The Knight of Tone SMD

Based on:
Analogman King of Tone

Amount of parts:
High, total 43 components

Enclosure type:
1590bb

Effect type:
Dual Overdrive/Boost/distortion

Technology:
Dual OpAmp

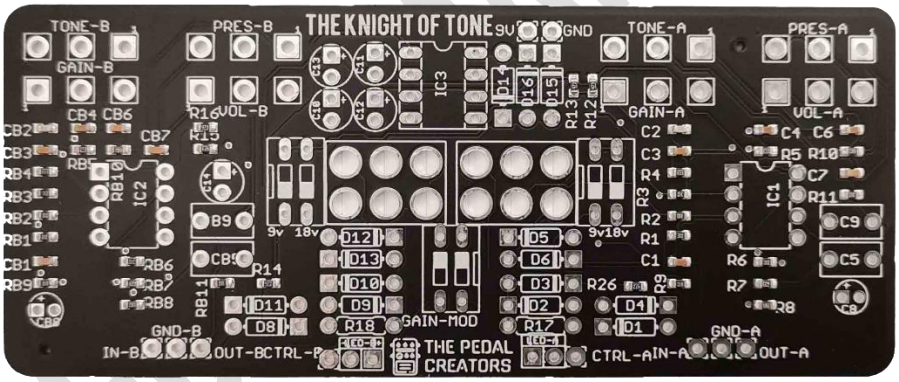
Get your board at:
Knight of Tone SMD

Build difficult:
Medium-advanced

Power consumption:
20mA (9v)

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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About The Pedal Creators

Everyone can build excellent boutique guitar **pedals**.
Everything **we do** is to make that **experience** more accessible and **user-friendlier.**
The **Pedal Creators** series are the **best and easiest to build PCB**s ever. Including most **resistors** and **capacitors** already **soldered** on board as SMD components, leaving the key values for you to **experiment** and craft **your own tone**.
Now you can **build** a pedal you are **proud** of in **less than an hour** without any previous experience.
What are you waiting for to **become a Pedal Creator?**

The Pedal creators - key features:

- **Easy to build,** no previous experience required. It's like Lego for musicians.
- **Fast assembly** finish a pedal in less than an hour. Play your favorite record and enjoy the ride along.
- **100% mistake-proof**. Even my grandma can build one while she cooks.
- **Build** your own boutique pedal. Experiment with different values and make the **pedal you always dreamed of.**
- Easy to scale. **Turn your passion into a money-making machine**.

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Introduction

The origins of this circuit goes back to 1991, when the engineers at Marshall where 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
- Voltage
- Footswitch Channel 1 & 2

All this controls corresponds to each side of the pedal.

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Bill of materials (Standard version)

Resistors	
Part	**Value**
R17****	Empty or 170k
R18****	Empty or 170k

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**
C5	100n
C8	1uf electro
C9	1uf
C10	100uf electro
C11	10uf electro
C12	10uf electro
C13	10uf electro
C14	100uf
CB1	10nf
CB5	100n
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
Gain-mod	**DIP switch 2 poles*****
Voltage 1	**DIP switch 2 poles*****
Voltage 2	**DIP switch 2 poles*****
Footswitch Channel 1	3PDT On/On
Footswitch Channel 2	3PDT On/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

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Shopping list

Resistors		
Qty	**Value**	**Part**
2	Empty or 170k	**R17, R18******

Capacitors		
Qty	**Value**	**Part**
2	100uf	C10, C14
3	10uf	C11, C12, C13
2	100n	C5, CB5
2	1uf	C8, CB8
2	1uf	C9, CB9

Diodes		
Qty	**Value**	**Part**
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

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

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

Switches		
Qty	**Value**	**Part**
2	DPDT ON-OFF-ON	SW1, SW2
3	**DIP switch 2 poles*******	Gain-mod, Voltage 1, Voltage 2
2	3PDT On/On	Footswitch Channel 1, Footswitch Channel 2

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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 tit 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 and place the R17 and R18 components.

*DIP switch 2 poles******

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Additional Notes

The KoT is a symmetrical dual overdrive with an unlimited set of 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 a 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

Schematic

Coming soon.

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.

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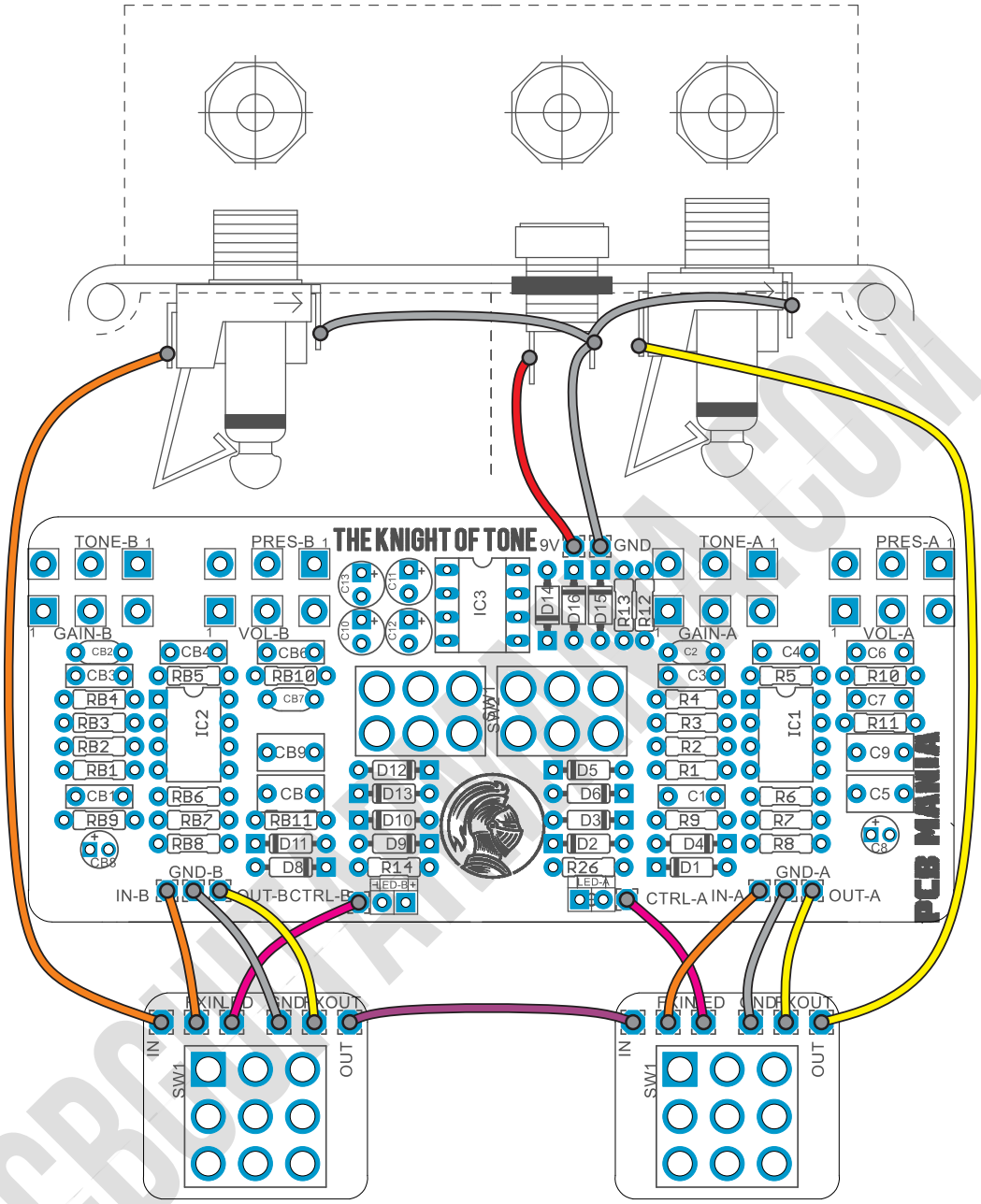

Drill Template

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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