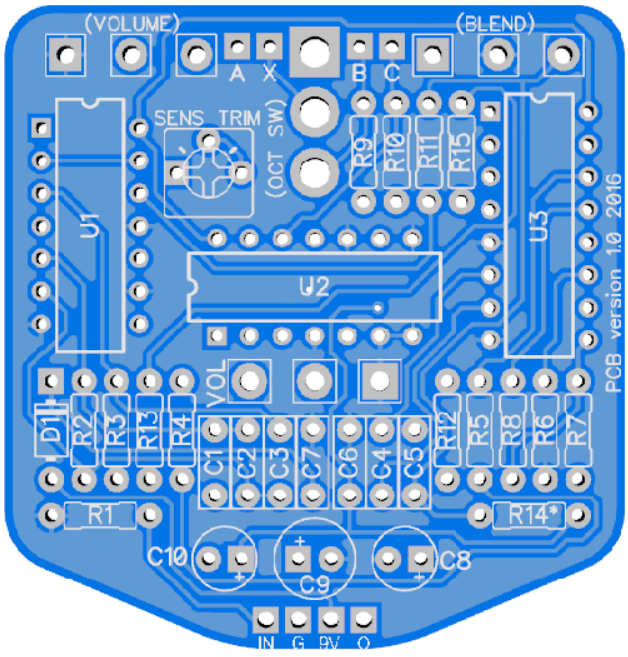
THE THEREMIN FUZZ

Build Document last updated january 2017
for PCB version 1.0

The Theremin Fuzz is a guitar effect that produces a sound similar to a real theremin instrument, but controlled with the input from your guitar. Just like the ITU Guitar Synth this one uses a PLL VCO (Voltage Controlled Oscillator) for the main sound, but in a much smaller and easier to control format. This is the perfect pedal for freaky retro space effects!

This is a gated circuit that works best with high output pickups. If you are using single coils and need more sustain, try a boost or compressor in front. To tighten up the tracking, use your neck pickup with the tone rolled off. For really spacey sounds, I recommend using this effect together with a reverb or delay! :)



Controls

- Octave switch – Toggles between unity or one octave up for the theremin sound
- Blend - Blends between theremin and square wave fuzz
- Volume - Controls the overall output volume

General builds tips

- Solder the low profile components first, from short to tall height. Recommended order: resistors, diodes, IC socket, film-caps, electrolytics, pots and switches
- To make the PCB easier to mount inside the enclosure after drilling, it's best to put the pots and switchen in the PCB first without soldering them. Then put it inside the enclosure and gently tighten the nuts, then solder the pots and switches last.
- CMOS chips are very sensitive to static charges and can be easily damaged. It's a good idea to wear a anti-static wristband or at least avoid wearing a wool jumper and petting your cat/dog while building...
- Always use sockets for IC chips and transistors to avoid heating them directly. It also makes it much easier to swap them out if needed.
- Pay special attention to the orientation of the diodes and electrolytics.
- All PCB's are designed for 16mm Alpha PCB mount angeled pots. You could also use solder lug type and just tack some “legs” with short pieces of wire to each pot to mimic a PCB mount type.
- The square pad represents pin 1 of each pot.
- Both pots and switches are meant to be mounted on the backside (the solder side) of the PCB and soldered from the front side (component side).

Bill Of Materials (BOM)

Capacitors		Resistors		IC's	
C1	100nF	R1	1M	U1	CD4069UBE
C2	4.7nF	R2	1M	U2	CD4013BE
C3	100nF	R3	2.2M	U3	CD4046BE
C4	33nF	R4	1M		
C5	2.2nF	R5	10K		
C6	1nF	R6	10K	**Potentiometers**	
C7	100nF	R7	1K	BLEND	B50K
C8	2.2uF	R8	470K	VOLUME	A100K
C9	100uF	R9	10K	TRIMPOT	200K
C10	2.2uF	R10	10K		
		R11	100K	**Switches**	
		R12	100K	Octave	SPDT on/on
		R13	47K		
Diodes		R14	47K*		
D1	1N4001	R15	47K		
on/off LED x1		CLR	4.7K-22K**		

- The trimmer sets the input sensitivity, from very sensitive and noisy when just touching the strings to more gated and controlled. Adjust to suite your guitar output and taste.
- * (R14) = Do not include this resistor if you are building the minimalist version. More info on the next page!
- ** = Current limiting resistor for the LED. This needs to be wired offboard together with the bypass LED. Choose the appropriate value for the type of LED you are using. A 4.7K resistor is usually a good value for a regular diffused LED and 15K resistor for a superbright clear LED.
- Other things that are not included in the BOM but good to have: enclosure, input and output jacks, LED Bezel, DC jack, 3PDT switch and knobs.

Wiring

For more info on how to wire up the stompswitch, jacks ect, please visit the Parasit Studio website and download the PDF called ”offboard wiring”. You can find it here:

http://www.parasitstudio.se/build-docs.html

Build Options

The Theremin Fuzz can be built in two different versions depending on if you want the full featured version or a simple one knob build.

Full build
Includes the blend pot, octave switch and volume pot.

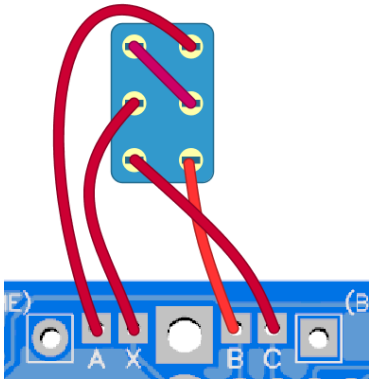
- Use the top left volume pads and ignore the middle vol pads.
- Ignore the A, B, C and X pads.
- Include the resistor R14!

Minimalist build
Includes only a volume pot (100% theremin sounds).

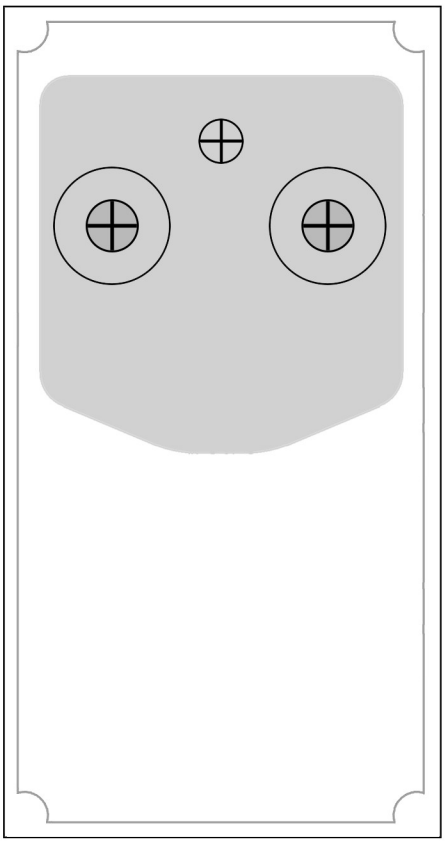
- Use the middle vol pads and ignore the top left volume pads.
- Don't include the blend pot or the octave switch.
- Omit R14 (just leave it out - don't put a link there).
- Put a link between pads X and B. Don't forget this link!

Possible mod for the full build

You can use a DPDT on/on/on switch insted of the SPDT switch to access one octave higher aswell (two octaves up beside the normal unity and one octave up). I don't think that the second octave adds much usability, but in case you want to add this mod, this is how you wire it up.

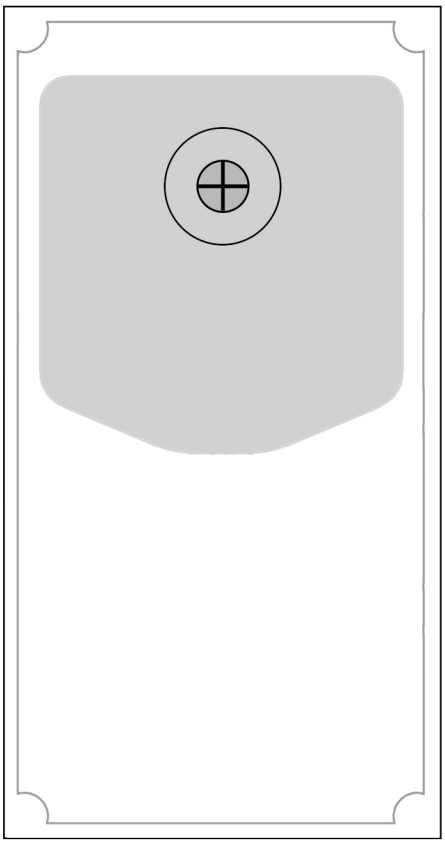


Drilling template – full build (1590B)

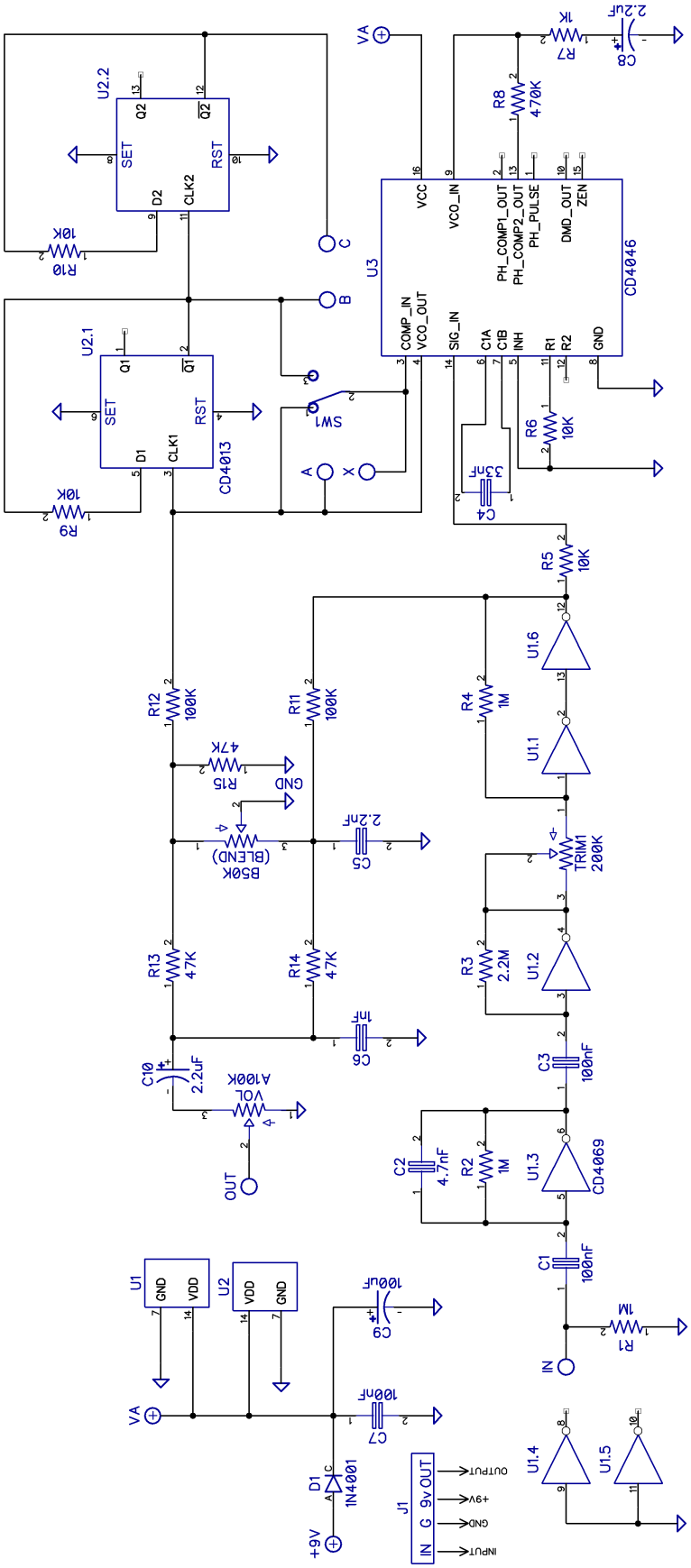


- Use at your own risk! This template is approximate.
- Make sure your printer isn't doing any scaling / is set to 100% print size.
- Drill footswitch, DC jack, LED socket and input/output jacks to your own preference.
- **Measure and confirm before drilling!**

Drilling template – minimalist build



Schematic


VA
R7
1K
C8
2.2uF
R8
470K
U2.2
Q2
Q2
SET
RST
D2
CLK2
R10
10K
C
B
U3
VCC
VCO_IN
PH_COMP1_OUT
PH_COMP2_OUT
PH_PULSE
DMD_OUT
ZEN
CD4046
COMP_IN
VCO_OUT
SIG_IN
C1A
C1B
INH
R1
R2
GND
U2.1
Q1
Q1
SET
RST
D1
CLK1
CD4013
SW1
A
X
R6
10K
C4
5nF
R9
10K
R5
10K
U1.6
R12
100K
R11
100K
R4
1M
U1.1
R15
4.7K
GND
B50K
(BLEND)
C5
2.2nF
TRIM1
200K
R13
47K
R14
47K
R3
2.2M
U1.2
C6
1nF
C10
2.2uF
A100K
VOL
OUT
C3
100nF
C2
4.7nF
R2
1M
U1.3
CD4069
C1
100nF
U1
GND
VDD
U2
VDD
GND
100uF
C9
R1
1M
IN
VA
100nF
C7
U1.4
U1.5
D1
1N4001
+9V
J1
IN
G
9v
OUT
INPUT
GND
+9V
OUTPUT

Troubleshooting

There's always a chance of running into trouble. To minimize error, follow the BOM and general building tips carefully. Take your time and don't rush. Take a break now and then. Use good solder, and it helps to have a decent soldering station insted of a cheap iron.

If you are still having trouble, please visit the madbean forum Parasit Studio subforum section and ask for help there.

http://www.madbeanpedals.com/forum/index.php?board=84.0

If you have bought the Musikding kit and have recieved a faulty or missing component, please contact musikding directly.

https://www.musikding.de/kontakt.php?lang=eng

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