Total Bender

Based on:
Tone Bender 3 in 1
Effect type:
Classic British Fuzz
Build difficult:
Advanced

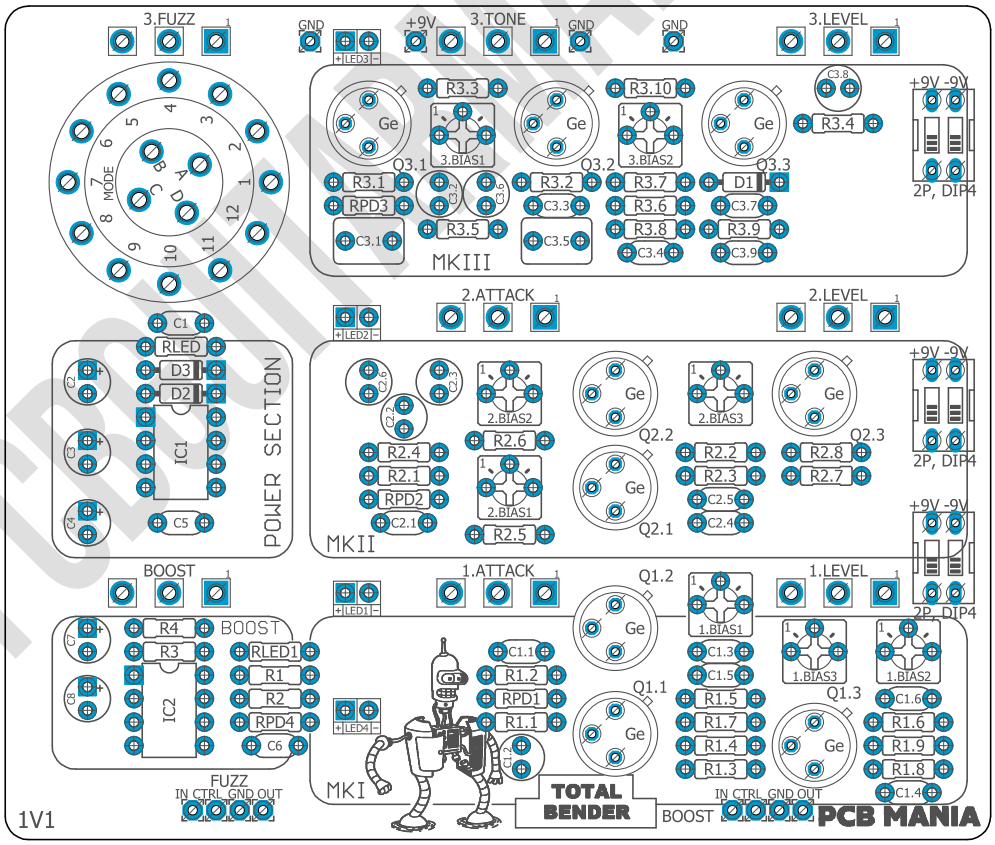
Amount of parts:
High, total 92 components
Technology:
Op Amp, Switching Voltage Regulator
Power consumption:
9V

Enclosure type:
1790NS
Get your board at:
Total Bender
Get your kit at:
Das Musikding (Europe)

Project overview:

This superb pedal gives you three classic Tone Benders in one compact unit, allowing you to switch between them with ease. Whether you're looking for that old-school MK1 sound or want to experiment with the MK2 or MK3, the Total Bender has you covered.

This build allows you to choose between silicon and germanium versions according to your preference and comes with trimmers that enable setting the transistors to your taste, so you can really make this pedal your own.



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Introduction

The Tone Bender is one of the most admired and unique fuzz pedals in music history. Chosen by many of the best guitarists in the world, its sound is a fundamental element of the most influential music of the last five decades.

So, how does a Tone Bender sound? The signature sound of the Tone Bender is hairy, spitting, and aggressive. It doesn't have problems cutting through a live mix as scooped Muff-style fuzzes, and while it doesn't clean up as elegantly as a Fuzz Face, it has a unique compression and bloom when responding to pick attack. Players such as Mark Ronson, Jeff Beck, Brian May, Ernie Isley, Syd Barrett, Kevin Shields, and of course, Jimmy Page have all used the Tone Bender to create iconic recorded and live guitar tones.

Having the three main versions in a single board is as convenient and versatile as it gets. Let us check all you can get with just the flip of a switch:

Tone Bender MKI

The first incarnation of the Tone Bender was a three-transistor circuit based on the Gibson Maestro Fuzz-Tone (FZ-1) circuit. The circuit was modified by the technician Gary Hurst to produce more sustain than its American counterpart. The story goes that the guitar legend Vic Flick (the man responsible for the James Bond Theme), brought a Fuzz-tone to Hurst and requested a version with more sustain.

Hurst began selling the resulting pedal in mid-1965. He housed the early Benders in those iconic wooden enclosures that later were replaced by the folded steel ones. The Tone Bender was the first-ever British-made Fuzz box available to the public. And just like that, **ladies and gentlemen, the British fuzz was born!**

Tone Bender MKII

MKII is the most popular version of the Tonal Bender, and it has a special place in the hall of rock'n'roll. The MKII Tone Bender has a thicker and slightly less aggressive sound than the MKI, and is capable of loading tons of headroom, warm fat crunch, aggressive rock tones suitable for down-tuning, and huge blues tones.

If you are going for the sound that shocked everyone in the mid-sixties, this is the one. Just imagine the moment this pedal played through an old Marshall or Selmer or Vox for the first time; for a guitarist, it must have been life-changing!

Tone Bender MKIII

The final chapter in the classic Tone Bender series and by far the most versatile of the three. When introduced in 1968, the Tone Bender MKIII did not come in the iconic aluminum enclosure but in a pressed steel casing, with a far livelier and attractive set of silk-screened graphics.

The MKIII has three control knobs on the panel: Level, Tone, and Fuzz. It features a three-transistor fuzz circuit that was based on the earlier Baldwin-Burns Buzzaround, but offers you the tone control in place of the 'balance' control on the Burns model. The result is a pedal that sounds much tamer and is more user-friendly than the often chaotic-sounding Buzzaround.

Silicon or Germanium

This project allows you to choose your build based on your preferences; whether you want to go for the warmer, rounder vintage tone of the germanium version or the rougher silicon one that comes with more gain. In addition, the trimmers allow setting the transistors to your taste.

Total Bender was a satisfying project to work on. Not only did it require a lot from us, but it also gave back in spades with its great sound and versatility that will make any guitarist happy to try out their new toy! We just cannot wait to hear your feedback and demos.

Controls

MKI

- 1.ATTACK
- 1.LEVEL
- BOOST

MKII

- 2.ATTACK
- 2.LEVEL

MKII

- 3.FUZZ
- 3.LEVEL
- 3.TONE

Switches

- Mode
- Voltage
- Voltage 1
- Voltage 2

Silicon - Bill of materials

Resistors	
Part	**Value**
R1	2M2
R1.1	4M7
R1.2	8k2
R1.3	270k
R1.4	22k
R1.5	1M2
R1.6	8k2
R1.7	82k
R1.8	47k
R1.9	2M2
R2	2M2
R2.1	100k
R2.2	1k
R2.3	100k
R2.4	470k
R2.5	2k7
R2.6	100R
R2.7	220R
R2.8	100R
R3	100k
R3.1	47k
R3.2	470k
R3.3	empty
R3.4	1k
R3.5	330R
R3.6	10k
R3.7	empty
R3.8	33k
R3.9	33k
R3.10	jumper
R4	100k
RLED	6k8
RLED1	6k8
RPD1	1M
RPD2	1M
RPD3	1M
RPD4	1M

Capacitors	
Part	**Value**
C1	100n
C1.1	10n
C1.3	100n
C1.4	100n
C1.5	100p
C1.6	100p
C2.1	10n
C2.4	100n
C2.5	100n
C3.1	1u
C3.3	47p
C3.4	jumper
C3.5	1u
C3.7	10n
C3.9	470p
C5	470n
C6	100n

Electrolytic Capacitors	
Part	**Value**
C1.2	2u2
C2	100u
C2.2	4u7
C2.3	47u
C2.6	4u7
C3	10u
C3.2	100u
C3.6	10u
C3.8	22u
C4	47u
C7	10u
C8	10u

Potentiometers	
Part	**Value**
1.ATTACK	B25k
1.LEVEL	A500k
2.ATTACK	B1k
2.LEVEL	A100k
3.FUZZ	B250k
3.LEVEL	A100k
3.TONE	B100k
BOOST	A10k

Trimpots	
Part	**Value**
1.BIAS1	10k
1.BIAS2	33k
1.BIAS3	50k
2.BIAS1	20k
2.BIAS2	100k
2.BIAS3	20k
3.BIAS1	20k
3.BIAS2	20k

IC	
Part	**Value**
IC1	TC1044SCPA
IC2	TL071

Transistors	
Part	**Value**
Q1.1	**Any type***
Q1.2	**Any type***
Q1.3	**Any type***
Q2.1	**Any type***
Q2.2	**Any type***
Q2.3	**Any type***
Q3.1	**Any type***
Q3.2	**Any type***
Q3.3	**Any type***

Switches	
Part	**Value**
Mode	4P3T rotary
Voltage	**2P, DIP4*** **
Voltage 1	**2P, DIP4*** **
Voltage 2	**2P, DIP4*** **

Diodes	
Part	**Value**
D1	**1N34 Ge***
D2	1N5817
D3	1N4742
LED1	3mm red LED
LED2	3mm red LED
LED3	3mm red LED
LED4	3mm red LED

Silicon - Shopping list

Resistors		
Qty	**Value**	**Parts**
3	2M2	R1, R1.9, R2
1	4M7	R1.1
2	8k2	R1.2, R1.6
1	270k	R1.3
1	22k	R1.4
1	1M2	R1.5
1	82k	R1.7
2	47k	R1.8, R3.1
4	100k	R2.1, R2.3, R3, R4
2	1k	R2.2, R3.4
2	470k	R2.4, R3.2
1	2k7	R2.5
2	100R	R2.6, R2.8
1	220R	R2.7
1	330R	R3.5
1	10k	R3.6
2	33k	R3.8, R3.9
2	6k8	RLED, RLED1
4	1M	RPD1, RPD2, RPD3, RPD4

Capacitors		
Qty	**Value**	**Parts**
6	100n	C1, C1.3, C1.4, C2.4, C2.5, C6
3	10n	C1.1, C2.1, C3.7
2	100p	C1.5, C1.6
2	1u	C3.1, C3.5
1	47p	C3.3
1	470p	C3.9
1	470n	C5

Electrolytic Capacitors		
Qty	**Value**	**Parts**
1	2u2	C1.2
2	100u	C2, C3.2
2	4u7	C2.2, C2.6
2	47u	C2.3, C4
4	10u	C3, C3.6, C7, C8
1	22u	C3.8

Potentiometers		
Qty	**Value**	**Parts**
1	B25k	1.ATTACK
1	A500k	1.LEVEL
1	B1k	2.ATTACK
2	A100k	2.LEVEL, 3.LEVEL
1	B250k	3.FUZZ
1	B100k	3.TONE
1	A10k	BOOST

Trimpots		
Qty	**Value**	**Parts**
1	10k	1.BIAS1
1	33k	1.BIAS2
1	50k	1.BIAS3
1	20k	2.BIAS1
1	100k	2.BIAS2
3	20k	2.BIAS3, 3.BIAS1, 3.BIAS2

IC		
Qty	**Value**	**Parts**
1	TC1044SCPA	IC1
1	TL071	IC2

Transistors		
Qty	**Value**	**Parts**
9	**Any type***	Q1.1, Q1.2, Q1.3, Q2.1, Q2.2, Q2.3, Q3.1, Q3.2, Q3.3

Switches		
Qty	**Value**	**Parts**
1	4P3T rotary	Mode
3	**2P, DIP4*** **	Voltage, Voltage 1, Voltage 2
2	3PDT Stomp foot	-

Diodes		
Qty	**Value**	**Parts**
1	1N4742	D3
1	1N5817	D2
1	**1N34 Ge***	D1
4	3mm red LED	LED1, LED2, LED3, LED4

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

Germanium - Bill of materials

Resistors	
Part	**Value**
R1	2M2
R1.1	1M
R1.2	8k2
R1.3	470k
R1.4	1k8
R1.5	empty
R1.6	8k2
R1.7	empty
R1.8	47k
R1.9	2M2
R2	2M2
R2.1	100k
R2.2	470r
R2.3	100k
R2.4	empty
R2.5	jumper
R2.6	jumper
R2.7	jumper
R2.8	100r
R3	100k
R3.1	100k
R3.2	680k
R3.3	10k
R3.4	jumper
R3.5	3k3
R3.6	10k
R3.7	10k
R3.8	jumper
R3.9	10k
R3.10	220k
R4	220k
RLED	6k8
RLED1	6k8
RPD1	1M
RPD2	1M
RPD3	1M
RPD4	1M

Capacitors	
Part	**Value**
C1	100n
C1.1	10n
C1.3	100n
C1.4	100n
C1.5	empty
C1.6	empty
C2.1	15n
C2.4	100n
C2.5	15n
C3.1	100n
C3.3	220p
C3.4	100n
C3.5	220n
C3.7	2n
C3.9	empty
C5	470n
C6	100n

Electrolytic Capacitors	
Part	**Value**
C1.2	22u
C2	100u
C2.2	4u7
C2.3	47u
C2.6	4u7
C3	10u
C3.2	22u
C3.6	10u
C3.8	empty
C4	47u
C7	10u
C8	10u

Potentiometers	
Part	**Value**
1.ATTACK	B50k
1.LEVEL	A500k
2.ATTACK	B1k
2.LEVEL	A100k
3.FUZZ	B100k
3.LEVEL	A100k
3.TONE	B100k
BOOST	A10k

Trimpots	
Part	**Value**
1.BIAS1	10k
1.BIAS2	33k
1.BIAS3	empty
2.BIAS1	20k
2.BIAS2	100k
2.BIAS3	20k
3.BIAS1	20k
3.BIAS2	33k

IC	
Part	**Value**
IC1	TC1044SCPA
IC2	TL071

Transistors	
Part	**Value**
Q1.1	**Any type***
Q1.2	**Any type***
Q1.3	**Any type***
Q2.1	**Any type***
Q2.2	**Any type***
Q2.3	**Any type***
Q3.1	**Any type***
Q3.2	**Any type***
Q3.3	**Any type***

Switches	
Part	**Value**
Mode	4P3T rotary
Voltage	**2P, DIP4*** **
Voltage 1	**2P, DIP4*** **
Voltage 2	**2P, DIP4*** **

Diodes	
Part	**Value**
D1	**1N34 Ge***
D2	1N5817
D3	1N4742
LED1	3mm red LED
LED2	3mm red LED
LED3	3mm red LED
LED4	3mm red LED

Germanium - Shopping list

Resistors		
Qty	**Value**	**Parts**
3	2M2	R1, R1.9, R2
5	1M	R1.1, RPD1, RPD2, RPD3, RPD4
2	8k2	R1.2, R1.6
1	470k	R1.3
1	1k8	R1.4
1	47k	R1.8
4	100k	R2.1, R2.3, R3, R3.1
1	470r	R2.2
1	100r	R2.8
1	680k	R3.2
4	10k	R3.3, R3.6, R3.7, R3.9
1	3k3	R3.5
2	220k	R3.10, R4
2	6k8	RLED, RLED1

Capacitors		
Qty	**Value**	**Parts**
7	100n	C1, C1.3, C1.4, C2.4, C3.1, C3.4, C6
1	10n	C1.1
2	15n	C2.1, C2.5
1	220p	C3.3
1	220n	C3.5
1	2n	C3.7
1	470n	C5

Electrolytic Capacitors		
Qty	**Value**	**Parts**
2	22u	C1.2, C3.2
1	100u	C2
2	4u7	C2.2, C2.6
2	47u	C2.3, C4
4	10u	C3, C3.6, C7, C8

Potentiometers		
Qty	**Value**	**Parts**
1	B50k	1.ATTACK
1	A500k	1.LEVEL
1	B1k	2.ATTACK
2	A100k	2.LEVEL, 3.LEVEL
2	B100k	3.FUZZ, 3.TONE
1	A10k	BOOST

Trimpots		
Qty	**Value**	**Parts**
1	10k	1.BIAS1
1	33k	1.BIAS2
3	20k	2.BIAS1, 2.BIAS3, 3.BIAS1
1	100k	2.BIAS2
1	33k	3.BIAS2

IC		
Qty	**Value**	**Parts**
1	TC1044SCPA	IC1
1	TL071	IC2

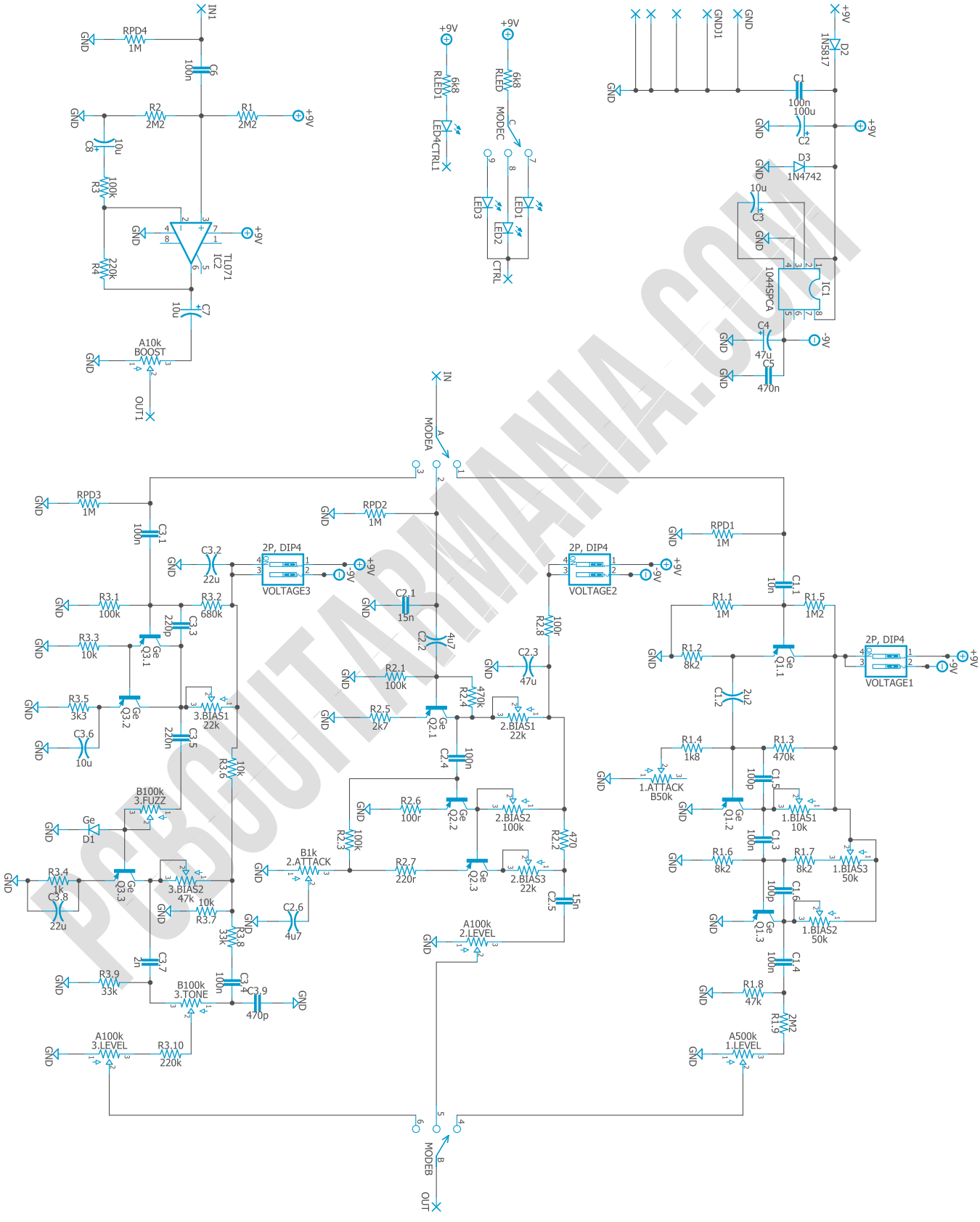
Transistors		
Qty	**Value**	**Parts**
9	**Any type***	Q1.1, Q1.2, Q1.3, Q2.1, Q2.2, Q2.3, Q3.1, Q3.2, Q3.3

Switches		
Qty	**Value**	**Parts**
1	4P3T rotary	Mode
3	**2P, DIP4*****	Voltage, Voltage 1, Voltage 2
2	3PDT Stomp foot	-

Diodes		
Qty	**Value**	**Parts**
1	1N4742	D3
1	1N5817	D2
1	**1N34 Ge***	D1
4	3mm red LED	LED1, LED2, LED3, LED4

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

Schematic



Components Recommendations

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

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

Any type*

You can use any type of transistor; no matter it is Si or Ge. Tune using bias trims.

1N34 Ge**

Even though 1N34 GE is the most used and universal value, you can experiment by placing any type of Germanium diode accordingly to your taste.

2P, DIP4***

Every dip switch has -9 and +9v. This means that both switches of every dip switch should NEVER be turned on at the same time.

Wiring Diagram

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

This Project has been planned to fit into a 1790ns 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

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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