Poly-face

Based on:
Polyphaser EHX

Effect type:
Ultimate Vintage Phaser – Envelope Filter

Build difficult:
Advanced

Amount of parts:
High, total 153 components

Technology:
Photo-resistors

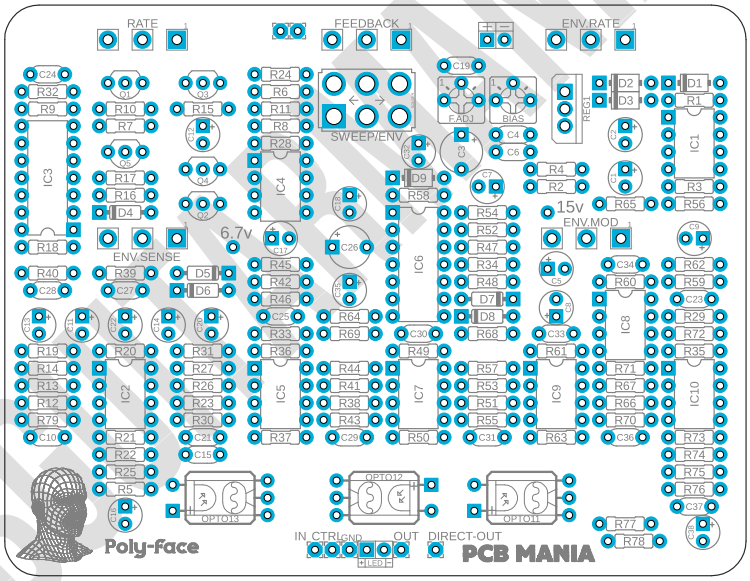
Power consumption:
18V

Enclosure type:
1790NS

Get your board at:
Poly-face

Get your kit at:
Das Musikding (Europe)

Project overview:
Inspired on Electro Harmonix Polyphase. Ready to challenge yourself with a rare vintage unit?



Index

Introduction

Welcome to the experimental guitarist's paradise. The Poly-face offers a level of interactivity way beyond a typical pedal to give you the most important thing: total control.

Its complexity enables you to have a level manage over the effects parameters that is not that far away from what a synthesizer can offer.

Not only does it deliver the classic phase sounds, but it also reaches new dimensions with its envelope filter mode. It is no beginner project for sure; controls for rate, feedback, envelope sensitivity, envelope modulation, and modulation rate plus a sweep toggle will do everything between funky envelope filter to Leslie-like rotary sounds.

Is it necessary to mention the enormous potential that this pedal hides behind these features?

Now let us go to the technical part; make sure you source your TL1054 from a trusted source. Also, keep in mind there are three optocouplers. If you decide to use LDRs and LEDs, you need to cover them (some guys put them in a heat sink tube) because otherwise, the light of one will affect multiple light-sensitive resistors at once.

Controls

- ENV. MOD
- ENV. RATE
- ENV. SENSE
- FEEDBACK
- RATE

Bill of materials

Resistors	
Part	**Value**
R1	2R2
R2	100R
R3	100R
R4	100R
R5	22K
R6	6k8
R7	100k
R8	390R
R9	56k
R10	620k
R11	1k3
R12	470k
R13	390k
R14	75k
R15	51k
R16	470k
R17	100k
R18	100k
R19	56k
R20	56k
R21	100k
R22	620k
R23	220k
R24	18k
R25	5k1
R26	620k
R27	100k
R28	4k7
R29	82k
R30	36k
R31	22k
R32	4k7
R33	18k
R34	8k2
R35	15k
R36	15k
R37	100k
R38	15k
R39	470k
R40	470k
R41	15k
R42	240k
R43	100k
R44	15k
R45	100k
R46	100k
R47	100k
R48	100k
R49	15k
R50	100k
R51	15k
R52	100k
R53	15k
R54	100k
R55	100k
R56	2k7
R57	15k
R58	10k
R59	330R
R60	15k
R61	15k
R62	12k
R63	100k
R64	4k7
R65	75k
R66	15k
R67	15k
R68	820k
R69	39k
R70	100k
R71	15k
R72	18k
R73	43k
R74	36k
R75	3k6
R76	3k6
R77	15k
R78	1M
R79	1m

Capacitors	
Part	**Value**
C4	100n
C6	100n
C10	47n
C15	8n2
C19	47p
C21	4n7
C23	5n6
C24	470n
C25	10n
C27	22n
C28	22n
C29	10n
C30	10n
C31	10n
C33	10n
C34	330n
C36	10n
C37	4n7

Electrolytics Capacitors	
C1	10uf
C2	10uf
C3	220uf
C5	100uf
C7	100uf
C8	100uf
C9	100uf
C11	1uf
C12	470nf
C13	1uf
C14	22uf
C16	2u2
C17	10uf
C18	10uf
C20	22uf
C22	1uf
C26	22uf
C32	10uf
C35	1uf
C38	1uf

Potentiometers	
Part	**Value**
ENV.MOD	100k B
ENV.RATE	C1M
ENV.SENSE	10k B
FEEDBACK	100k B
RATE	C1 M

Trimpots	
Part	**Value**
BIAS**	10k
F.ADJ***	50k

IC	
Part	**Value**
IC1	LT1054
IC2	JRC4558
IC3	CD4013.2
IC4	CA3140
IC5	JRC4558
IC6	LM324
IC7	JRC4558
IC8	LM1458
IC9	JRC4558
IC10	JRC4558

Transistors	
Part	**Value**
Q1	2N5088
Q2	2N5088
Q3	2N5087
Q4	2N3904
Q5	2N5088
REG1	LM7815

Vactrols	
Part	**Value**
OPTO 11	**CLM8200/2***
OPTO 12	**CLM8200/2***
OPTO 13	**CLM8200/2***

Switches	
Part	**Value**
SWEEP/ENV	DPDT ON-ON

Diods	
Part	**Value**
D1	1N5817
D2	1N5817
D3	1N5817
D4	1N914
D5	1N914
D6	1N914
D7	1N914
D8	1N914
D9	1N4001
LED	3mm Red LED

Shopping list

Resistors		
Qty	**Value**	**Parts**
3	100R	R2, R3, R4
17	100k	R7, R17, R18, R21, R27, R37, R43, R45, R46, R47, R48, R50, R52, R54, R55, R63, R70
1	10k	R58
1	12k	R62
15	15k	R35, R36, R38, R41, R44, R49, R51, R53, R57, R60, R61, R66, R67, R71, R77
3	18k	R24, R33, R72
1	1M	R78
1	1k3	R11
1	1m	R79
1	220k	R23
1	22K	R5
1	22k	R31
1	240k	R42
1	2R2	R1
1	2k7	R56
1	330R	R59
2	36k	R30, R74
1	390R	R8
1	390k	R13
1	39k	R69
2	3k6	R75, R76
1	43k	R73
4	470k	R12, R16, R39, R40
3	4k7	R28, R32, R64
1	51k	R15
3	56k	R9, R19, R20
1	5k1	R25
3	620k	R10, R22, R26
1	6k8	R6
2	75k	R14, R65
1	820k	R68
1	82k	R29
1	8k2	R34

Capacitors		
Qty	**Value**	**Parts**
2	100n	C4, C6
6	10n	C25, C29, C30, C31, C33, C36
2	22n	C27, C28
1	330n	C34
1	470n	C24
1	47n	C10
1	47p	C19
2	4n7	C21, C37
1	5n6	C23
1	8n2	C15

Electrolytics Capacitors		
Qty	**Value**	**Parts**
5	10uf	C1, C2, C17, C18, C32
1	220uf	C3
4	100uf	C5, C7, C8, C9
5	1uf	C11, C13, C22, C35, C38
1	470nf	C12
3	22uf	C20, C14, C26
1	2u2	C16

Potentiometers		
Qty	**Value**	**Parts**
2	100k B	ENV.MOD, FEEDBACK
1	10k B	ENV.SENSE
2	C1M	ENV.RATE, RATE

Trimpots		
Qty	**Value**	**Parts**
1	10k	BIAS**
1	50k	F.ADJ***

IC		
Qty	**Value**	**Parts**
1	CA3140	IC4
1	CD4013.2	IC3
5	JRC4558	IC2, IC5, IC7, IC9, IC10
1	LM1458	IC8
1	LM324	IC6
1	LT1054	IC1

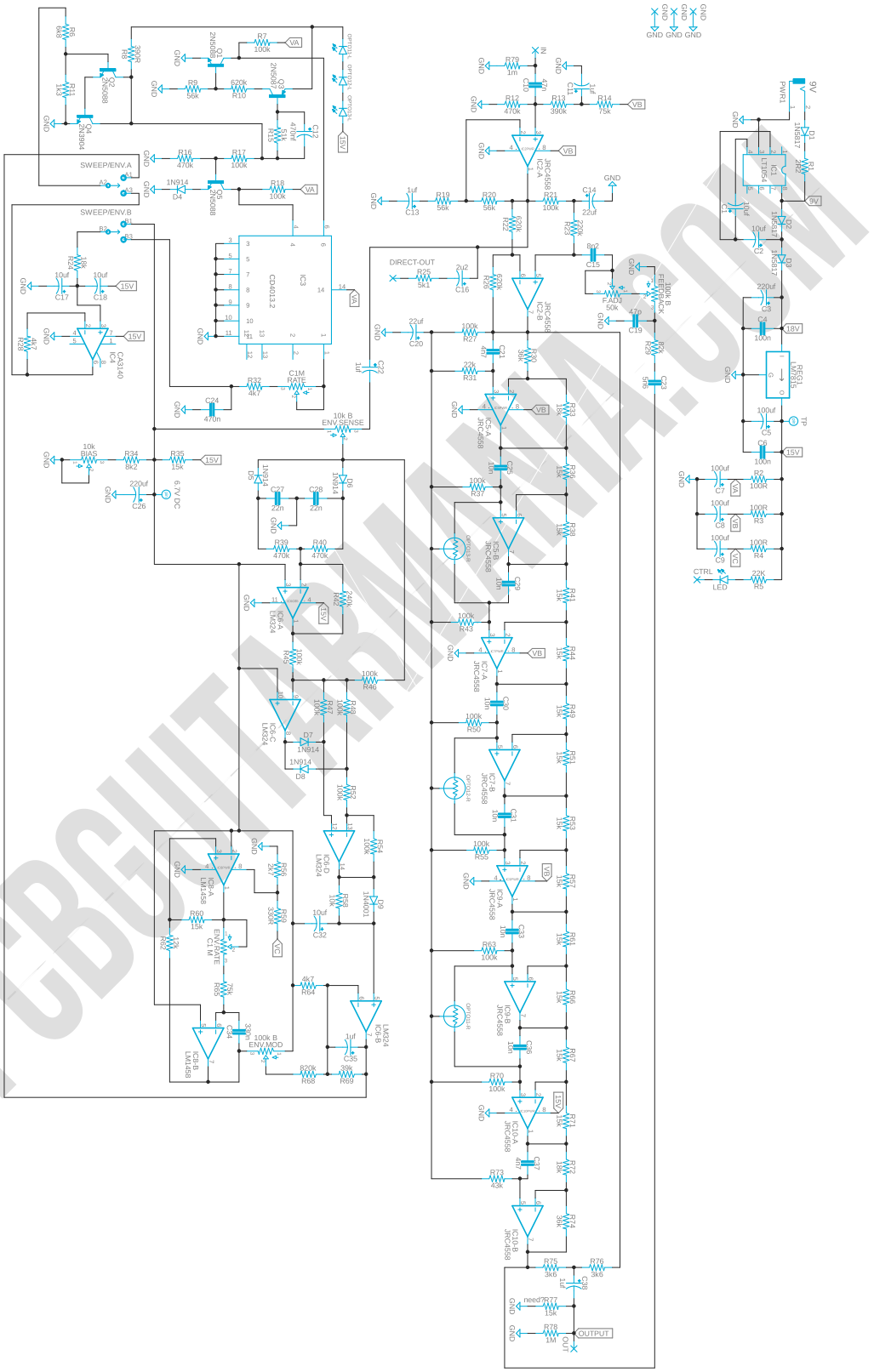
Transistors		
Qty	**Value**	**Parts**
1	2N3904	Q4
1	2N5087	Q3
3	2N5088	Q1, Q2, Q5
1	LM7815	REG1

Vactrols		
Qty	**Value**	**Parts**
3	**CLM8200/2***	OPTO 11, OPTO 12, OPTO 13

Switches		
Qty	**Value**	**Parts**
1	DPDT ON-ON	SWEEP/ENV

Diods		
Qty	**Value**	**Parts**
3	1N5817	D1, D2, D3
1	1N4001	D9
5	1N914	D4, D5, D6, D7, D8
5	1N914	D4, D5, D6, D7, D8
1	3mm Red LED	LED

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.

CLM8200/2*: Could be replaced by VTL5C3/2 Or LED R or with square leds and 2 resistors per vactrol. Check on the picture below for further referece. Don't forge to encapsulate the led+photo resistors on heatshrink tube or with some black tape to avoid outside light interference on the operation of your photo-resistors.
For this project we used the following photo resistors:
https://www.taydaelectronics.com/photo-conductive-cell-resistor-ldr-650nm-radial-ke-10720.html
https://www.musikding.de/Photo-cell-8k-20k-1M

Bias** Check the correct biasing of this circuit using the reference pads on board labeled with the target voltage with your multimeter. Remember for the right functioning of this circuit you have to plug it into a 18v power supply, make sure that all your electrolytic capacitors are suitable for 25v or more just in case.

F-ADJ*** Set how much feedback you want on your unit.

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 1790NS 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.

Follow us on Instagram and Facebook to stay in tune with the latest projects!