

# Nordic Metal

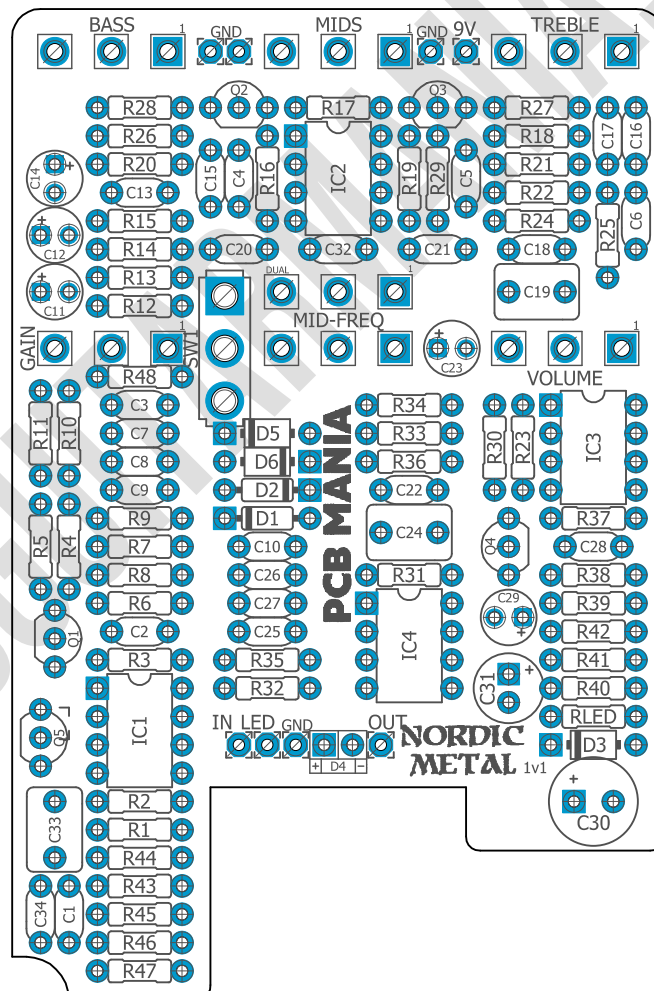
**Based on:**  
Boss Metal zone  
**Effect type:**  
Distortion  
**Build difficult:**  
Advanced

**Amount of parts:**  
High, total 101 components  
**Technology:**  
Op Amps  
**Power consumption:**  
9V

**Enclosure type:**  
125b  
**Get your board at:**  
[Nordic Metal](#)  
**Get your kit at:**  
[Das Musikding \(Europe\)](#)

## Project overview:

Can you hear that buzz?! It sounds like we're being swarmed by an army of blood-thirsty wasps... oh, no worries, actually, its Steve testing his new Nordic Metal pedal!



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## Introduction

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Nordic Metal is inspired by the one and only Metal Zone. The unmistakable sounding circuit comes with a complete list of mods that is able to change the wasp nest into a metal sculpting machine.

TREBLE, MIDS, BASS, VOLUME, MID-FREQ and GAIN are the 6 knobs available on this pedal. VOLUME allows setting the loudness of the engaged unit. GAIN is the control over how metal the pedal sounds, and let's not lie to ourselves here - this knob will be stuck at the max all the time, we guarantee you. TREBLE, MIDS, and BASS are the pots responsible for the equalization of the tone, covering a full range of frequencies - from the top, through the mids, down to the low bass. MID-FREQ allows you to finetune the central frequency of the MIDS control to give your tone its unique character. In fact, the EQ controls of this pedal are so powerful that they might end up in a separate circuit... watch this space!

If you consider yourself a true metalhead, then there is nothing to think about twice. The Nordic Metal pedal is a must-have for any self-respecting sonic annihilator!

This build allows you to **choose between multiple mods** such as Diezel mod, Boogie/Bogner mod, Keeley mod, Waza Craft mod, and single components replacement that will allow you to craft your own perfect version of this pedal.

## Controls

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### *Potentiometers*

- Bass
- Gain
- MIDs
- Treble
- Volume

### *Switches*

- SW1

# Bill of materials

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Resistors	
Part	Value
R1	1M
R2	100K
R3	200K*
R4	2K2*
R5	10K
R6	47K*
R7	10K
R8	10K*
R9	100K
R10	1K
R11	1K*
R12	2K2
R13	10K
R14	4K7*
R15	100K
R16	3K3
R17	22K
R18	22K*
R19	470R*
R20	1K
R21	22K*
R22	2K2
R23	2K2
R24	100K
R25	22K
R26	10K
R27	10K
R28	47K*
R29	470K*
R30	47K
R31	47K
R32	1M
R33	330R
R34	330R

R35	2K2
R36	2K2
R37	1M
R38	10K
R39	1K
R40	100K
R41	10k
R42	10k
R43	100K
R44	10K
R45	1M
R46	10K
R47	1M
R48	15k or less
RLED	4K7

Capacitors	
Part	Value
C1	15n*
C2	100p
C3	47p*
C4	47p*
C5	47p
C6	10p*
C7	27n*
C8	10n*
C9	33n*
C10	47n*
C13	15n*
C15	15n*
C16	220n
C17	10n
C18	47n*
C19	1u
C20	1n5*
C21	47n*

<b>C22</b>	<b>100p*</b>
<b>C24</b>	1u
<b>C25</b>	22n
<b>C26</b>	100n
<b>C27</b>	8n2
<b>C28</b>	47n
<b>C32</b>	<b>220n*</b>
<b>C33</b>	1u
<b>C34</b>	<b>47n*</b>

Electrolytic Capacitors	
Part	Value
<b>C11</b>	<b>10u*</b>
<b>C12</b>	<b>10u</b>
<b>C14</b>	1u
<b>C23</b>	<b>10u</b>
<b>C29</b>	<b>1u*</b>
<b>C30</b>	<b>100u</b>
<b>C31</b>	<b>47u</b>

Potentiometers	
Part	Value
<b>BASS</b>	100K B
<b>GAIN</b>	250K B
<b>MIDS</b>	100K B
<b>TREBLE</b>	100K B
<b>VOLUME</b>	50K A
<b>MID-FREQ</b>	50K B Stereo

IC	
Part	Value
<b>IC1</b>	C4558
<b>IC2</b>	C4558
<b>IC3</b>	C4558
<b>IC4</b>	C4558

Transistors	
Part	Value
<b>Q1</b>	2N3904
<b>Q2</b>	2N3904
<b>Q3</b>	2N3904
<b>Q4</b>	2N3904
<b>Q5</b>	2N5457

Switch	
Part	Value
<b>SW1</b>	<b>MINI SPDT ON-OFF-ON**</b>

Diodes	
Part	Value
<b>D1</b>	<b>1n4148</b>
<b>D2</b>	<b>1n4148</b>
<b>D3</b>	<b>1n5817</b>
<b>D4</b>	<b>3mm red LED</b>
<b>D5</b>	<b>Of your choice</b>
<b>D6</b>	<b>Of your choice</b>

# Shopping list

Resistors		
Qty	Value	Parts
6	100K	R2, R9, R15, R24, R40, R43
9	10K	R5, R7, R8, R13, R26, R27, R38, R44, R46
2	10k	R41, R42
4	1K	R10, R11, R20, R39
5	1M	R1, R32, R37, R45, R47
1	200K	R3
4	22K	R17, R18, R21, R25
6	2K2	R4, R12, R22, R23, R35, R36
2	330R	R33, R34
1	3K3	R16
1	470K	R29
1	470R	R19
4	47K	R6, R28, R30, R31
2	4K7	R14, RLED
1	15k or less	R48

Capacitors		
Qty	Value	Parts
1	100n	C26
2	100p	C2, C22
2	10n	C8, C17
1	10p	C6
3	15n	C1, C13, C15
1	1n5	C20

2	1u	C19, C24
1	1u	C33
2	220n	C16, C32
1	22n	C25
1	27n	C7
1	33n	C9
5	47n	C10, C18, C21, C28, C34
3	47p	C3, C4, C5
1	8n2	C27

Electrolytic Capacitors		
Qty	Value	Parts
3	10u	C11, C12, C23
2	1u	C14, C29
1	100u	C30
1	47u	C31

Potentiometers		
Qty	Value	Parts
3	100K B	BASS, TREBLE, MIDS
1	250K B	GAIN
1	50K A	VOLUME
1	50K B Stereo	Mid-Freq

IC		
Qty	Value	Parts
1	C4558	IC1, IC2, IC3, IC4

Transistors		
Qty	Value	Parts
4	2N3904	Q1, Q2, Q3, Q4
1	2N5457	Q5

Switches		
Qty	Value	Parts
1	SPDT On-Off-On Mini Toggle Switch*	SW1
1	3PDT 3PDT Stomp Foot	-

Diodes		
Qty	Value	Parts
2	1n4148	D1, D2
1	1n5817	D3
1	3mm red LED	D4
2	Of your choice	D5, D6

Jacks		
Qty	Value	Parts
1	DC JACK	-
2	AUDIO JACK	-

# Mods

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The Bill of Materials and Shopping list contains component values for assembling the **classical model** of this pedal.

Here are some standard mods you can do to the original pedal:

## Diezel mod:

**C8** - remove

**C7** - MKT 47nf

**C15** - remove

These three capacitors remove harshness.

**C34** - MKT 1uf

**D2** - remove or red LED

**D1** - 1N4001

These changes give the sound more dynamic and make it wider.

**C25** - 100nf

Changing this capacitor makes EQ more useful.

With this mod, the pedal's tone becomes a little more organic than stock, but the distortion is still a bit too over the top.

Replacing **D2** with a red LED makes a huge difference. A drop in distortion was available in the original pedal, but what was left was much fatter and chunky. There may still be enough dirt after the mod for big metal sounds, but it's just a lot bigger and thicker.

The pedal is still probably best for scooped metal sounds, as long as you don't go silly with scooping the mids too much. Setting the mids at about 12 o'clock, and the low and highs between 4 and 5 o'clock, with the mid frequencies at 1 to 2 o'clock, gives a nice modern metal tone without too much scooping going on.

The changes have also resulted in this pedal being an excellent overdrive as well. Rolling the distortion knob back to zero and adjusting the level knob, you can find a beautiful, fat tone. It's fat but still nice and sharp around the edges.

## Boogie/Bogner mod:

**C8** - jumper

**C7** - 47nf

**C25** - 1uF

**D2** - LED

**D1** - 1N4001

Plus:

**R4** - if you increase values, you get more pre-distortion + mids

**R11** - by reducing value, you obtain more distortion (470 ohms to start)

These mods don't have the same sound as Bogner amp, but they can be better than the stock sound.

#### [Keeley mod:](#)

**C32** - 220nf

**C34** - 100nf

**C24, C33, C21, C19** - 1uf

**C16** - 220nf

**C18** - 100nf

**C32** - 220nf

**D1, D2** - LED

#### [Waza Craft mod:](#)

**C10** - remove. Alternatively, you can add an SPST toggle and easily switch between classic and Waza Craft Custom.

This mod reduces massive pre-distortion boost to the mid frequencies and gives more balanced voicing to the pedal. Also, the overall gain is reduced slightly, removing some of the harshnesses.

Optional: **C15** and **C32** are responsible for the post-distortion filters, which give a boost to the high and low frequencies, respectively. If you find your pedal too dark or bright for your taste - you can experiment by removing one or both of them too.

### Single components replacement:

**\* A gyrator can be used to transform a load capacitance into an inductance and form an LR-filter.**

**R3** – 1k. Almost the same situation is here. The Gain ratio depends on the R3 value. Higher resistance – more gain. By choosing 1k, you cut gain and also mid frequencies peak. The gyrator is in a negative feedback chain and is based around Q1.

**R4** – 10k or 1k. This resistor is a part of the gyrator based around Q1. By choosing 10k you decrease the gain of the mid-frequency amp based on IC1\_A and, respectively, lower mids gain. By choosing a 1k resistor, you increase the gain of the mid-frequency amp.

**R6** – remove. If you remove this resistor - you also clear the positive bias feeding of the base of Q1. This will give you a mid-frequency cut and less treble cut.

**R8** – remove. It gives you more bass because this resistor was a divider, with R7 providing 5k as a result. An R7/R8-C10 is a high-pass filter. Removing R8 increases resistance in this filter and gets more bass.

**R11** – choose between 4k7 and 680. The resistor is in the negative feedback chain of IC1\_B. The gain ratio is  $(GAIN+R10)/R11$ . By choosing higher resistance you are lowering the gain. For more gain choose 680.

**R14** – jumper. Replacing this resistor with a jumper gives you a low-pass filter through the R13-C13 chain that boosts bass and mids and cuts treble.

**R18** – by increasing the value of this resistor (not recommended above 100k), you increase the boost/gain of IC2\_B through a negative feedback chain.

**R19** – remove. By removing this resistor, you increase the gain of IC2\_A.

**R28** – remove. By removing this resistor, you cut the treble bump at 5kHz, because you remove positive bias feeding of the base of Q2.

**R29** – remove. By removing this resistor, you remove positive bias feeding of the base of Q3 that will give you more boost/gain.

**C1** – 1uf. The situation is absolutely the same as with C9. This capacitor is part of a high-pass filter (C1-R2). Decreasing its value cuts bass. Increasing gives you more bass in frequency response.

**C3** – 100pf. Increasing the capacitor value cuts high gain because it is connected in parallel to a negative feedback resistor. Ideally, the closed loop gain versus frequency curve should cross the open loop gain curve at an angle. For example, in conventional inverting and non-inverting amplifiers, a small capacitor is often connected in parallel with the feedback resistor to achieve this. If the frequency response of the feedback circuit were horizontal, then the amplifier would be on the verge of instability. The capacitor ensures that the curves intersect at an angle and thus guarantees the stability of the circuit.

**C6** – 100pf. The capacitor is in the negative feedback chain of IC3, which is an active EQ for bass and treble. By increasing its value, you move the EQ shelf a bit, giving a mid boost to IC3\_B.

**C7** – 47nf. By increasing this capacitor value will increase the frequency response of the gyrator based on Q1 and give you more mids and bass.

**C8** – remove. Read **Waza Craft Mod**.



**C9** – 1uf. This capacitor is part of a high-pass filter (C9-R9). Decreasing its value cuts bass. Increasing gives you more bass in frequency response.

**C10** – remove. This capacitor is a part of the low-pass filter (R7/R8-C10). By removing this capacitor, you get no treble cut because this filter turns into resistor divider R7-R8.

**C11** – 47nf. If you put a low-value capacitor here – it will have a high impedance in bass and mid-frequency range, so you will get bass and mid-gain cut. IC1\_B is an alternating current amp here.

**C15** – 1uf. By increasing the value of this capacitor, you will get more boost/gain from the gyrator based on Q2.

**C20** – 10nf or remove. This change will lead to more treble because you will change the frequency response of the gyrator based on Q2.

**C21** – remove or 1uf. This change will give you a mid-boost because it won't cut mids in the gyrator based on Q3.

**C22** – 220pf. The capacitor in the negative feedback chain of IC4 is an amp for active parametric mid-section EQ. By increasing its value, you move the EQ resonance peak, giving a mid boost and a bit treble cut.

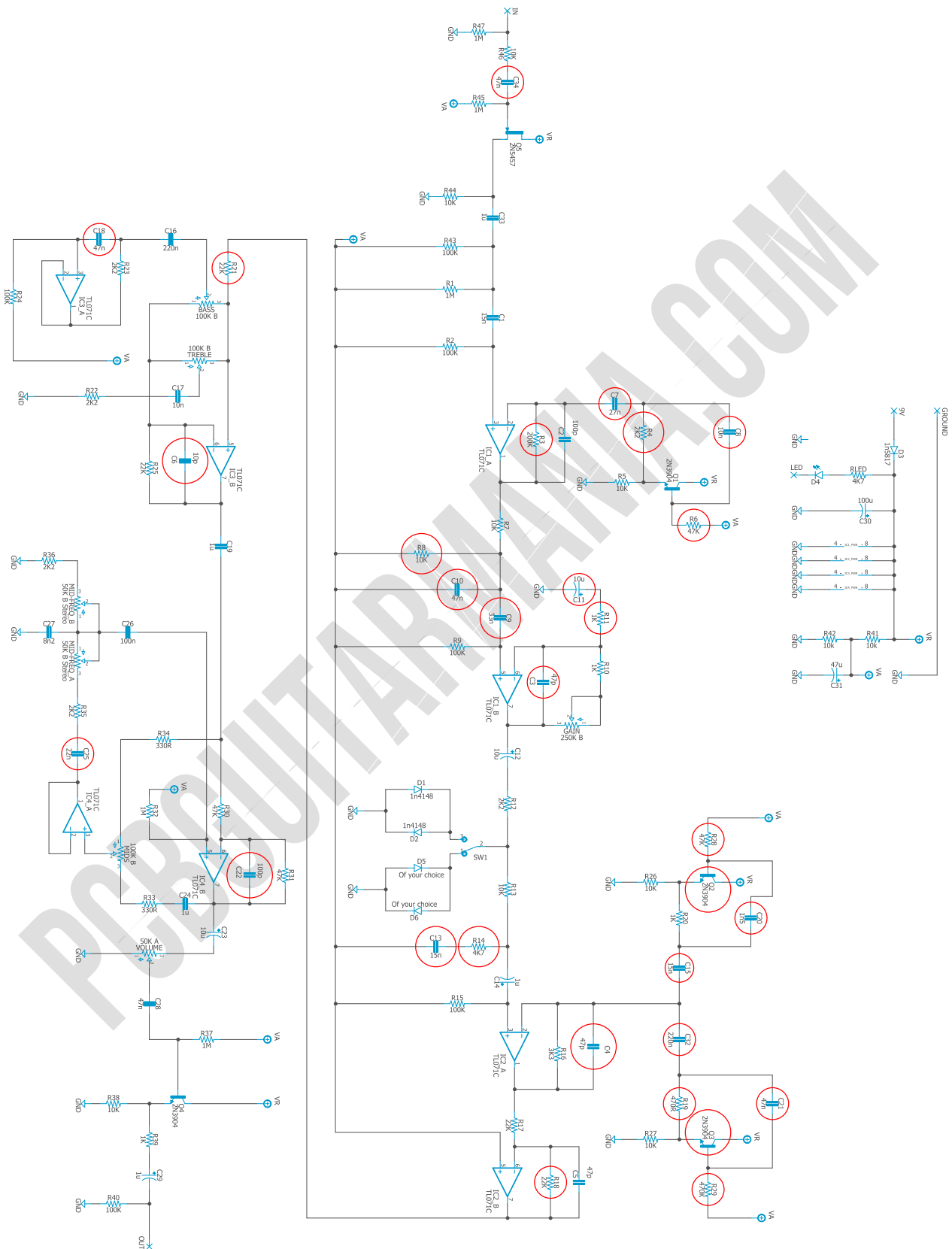
**C25** – 100nf. This is a coupling capacitor. A bigger value will have a wider frequency response giving you a bigger mid-pot range.

**C32** – remove. If you remove this capacitor, you will exclude the gyrator based on Q3 and receive a bass cut and treble boost.

**C34** – 1uf. This one is the input capacitor that influences the circuit's frequency response. Higher value – more basses and overall sound becomes richer.

**Q2, Q3** – remove. Gyrators based on these transistors are used to boost treble and bass, respectively, and to form a frequency response curve specific to this pedal. By removing these transistors, you disable these gyrators and give more "breathe" to the mids.

# Schematics



# Components Recommendations

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As many people like to experiment with some pedals with higher voltage, always ensure your **electrolytic capacitors'** max tolerance is over 25v.

This board has been tested using Film box capacitors for most of the values over 1nf and ceramics discs for those under 1nf. However, high-quality components such as Wima's Capacitors and Panasonic's electrolytics can deliver a better performance.

All the resistors used for testing this project are 1/4W Metal Film.

The BOM and Shopping list are exclusive regarding this project. It doesn't include all the hardware like the 3PDT bypass switch, audio/dc jacks, enclosure, etc.

## Build Notes

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If this is one of your first projects, I recommend you to take a look at our [Pedal Building Guide](#).

For a successful and tidy build, it's recommended the following order:

1. Resistors & diodes
2. Capacitors, starting with the smaller ones and the ceramic ones.
3. Electrolytic capacitors (always check the polarity)
4. Transistors
5. Wires
6. Potentiometers and switches
7. Off-board wiring

### SW1\*

You cannot use a standard SPDT due to lack of space. If you don't have the microswitch, it is better to put a jumper between pads 2 and 3 for the stock version or between 2 and 1 for the custom version.

- <https://www.taydaelectronics.com/sub-mini-toggle-switch-2m-series-spdt-on-off-on-pcb-pins.html>
- <https://www.musikding.de/Mini-Toggleswitch-SPDT>

## Wiring Diagram

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All our projects include a free 3PDT Board to make the wiring easier and tidier. Also, all of our PCBs feature the status LED on board.

The pad named “Ctrl” or “LED” is the one that controls the status of the led; wire it to the “LED” pad on the 3PDT board or in the control slug of your 3PDT.

This board has been designed to match our EZ 3PDT PCB; check it [here](#) to access our [Pedal Wiring Guide](#).

## Drill Template

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This Project has been planned to fit into a 125b enclosure type.

Check the Attached “Drilling templates” to drill the box properly. The files are on Scale 1:1, ready to print on an A4 page.

## Licensing and Usage

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We really appreciate your trust and support in buying this PCB, as well as your will to dive into the DIY electronics world. For us, that's why you can make this project work properly and enjoy not only the building process but also experiment and play with it on your rig.

We try to reply to every question we receive on our email or our social media. Still, we try to encourage all our customers to join our [PCB Guitar Mania – Builders Group](#) on Facebook to post all your doubts, issues, suggestions, or requests, share your builds, and have some feedback from other fellow builders and us!

We tested all our projects following this same guide on their standard configurations. Although, not all of the variations and mods have necessarily been checked. These are suggestions based on the schematic analysis and the experiences and opinions of others. Feel free to share with us your views and recommendations regarding the mods your personal experimentation.

These boards may be used for commercial endeavors in any quantity unless expressly noted. No attribution is necessary, though accreditation or a link back is always much appreciated.

If you are a builder planning to make your own run of pedals, we also offer the service of custom-made boards with your brand and logo, design according to your specifications.

The only usage restrictions are that, first, you cannot resell the PCB as part of a kit without prior arrangement with us, and second, you cannot scratch off the silkscreen or other way of trying to hide our logos and the source of the PCBs. Like it's written above, if you want to have your designs with your brand and logo, we could undoubtedly reach an agreement.

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