

Master Sampler & Hodler

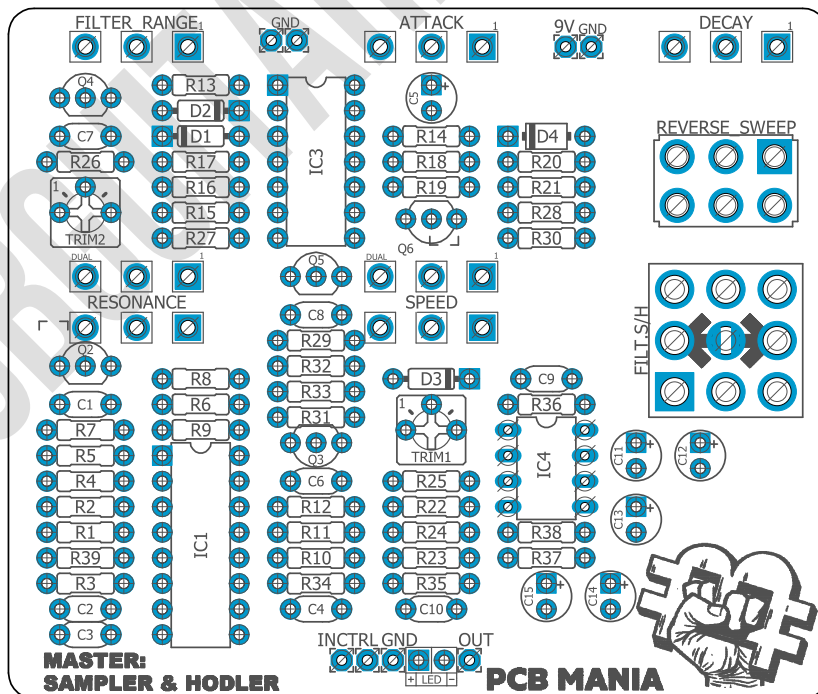
Based on: Maestro FSH-1 Filter Sample/Hold	Amount of parts: High, total 74 components	Enclosure type: 1590bb
Effect type: Modern version of the classic 70s effect pedal	Technology: Dual Op Amp, Quad Op Amp	Get your board at: Master Sampler & Hodler
Build difficult: Advanced	Power consumption: 9V	Get your kit at: Das Musikding (Europe)

Project overview:

The Maestro Sample/Hold from the early to mid-70s is one of Tom Oberheim's more interesting effects. It features not only vibrato and tremolo but also rhythms with added patterns that can be far beyond typical. The filter is a classic low pass that sounds incredibly smooth, and the controls allow you to tweak the rate of the sample/hold as well as the frequency of the filter.

Our Master Sampler/Hodler is a clone that maintains the original's soul and adds modern versatility with the addition of three potentiometers and a Reverse Sweep Switch.

You should watch some of the many demos out there to get a taste of what this pedal can do!



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Introduction

When we think about the pedal's history, it's quite amazing that just a handful of manufacturers carried the pedal industry on their backs. Electro-Harmonix and MXR usually get credit for their contributions but one company often forgotten is Maestro that with products like "the FSH-1 Filter Sample/Hold", which made a huge impact on the music enterprise.

This pedal is two-in-one, with the option between Envelop Filter and Sample/Holp. When Filter is selected, the plugged instrument automatically activates an envelope follower that contours the modified low pass filter's response curve according to the dynamics of the input. This gives a controllable dynamic effect that's slightly more subtle than an "auto WAH". In the Sample/Hold position the filter's response is controlled randomly, but with an overlying rhythmic element determined by the controllable LFO (Speed control).

Controls

Potentiometers

- **Filter Range:** 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.
- **Resonance:** This controls the filter resonance from dark and full to thin and resonant.
- **Speed:** Controls the speed of the sample/hold effect.
- **T1, T2:** These trimmers (inside the pedal) are used to adjust the Sample and Hold function behavior.

Switches

- **Filter Sample/Hold:** Switches between Envelope Filter or Sample/Hold modes.
- **Reverse Sweep:** reverses the direction of the sweep.

The Attack, Filter, and Decay controls work only in Filter mode. They do not influence the Sample and Hold. However, the Resonance control works in both modes. It is less significant in Sample/Hold, but it will produce a range of different resonant peaks as the S/H operates.

Bill of materials

Resistors	
Part	Value
R1	10k
R2	100k
R3	22k
R4	100k
R5	3k3
R6	22k
R7	12k
R8	100k
R9	100k
R10	3k3
R11	3k3
R12	22k
R13	330R
R14	10k
R15	1M
R16	22k
R17	12k
R18	120k
R19	120k
R20	120k
R21	180k
R22	22k
R23	2M7
R24	1M
R25	100k
R26	100k
R27	1M
R28	22k
R29	1M
R30	330k
R31	3k3
R32	22k
R33	47k
R34	3k3
R35	100k

R36	470R
R37	6k8
R38	470R
R39	1M

Capacitors	
Part	Value
C1	47n
C2	150n
C3	1n
C4	33n
C6	150n
C7	47n
C8	47n
C9	150n
C10	150n

Electrolytic Capacitors	
Part	Value
C5	4u7
C11	220u
C12	220u
C13	220u
C14	220u
C15	10u

Potentiometers	
Part	Value
ATTACK	B5k
DECAY	B1M
FILTER_RANGE	B100k
RESONANCE	B1M Dual
SPEED	B1M Dual

Trimpots	
Part	Value
TRIM1	100k
TRIM2	10k

IC	
Part	Value
IC1	LM13700N
IC3	LM324
IC4	7660SPCA

Transistors	
Part	Value
Q2	2N5457
Q3	2N3906
Q4	2N3904
Q5	2N5457
Q6	2N5457

Switches	
Part	Value
REVERSE_S WEEP	DPDT On/On
FILT.S/H	3PDT On/On

Diodes	
Part	Value
D1	1N4148
D2	1N4148
D3	1N4148
D4	1N5817
LED	3mm red LED

Shopping list

Resistors		
Qty	Value	Parts
7	100k	R2, R4, R8, R9, R25, R26, R35
2	10k	R1, R14
3	120k	R18, R19, R20
2	12k	R7, R17
1	180k	R21
5	1M	R15, R24, R27, R29, R39
7	22k	R3, R6, R12, R16, R22, R28, R32
1	2M7	R23
1	330R	R13
1	330k	R30
5	3k3	R5, R10, R11, R31, R34
2	470R	R36, R38
1	47k	R33
1	6k8	R37

Capacitors		
Qty	Value	Parts
4	150n	C2, C6, C9, C10
1	1n	C3
1	33n	C4
3	47n	C1, C7, C8

Electrolytic Capacitors		
Qty	Value	Parts
1	10u	C15
4	220u	C11, C12, C13, C14
1	4u7	C5

Potentiometers		
Qty	Value	Parts
1	B100k	FILTER_RANGE
1	B1M	DECAY
1	B5k	ATTACK
2	B1M Dual	RESONANCE, SPEED

Trim pots		
Qty	Value	Parts
1	100k	TRIM1
1	10k	TRIM2

IC		
Qty	Value	Parts
1	7660SPCA	IC4
1	LM13700N	IC1
1	LM324	IC3

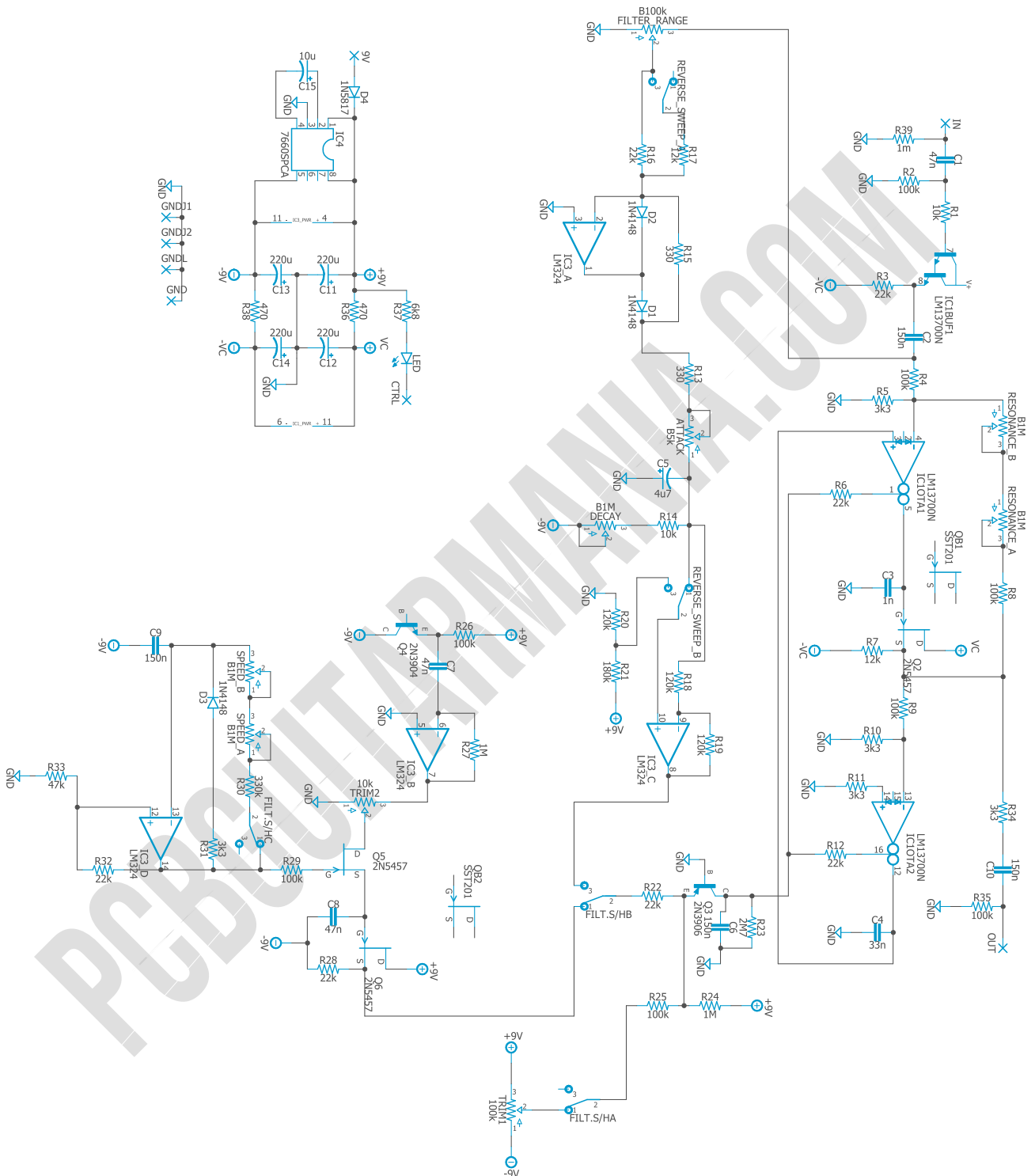
Transistors		
Qty	Value	Parts
1	2N3904	Q4
1	2N3906	Q3
3	2N5457	Q2, Q5, Q6

Switches		
Qty	Value	Parts
1	DPDT On/On	REVERSE_SWEEP
1	3PDT On/On	FILT.S/H
1	3PDT Stomp foot	-

Diodes		
Qty	Value	Parts
1	1N5817	D4
3	1N4148	D1, D2, D3
1	3mm red LED	LED

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

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 1590bb 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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