

MANGLER2020

FX TYPE: Fuzz

Based on the Fuzz Face™

Enclosure Size: 1590B, 1590B2, 125B

"Softie" compatibility: Softie1&2

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Overview

Either you love fuzz, or hate fuzz. There is no in-between. Fuzz for life! That said, the Mangler is $\frac{1}{2}$ classic Fuzz Face and $\frac{2}{3}$ rd other stuff. I double-checked my math on that and it's solid.

The 2020 edition of the Mangler has been updated to fit the current style of mbp projects which allows you to build them in different sized enclosure. **It includes a voltage inverter on the PCB so you can use your standard center-tip negative 9v power supply to power this positive ground effect.** This takes out all the guess work for newer builders who have not dealt with positive ground effects before: everything is hooked up and wired like a normal negative ground effect!

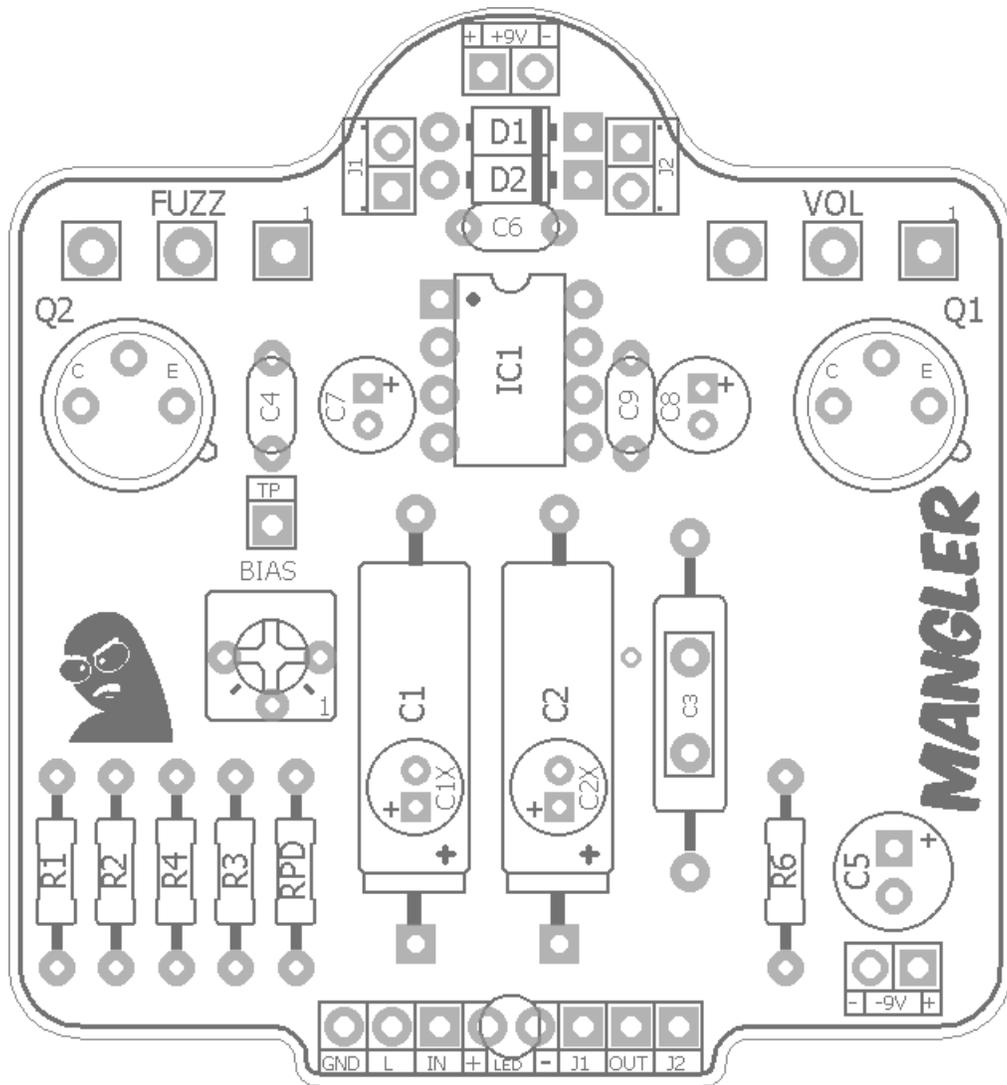
If you have never purchased PNP germanium transistors before, you can find several variations and offerings at <http://smallbear-electronics.mybigcommerce.com/>. These transistors are tested for gain and leakage beforehand. Smallbear also provides resistor values to properly bias the pair of transistors you purchase. Please feel free to use those values instead of the ones listed in the BOM of the Mangler.

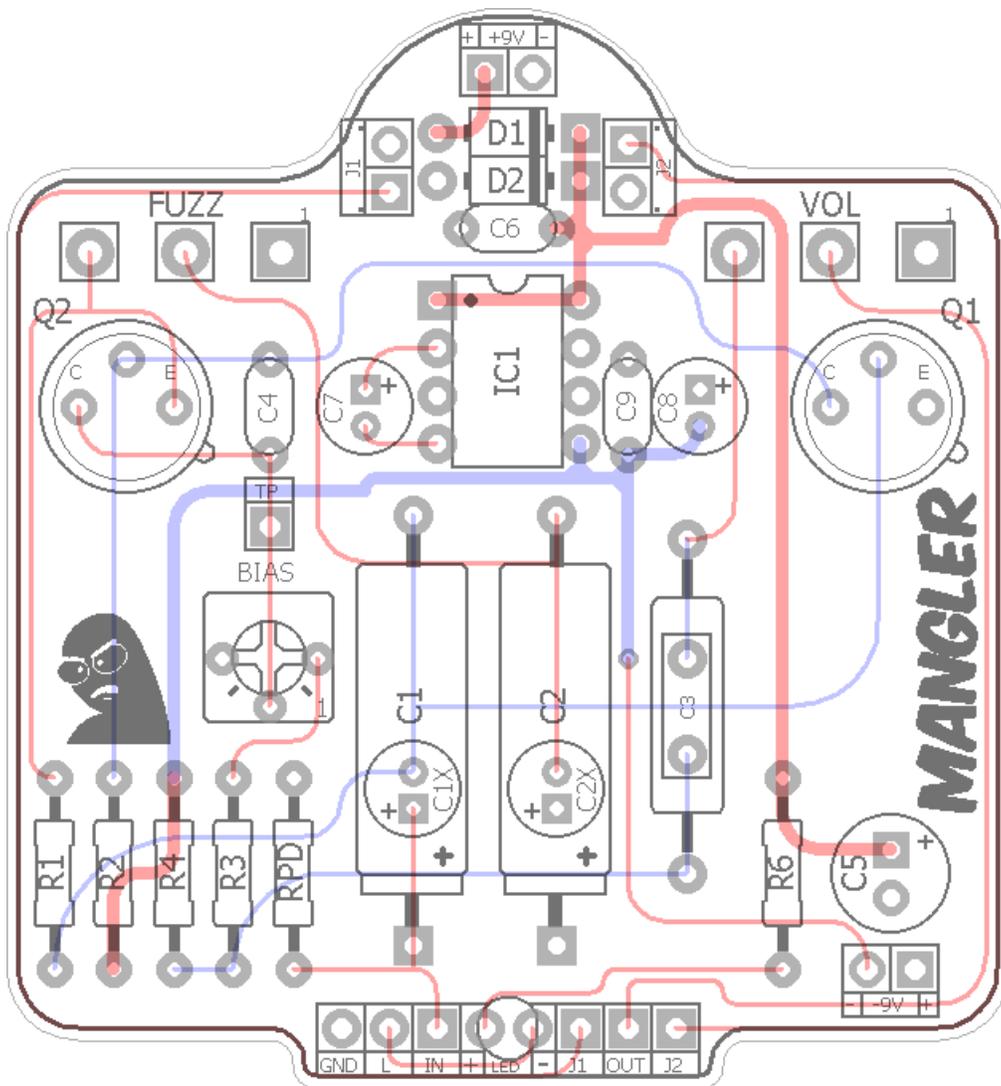
Controls

- **VOL:** Total output.
- **FUZZ:** Total fuzz. This control is improved by using the reverse audio (1kC) pot. However, the nature of the circuit is that the fuzz will get darker and muddier as it is turned CCW. The most useful settings tend to fall in the second 1/2 or 2/3 of the control. You can also get a lot of control over the fuzz by turning your guitar volume down.
- **BIAS:** This trimpot sets the optimal operational voltage for the Q2 collector.

Terms of Use: You are free to use purchased **Mangler2020** circuit boards for both DIY and small commercial operations. You may not offer **Mangler2020** PCBs for resale or as part of a "kit" in a commercial fashion. Peer to peer re-sale is fine, though.

Technical assistance for your build(s) is available via the [madbeanpedals forum](http://madbeanpedals.com/forum). Please go there rather than emailing me for assistance on builds. This is because (1) I'm not always available to respond via email in a timely and continuous manner, and (2) posting technical problems and solutions in the forum creates a record from which other members may benefit.





| Resistors | | Caps | | Diodes | |
|-----------|------|------|--------|--------------------|------------|
| R1 | 100k | C1 | 2u2 | D1 | 1N5817 |
| R2 | 33k | C2 | 22uF | D2 | 12v |
| R3 | 1k | C3 | 10n | Transistors | |
| R4 | 470R | C4 | *notes | Q1 | PNP GE |
| R6 | 4k7 | C5 | 100uF | Q2 | PNP GE |
| RPD | 1M | C6 | 100n | IC | |
| | | C7 | 10uF | IC1 | TC1044SCPA |
| | | C8 | 10uF | Trimmer | |
| | | C9 | 100n | BIAS | 20k |
| | | | | Pots | |
| | | | | FUZZ | 1kC |
| | | | | VOL | 500kA |

| Value | QTY | Type | Rating |
|------------|-----|---------------------|----------|
| 470R | 1 | Metal / Carbon Film | 1/4W |
| 1k | 1 | Metal / Carbon Film | 1/4W |
| 4k7 | 1 | Metal / Carbon Film | 1/4W |
| 33k | 1 | Metal / Carbon Film | 1/4W |
| 100k | 1 | Metal / Carbon Film | 1/4W |
| 1M | 1 | Metal / Carbon Film | 1/4W |
| 10n | 1 | Film | 16v min. |
| 100n | 2 | Film | 16v min. |
| 2u2 | 1 | Electrolytic | 16v min. |
| 10uF | 2 | Electrolytic | 16v min. |
| 22uF | 1 | Electrolytic | 16v min. |
| 100uF | 1 | Electrolytic | 16v min. |
| 1N5817 | 1 | | |
| 12v | 1 | Zener | |
| PNP GE | 2 | *see notes | |
| TC1044SCPA | 1 | | |
| 20k | 1 | Bourns 3362p | |
| 1kC | 1 | PCB Right Angle | 16mm |
| 500kA | 1 | PCB Right Angle | 16mm |

- You can use a 22k or 25k trimmer in place of the suggested 20k
- The TC1044**SCPA** is the recommended inverter, but you can also use a MAX1044**CPA** or ICL7660**SCPA**. Make sure you get the part that matches the **BOLDED SUFFIX**.

12v Zener:

<http://smallbear-electronics.mybigcommerce.com/diode-zener-1n4742a/>

PNP Transistors:

<http://smallbear-electronics.mybigcommerce.com/fuzz-faces-and-similar/>

- This list also includes NPN. Be sure to get PNP!

TO5 Sockets (optional):

<http://smallbear-electronics.mybigcommerce.com/to-5-transistor-mill-max/>

TC1044SCPA:

<http://smallbear-electronics.mybigcommerce.com/ic-tc1044scpa/>

<https://www.mouser.com/ProductDetail/579-TC1044SCPA>

MAX1044CPA:

<http://smallbear-electronics.mybigcommerce.com/ic-max1044cpa/>

Bourns 3362p (20k):

<https://www.mouser.com/ProductDetail/652-3362P-1-203LF>

<https://www.taydaelectronics.com/potentiometer-variable-resistors/cermet-potentiometers/3362p/20k-ohm-trimmer-potentiometer-cermet-1-turn-3362p.html>

16mm Right Angle Pots (1kc, 500kA):

<http://smallbear-electronics.mybigcommerce.com/alpha-single-gang-16mm-right-angle-pc-mount/>

Thinline DC Jack:

<http://smallbear-electronics.mybigcommerce.com/dc-power-jack-all-plastic-unswitched-2-1-mm/>

Enclosed Mono:

<http://smallbear-electronics.mybigcommerce.com/1-4-in-mono-enclosed-jack/>

<http://smallbear-electronics.mybigcommerce.com/1-4-in-mono-enclosed-switchcraft-111x/>

Lumberg Mono:

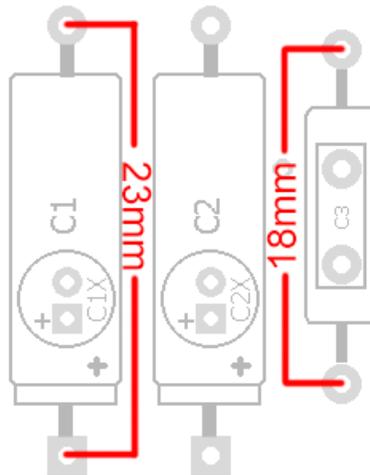
<http://smallbear-electronics.mybigcommerce.com/lumberg-1-4-compact-shrouded-mono-jack/>

Bonus - axial caps:

<https://www.mouser.com/ProductDetail/594-2222-021-38228>

<https://www.mouser.com/ProductDetail/75-TVA1305.5>

<https://www.mouser.com/ProductDetail/598-WMF1S1K-F>



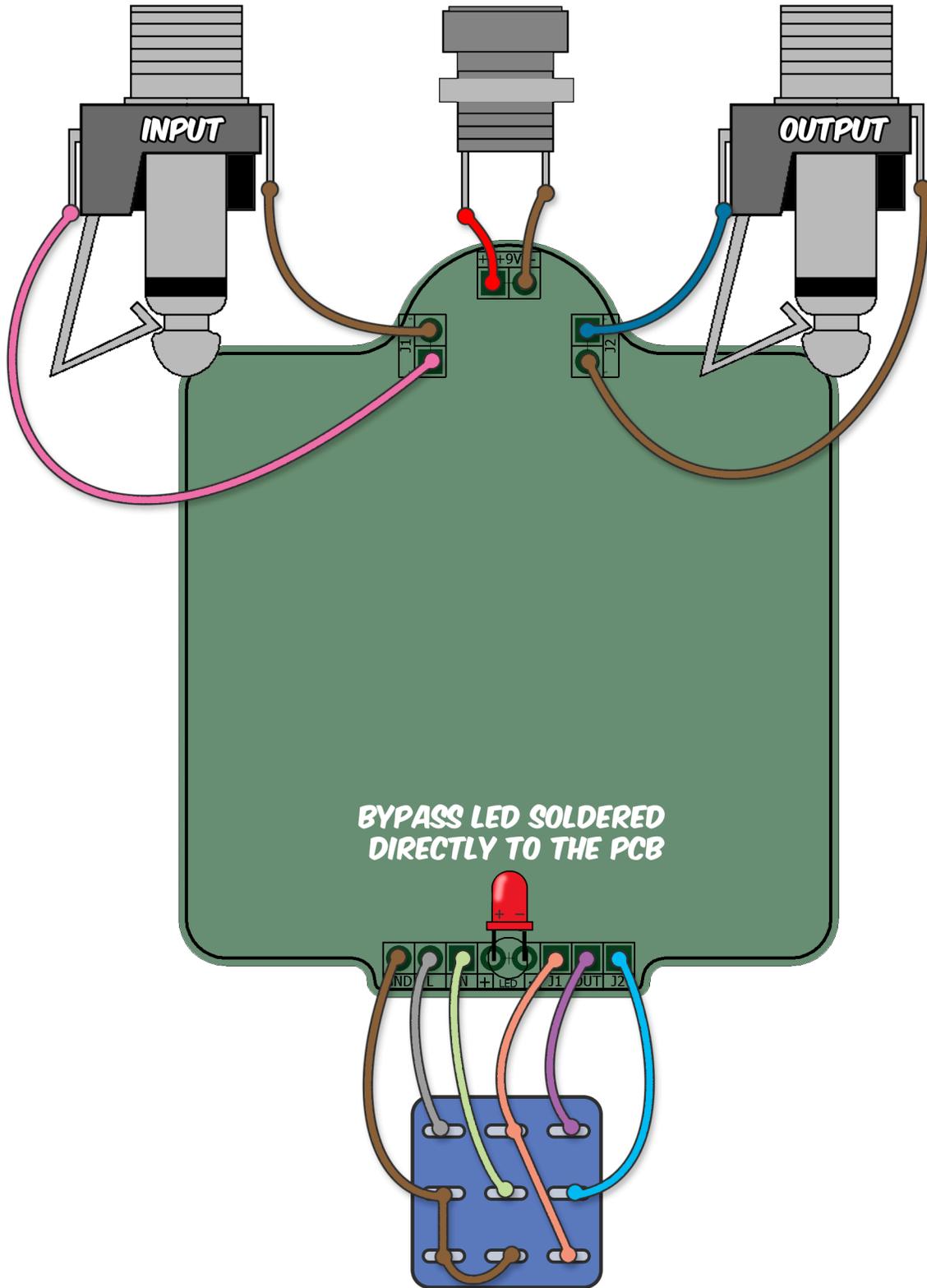
- C1, C2 and C3 have pads for axial caps (for the extra mojo) should you want to use them. If you are using radial caps, use the C1x, C2x and inside pads of C3 instead. Those spacing are 2mm and 5mm, resp.

Biasing

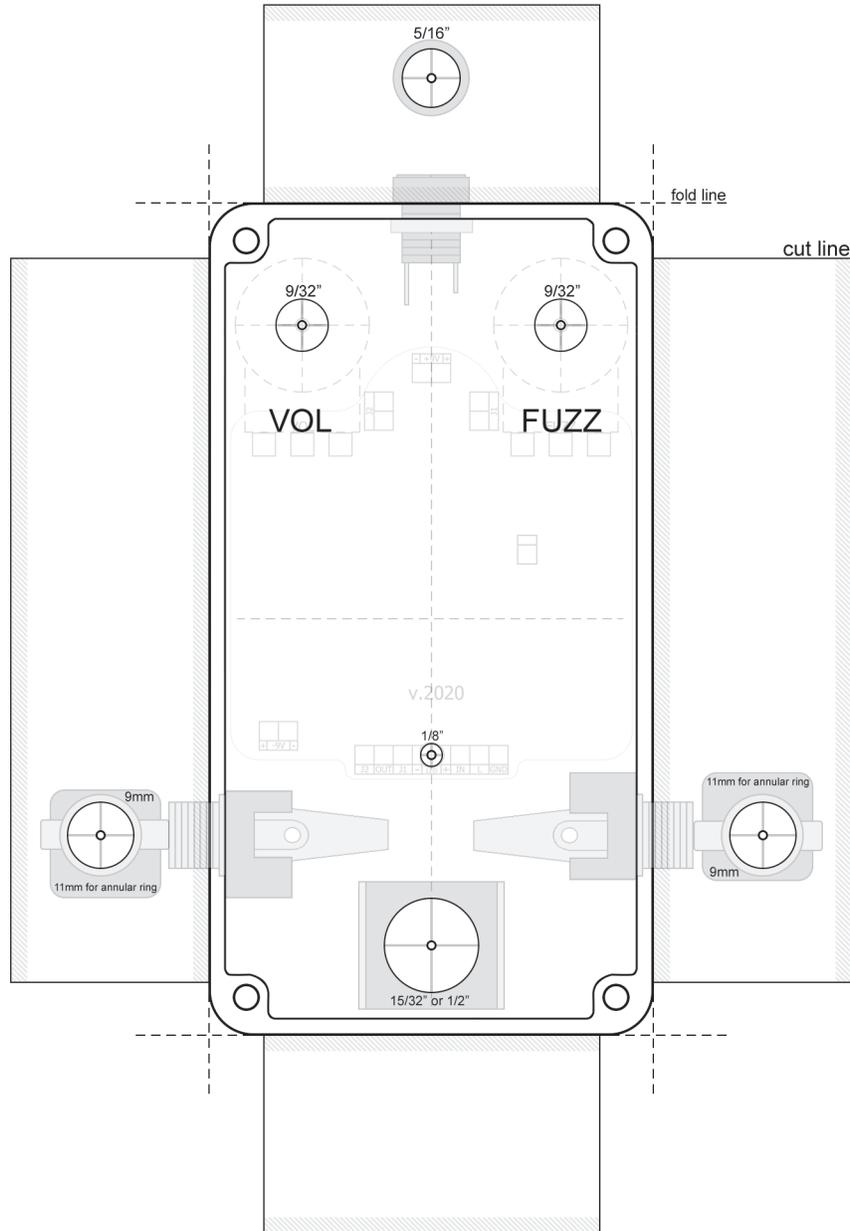
- Setting the bias voltage on the collector of Q2 will ensure the best, most fuzzy operation. For a positive ground PNP fuzz, we typically go with half the supply voltage (so -4.5v on a -9v supply). This is not a hard set rule, but a guideline.
- Using a multimeter, connect the black lead to ground and touch the red lead to the “TP” (test point) pad on the PCB. Adjust the bias trimmer until you read about -4.5v. It’s best to do this after the circuit has been powered for a couple minutes to allow Q2 to become temperature stable.
- For a more compressed fuzz, try setting the bias voltage between -2.5v and -3.5v. This can get you into some of the squishy “violin” tones a la Eric Johnson. Not guaranteed to work but worth a try if you like that sound.
- As mentioned on pg.1, if you order a pre-tested set of transistors from smallbear, they will list (or include) resistors that produce the best result for that transistor pair. **Feel free to use those instead of the values listed in the BOM.** If you want to use their supplied resistor for biasing Q2, simply install it in R3 and jumper the Bias trimpot pads together. However, there is no harm in sticking with an adjustable bias trimpot.

Mods

- C4 is optional and not part of the classic FF design. This cap will tame some high end and quiet down a hissy pair of transistors, if needed. Before committing to a using the cap test how your build sounds. Then test it with C4. You can do this with a socket or by inserting the cap loose into the pads. Start with around 47pF and up to 100pF or 120pF to see if you like the result.
- Fuzz Faces tend to have low output so you can expect unity gain at around 75-85% of the volume knob. To increase output, use a larger value for R4. Either 820R or 1k2 are typically used. Note: this will impact the bias point of Q2 so your trimpot setting will be slightly different than if you used the stock 470R value in R4.

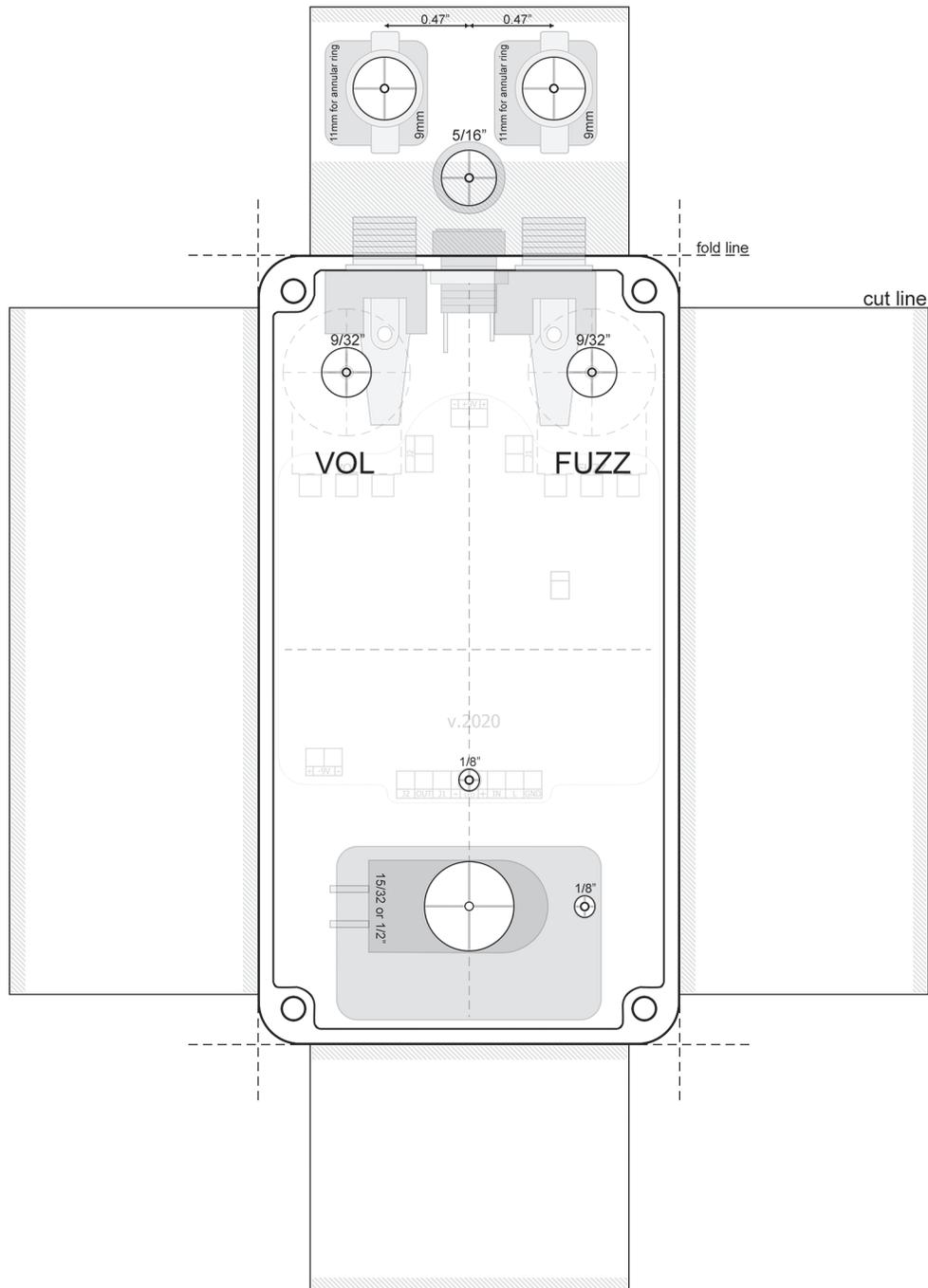


Note: Drill Guides are approximate and may require tweaking depending on the types of jacks, switches and pots you use.



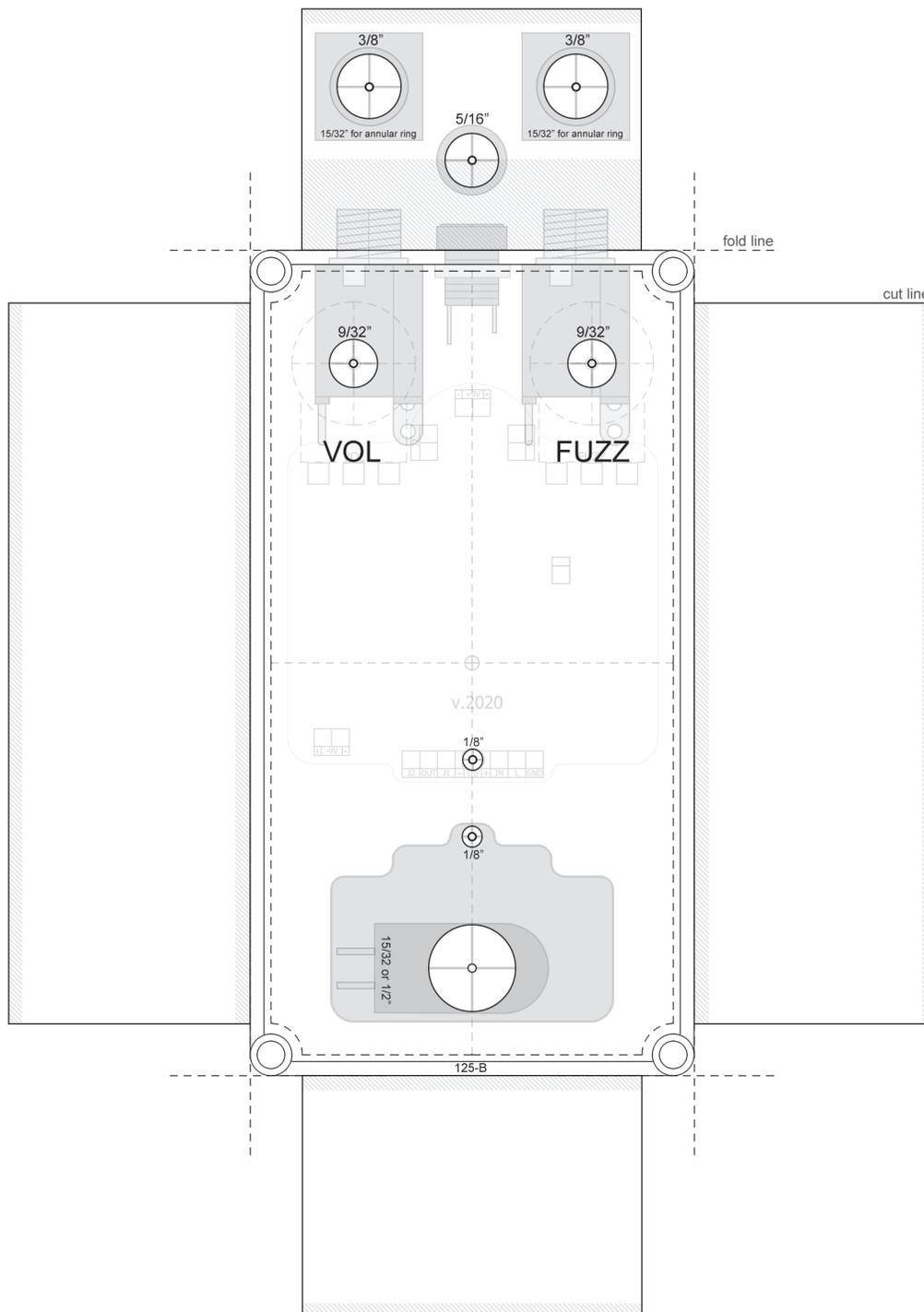
- This is a tight fit, but should work if you use the Lumberg style 1/4" jacks.
- I don't recommend using any of the mbp 3pdt boards for this enclosure.

Note: Drill Guides are approximate and may require tweaking depending on the types of jacks, switches and pots you use.



- Shown with Softie 2 relay bypass. If you are using one of the mbp 3pdt bypass boards, or just a 3pdt switch on its own, move the drill spot for the switch a bit lower so you can fit everything properly. Drill only one LED spot!
- Lumberg style jacks are used here but other styles may fit using the same drill locations.

Note: Drill Guides are approximate and may require tweaking depending on the types of jacks, switches and pots you use.



- Shown with Softie 1 relay bypass. Use the same drill spot for 3PDT switch or move to your desired location. Drill only one LED spot!
- Enclosed top jacks are used here, but you should also be able to fit open-frame metal jacks or the Lumberg style.
- You could also use side jacks but you'll need to move the Softie1 drill spot down. If you use side jacks with a regular 3pdt instead of the Softie simply pick your drill spots for the jacks.

| IC1 TC1044SCPA | | Q1 PNP | |
|----------------|-------|--------|--------|
| 1 | 9.21 | C | -0.55 |
| 2 | 5.51 | B | -120mV |
| 3 | 0 | E | 0 |
| 4 | -3.68 | | |
| 5 | -9.17 | Q2 PNP | |
| 6 | 4.34 | C | -4.6 |
| 7 | 5.67 | B | -0.55 |
| 8 | 9.21 | E | -0.43 |

- 9.42vDC One Spot
- Current Draw ~ 3mA

