

Knight Of Tone

Based on:
Analogman King Of Tone

Effect type:
Dual Overdrive/Boost/distortion
Build difficult:
Medium-advanced

Amount of parts:
High, total 78 components

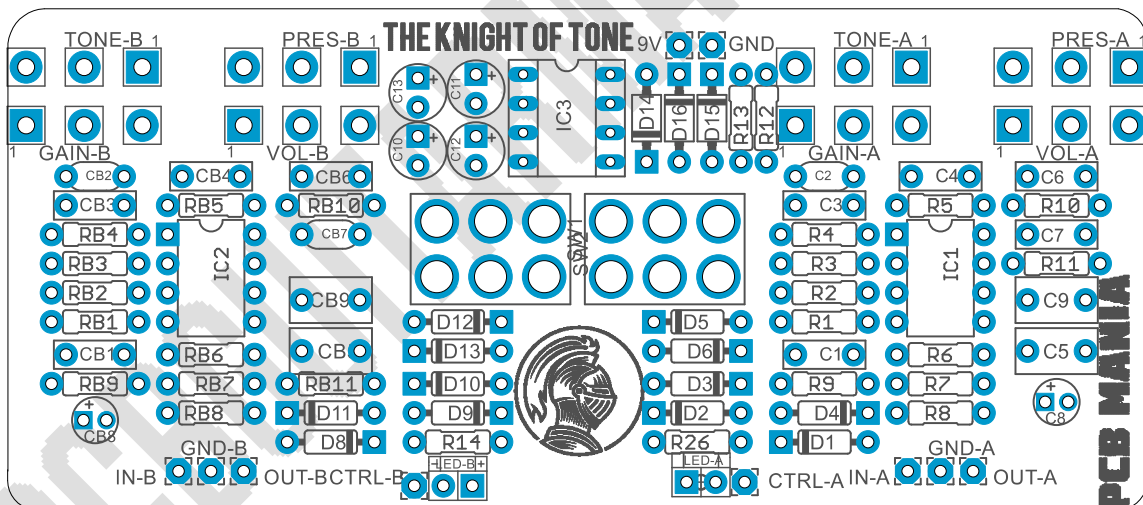
Technology:
Dual OpAmp
Power consumption:
20mA (9v)

Enclosure type:
1590bb

Get your board at:
[Knight Of Tone](#)
Get your kit at:
[Das Musikding \(Europe\)](#)

Project overview:

Based on one of the most famous and boutique overdrives, the Knight Of tone takes to the limit the possibilities you can get out of this circuit; featuring many possible mods such as external presence control, internal charge pump, and external toggles to select in between the three modes, boost, overdrive and distortion.



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Introduction

The origins of this circuit goes back to 1991, when the engineers at Marshall were trying to recreate the tone of the classic Bluesbreaker amps from the 60's on a pedal format. The result of that was a dual OpAmp based transparent overdrive with the same name as the legendary amp, and with the same core design as the one we have here today in the Knight of Tone, as well as on many other boutique overdrives from Analogman's King of Tone to JHS Morning glory and many others.

On the King Of Tone by Analogman you got basically two Bluesbreakers circuits with different clipping options that allows you to set the pedal as an overdrive (Clipping on the feedback loop of the OpAmp), Distortion (after the OpAmp and before the tone control, pretty much like a Rat) or as a booster (Without any clipping option engaged)

For this design we conceived the idea of taking all the things that make great this circuits and take it to the next level. We took many off the great functionalities of the King of tone, but making them more userfriendly, for example we replaced the internal DIP switches that selects the diode mode, with external DPDT switches, making dialing your tone much easier. Also we did the same with Presence control, making easier to cut through the mix.

Another mod included here is the internal Charge pump, that takes the 9v input and doubles it to 18v, giving this way much more headroom and clarity. This can be easily bypassed as it's explained on the graphic bellow.

Also, we included here another mod you can make if you want to add more gain to your build, but take in mind that the high gain goes better on lower voltages if you wanna get a dirty tone out of it.

Controls

- Gain
- Volume
- Tone
- Presence
- Mode Switch

All this controls corresponds to each side of the pedal.

Bill of materials (Standard version)

Resistors	
Part	Value
R1	1M
R2	1M
R3	10k
R4	33k
R5	27k
R6	10k
R7	220k
R8	6.8k
R9	1k
R10	6.8k
R11	1M
R12	47k
R13	47k
R14	4.7k
R26	4.7k
RB1	1M
RB2	1M
RB3	10k
RB4	33k
RB5	27k
RB6	10k
RB7	220k
RB8	6.8k
RB9	1k
RB10	6.8k
RB11	1M

Pots	
Part	Value
TONE	25k B
TONE1	25k B
VOL	100K A
VOL1	100K A
GAIN	100k B
GAIN1	100k B
PRES	50k B
PRES1	50k B

Capacitors	
Part	Value
C1	10nf
C2	100pf
C3	10nf
C4	10nf
C5	100n
C6	10nf
C7	10nf
C8	1uf electro
C9	1uf
C10	100uf electro
C11	10uf electro
C12	10uf electro
C13	10uf electro
CB1	10nf
CB2	100pf
CB3	10nf
CB4	10nf
CB5	100n
CB6	10nf
CB7	10nf
CB8	1uf electro
CB9	1uf

Ics	
Part	Value
IC1	JRC4580
IC2	JRC4580
IC3	TC1044

Switches	
Part	Value
SW1	DPDT ON-OFF-ON
SW2	DPDT ON-OFF-ON

Diodes	
Part	Value
D1	MA856
D2	MA856
D3	MA856
D4	MA856
D5	1S1588
D6	1S1588
D8	MA856
D9	MA856
D10	MA856
D11	MA856
D12	1S1588
D13	1S1588
D14	1n5817
D15	1n5817
D16	1n5817
LED-A	LED 3mm
LED-B	LED 3mm

Shopping list

Resistors		
Qty	Value	Device
6	1M	R1, R2, R11, RB1, RB2, RB11
2	47k	R12, R13
2	4.7k	R14, R26
4	10k	R3, R6, RB3, RB6
2	33k	R4, RB4
2	27k	R5, RB5
2	220k	R7, RB7
4	6.8k	R8, R10, RB8, RB10
2	1k	R9, RB9

Pots		
Qty	Value	Device
2	25k B	TONE, TONE1
2	100K A	VOL, VOL1
2	50k B	PRES, PRES1
2	100k B****	GAIN, GAIN1

ICS		
Qty	Value	Device
2	JRC4580	IC1, IC2
1	TC1044***	IC3

Capacitors		
Qty	Value	Device
10	10nf	C1, C3, C4, C6, C7, CB1, CB3, CB4, CB6, CB7
1	100uf	C10
3	10uf	C11, C12, C13
2	100pf	C2, CB2
2	100n	C5, CB5
2	1uf	C8, CB8
2	1uf	C9, CB9

Switches		
Qty	Value	Device
2	DPDT ON-OFF-ON	SW1, SW2

Diodes		
Qty	Value	Device
8	MA856*	D1, D2, D3, D4, D8, D9, D10, D11
3	1n5817	D14, D15, D16
4	1S1588**	D5, D6, D12, D13
2	LED 3mm	LED-A, LED-B

Components Recommendations

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

This board has been tested using Film box capacitors for most of the values over 1nf, and ceramics discs for the ones 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 exclusively regarding this project. It doesn't include all the hardware like the 3PDT bypass switch, audio/dc jacks, enclosure, etc.

*Diodes MA856**

These diodes are nearly impossible to get nowadays. However they can easily be replaced by much more common standard 1n914 or 1n4148 without a big tonal difference. This set of diodes are in charge of the overdrive mode, feel free to experiment with other values and type of diodes. Germanium diode won't work properly on this build giving you an overly compressed tone and a lot of volume loss.

*Diodes 1S1588***

Like the MA856, these diodes are nearly impossible to get nowadays. They can also be replaced by much more common standard 1n914 or 1n4148 without a big tonal difference. Also feel free to experiment with other alternatives, such as 3mm red LED for a more Marshallish tone or with BAT46 diodes for a more crisp distortion.

*IC TC1044****

This is the IC in charge of the voltage doubler section. There are many other possible alternatives for it such as MAX1044. However isn't recommended to go for the 7660s due possible unwanted noises on the circuit.

*High Gain Mode*****

If you want to experiment with the higher gain configuration, replace one of the 100k B pots for a 250k B pot.

Additional Notes

The KoT is a symmetrical dual overdrive with an unlimited set of possible configurations. Most people like to use the first part as a booster and the second as the main overdrive/distortion, or two overdrives in a row on the vein of SRV, or even first an overdrive and then a distortion for more chonky tones. Take this in mind at the time of designing your set, take a read on all the suggestions and experiment as much as you feel to achieve the tone you want to. Maybe the high gain mode with 3mm red leds on the over drive on the second part of the circuit and the first one as a clean boost? Or maybe an overdrive in the front to drive a higher gain BAT46 distortion section? The possibilities are unlimited, build it at your own taste!

Build Notes

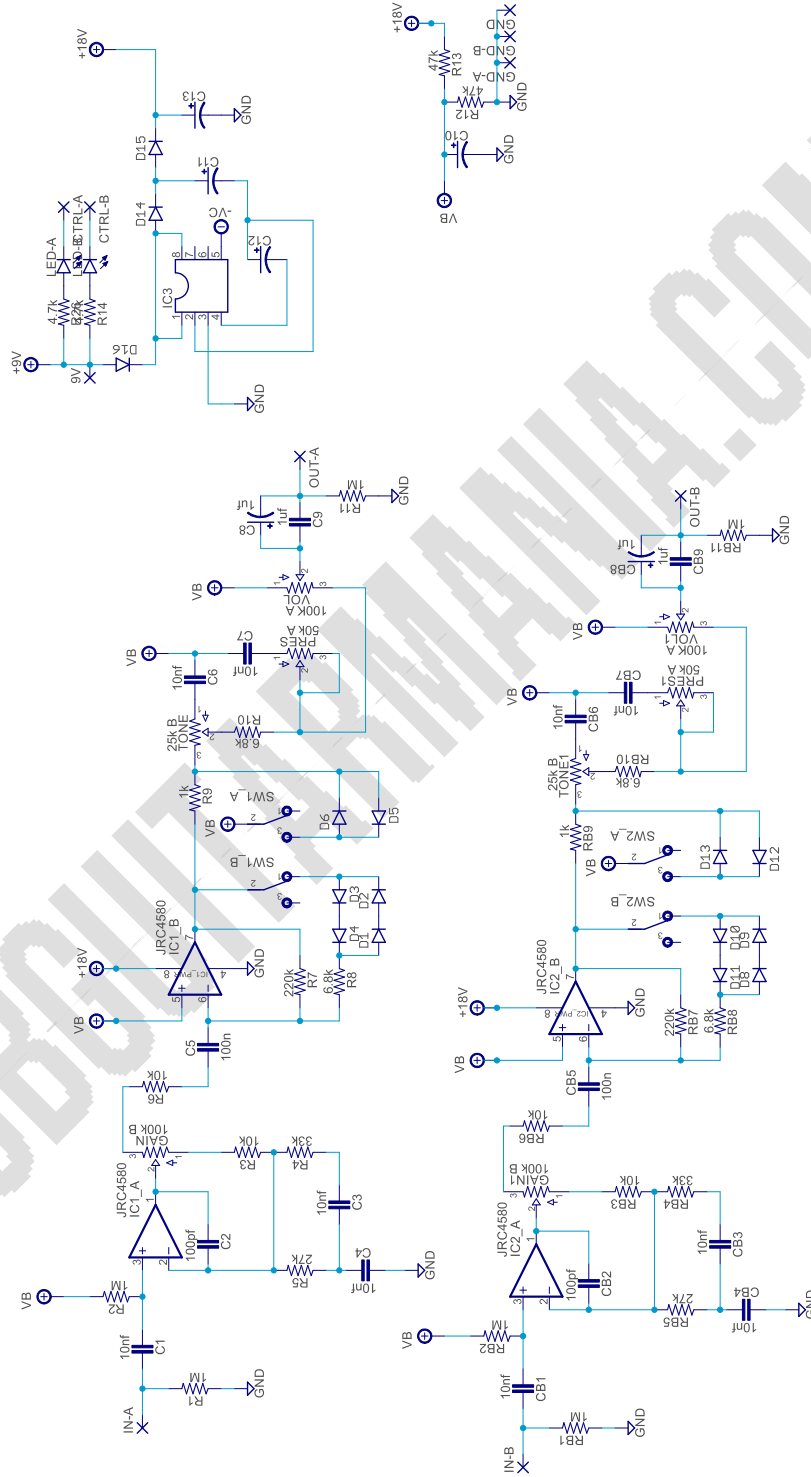
If this is one of your first projects I recommend you to take a look on our [Pedal Building Guide](#)

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

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Schematic

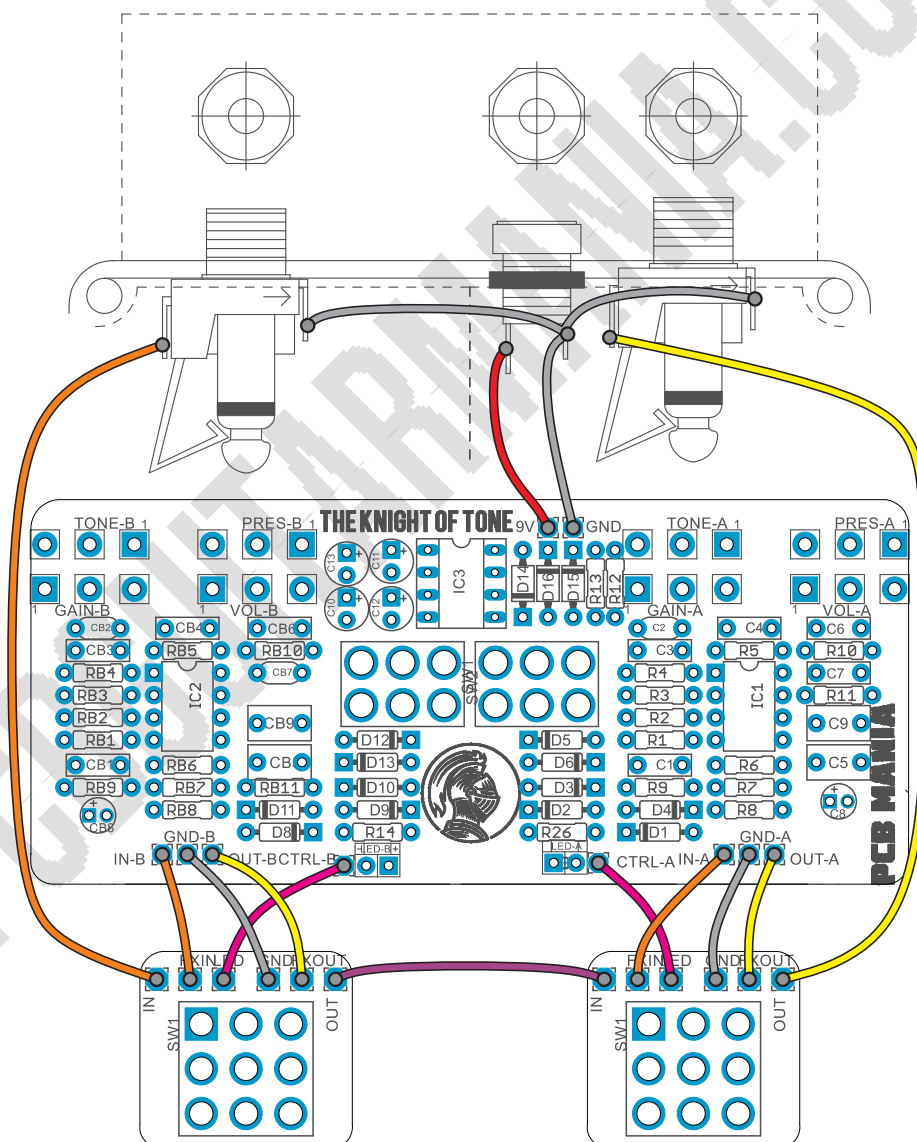


Wiring Diagram

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 control slug of your 3PDT.

You can take a look on the following diagram to understand the general connections. For further information check our [Pedal Wiring guide](#).



Drill Template

This Project has been planned to fit into a 1590bb enclosure type.

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

Licensing and Usage

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

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

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

These boards may be used for commercial endeavors in any quantity unless specifically noted. No attribution is necessary, though accreditation or a link back is always greatly 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 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 silk screen, 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 own designs, with your brand and logo we could certainly reach an agreement.

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