

# Cosmos Delay

**Based on:**  
Sagan Delay  
Roland Space echo

**Effect type:**  
Triple Delay

**Build difficult:**  
Advanced

**Amount of parts:**  
High, total 131 components

**Technology:**  
PT2399 delay

**Power consumption:**  
9V

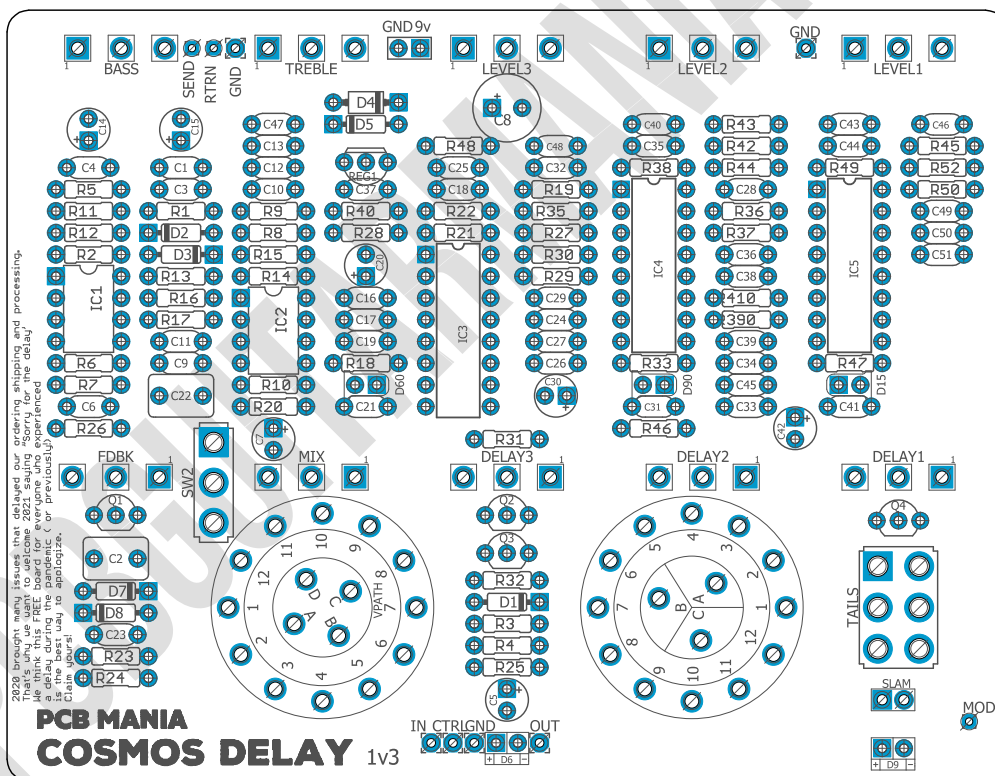
**Enclosure type:**  
1790NS

**Get your board at:**  
[Cosmos Delay](#)

**Get your kit at:**  
[Das Musikding \(Europe\)](#)

## Project overview:

The Cosmos Delay is a triple head PT2399 delay, inspired by Roland Space Echo, Designed by Chris Carter. Only DYI available.



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## Introduction

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During 2020 we had a lot of issues and delays processing your orders, so we wanted to giveaway this board to anyone who experienced some delay with our company over the last year for FREE. Please contact us directly, and we will sort the things out for you to build this project.

This board will also be available as a regular product at our store.

The Cosmos delay takes the original concept of the Roland Space Echo of 3 individual tape heads and takes it to the extreme. This circuit adds an individual delay time and volume control to each head so you can create your own rhythmic textures. If that's not enough, you even have a rotary switch in charge of synchronizing the delay heads in 4 different ways to create your galloping echo wave structures.

The Vpath rotary switch is another exclusive tool of this magnificent circuit. This knob allows you to set where you are placing the feedback loop, which you can combine with reverbs and other modulations to enlarge your spaceship.

This circuit also comes with a dry switch, tails control, and a slam switch to momentary drive your signal into fully chaotic feedback.

This is not a beginner-friendly project, and we recommend you take your time and patience to get the best possible results.

This board has been corrected and improved a couple of times, being 1v4 the final revision. All the previous versions are fully working.

## Controls

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### Potentiometers

- Bass
- Delay1
- Delay2
- Delay3
- FDBK

- Level 1
- Level 2
- Level 4
- Mix
- Treble

### Switches

- Delay
- Vpath
- Dry Sitch
- Slam
- Tails

The **VPATH** switch allows you to dial different configurations using the Send and Return loops.

**1st position:** Dry signal goes to the first opamp unaffected, while send return loop is enabled right before the mix pot.

**2nd position:** Dry signal goes first through the send return pads before entering the delay circuit. Great for using some reverbs in front of the delay.

**3rd position:** Bypasses the send return pads and goes directly into the delay circuit. To access this position, you must place jumpers in between pads 3 to 6 and 9 to 12.

The **Delay sync** rotary controls the behavior and structure of the three delay heads. Explanation below.

**1st position:** All delays are un-sync; each delay pot works independently.

**2nd position:** All delay heads are sync. Use delay 1 to control all of them.

**3rd position:** delay 1 and 2 synchronized, delay 3 independents

**4th position:** delay 1 and 3 synchronized, 2 independents

# Bill of materials

Resistors	
Part	Value
R1	22k
R2	1m
R3	1k
R4	4k7
R5	3k9
R6	470k
R7	1m
R8	2k2
R9	3k6
R10	10k
R11	10K
R12	10K
R13	820r
R14	1k5
R15	33k
R16	10k
R17	10k
R18	1k
R19	7k5
R20	7k5
R21	10k
R22	10k
R23	5k1
R24	10k
R25	10k
R26	10K
R27	20k
R28	2k2
R29	10k
R30	10k
R31	560r
R32	560r
R33	1k
R35	10k
R36	10k
R37	20k

R38	10k
R40	2k2
R42	10k
R43	10k
R44	10k
R45	7k5
R46	560r
R47	1k
R48	2k2
R49	20k
R50	10k
R52	10k
R390	10k
R410	10k

Capacitors	
Part	Value
C1	82n
C2	1u
C3	6n8
C4	100n
C6	100n
C9	100n
C10	3n3
C11	220p
C12	100N
C13	220n
C16	100n
C17	100n
C18	1n
C19	100n
C21	100n
C22	1u
C23	220n
C24	100n
C25	100n
C26	100n
C27	100n

C28	1n
C29	1n
C31	100n
C32	47n
C33	100n
C34	47n
C35	100n
C36	1n
C37	100n
C38	100n
C39	100n
C40	4n7
C41	100n
C43	100n
C44	1n
C45	100n
C46	47n
C47	100n
C48	100n
C49	1n
C50	100n
C51	100n

Electrolytics capacitors	
Part	Value
C5	10u
C7	1u
C8	220u
C14	47u
C15	47u
C20	47u
C30	47u
C42	47u

Potentiometers	
Part	Value
BASS	100k B
DELAY1	500ka
DELAY2	500ka
DELAY3	500ka
FDBK	50kb
LEVEL1	10kb
LEVEL2	10kb
LEVEL3	10kb
MIX	50kb
TREBLE	100kb

IC	
Part	Value
IC1	TL072
IC2	TL072
IC3	PT2399
IC4	PT2399
IC5	PT2399

Transistors	
Part	Value
Q1	2N5457***
Q2	BC550**
Q3	BC550**
Q4	BC550**

Switches	
Part	Value
DCTRL (Delay Sync)	3PDT ROTARY
DRYKILL	SPDT
SLAM	SPDT MOMENTARY FOOTSWITCH
TAILS****	DPDT FOOTSWITCH
VPATH	4P3T ROTARY

Regulator	
Part	Value
REG1	LM78L05*

Diodes	
Part	Value
D1	1n4148
D2	1n914
D3	1n914
D4	1N4001
D5	1N4148
D6	1n914
D7	1n914
LED	3mm Red LED
D15	3mm Green LED
D60	EMPTY
D90	EMPTY

# Shopping list

Resistors		
Qty	Value	Parts
22	10k	R10, R11, R12, R16, R17, R21, R22, R24, R25, R26, R29, R30, R35, R36, R38, R42, R43, R44, R50, R52, R390, R410
4	1k	R3, R18, R33, R47
1	1k5	R14
2	1m	R2, R7
3	20k	R27, R37, R49
4	2k2	R8, R28, R40, R48
1	3k6	R9
1	3k9	R5
1	470k	R6
1	4k7	R4
3	560r	R31, R32, R46
1	5k1	R23
3	7k5	R19, R20, R45
1	820r	R13
1	22k	R1
1	33k	R15

Capacitors		
Qty	Value	Parts
25	100n	C4, C6, C9, C12, C16, C17, C19, C21, C24, C25, C26, C27, C31, C33, C35, C37, C38, C39, C41, C43, C45, C47, C48, C50, C51
6	1n	C18, C28, C29, C36, C44, C49
2	1u	C2, C22
2	220n	C13, C23
1	220p	C11
1	3n3	C10
3	47n	C32, C34, C46
1	6n8	C3
1	4n7	C40
1	82n	C1

Electrolytics Capacitors		
Qty	Value	Parts
1	10u	C5
1	1u	C7
1	220u	C8
5	47u	C14, C15, C20, C30, C42

Potentiometers		
Qty	Value	Parts
1	100k B	BASS
1	100kb	TREBLE
3	10kb	LEVEL1, LEVEL2, LEVEL3
3	500ka	DELAY1, DELAY2, DELAY3
2	50kb	FDBK, MIX

IC		
Qty	Value	Parts
3	PT2399	IC3, IC4, IC5
1	TL072	IC2
1	tl072	IC1

Transistors		
Qty	Value	Parts
1	2N5457***	Q1
3	BC550**	Q2, Q3, Q4

Switches		
Qty	Value	Parts
1	3PDT ROTARY	DCTRL (Delay Sync)
1	SPDT	<b>DRYKILL-SW2 (on/on) *****</b>
1	SPDT MOMENTARY FOOTSWITCH	SLAM (on/on)
1	<b>DPDT FOOTSWITCH*****</b>	TAILS - need to be jumpered in v1

1	4P3T ROTARY	VPATH
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Regulator		
Qty	Value	Parts
1	LM78L05	REG1*

Diodes		
Qty	Value	Parts
2	1n4148	D1, D5
4	1n914	D2, D3, D6, D7
1	1N4001	D4
1	3mm Red LED	LED
1	3mm Green LED	D15

**REG1\*** In the first version of this board, you have to place REG1 flipped 180°. Boards 1v1, 1v2, 1v3 have this problem solved so that you can put it exactly as on the silkscreen.

**BC550\*\*** This transistor goes flipped 180° in every version of this board. You can also try placing a 2n3904 or 2n5088 matching the silkscreen.

**2N5457\*\*\*** This JFET controls the On-off tails function. Feel free to experiment with others similar to J201, PF5102, and others.

**DPDT FOOTSWITCH\*\*\*\*** In the first version of this board, you must place an SPDT on the column closer to the center off the board and leave the one close to the edge empty.

This issue has been corrected on version 1v3 and on, where we included an LED indicating the Tails status.

Feel free to wire this switch of the board as many players prefer it to have it as a footswitch.

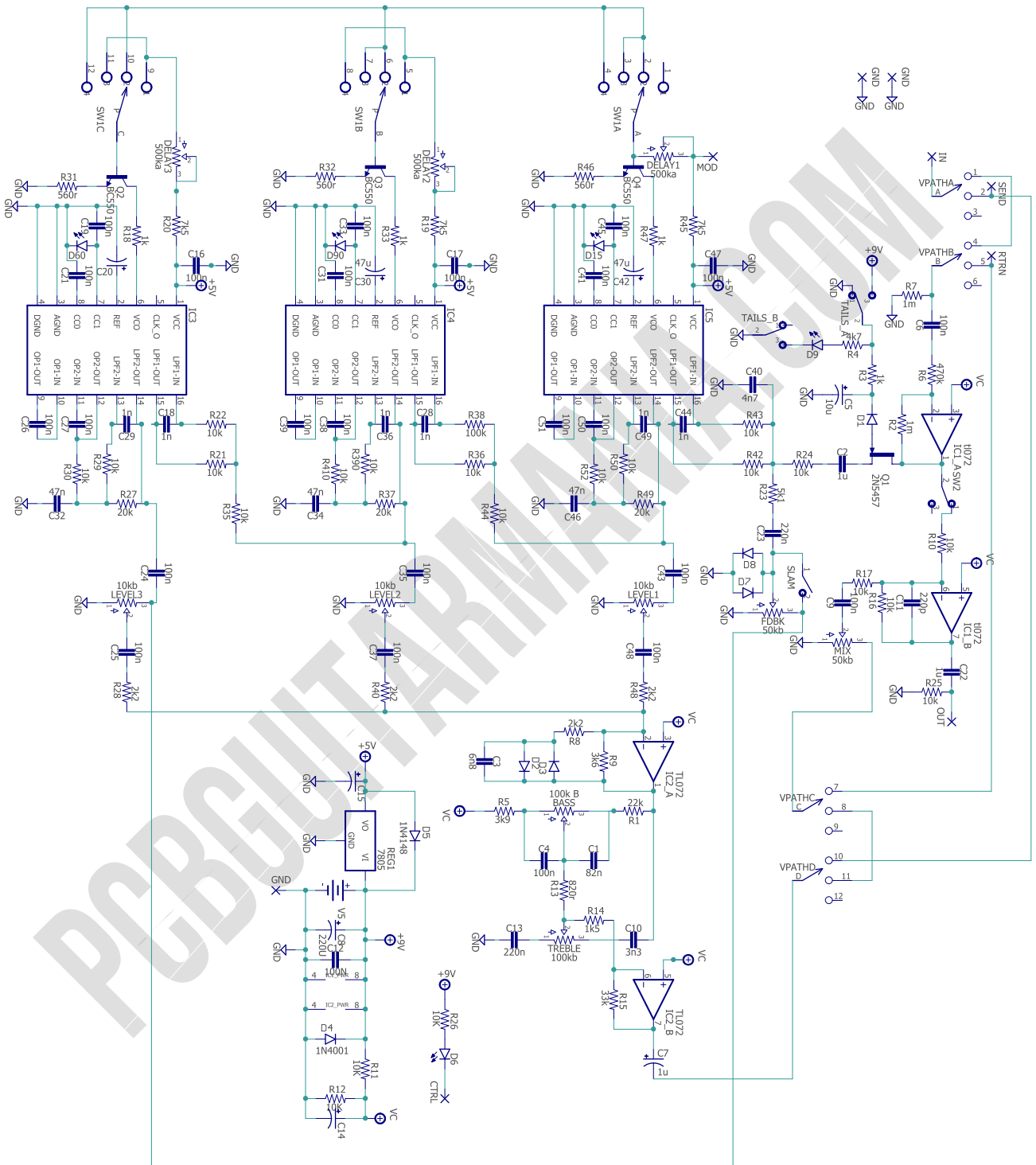
**DRYKILL-SW2 (on/on) \*\*\*\*\***

Switch off-board.

**VPATH ROTARY**

Jumper from lug 3 to 6 and a jumper from lug 9 to 12 on the rotary.

# Schematic





# Components Recommendations

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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

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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

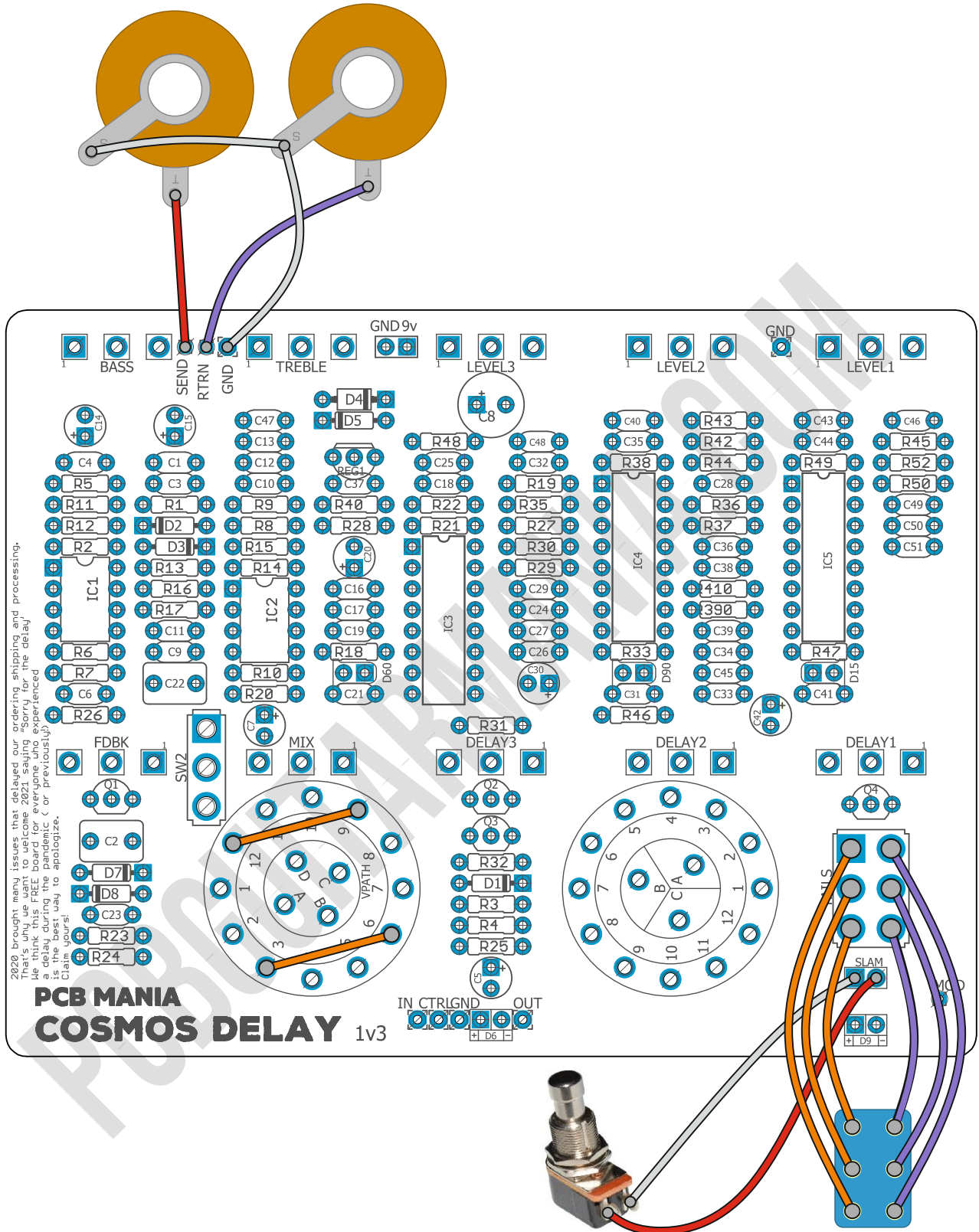
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All our projects include a free 3PDT Board to make the wiring easier and tidier. Also, all of our PCBs feature the status LED on board.

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](#).

Below you can find the special off-board wiring for this pedal. The on-off bypass switch is wired as usual with our EZ3PDT board.



On versions prior to 1v3,  
wire only the orange wires of the tail switch.

# Drill Template

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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

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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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