

AustinDrive

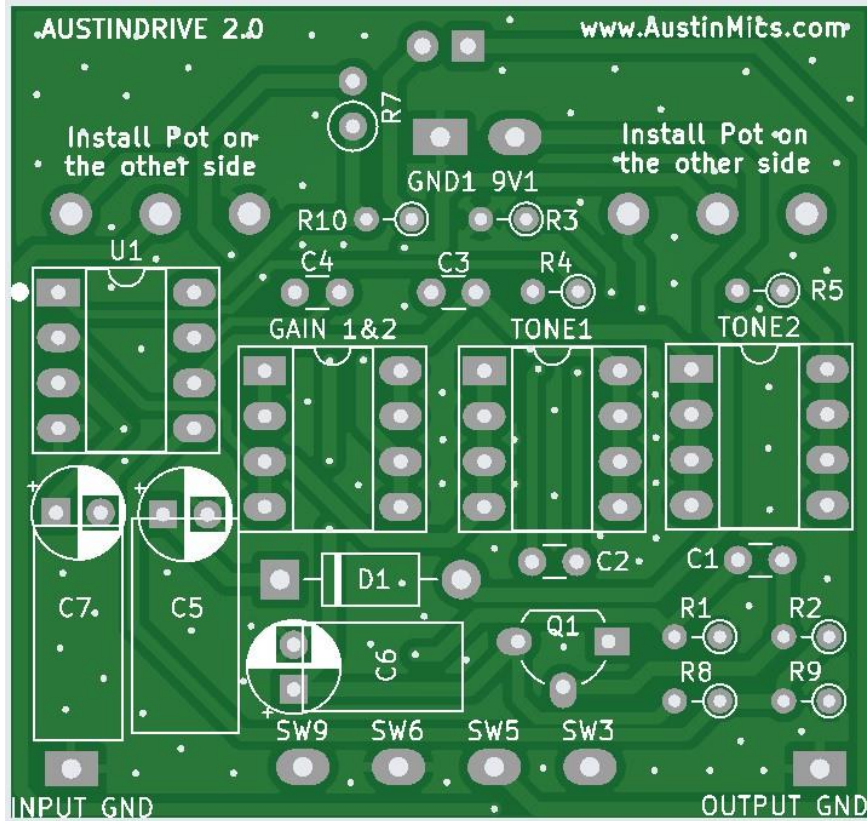
Illustrated Assembly Guide



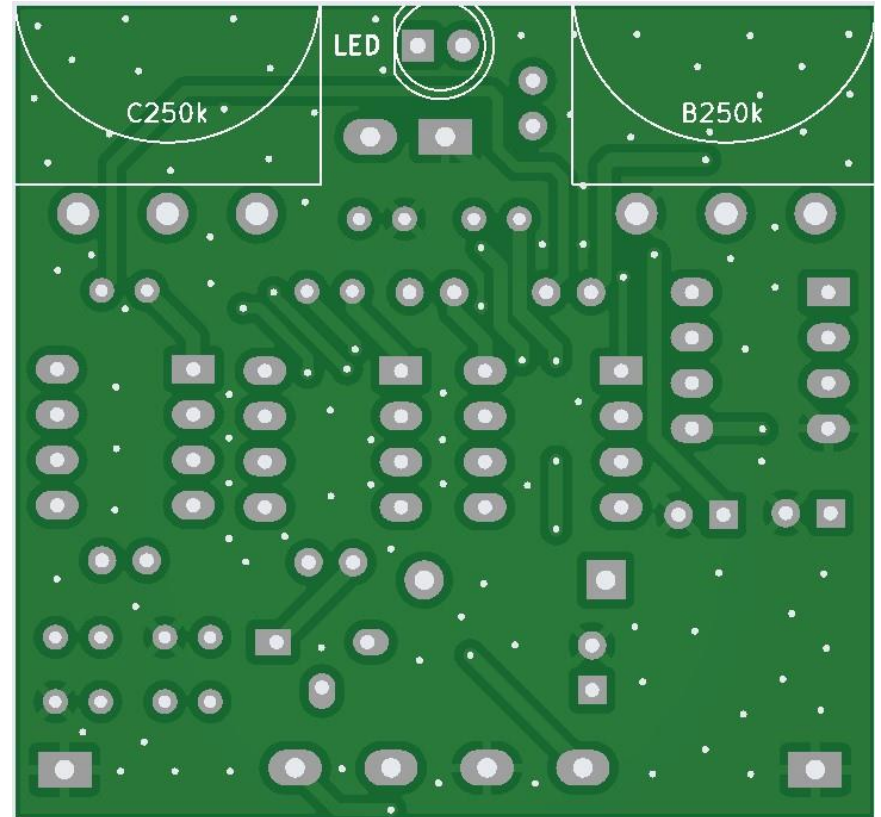
PCB Assembly

- Solder the Sockets to the PCB
- Bend and Solder the Components to the PCB
- Install the Pots and LED on the back

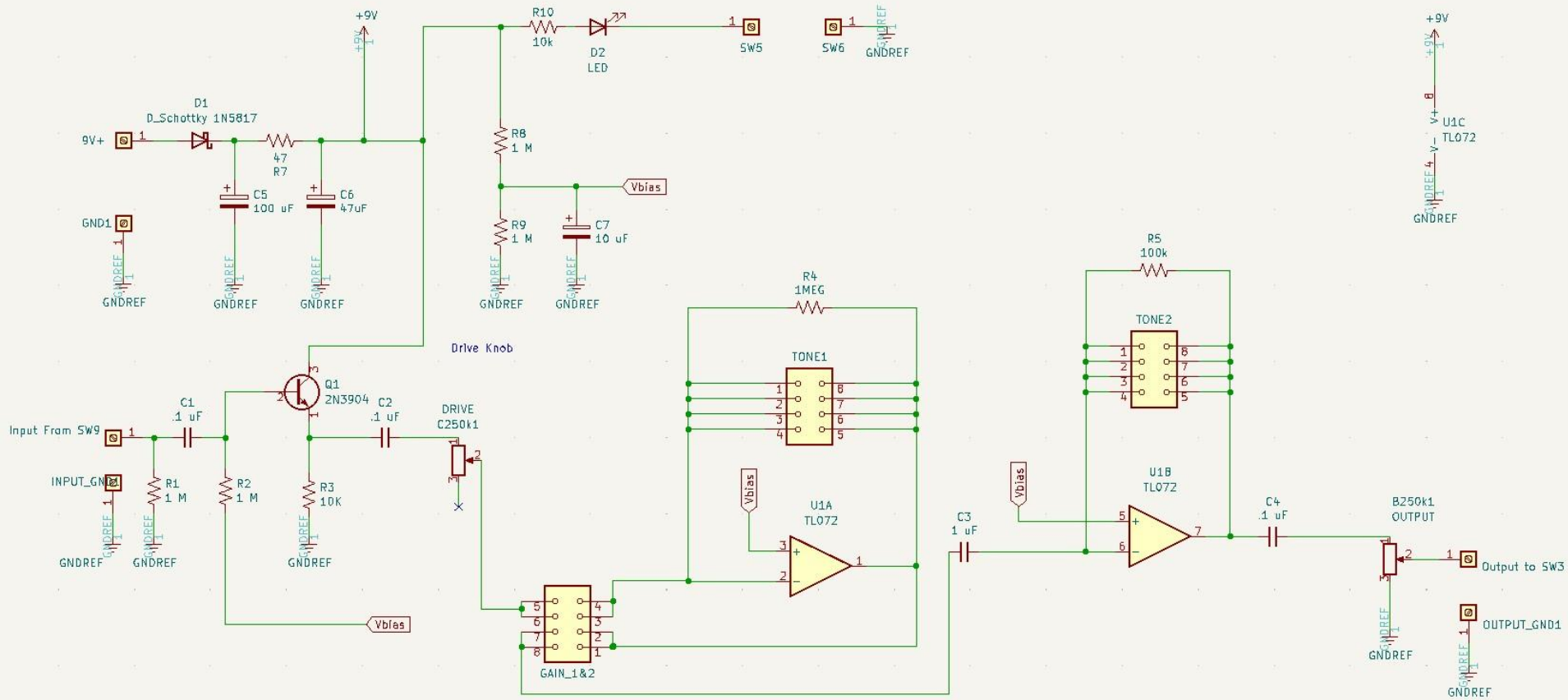
FRONT

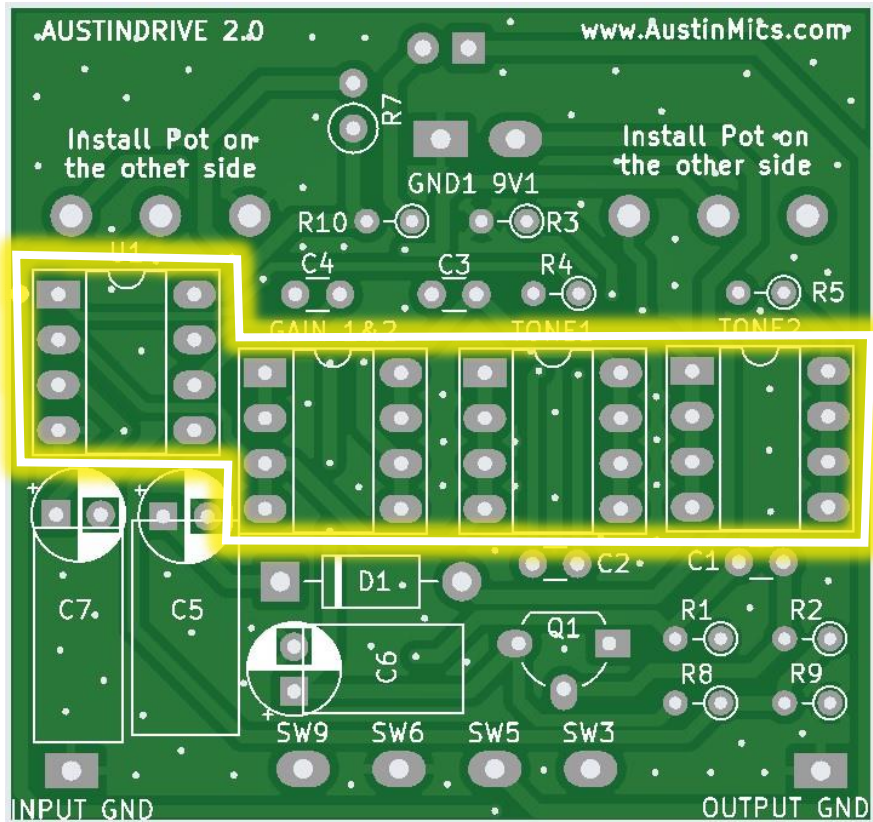


BACK



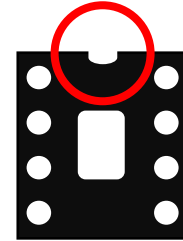
Schematic





Install FOUR Sockets

These hold the amplifier chip, and allow you to change the tone components easily.



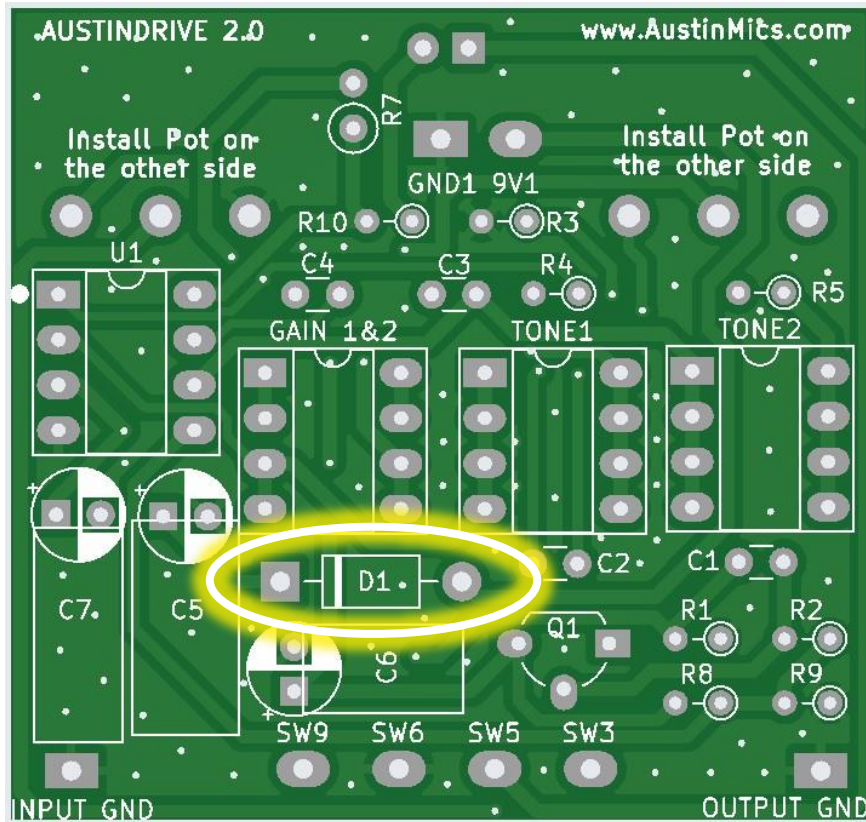
Each socket has a “U” shaped notch.

Align the notch in the socket with the notch printed on the circuit board.

Install, and bend the corner pins over to keep the sockets from falling out!

Solder all 32 pins.

You'll be pretty good at soldering after this!



D1 Diode 1N5819

This diode protects the circuit from reverse power.

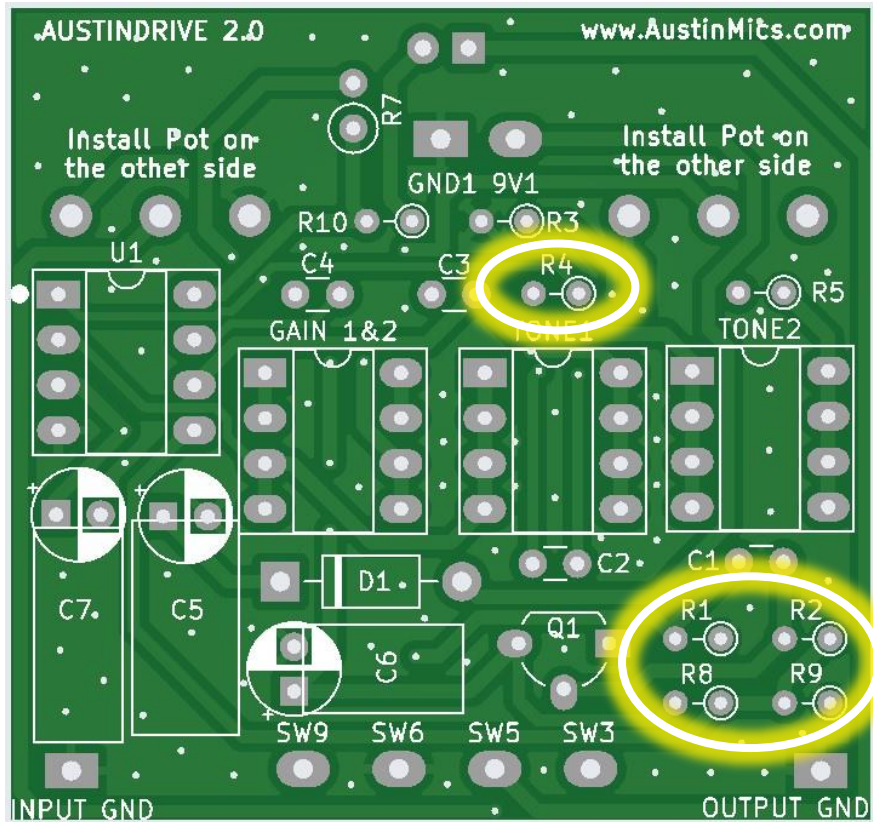


Pinch the diode body with your fingers, and bend the legs down.



Match the silver stripe on the diode with the stripe on the circuit board.





FIVE, 1 MEG Resistors:

R4, plus: R1, R2, R8, R9

R1 reduces footswitch “pop.”

R2 sets the input level of the first stage.

R4 limits the gain of the first stage.

R8 & R9 divide the power voltage in half, to be the center (“BIAS”) voltage.

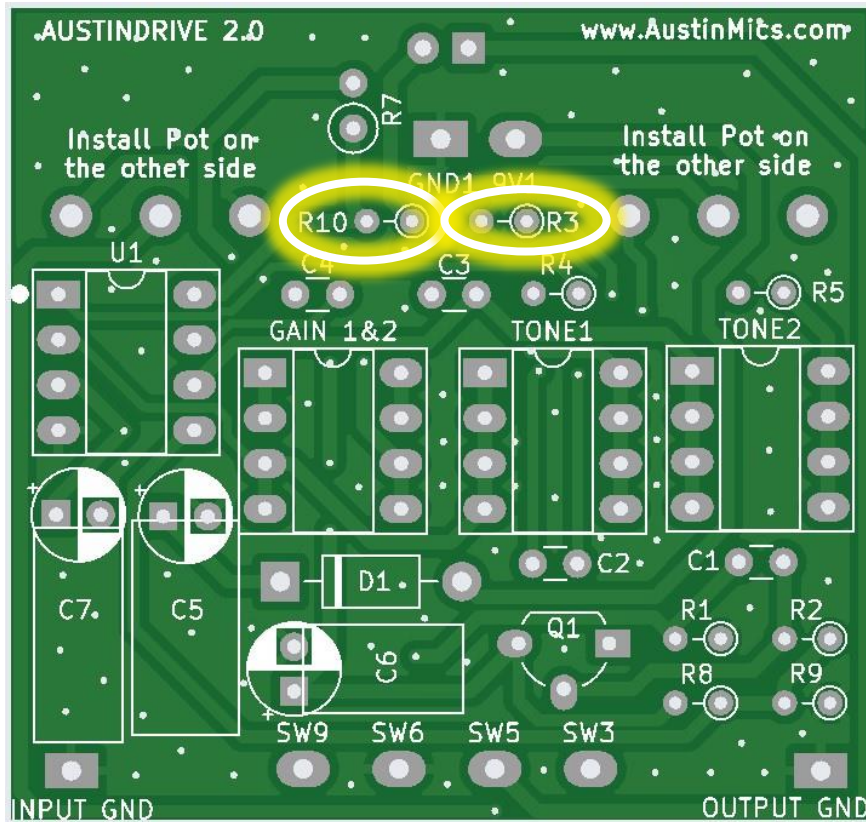
Bend the resistors as shown, with one leg bent-over along the body. (NOTE: It does not matter which leg is bent-over.)



The body of the resistors go in the holes with the circle.

The circles are on the Right side in this circuit.

Double-Check and 100% verify the resistors are in the correct spaces before you solder.



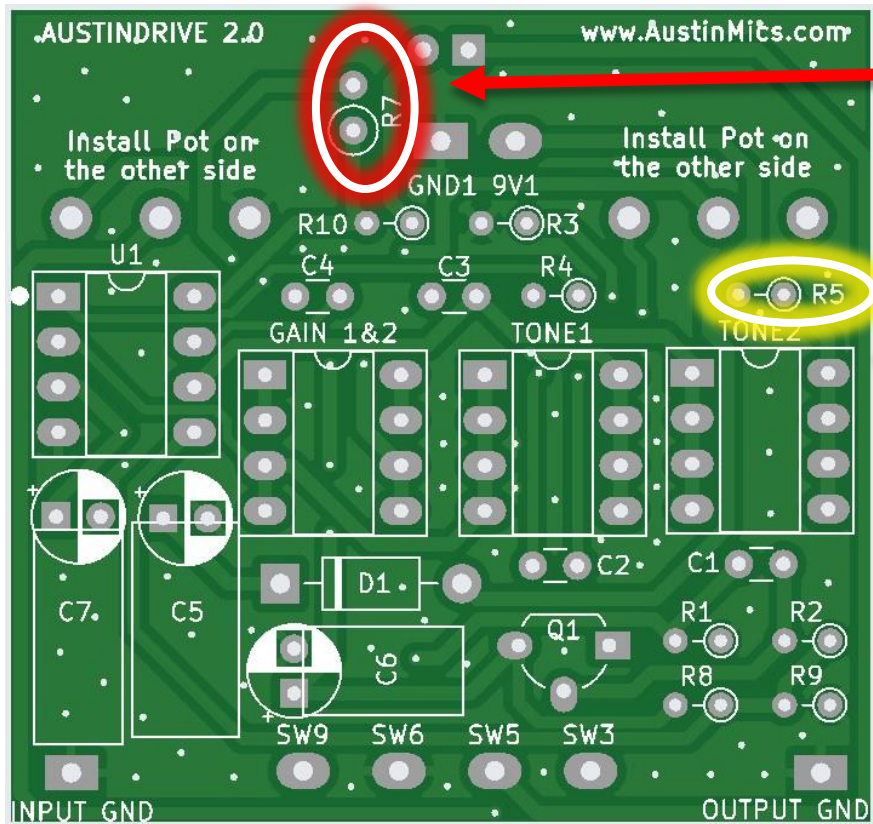
10K – R3, R10

R10 limits the brightness of the LED
R3 sets the level of the input buffer.

Bend the resistors as shown, with one leg bent-over along the body. (NOTE: It does not matter which leg is bent-over.)



The body of the resistor goes in the hole with the circle.
The circles are on the Right side in this circuit.



47 Ohm 1/4W – R7

This resistor is *bigger* than the others because it needs to handle more power (heat.)

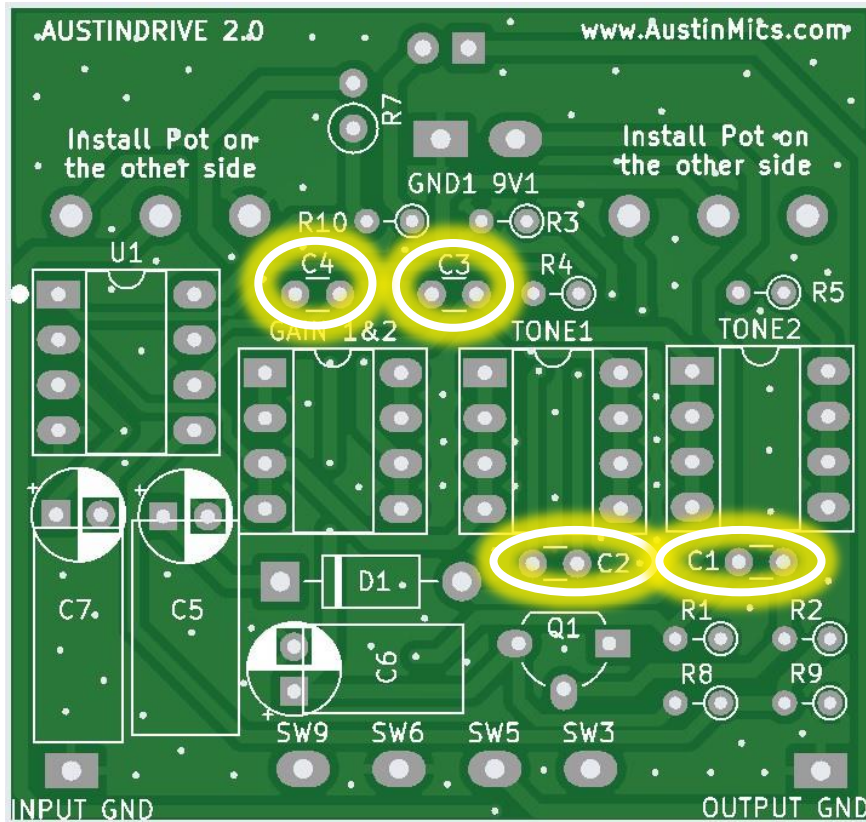
R7 reduces power supply noise by drawing more power from the power supply.

100K – R5

Helps define the gain of the 3rd amplifying stage.



Bend the resistors as shown, with one leg bent-over along the body.



0.1uF (104) – C1, C2, C3, C4



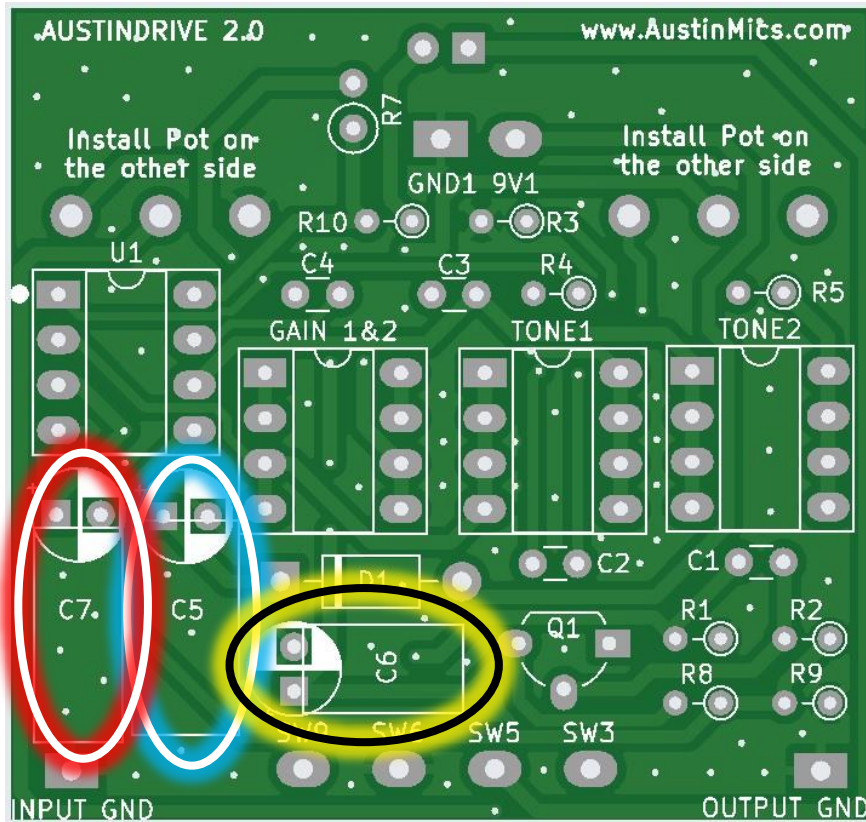
These capacitors have “104” stamped on them

These capacitors are not “polarized.” They can go in forwards or backwards.

Each blocks DC “offset” voltage from leaking into the next gain stage. They are called “Coupling Capacitors” because each one *connects* one part of the circuit to the next part.



The ceramic capacitors in this kit look very similar. Verify you are installing the correct capacitors in the correct locations.

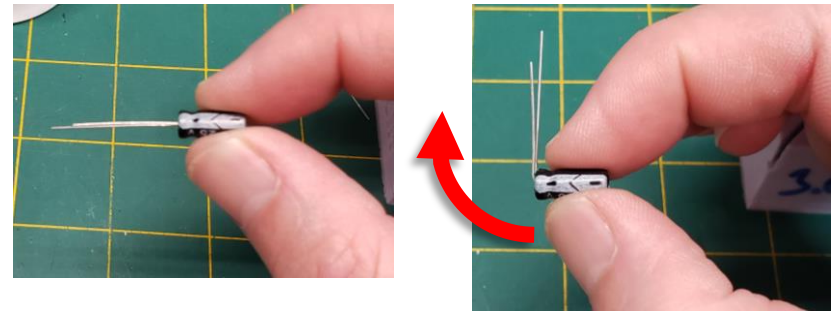


Electrolytic Capacitors

10uF – C7 (Red Oval)

100uF – C5 (Blue Oval)

47uF – C6 (Black Oval)

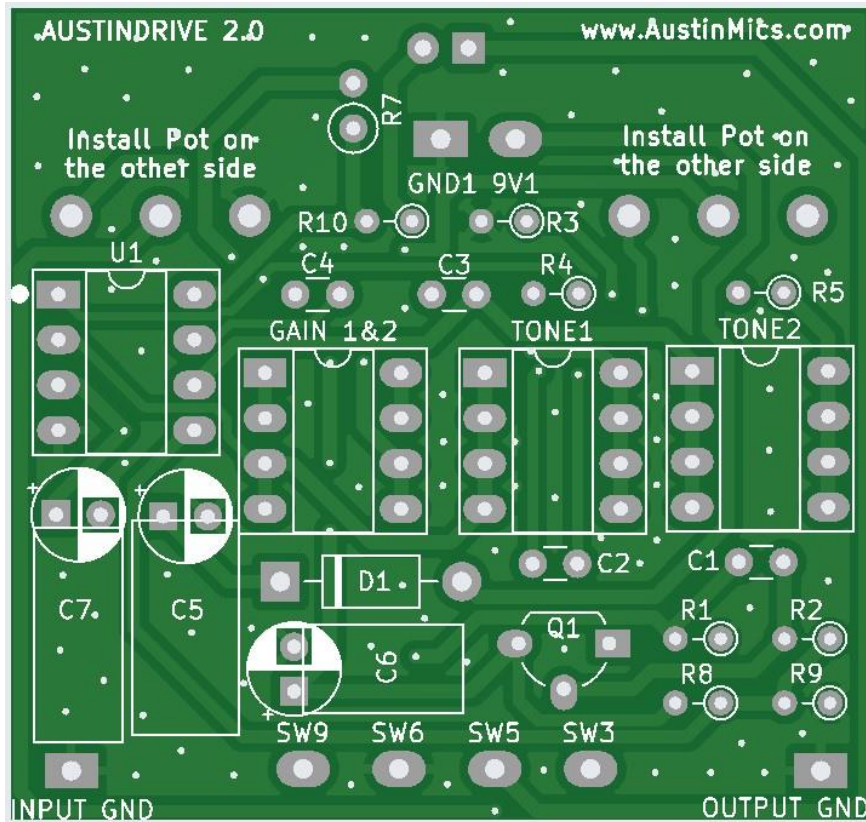


Hold each capacitor in your RIGHT hand with the stripe facing you, and bend the legs UP.

These capacitors smooth the DC power supply and reduce noise.



The electrolytic capacitors in this kit look very similar and may be the same color. Verify you are installing the correct capacitors in the correct locations.



2N3904 – Q1

This is the buffer amplifier for the pedal, and it reduces high-frequency loss.

The transistor has one *flat* face. Bend the center leg slightly backwards, away from the flat face.



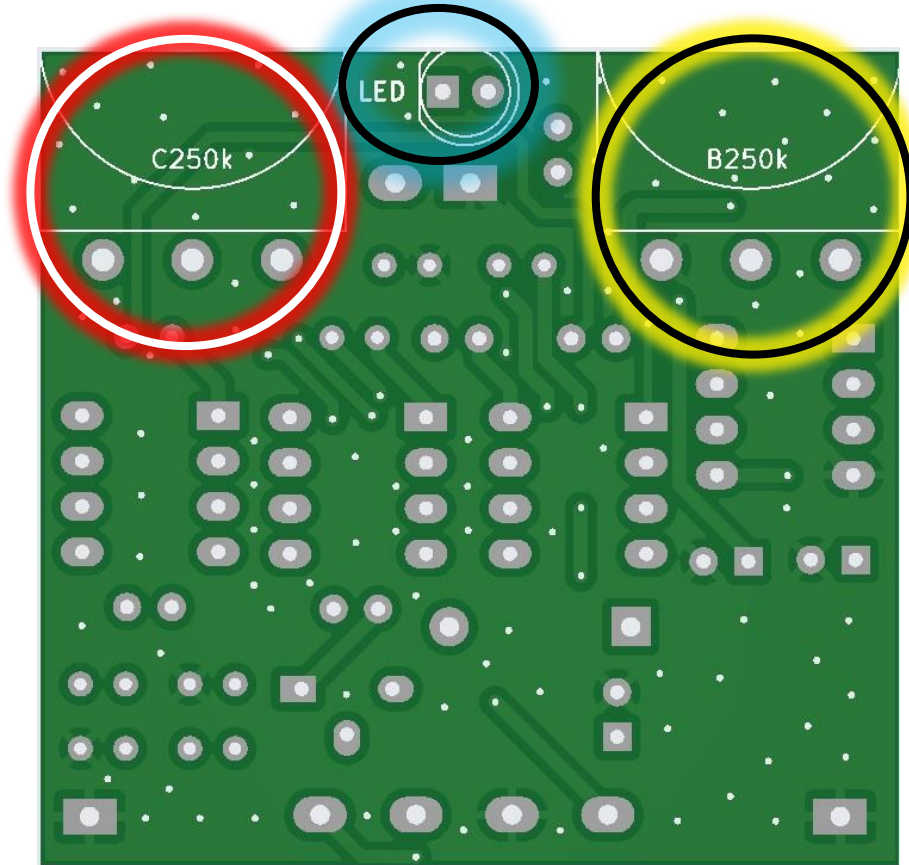
Orient the transistor as shown on the screen print on the board, and solder slightly *above* the board as shown below.



YES



NO



These potentiometers (“pots”) give user adjustments for drive level and output level. The LED indicates the pedal is ON.

Back Side of Board

C250K

FIRST:

B250K

Break-off
this tab →



Values are marked here →



LED & Spacer

Slide the spacer onto the legs of the LED, before soldering the LED to the board.



Short leg goes to square hole

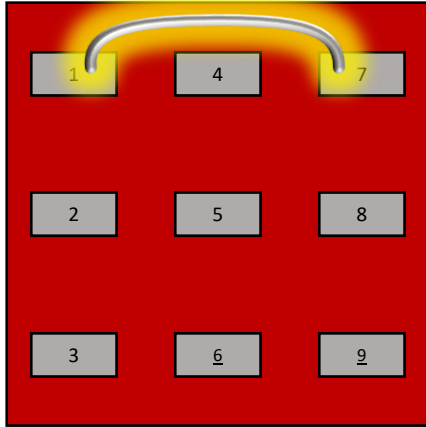
Save the legs of this LED after you cut them. You will use one leg to jumper the stomp switch at the other station.

Enclosure Assembly

- Install the True Bypass Jumper on the Switch
- Install the Foam Pad
- Wire & install the Input & Output Jacks
- Install the DC Power Jack
- Strip & Twist the hookup wires
- Bend and cut the first components for the sockets
 - 2x 10k resistors
 - 2x 1N914 Glass Diodes
 - 2x 1N4007 Silicon Diodes
 - 1x 2200pF (222) Capacitor

Wire the True Bypass:

Jumper 1 and 7 with a piece of wire.



- Use needle-nose pliers to bend the jumper to fit through the holes in Pins 1 and 7.
- Solder the jumper in place.
- Be sure the jumper does not touch Pin 4, and that the ends do not touch the other pins.

This 3-Pole, Double-Throw (3P2T) switch is 3 switches in one!

- The outside two switches route the input signal to the pedal, or through the jumper directly to the output (“True Bypass”).
- The center switch turns the LED on and off.

“Tin” all the pins of the switch

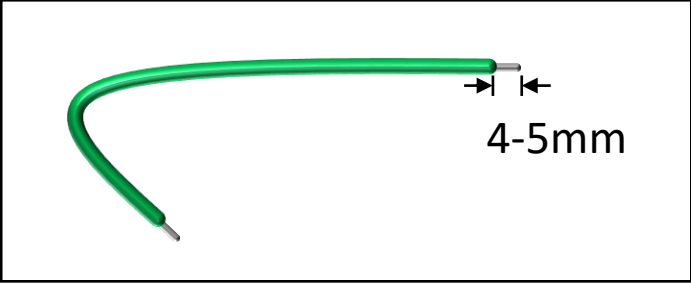
(“Tinning” is adding solder to each pin of the switch.)

3 seconds maximum with your iron.

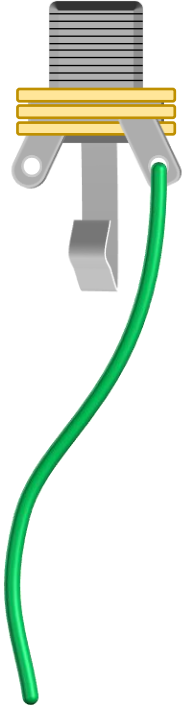
The switch pins are encased in plastic, which will melt if overheated for more than 3 seconds.

NOTE: Pin 4 under the jumper is not used. No need to tin that pin.

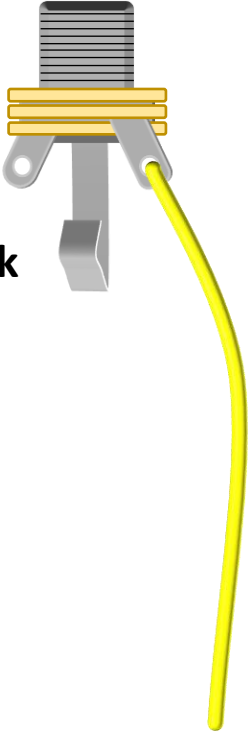
Wire the Input & Output Jacks



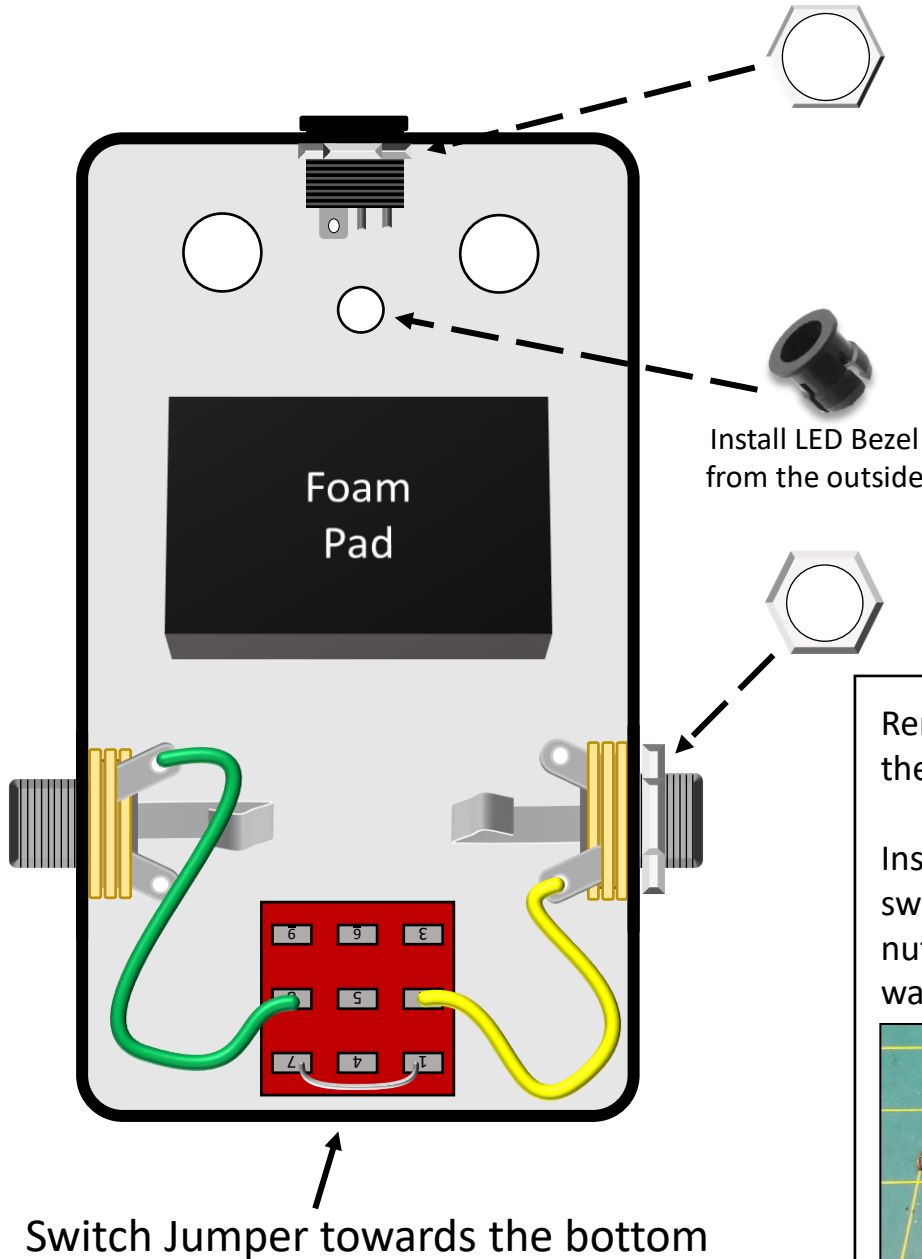
Input Jack



Output Jack



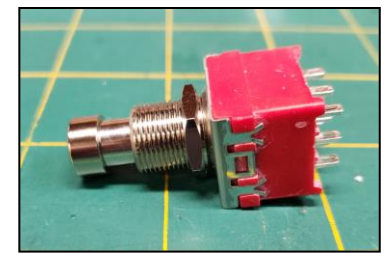
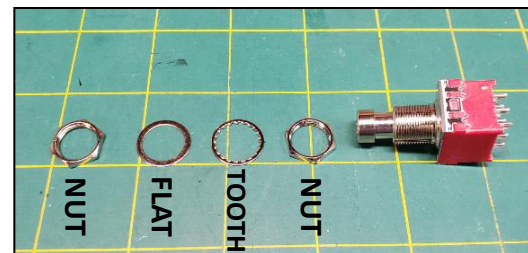
Install the Foam Pad, Footswitch and Jacks



1. Peel and stick the foam pad just under the center hole for the LED.
2. Install the switch and the Jacks.
3. See the details below for the order of the footswitch nuts and washers.
4. Use Turn-Ups to tighten the nuts on the pots, footswitch and jacks.
5. Solder the Green and Yellow wires to the Footswitch as shown.

Remove everything from the switch, then thread one nut on the switch so that goes all the way to the bottom of the shaft:

Install the tooth washer on top of that first nut and put the switch through the enclosure from the inside. With the lock nut and the tooth washer inside the enclosure, the flat metal washer and the remaining nut are installed from the outside.



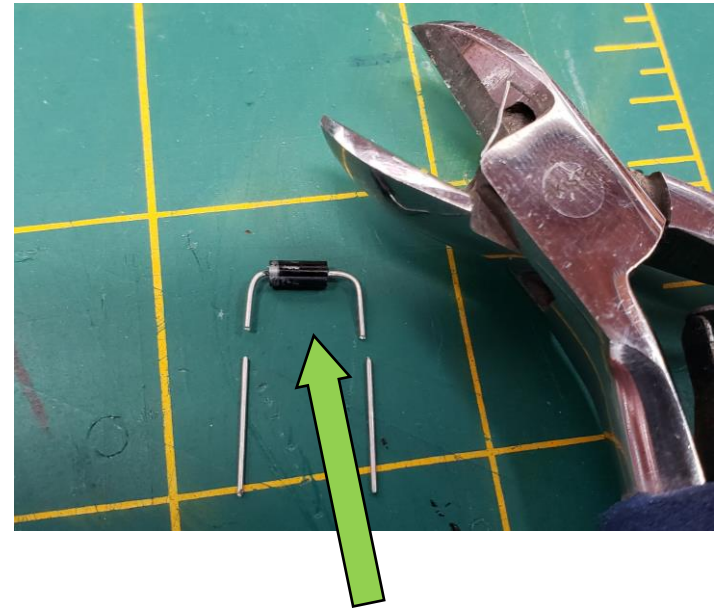
Bend and cut “Starter” Components

Bend and cut the first components for the sockets:

- 2x 22k Resistors
- 2x 1N914 Glass Diodes
- 2x 1N4007 Silicon Diodes
- 1x 2200pF (222) Capacitor

The values of these components are in the middle of the range. Change to different values for less or more drive and distortion.

Set aside for final assembly and testing.



About the size and shape of a staple.

Longer legs are better...

You can't *un-cut* a short leg!

Strip the Enclosure Wires

Strip each enclosure wire about 4-5 mm. (¼ inch)

- **Red/Black** twist
- **White**
- **Blue**
- **Yellow**
- **Green**
- **2x Black**



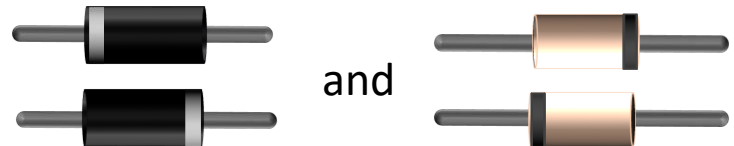
Final Assembly

Illustrations on the following pages

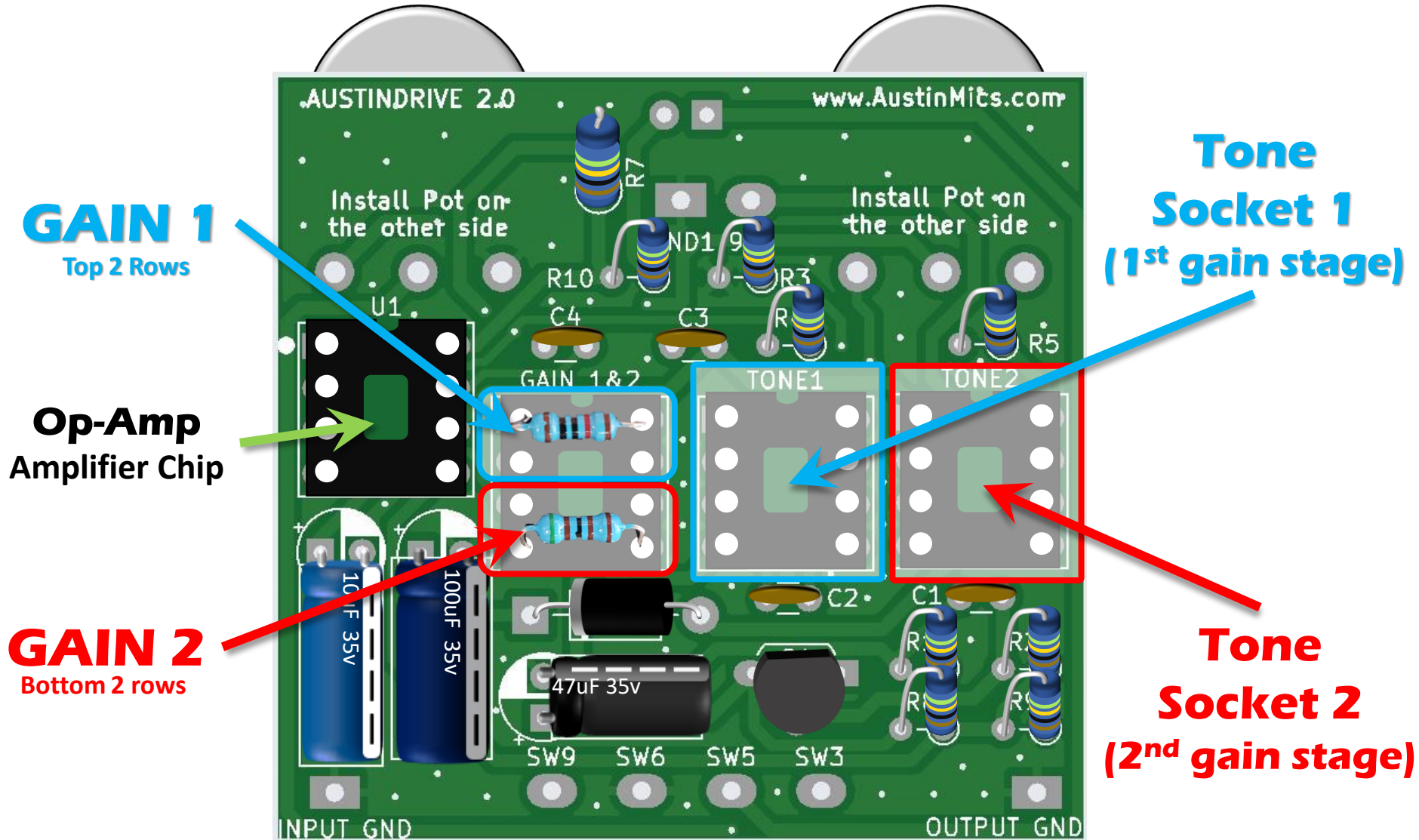
- Install the first TONE components in the sockets:
 - 2x 22k resistors in GAIN 1 & GAIN 2 Socket
 - 2x 1N914 Glass Diodes in TONE 1 Socket*
 - 2x 1N4007 Silicon Diodes in TONE 2 Socket*
 - 1x 2200pF (222) Capacitor in TONE 2 Socket
- Solder the 4 wires to the Foot Switch
- Solder the black wires to the Input & Output Jacks
- Wire & install the DC Power Jack

* **Diodes have stripes on one end.**

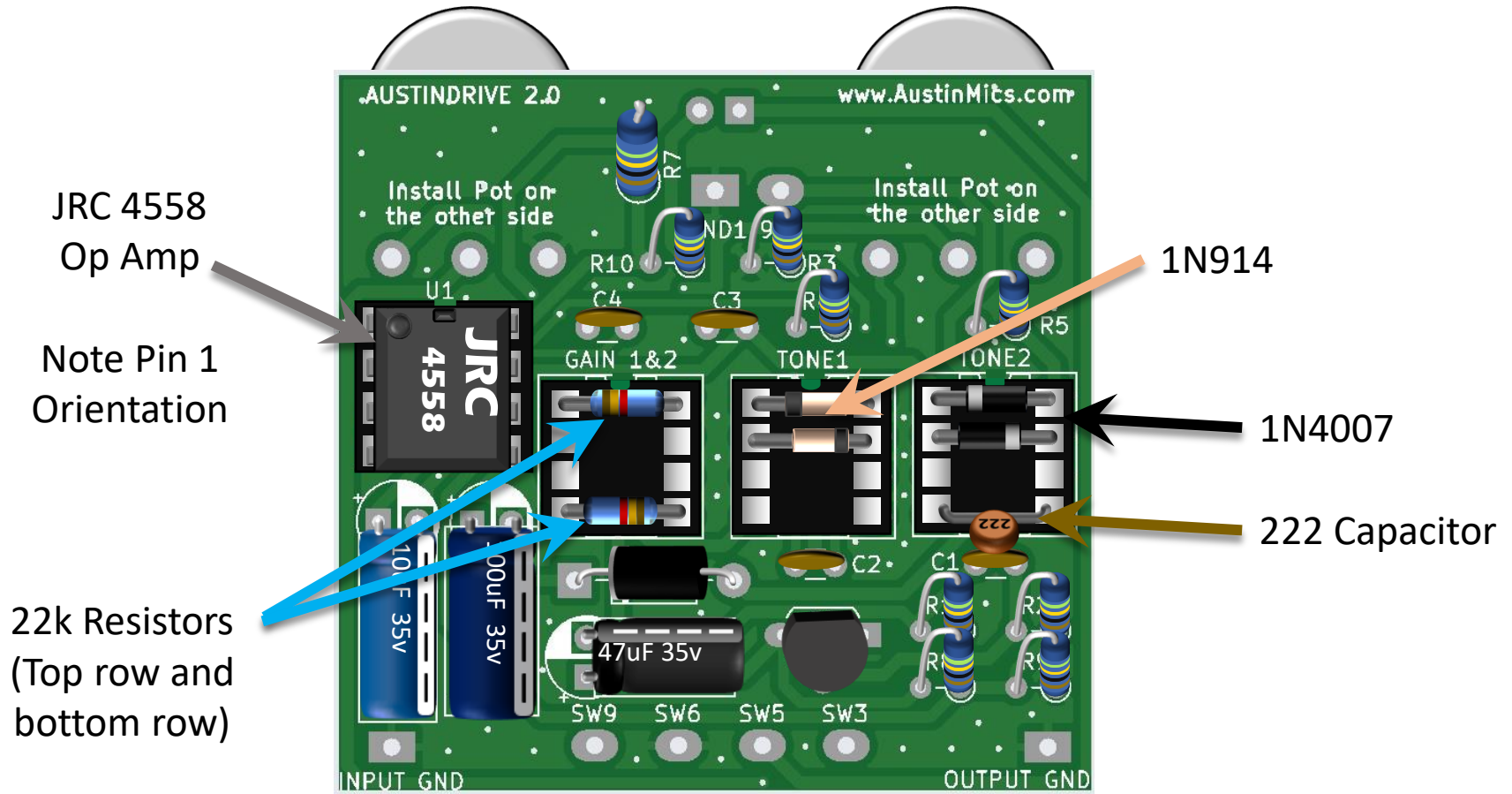
For Symmetrical distortion, point the diodes in opposite directions in the TONE Sockets:



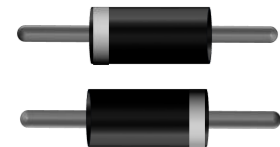
SOCKET FUNCTIONS



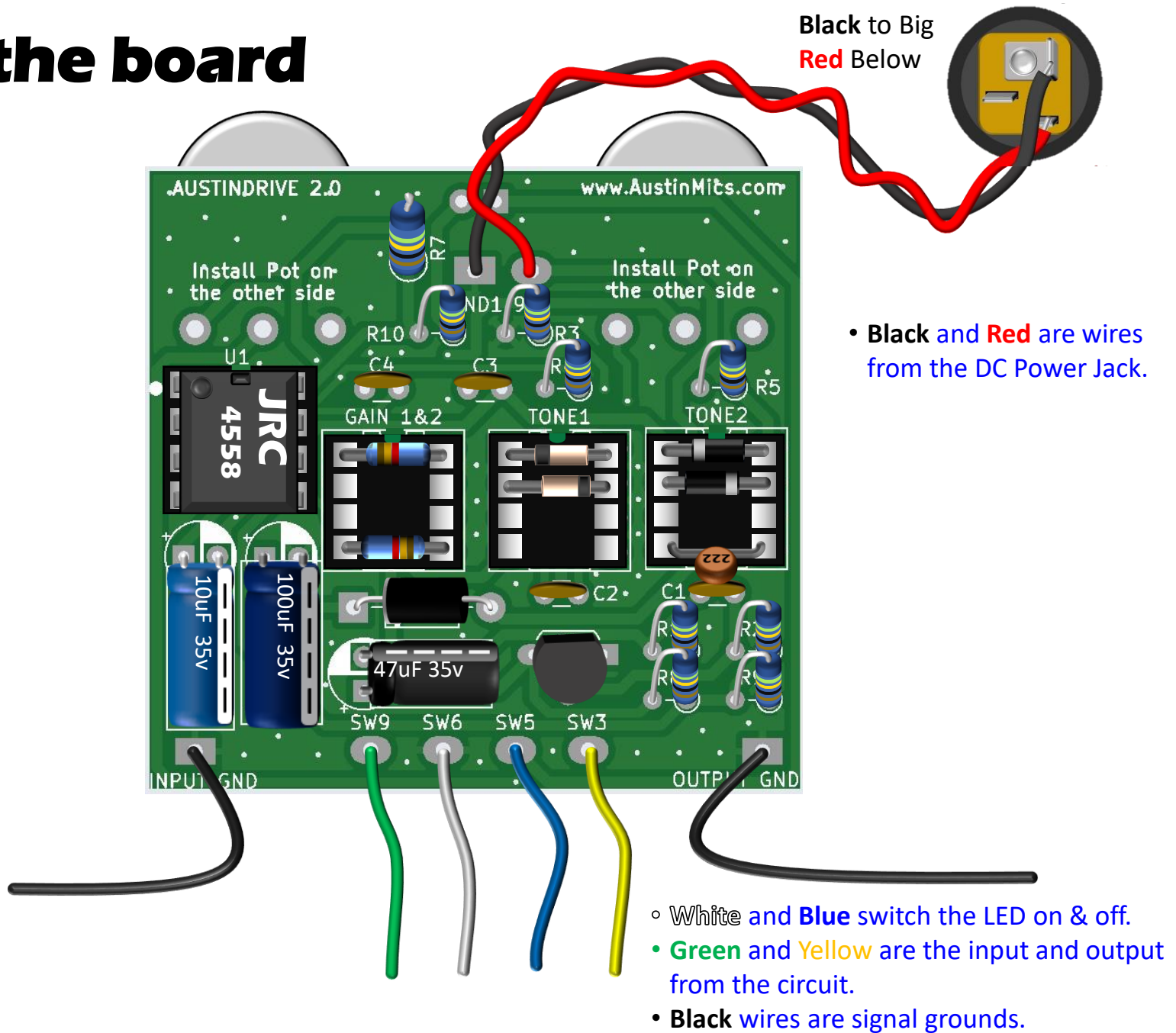
Install the TONE Components



Diode stripes point in opposite directions,
To evenly clip the top and bottom of the signal

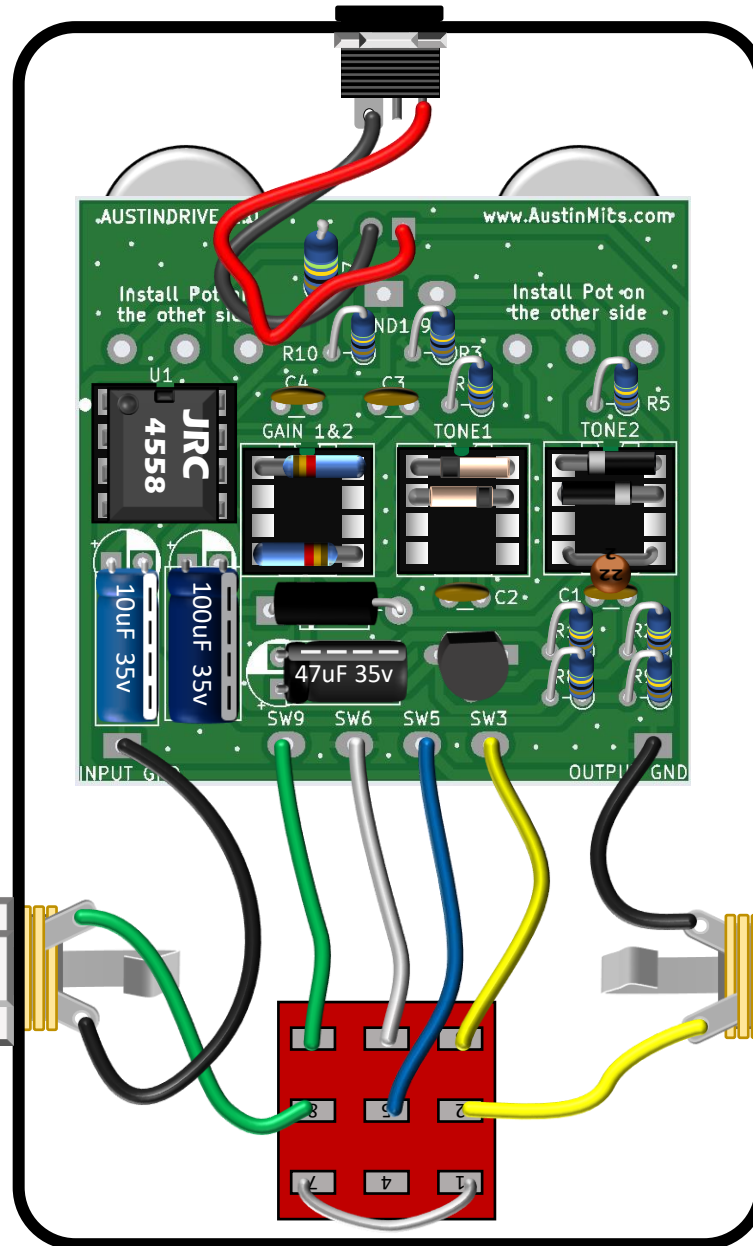


Wire the board



Wire the PCB to the Switch & Jacks

NOTE:
Electrolytic Capacitor
colors may vary from
batch-to-batch.



NOTE: With the pedal
in “playing position”
(with the graphics up)

Input is on the right.
output is on the left.

Input
Jack

Output
Jack

TEST Your Pedal!

Use a guitar and amplifier to test your pedal.

The components you have bent and installed so far will deliver a drive sound in the “middle-range” of what this pedal can deliver.

Listen to how it sounds, then decide how you want to change it:

- *More/less drive*
- *Different high-frequency tone shaping*

On the next pages, follow the GAIN Resistors chart and the descriptions of the different clipping diodes, filter capacitors and Op Amps.

Troubleshooting [HERE](#)

Tone Shaping Basics:

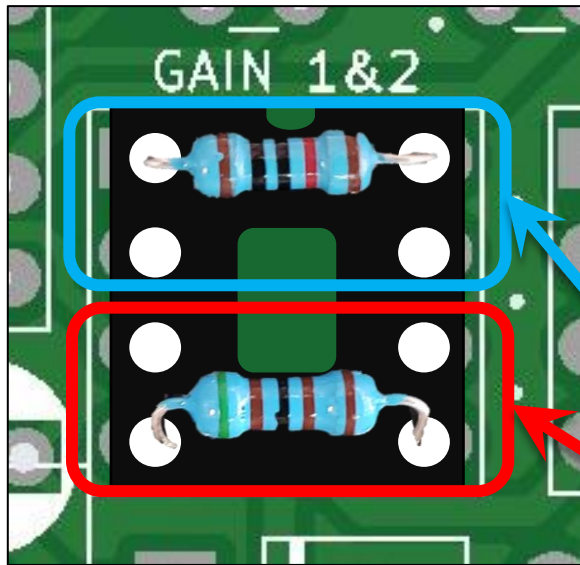
MORE Distortion:

- *Lower-value* GAIN1 and GAIN2 resistors (2.2k to 10k)
- 1N4007 diodes in both TONE1 and TONE2
- *Lower-value* capacitor in TONE2
- --OR-- *Remove* the capacitor from TONE2
- LEDs in TONE1 and 1N4007's in TONE2 (*LEDs = Louder!*)

Less Distortion:

- Higher-value GAIN1 and GAIN2 resistors (10k to 100k)
- 1N914 diodes in both TONE1 and TONE2
- Remove all diodes from TONE1 and/or TONE2
- Larger-value tone capacitor in TONE2, or try one in TONE1
- LEDs instead of 1N914's. LEDs are louder before they distort. Adjust LED distortion with high-value GAIN resistors.

Define Your Tone



GAIN 1 drives the TONE1 diodes.

GAIN 2 drives the TONE2 diodes.

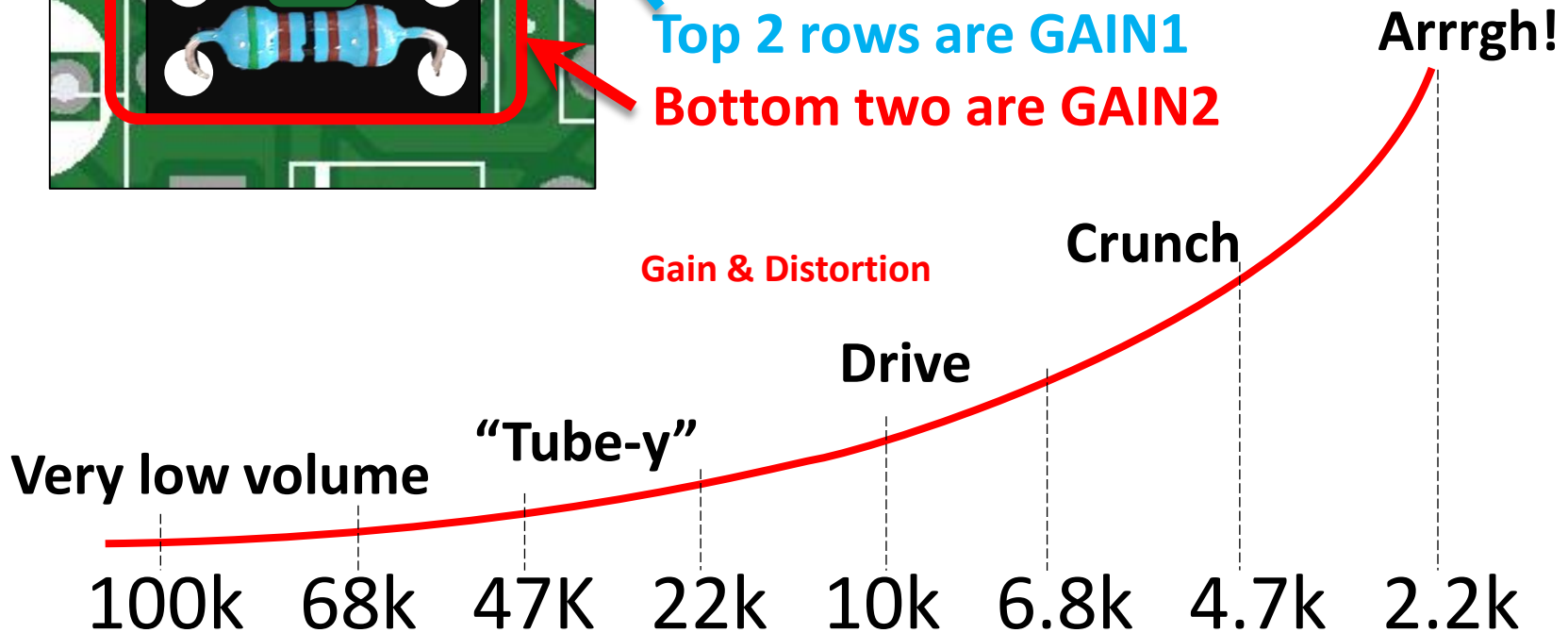
Lower values allow more signal = increased gain.

Experiment with different values for GAIN1 & 2,

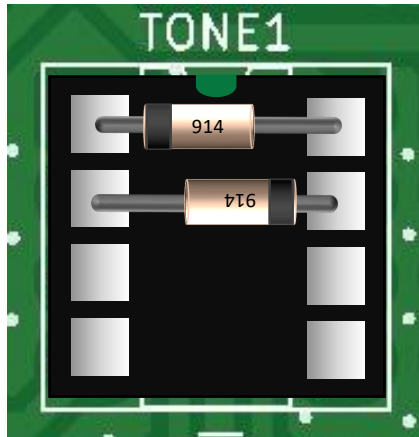
...But 2.2k resistors in *both* gets very muddy!

Top 2 rows are **GAIN1**

Bottom two are **GAIN2**



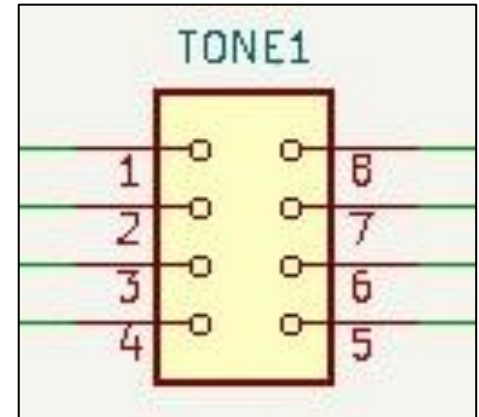
Gain Stage 1 ("TONE1")



DIAGRAM



PHOTO



SCHEMATIC

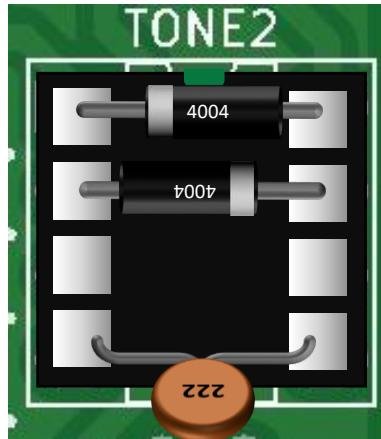
- 1N914's here provide a "smooth" overdrive
- 1N4007's deliver more "harsh" distortion
- LED's are louder, but have less distortion

NOTE:
Components can
be in any row

EXPERIMENT! – Try mixed combinations of diodes across this socket, or 2 pointing one way, and just one going the other.

Remember: Distortion here, is multiplied in the next stage!

Gain Stage 2 ("TONE2")



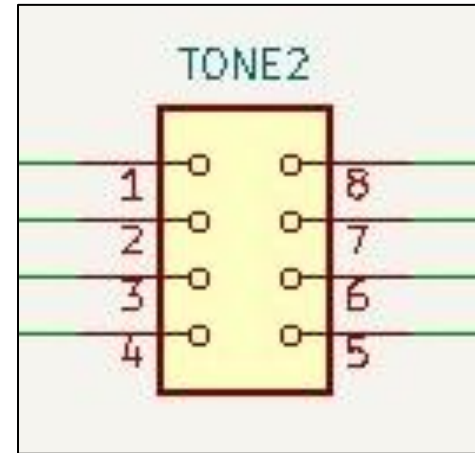
DIAGRAM

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PHOTO

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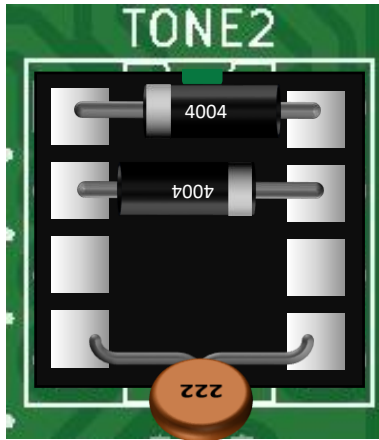
SCHEMATIC

- 1N914's provide *smoother* distortion with lower treble
- 1N4007's deliver *harsher* distortion and higher treble
- LED's are loud, but have less distortion

NOTE:
Components can
be in any row

EXPERIMENT! – Remove the capacitor, Mix different diodes in this socket, try 2 diodes pointing one way, and one pointing the other. The Optional capacitor cuts-down harsh high-frequency “squeal.” (As capacitance gets higher, more high-frequency is removed.)

Filter Capacitor



NOTE:
Components
can be in any
row



The Capacitor values in the kit are:

- 501 (500pF)
 - 102 (1000pF)
 - 152 (1500pF)
 - 222 (2200pF)
 - 332 (3300pF)
 - 472 (4700pF)
- Low
↓
High

The capacitor in gain stage 2 cuts-down high frequencies. It's like a tone knob. Higher-value capacitors remove more high frequencies. Remove the capacitor, and no high-frequencies are cut. (Having no cap can get edgy!)

The first 2 numbers on the capacitor are the amount of Picofarads (pF) and the last number is the number of zeros to add to that number.

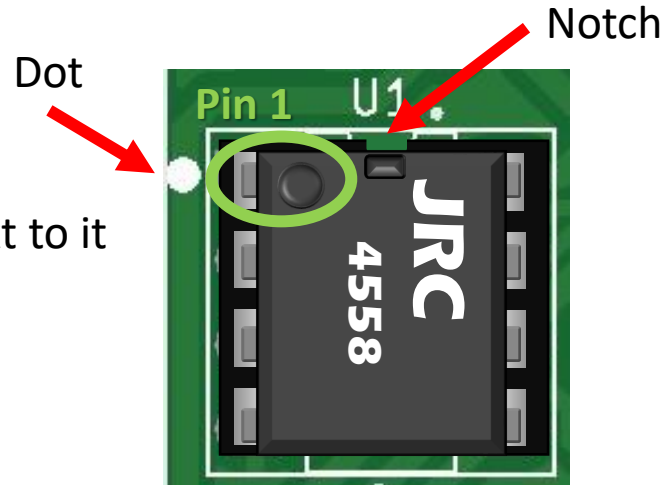
“102” is 1000pF, “222” is 2200pF, “332” is 3300pF, ...and so-on.

Remember: Higher values remove *more* high frequencies.

Op-Amp (U1)

Pin 1 on the chip has a dimple next to it
Or it has a notch on the same end

A Dot is on the PCB next to Pin 1



FOUR different Op-Amps are included, but you only need one.

I chose vintage Op-Amps designed in the 1970's:

- The 4558 is used in many pedals: Tube Screamer, Boss SD-1, and HM-2, etc.
- The 1458 is an older 4558 - essentially a dual 741 (Early Fuzz pedals used 741's)
- The LM358 is a 1970's design. Not great for clean audio, but good for distortion!
- The TL072 is a "low noise" FET device popular in the Klon Centaur

Modern "clean" Op-Amps don't affect the tone as much.

Some people say they can hear differences between Op-Amps, while others cannot. Your mileage may vary.

Tradeoffs

- *You might be tempted to start with the highest gain possible (low values for GAIN1 and GAIN2 resistors)* for the most distorted pedal you can build.
- **The problem with that is:** MASSIVE GAIN from low-value GAIN1 and GAIN2 resistors overloads the low frequencies, and it gets muddy.

I've found my favorite tone from these combinations:

- 1N914 in the first stage and 1N4007 in the second drives nicely.
- Start with 10k gain resistors, then make small changes.
 - Driving the first stage 1N914's harder, delivers a smooth "tube" drive
 - Driving the second stage 1N4007's harder increases harsh distortion
- You can reduce high frequency "icepick" tone with a capacitor in the 2nd gain stage. Removing it, allows those artifacts through.
 - The higher the value, the more High-Frequency you cut-out.



Use masking tape or place a business card in the inside cover, to insulate from short-circuits.

Troubleshooting Basics

LED doesn't light-up when clicked:

- LED installed backwards?
- Battery red/black wires backwards
- DC Jack wired incorrectly
- Dead battery, bad power supply, or a broken wire in the battery clip and connector.

No sound at all, with switch clicked on or off:

- Foot switch wires may be wired to the wrong pins. Re-verify with the pictures.
- Input and output jack wires were soldered to the wrong lugs
- Bad solder joints on the true bypass jumper or the input/output jacks

LED comes on, but no drive sound when "on"

- Gain 1 and Gain 2 Resistors not inserted all the way
- Guitar plugged-in to the output jack:
 - With the pedal in playing position, INPUT is on the right, OUTPUT is on the left.
- Output knob all the way down? Turn both knobs to their middle position
- Op-Amp in Backwards, or a pin is bent-over, or sticking-out of the socket (Verify the Pin 1 dot on the board matches the Pin 1 dimple on the chip)
- Dead battery? The LED will be dim or out if the battery is dead.

Not enough distortion or drive:

- Gain 1 and Gain 2 resistor values too high. Measure them with a meter.
- Diodes are not seated correctly in the TONE 1 and TONE 2 sockets
- Both Diodes are pointing the same way in one or both TONE sockets (Diodes should point in opposite directions for symmetrical distortion)

For additional troubleshooting help, email clear photos of your board and the wiring to DiyRibbonMic@yahoo.com, and describe the problem you are having.