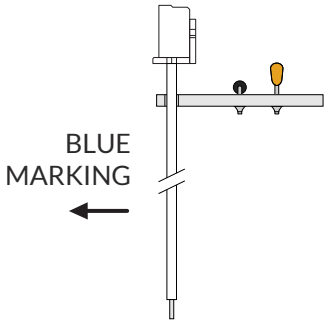
STEP 2

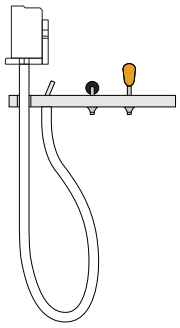
Next, bend the wires back upward and fit the ends of the wires into the solder pads.

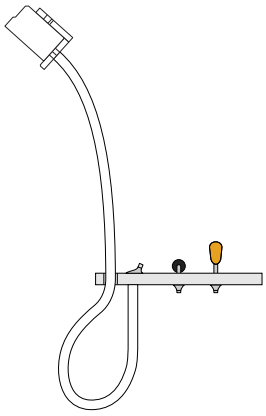
On the top side of the PCB, bend the exposed wires backward so it holds the wire in place. Pull the header back up through the slot partway.

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.



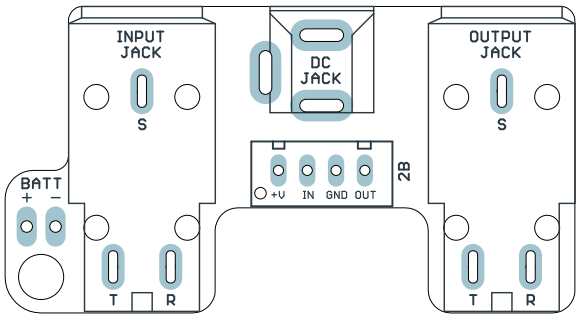




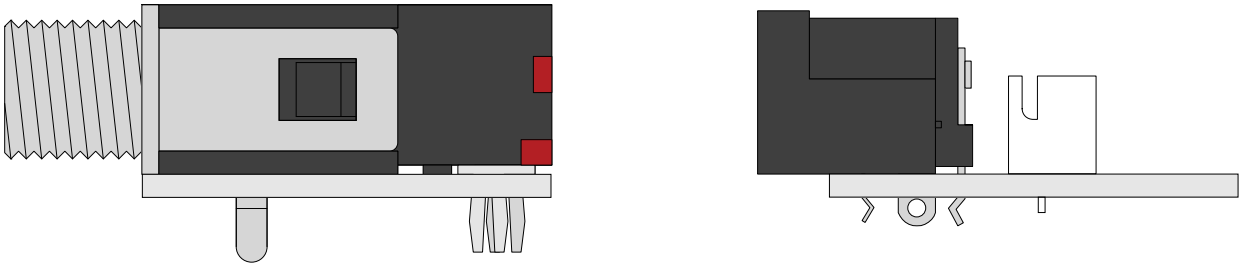
Once all three wire assemblies are soldered, set the footswitch PCB aside. We'll solder the actual footswitch and LED in a later step.

INPUT/OUTPUT PCB

PARTS
Input & output jacks
DC jack
Wire header
9V 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.

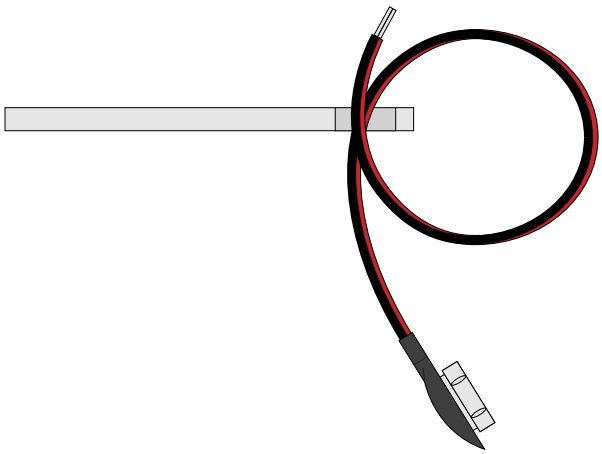


After you've soldered everything, make sure to **snip the leads on the I/O jacks as close as possible to the PCB**. There's not a lot of clearance between the bottom of this board and the top of the main PCB once everything is in place, and you don't want the pins to short against anything on accident.

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

STEP 1

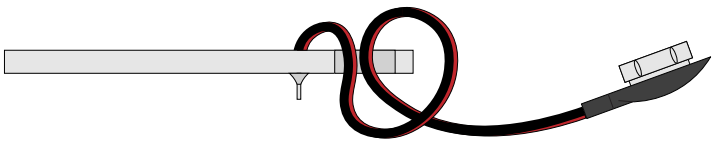
Thread the battery snap leads through the strain-relief hole twice so it forms a single loop.



STEP 2

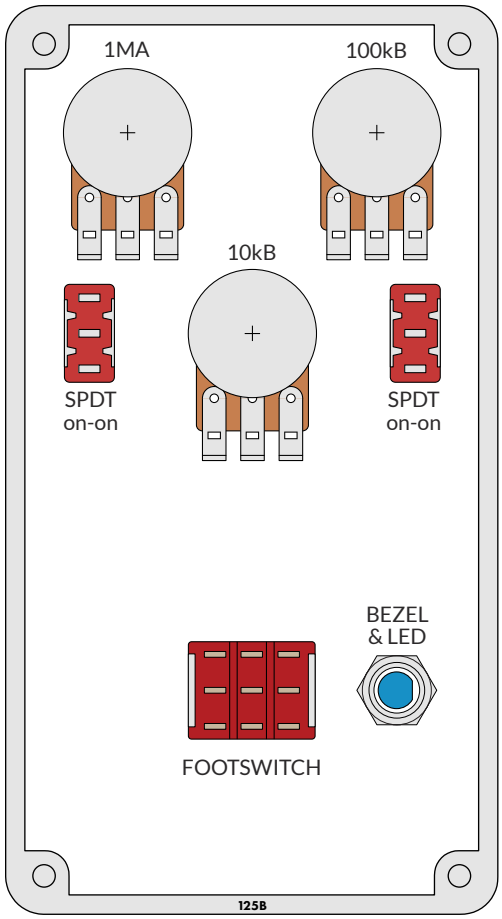
Bend the exposed wires back down and solder them into the pads. Red is positive (+), black is negative (-). After soldering, pull it tight.

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

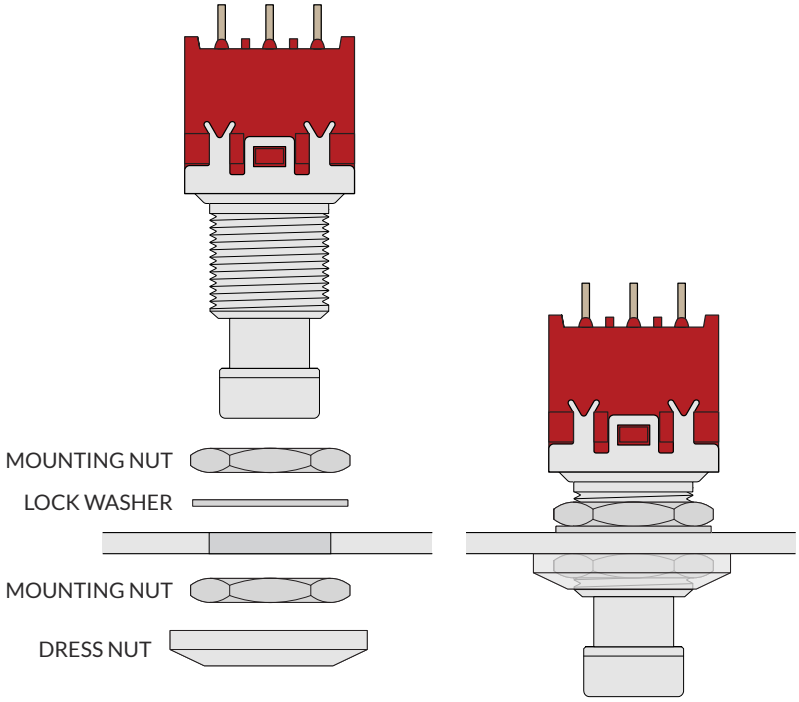


ENCLOSURE LAYOUT: PANEL MOUNTS

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



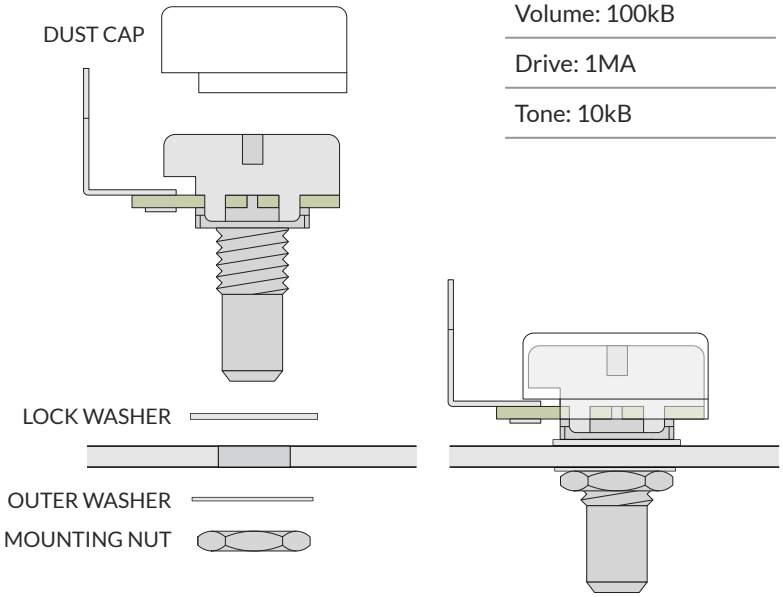
FOOTSWITCH



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. Do not use metal tools on it or you run the risk of scratching or denting it.

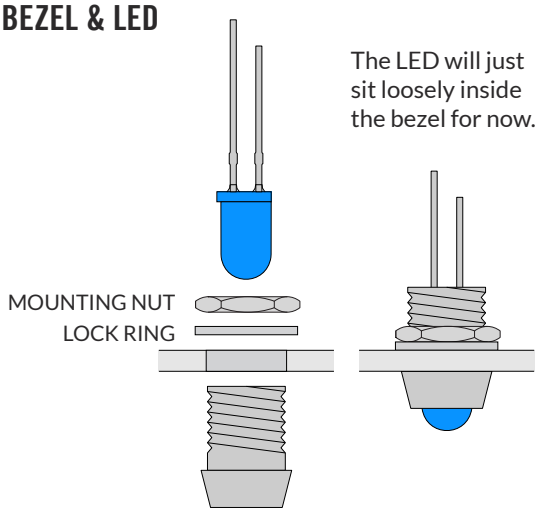
POTENTIOMETERS

Volume: 100kB
Drive: 1MA
Tone: 10kB



BEZEL & LED

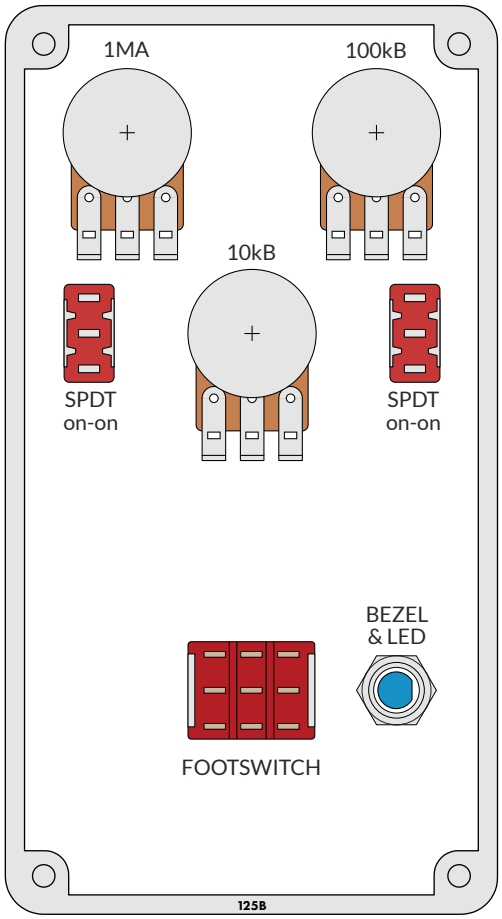
The LED will just sit loosely inside the bezel for now.



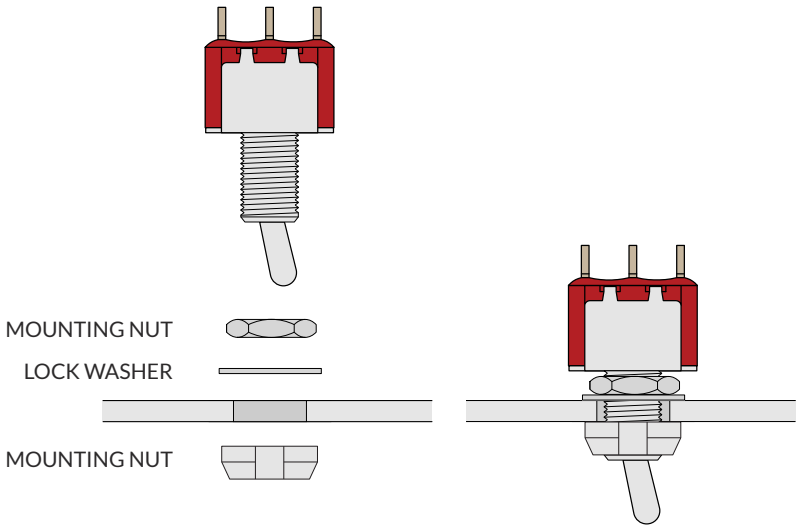
You'll need to hold the bezel in place when tightening the nut. The top of the bezel is fairly sharp, so try using a rubber band for grip instead of pressing your finger against the bottom.

ENCLOSURE LAYOUT: PANEL MOUNTS (CONT.)

Attach the toggle switches to the enclosure as shown in the diagram.

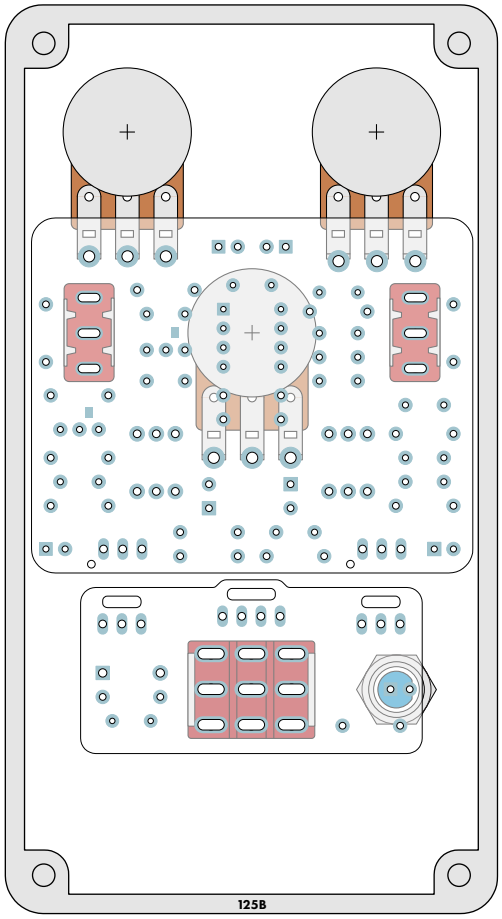


TOGGLE SWITCH



The dress nut acts as a mounting nut, unlike the footswitch dress nut. Use flat-nose pliers on the flat sides of the nut to tighten securely.

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 and toggle switches as in the diagram to the left.

You may need to adjust the position of the potentiometers and toggles slightly if they are not aligned straight.

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. (The toggle switch lugs do not need to be clipped.)

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?

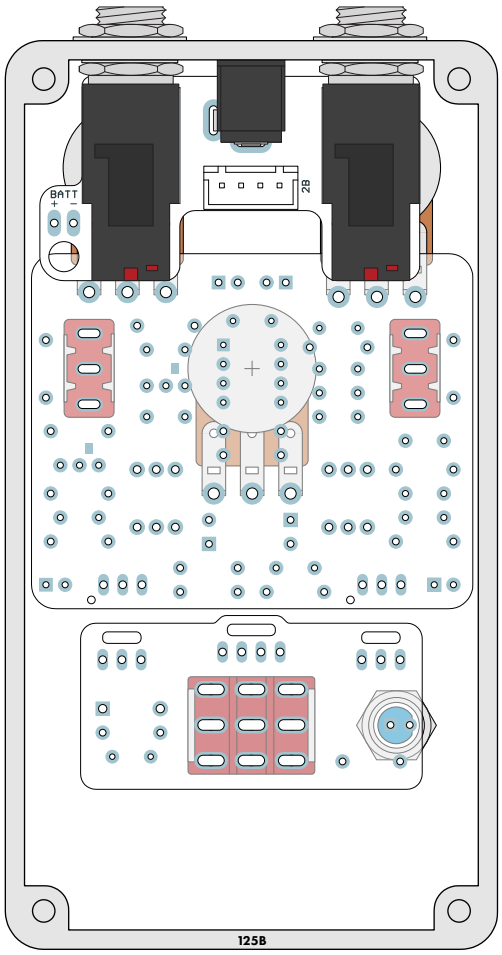
"Rock it before you box it" is conventional wisdom in pedalbuilding, and you'll often hear it recommended that builders should test the circuit before putting everything inside the enclosure. However, Aion FX projects are designed to be extremely easy to remove from the enclosure for troubleshooting,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

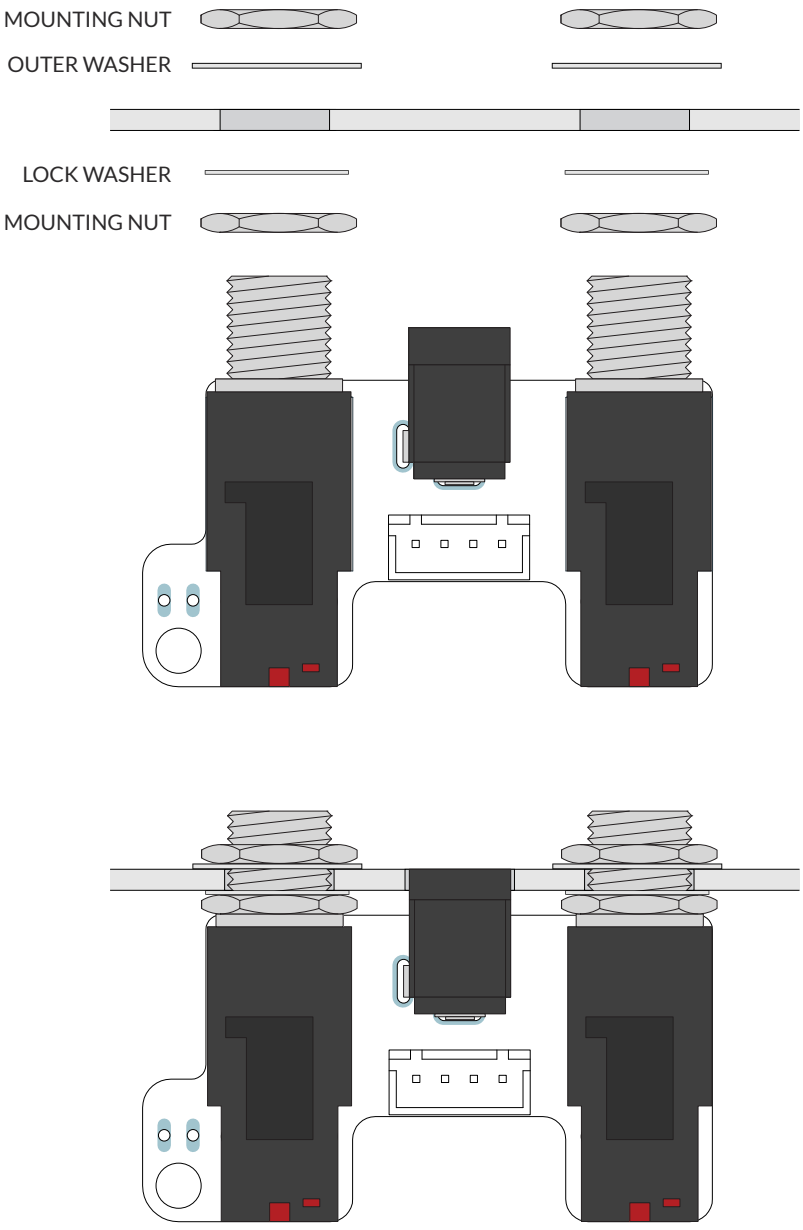
If you've read the documentation carefully and followed all the instructions, there's a good chance you will get it right the first time!

ENCLOSURE LAYOUT: INPUT/OUTPUT PCB

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

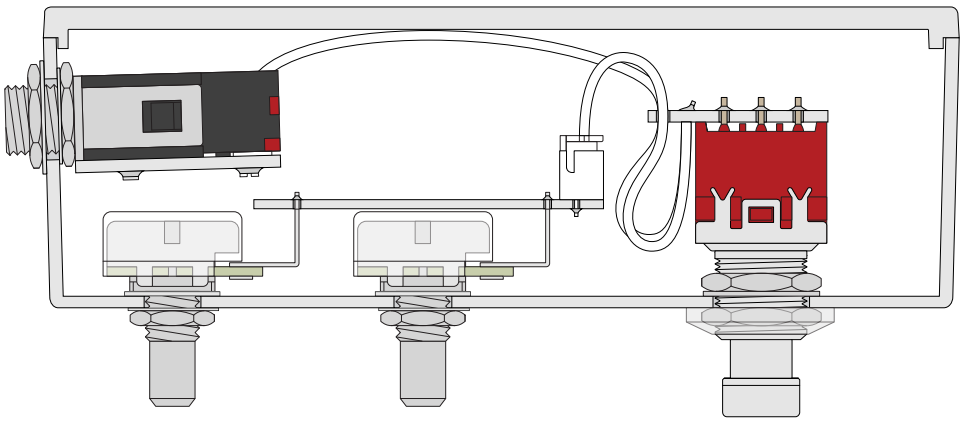
Note the use of two mounting nuts on each of the jacks, one inside and one outside. The inner nut acts as a spacer to set the DC jack flush with the outside of the enclosure. The inner nuts should be threaded as far down as they can go.





FINAL TESTING & ASSEMBLY

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

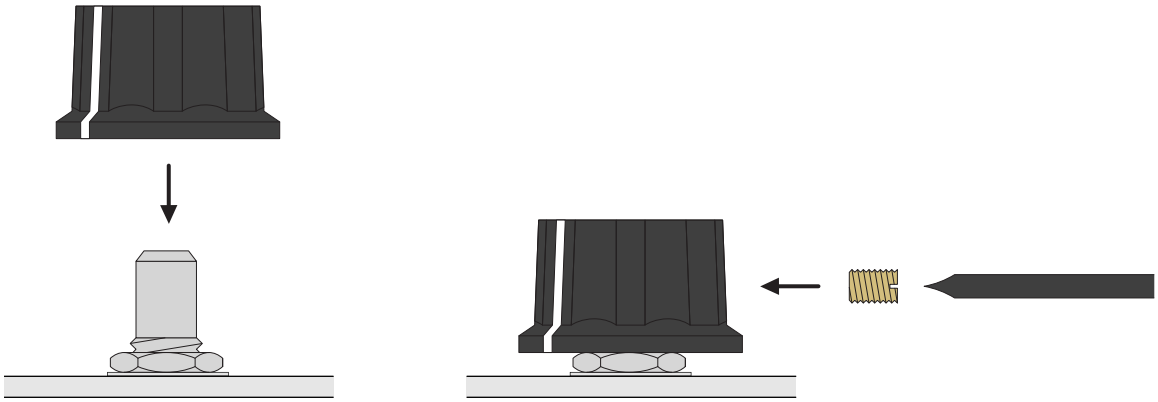
Test the bypass switch a few times, then start turning the knobs and see if everything sounds OK. If it works, great! If not, don't be discouraged. See page 29 for troubleshooting info.

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" / 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.



Last, just close the panel on the back using the four screws. That's it!

USAGE

The Titan has the typical controls of a 3-knob overdrive:

- **Drive** controls the amount of gain pushed into the hard-clipping diodes.
- **Tone** controls the treble response via a passive filter.
- **Volume** controls the overall output.

There are also two toggle switches:

- **Clipping** (toggle switch) selects between stock clipping, which uses MOSFET transistors that can optionally be combined with germanium diodes, and LED clipping.
- **HP/LP** (toggle switch) selects between "high peak" and "low peak" mode, which affects the range and travel of the tone control. With Tone fully up, it just provides a slight volume boost, no different than turning up the volume control a bit.

There are also two internal 3-position DIP switches, which are described in detail in the following section. The default positions from page 13 correspond to version 1.7 of the original pedal, which is the last version and typically seen as the best, though many prefer version 1.4.

DIP switch settings

The OCD V1 had seven major versions, and many of the circuit changes across versions make a noticeable difference to the tone. For the Titan, we included DIP switches to make several of these changes selectable so you can capture the main sonic characterics of any version.

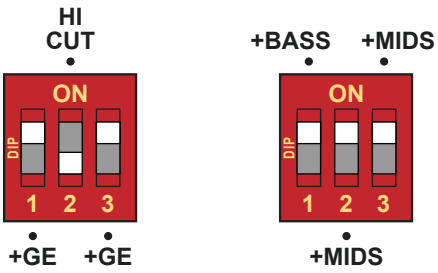
This table describes what each switch position does in technical terms. See the next page for a visual reference of the switch settings that correspond to each version.

SWITCH NAME	"ON" DESCRIPTION	"OFF" DESCRIPTION
+GE	MOSFET clipping only (all versions but v1.4). Default position for v1.7 specs.	Adds D2 and/or D3 in series with Q1 and Q2. With one OFF and one ON, it's equivalent to v1.4. With both OFF, it's equivalent to the V2 Custom Shop Germanium.
HI CUT	Adds C11 (10n) in parallel with C4 (v1.5), which cuts more highs before the clipping stage.	1n hi-cut capacitor only (all versions but v1.5). Default position for v1.7 specs.
+BASS	Adds C12 (33n) in parallel with C3 (v1.1 through 1.3) for ~100n total, which increases bass before the clipping stage.	68n capacitor value (v1.4 and later). Default position for v1.7 specs.
+MIDS (left sw.)	Adds C10 (47n) in parallel with C8 for ~100n total (v1.1 and 1.2) if the other +MIDS switch is ON. If the other +MIDS switch is OFF, the total is 68n, which does not correspond to any version but is a useful in-between value.	47n tone cap (v1.3 and later). Default position for v1.7 specs.
+MIDS (right sw.)	Bypasses C9 (47n), which keeps the tone capacitor value at 47n (v1.3 through 1.7). Default position for v1.7 specs.	Adds C9 (47n) in series with C8, which halves the tone cap value to ~22n (v2.0).

Note: On the PCB, the switch positions are labeled according to what happens if the lever is moved toward the label. In the table above, the "ON" description refers to the lever being moved up, regardless of the placement of the label on the PCB.

DIP SWITCH QUICK REFERENCE

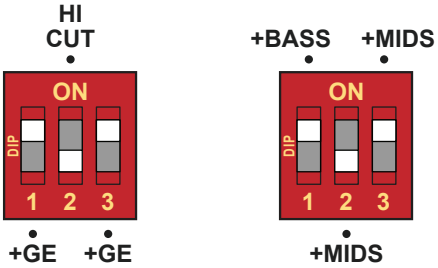
The DIP switches capture the main differences in voicing between each version of the original OCD®. However, not all of the circuit changes can be put on switches, particularly the different potentiometer values and tapers that were used throughout the manufacturing run, so we've also included notes on the remaining differences. The kit uses the potentiometer values from v1.6 and 1.7.



Versions 1.1 and 1.2

Other differences:

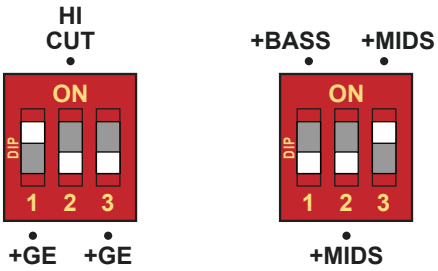
- Drive knob is 500kA (max gain is cut in half)
- Tone knob is 25kA (minimum tone position is much darker; no change at the upper end of the range)
- Volume knob is 500kB (v1.2 only; significantly higher output impedance, but less interaction with tone control)



Version 1.3

Other differences:

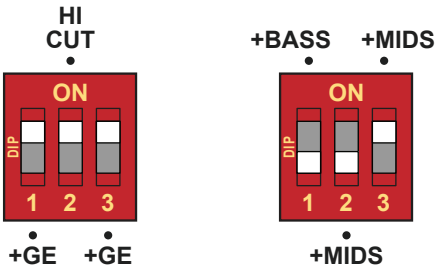
- Volume knob is 500kB (less interaction with tone control, but significantly higher output impedance)
- C2 and C5 are 330pF instead of 220pF (more treble cut in both op-amp stages)



Version 1.4

Other differences:

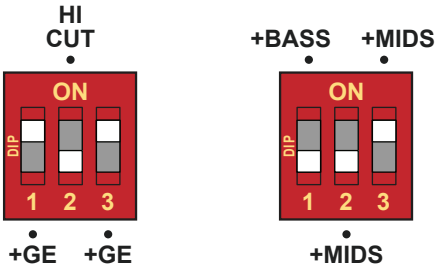
- Volume knob is 500kB (less interaction with tone control, but significantly higher output impedance)



Version 1.5

Other differences:

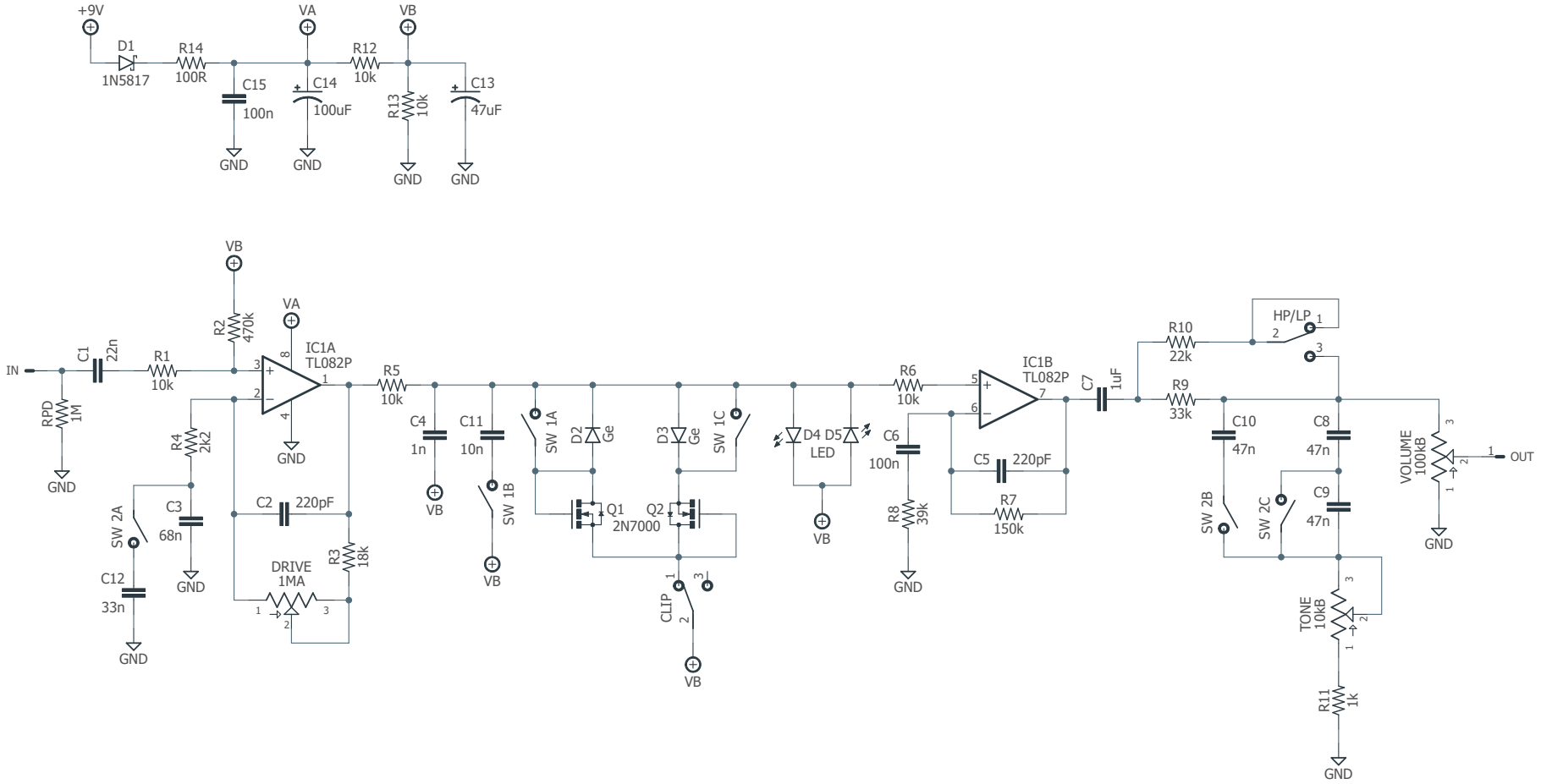
- Volume knob is audio taper (more gradual increase in volume at the low end of the range)



Versions 1.6 and 1.7

Other differences: none

Note: the only change between v1.6 and v1.7 is that the power supply capacitors were upgraded to higher values for better filtering and lower noise. The Titan already uses the upgraded values.


+9V
D1
1N5817
R14
100R
C15
100n
VA
C14
100uF
R12
10k
R13
10k
VB
C13
47uF
GND
VB
R2
470k
VA
IC1A
TL082P
IN
C1
22n
R1
10k
RPD
1M
R4
2k2
C3
68n
SW 2A
C12
33n
C2
220pF
DRIVE
1MA
R3
18k
R5
10k
C4
1n
C11
10n
SW 1A
SW 1B
D2
Ge
D3
Ge
SW 1C
Q1
Q2
2N7000
CLIP
D4 D5
LED
R6
10k
C6
100n
R8
39k
IC1B
TL082P
C5
220pF
R7
150k
C7
1uF
R10
22k
HP/LP
R9
33k
C10
47n
C8
47n
C9
47n
SW 2B
SW 2C
TONE
10kB
R11
1k
VOLUME
100kB
OUT

FULL PARTS LIST

Resistors

PART	VALUE
R1	10k
R2	470k
R3	18k
R4	2k2
R5	10k
R6	10k

PART	VALUE
R7	150k
R8	39k
R9	33k
R10	22k
R11	1k
R12	10k

PART	VALUE
R13	10k
R14	100R
RPD	1M
LEDR	10k

Capacitors

PART	VALUE
C1	22n film
C2	220pF MLCC
C3	68n film
C4	1n film
C5	220pF MLCC
C6	100n film
C7	1uF film
C8	47n film

PART	VALUE
C9	47n film
C10	47n film
C11	10n film
C12	33n film
C13	47uF electro
C14	100uF electro
C15	100n MLCC

Diodes

PART	VALUE
D1	1N5817
D2	Germanium
D3	Germanium
D4	3mm red LED
D5	3mm red LED

Transistors

PART	VALUE
Q1	2N7000
Q2	2N7000

IC

PART	VALUE
IC1	TL082CP

DIP Switches

PART
3-position DIP (2)

Potentiometers

PART	VALUE
Volume	100kB
Drive	1MA
Tone	10kB

Switches

PART
SPDT on-on (2)
3PDT stomp

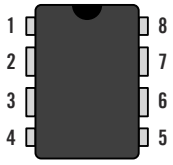
TROUBLESHOOTING INFORMATION

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 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 **9.60V** 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. For Q1, the legs are marked on the PCB.



IC1

PIN	VOLTAGE
1	4.46
2	4.46
3	4.25
4	0V
5	4.45
6	4.46
7	4.46
8	8.94V

Q1

PIN	VOLTAGE
D	4.45
G	4.45
S	4.45

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!

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DOCUMENT REVISIONS

1.0.2 (2024-08-08)
Added link to troubleshooting guide on page 29.

1.0.1 (2024-02-06)
Added diagrams of the DIP switch settings for each mode on page 26.

1.0.0 (2024-01-26)
Initial release.