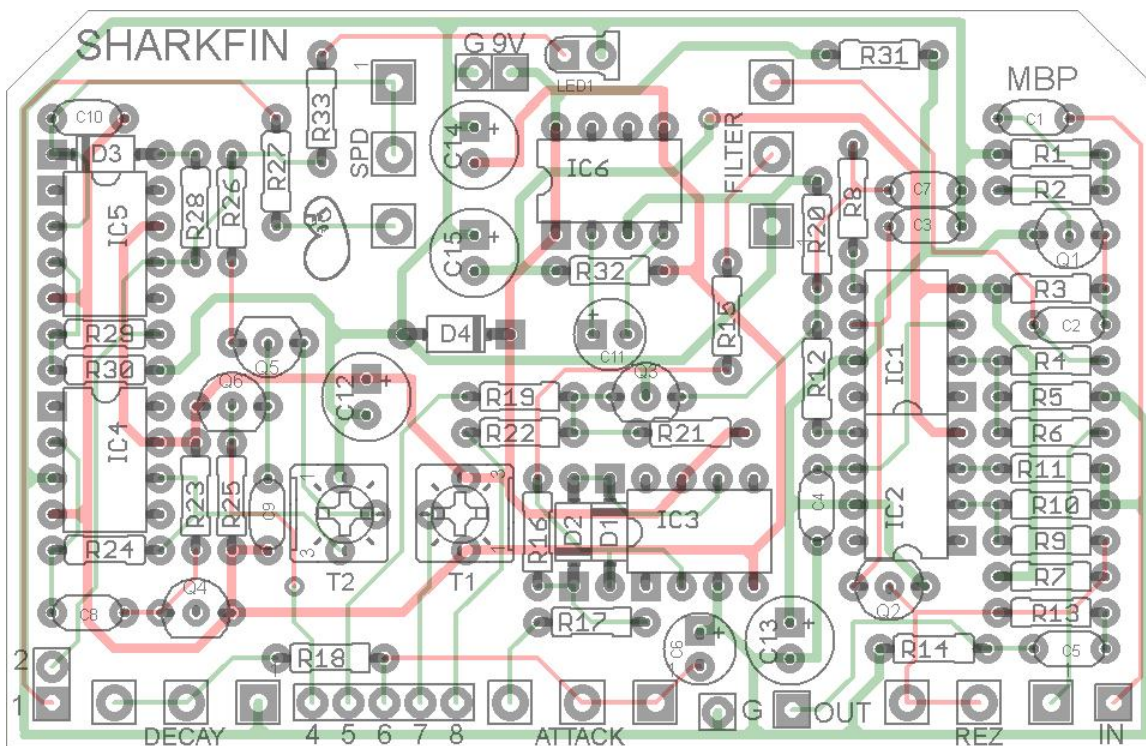
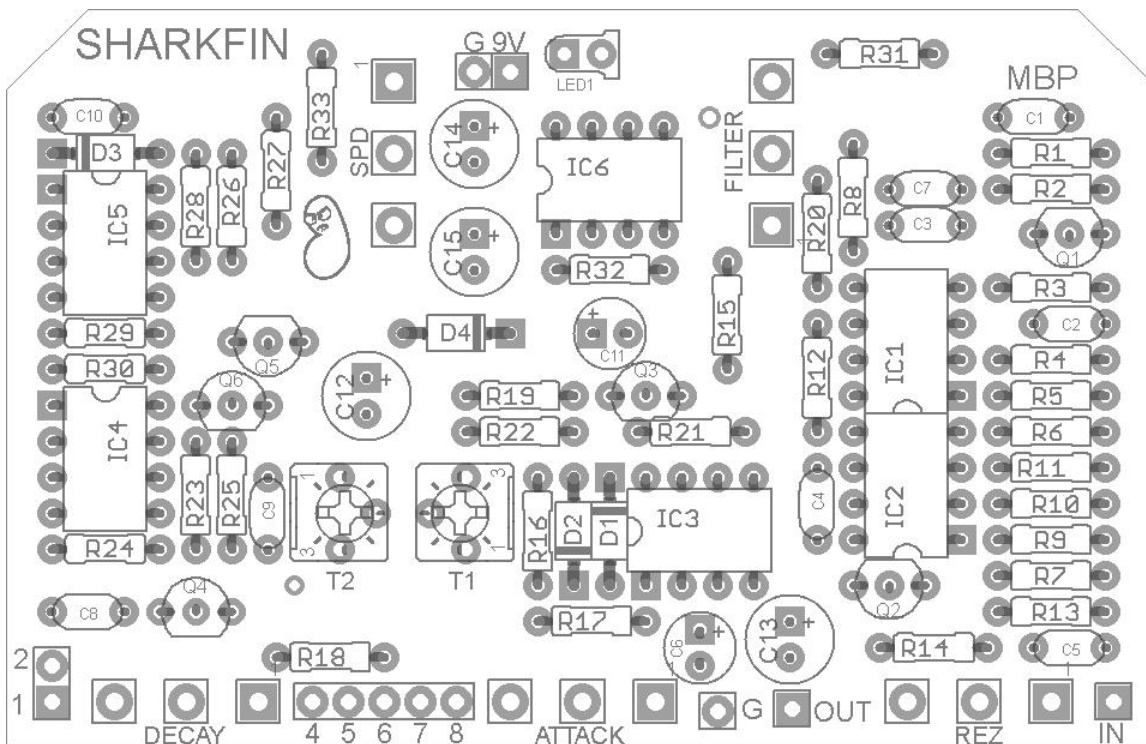


SHARKFIN

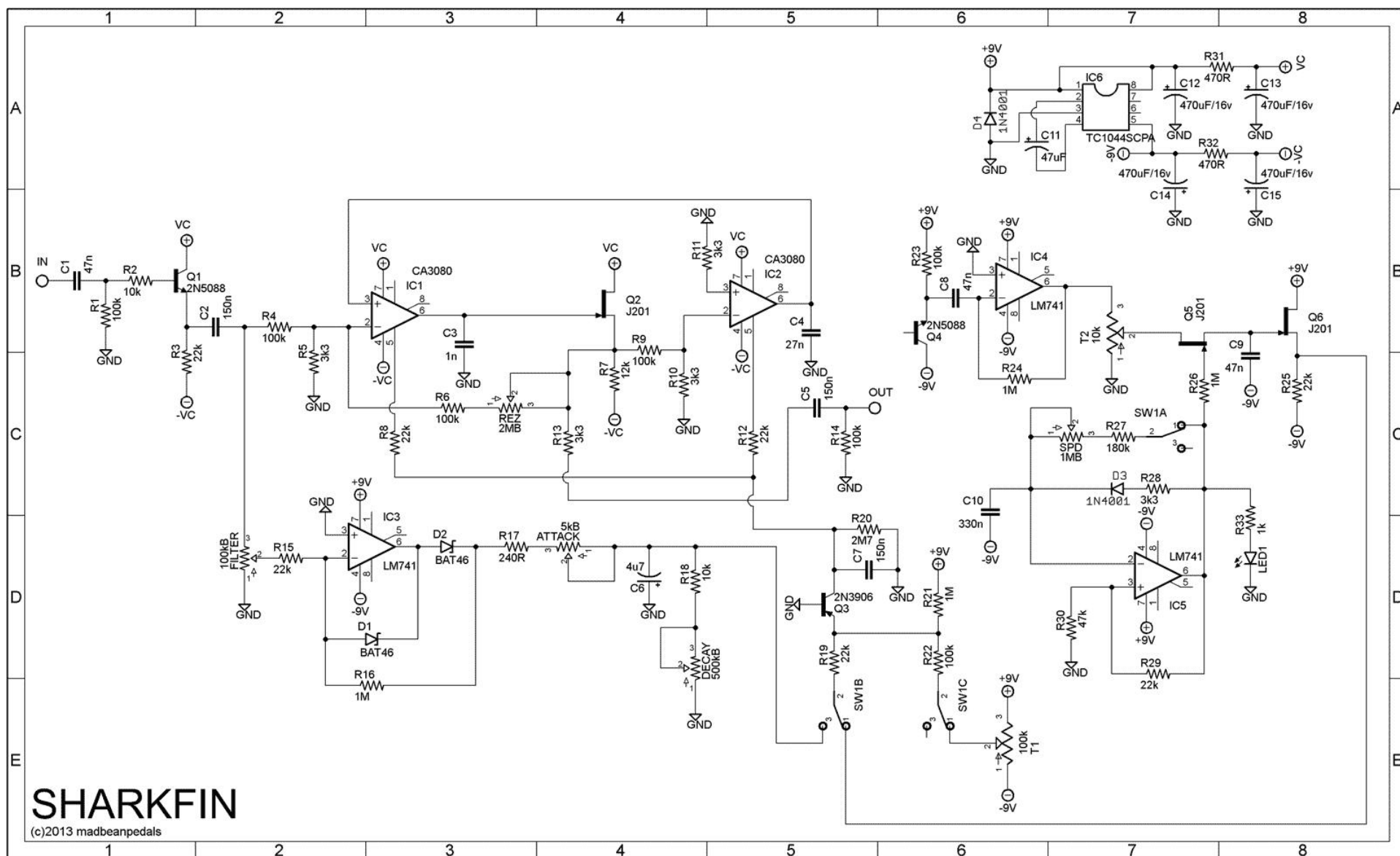
FX Type: Filter

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3.2" W x 2.05" H



Sharkfin PCBs purchased from madbeanpedals may be used for small amounts of commercial building without prior consent. Keep in mind that quantity discounts are not offered on PCBs. The use of the PCBs for resale or as part of a "kit" is strictly forbidden.



B.O.M.					
Resistors		Caps		Diodes	
R1	100k	C1	47n	D1, D2	BAT46
R2	10k	C2	150n	D3, D4	1N4001
R3	22k	C3	1n	LED1	3 or 5mm
R4	100k	C4	27n	Transistors	
R5	3k3	C5	150n	Q1	2N5088
R6	100k	C6	4u7	Q2	J201
R7	12k	C7	150n	Q3	2N3906
R8	22k	C8	47n	Q4	2N5088
R9	100k	C9	47n	Q5	J201
R10	3k3	C10	330n	Q6	J201
R11	3k3	C11	47uF	IC's	
R12	22k	C12	470uF	IC1, IC2	CA3080
R13	3k3	C13	470uF	IC3 - IC5	LM741
R14	100k	C14	470uF	IC6	TC1044SCPA
R15	22k	C15	470uF	Trimmers	
R16	1M			T1	100k
R17	240R			T2	10k
R18	10k			Switch	
R19	22k			3PDT	Toggle/Foot
R20	2M7			Pots	
R21	1M			ATTACK	5kB
R22	100k			DECAY	500kB
R23	100k			FILTER	100kB
R24	1M			SPD	1MB
R25	22k			REZ	2MB
R26	1M				
R27	180k				
R28	3k3				
R29	22k				
R30	47k				
R31	470R				
R32	470R				
R33	1k				

MAX1044CPA or ICL7660SCPA should work for IC6. Tests were also done with the LT1054 (with pin1 lifted) and produced no discernable difference so you should be able to sub that, as well.

You can use 16mm short-pin PCB mounted pots or regular 16mm solder lug type.

Shopping List			
Value	Qty	Type	Spacing
100k	7	Metal/Film	7.5mm
10k	2	Metal/Film	7.5mm
12k	1	Metal/Film	7.5mm
180k	1	Metal/Film	7.5mm
1k	1	Metal/Film	7.5mm
1M	4	Metal/Film	7.5mm
22k	7	Metal/Film	7.5mm
240R	1	Metal/Film	7.5mm
2M7	1	Metal/Film	7.5mm
3k3	5	Metal/Film	7.5mm
470R	2	Metal/Film	7.5mm
47k	1	Metal/Film	7.5mm
150n	3	Film	5mm
1n	1	Film	5mm
27n	1	Film	5mm
330n	1	Film / MLCC	5mm
47n	3	Film	5mm
4u7	1	Electrolytic	2.5mm
47uF	1	Electrolytic	2.5mm
470uF	4	Electrolytic (16v)	2.5mm
BAT46	2	Zener	7.5mm
1N4001	2	Silicon	7.5mm
2N5088	2	BJT	
J201	3	JFET	
2N3906	1	BJT	
CA3080	2		8-pin
LM741	3		8-pin
TC1044SCPA	1	Charge Pump	8-pin
100k	1	Bourns 3362P	6mm
10k	1	Bourns 3362P	6mm
3PDT	1	Toggle or Foot	
5kB	1	Potentiometer	16mm Short Pin
500kB	1	Potentiometer	16mm Short Pin
100kB	1	Potentiometer	16mm Short Pin
1MB	1	Potentiometer	16mm Short Pin
2MB	1	Potentiometer	16mm Short Pin

Overview

The **Sharkfin** is a Maestro Filter, Sample & Hold™ clone with a few modifications. It is really two effects in one: an envelope filter and a sample/hold. Most of you are probably already familiar with envelope filters (such as the Mutron III and the Q-Tron), but perhaps less so with sample and hold. Here's the [Wikipedia](#) definition (because, why not?)

In electronics, a sample and hold (S/H, also "follow-and-hold"[1]) circuit is an analog device that samples (captures, grabs) the voltage of a continuously varying analog signal and holds (locks, freezes) its value at a constant level for a specified minimal period of time.

In the case of the FSH1, it uses a combination of an LFO, voltage supply, JFET sampler and buffers to rapidly sweep the filter section of the two CA3080s. The result is a periodic sweep in fixed steps with a random filter range. To get a better sense of what this sounds like, check out some YouTube videos, or the samples at Moosapotamus:

<http://www.moosapotamus.net/fsh1a.html>

The Sharkfin borrows a couple of modifications from the Tonepad project (Attack and Decay controls for the envelope filter) and adds a couple component tweaks and a little switching trick to disconnect the LFO when you are in Filter mode. It's a really unique effect and worthy of some attention for its weirdness, if nothing else!

This is a pretty difficult project, and there are many FSH1 clone projects in the "fail pile" for our unlucky building brothers (and sisters). Not to say that the existing projects out there are flawed in any way (they were very helpful in developing this project); rather it is just complicated. You probably should not take on this project if you are new to pedal building or short-tempered.

Controls

Filter: This controls the sensitivity of the envelope follower to picking dynamics as it is turned clockwise.

Attack: This controls the intensity of the envelope attack as it is turned clockwise.

Decay: This controls the time decay of the envelope/swept filter as it is turned clockwise.

Rez: This controls the filter resonance from dark and full to thin and resonant.

Spd: The rate of the LFO in Sample/Hold mode.

SW1: This switches between the Envelope Filter and Sample/Hold modes.

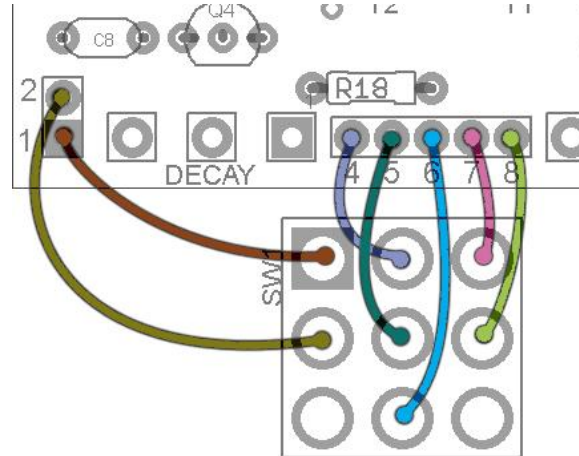
T1, T2: These trimmer are used to adjust the Sample and Hold function (more on that later).

The Attack, Filter and Decay controls work only in Filter mode. They have no influence on the Sample and Hold. However, the Rez control works in both modes. It is less influential in Sample/Hold, but it will produce a range of different resonant peaks as the S/H operates.

Notes

The Filter-Sample/Hold switch (SW1) can be either a toggle or footswitch. You do not need an indicator LED to show you which mode you are in. The LED at the top of the PCB will indicate the LFO rate only when it is in Sample/Hold mode.

Switch Wiring



The original Maestro unit lists 2n3904 for Q4, and 2N4303 for Q5, Q6 and Q2. The Tonepad project also lists 2n3904 for the Q4 position, and BF245A for the other three. Based on a suggestion on diystompboxes, I found that 2n5088 in Q4 and J201 in Q5, Q6, and Q2 worked best. It's probably less important in the Q2 position, but in the sample & hold portion it made the steps between the filter changes smoother and more musical. I suggest socketing all four transistors if you want to experiment. *Keep in mind that the BF245A is the opposite pinout of J201, so flip those 180° if you try them.*

C12-C15 are listed as 470uF/16v. You can use smaller values if you want, or have to (I happen to have them in 2.5mm spacing). 220uF should be fine and probably 100uF (if that's all you have).

1N4001 are spec'd for D1 and D2 in the original Maestro unit. I picked BAT46 because it seems to give better response with the envelope filter. If you don't have BAT46, try the 1N4001. Or, try something else like the 1n914, BAT41 or 1n34a.

Setup

The envelope portion of the effect needs no calibration, but you do need to calibrate the sample and hold section. This is done with the T1 and T2 trimmers. There is no specific rule to follow that I know of...it's all about tweaking. Here are the general guidelines:

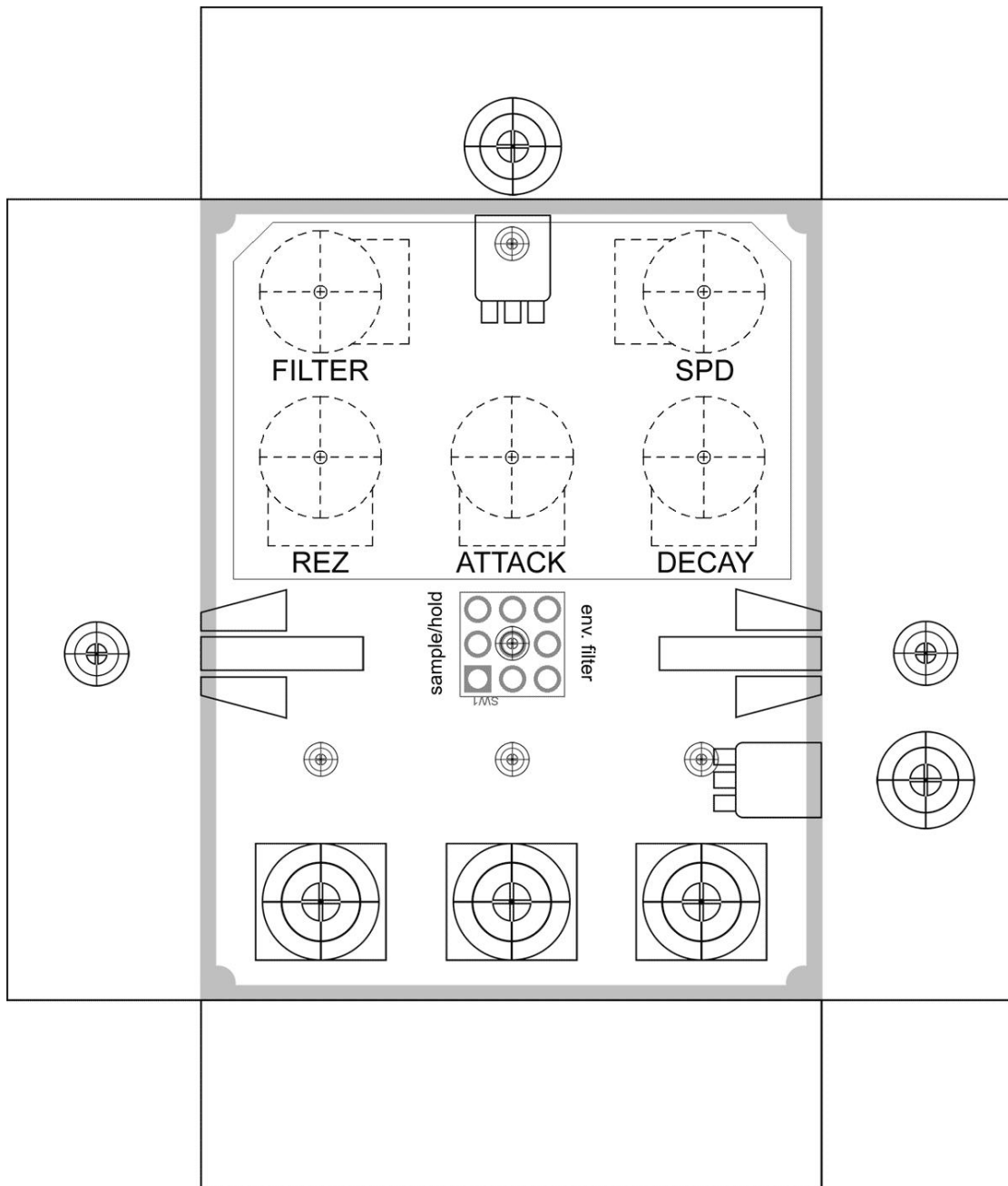
T2 sets the "intensity" of the S/H and T1 sets the "range". Start with the SPD and REZ controls about 2/3rd up and the switch set to S/H mode (the other knobs don't matter since they have no influence in this mode). T2 should be fully counter-clockwise and T1 about 1/3rd up. Adjust T2 clockwise until you hear the stepped filter sound. Now adjust T1 to alter the range of the steps. You will hear the filter sweep through a lot of up and down steps while this is going on. The key here is to adjust the trimmers until the number of up and down steps is about the same. IOW, they don't concentrate too heavily on the top or bottom end of the filter sweep.

The two trimmers are interactive and you will probably find yourself dialing the S/H a few times as you get used to the sound of the effect. Don't be afraid to adjust it as much as you like. You can get some very interesting results with very subtle adjustments.

Lastly, it is normal to hear the filter steps when you are not playing (this only happens in S/H mode). This may bother you or not (I actually like listening to it)...take comfort in the fact that this is how it is supposed to sound! AFAIK, there is no way to eliminate it.

1590BB Drill Guide

5.8" W x 6.8" H



This drill guide shows several possible configurations for the Sharkfin. If you have a small enough DC jack, you should be able to fit it underneath the PCB at the top of the enclosure (for those who really hate side jacks). There are spots for the toggle switch/single 3PDT bypass, two 3PDT switches, as well as possible LED locations.