

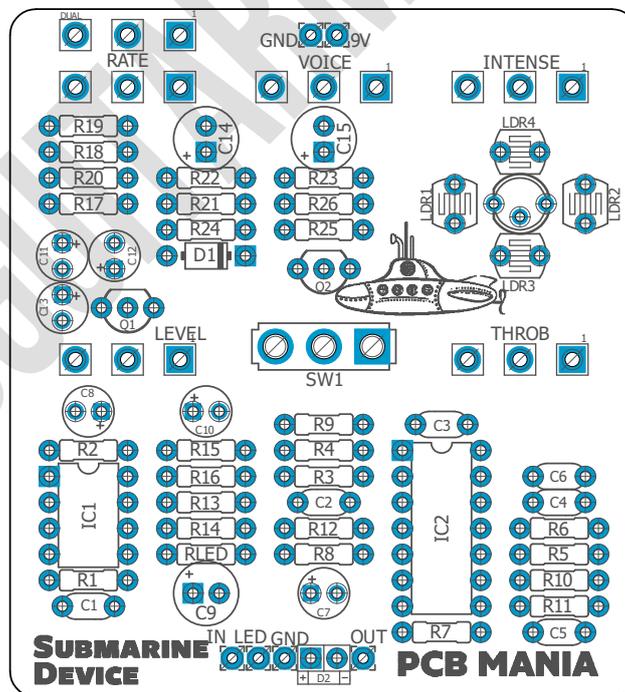
# Submarine Device

<b>Based on:</b> EQD the Depths	<b>Amount of parts:</b> Average, total 60 components	<b>Enclosure type:</b> 125b
<b>Effect type:</b> Analog Optical Vibe Machine	<b>Technology:</b> LDR Optical Vibe	<b>Get your board at:</b> <a href="#">Submarine Device</a>
<b>Build difficult:</b> Average	<b>Power consumption:</b> 9v – 18v(check max voltage of capacitors)	<b>Get your kit at:</b> <a href="#">Das Musikding (Europe)</a>

## Project overview:

Welcome to your new Optical Vibe Machine! With roots on the classic Uni-vibe, the guys from Akron, Ohio made a serious job on updating that classic pedal for the 21st century demands with the same lush, pulsating, three-dimensional swirling sound you know and love, and some modern accouterments for all you land-lubbers out there.

Designed to use with all kinds of instruments, pickups, and to play well with dirt, so nobody's left waiting on shore!



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## Introduction

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The guys at Earthquaker made some improvements to the original circuit. Smaller, more reliable by using leds instead of light bulbs. Able to run it at 9v-18v and adding some extra controls. So there was not much left for us to do but giving you an extra tonal option. Via toggle switch and bi Color led you can get even more sounds out of it, then the original provides. I highly recommend using sockets to experiment with the leds and solder the LDR's in after you got an idea how tall the led in the sockets will be. So you can match the height. While the original EQD unit uses a yellow led you could use a green/yellow led. With minor difference in sound or a red/blue the difference there is way more present without a need to touch any knob but it's overall a bit sharper sounding. Personally I used a single Color orange diffused led for a tone that made me more then happy. In case you're so in love with one specific led you can leave the toggle out and solder a jumper. I highly recommend experimenting with this and the distance between LDR and led. To get equal distance between them you can simply use a guitar thick 2mm guitar pick as spacer.

## Controls

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- Intensity: This controls how subtle or intense the overall effect is. Counterclockwise from noon are the more subtle, classic sounds. Clockwise from noon are the more drastic and intense sounds.
- Voice: Dials in the overall sound. Turn it clockwise for a fuller sound with more lows, bring it back for a thinner, more midrange focused tone.
- Rate: Controls the speed of the effect. Counterclockwise for slow, clockwise for fast.
- Level: Controls the volume of the effect. Unity is around 1 o'clock, everything above that is boost.
- Throb: This controls the low end pulse. It may not be immediately evident on the bridge pickup, but switch to the neck or add some dirt and it comes alive. All the way up for more throb, dial it back for less. Works best when the Voice is set to a warmer tone.
- LED toggle: Allows you to choose which color of the bicolored LED will shine, changing the behavior of the effect.

# Bill of materials

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Resistors	
Part	Value
R1	1M
R2	1M
R3	47K
R4	47K
R5	22K
R6	47K
R7	47K
R8	47K
R9	100K
R10	47K
R11	47K
R12	100K
R13	56K
R14	10K
R15	10K
R16	10K
R17	3K3
R18	220K
R19	220K
R20	3K3
R21	2M2
R22	15K
R23	4K7
R24	100K
R25	100r
R26	47K
RLED	4K7
LDR1	LDR**
LDR2	LDR**
LDR3	LDR**
LDR4	LDR**

Capacitors	
Part	Value
C1	100n
C2	15n
C3	220n
C4	100p
C5	470p
C6	4n7

Electrolytics Capacitors	
Part	Value
C7	1u
C8	1u
C9	100u
C10	10u
C11	1u
C12	1u
C13	1u
C14	47u
C15	47u

Potentiometers	
Part	Value
INTENSE	B25K
LEVEL	A100K
THROB	B25K
VOICE	B10K
RATE	B100K Dual gang (stereo)

IC	
Part	Value
IC1	TL072
IC2	TL074

Transistors	
Part	Value
Q1	MPSA18
Q2	MPSA18

Switches	
Part	Value
SW1	SPDT ON-ON***

Diodes	
Part	Value
D1	1N4001
D2	LEDSTATUS-LED
Bicolor LED	RED/GREEN 5mm COMMON CATHODE*

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# Shopping list

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Resistors		
Qty	Value	Parts
1	100r	R25
3	100K	R9, R12, R24
3	10K	R14, R15, R16
1	15K	R22
2	1M	R1, R2
2	220K	R18, R19
1	22K	R5
1	2M2	R21
2	3K3	R17, R20
8	47K	R3, R4, R6, R7, R8, R10, R11, R26
2	4K7	R23, RLED
1	56K	R13
4	LDR (photo resistor)**	LDR1, LDR2, LDR3, LDR4

Capacitors		
Qty	Value	Parts
1	100n	C1
1	100p	C4
1	15n	C2
1	220n	C3
1	470p	C5
1	4n7	C6

Electrolytics Capacitors		
Qty	Value	Parts
1	100u	C9
1	10u	C10
5	1u	C7, C8, C11, C12, C13
2	47u	C14, C15

Potentiometers		
Qty	Value	Parts
1	A100K	LEVEL
1	B10K	VOICE
2	B25K	INTENSE, THROB
1	B100K Stereo	RATE

IC		
Qty	Value	Parts
1	TL072	IC1
1	TL074	IC2

Transistors		
2	MPSA18	Q1, Q2

Switches		
1	SPDT ON-ON***	SW1

Diodes		
Qty	Value	Parts
1	1N4001	D1
1	LEDSTATUS-LED	D2
1	RED/GREEN 5mm COMMON CATHODE*	BICOLORLED



# Components Recommendations

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As many people like to experiment some pedals with higher voltage, always ensure the max tolerance of your **electrolytic capacitors** is over 25v.

This board has been tested using Film box capacitors for most of the values over 1nf, and ceramics discs for the ones 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.

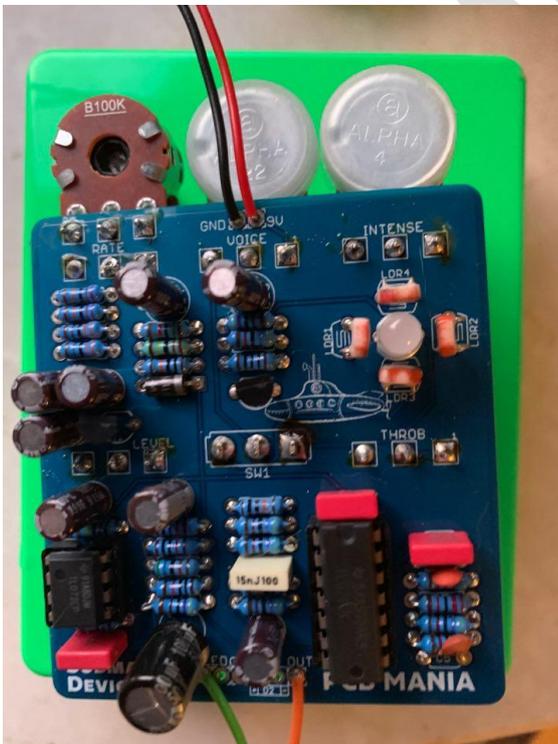
The BOM and Shopping list are exclusively regarding this project. It doesn't include all the hardware like the 3PDT bypass switch, audio/dc jacks, enclosure, etc.

**BICOLORLED\*** This is a mod we included over the original EQD that uses a single Yellow LED. The point of it is to change completely the character of the pedal just with a flip of a switch. Remember this LED is common Cathode (Common ground).

**LDR (photo resistor)\*\*** If you are new with photo resistors don't worry, there are much common than what you believe. Here you have some links bellow to see what I'm talking about.

<https://www.taydaelectronics.com/photo-conductive-cell-resistor-ldr-650nm-radial-ke-10720.html>

<https://www.musikding.de/LDR07-photo-cell-16k-50k-2M>



Remember the LDR must be **facing** the LED! Just like a bunch of acolytes worshipping the LED as some kind of pagan deity.

**SPDT Switch \*\*\*** This switch is not present on the original EQD pedal, but's the one that allows you to select which LED are you using.

If you want to build a closer replica of the original EQD pedal you should follow this formula:

- Use a yellow 5mm diffuse LED. Place it with the shorter leg (negative) in the middle pad and the longer one (positive) on the pad to the right.
- Place a jumper in between the center pad of the SW1 switch and the right pad, the Square one.

# Build Notes

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If this is one of your first projects I recommend you to take a look on 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 control slug of your 3PDT.

This board has been designed to match our EZ 3PDT PCB check it [here](#) to access to our [Pedal Wiring Guide](#)

## Drill Template

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This Project has been planned to fit into a 125b enclosure type.

Check the Attached "Drilling templates" to drill the box properly. The files are on Scale 1:1, ready to print in an A4 page.

# Licensing and Usage

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We really appreciate your trust and support buying this PCB, as well as your will to dive into the DIY electronics world. That's why for us is really important that you can make this project work properly and to enjoy not only the building process, but also to experiment and play with it on your rig.

We try to reply to every question we receive on our email or in our social media, but we try to encourage all our customers to join our [PCB Guitar Mania – Builders Group](#) on Facebook, in order to post all your doubts, issues, suggestions or request, as well to share your builds and have some feedback from us and other fellow builders!

All of our projects have been tested following this same guide on their standard configurations. Although, not all of the variations and mods have necessarily been tested. These are suggestions based on the schematic analysis, and on the experiences and opinions of others. Feel free to share with us your opinions and suggestions regarding the mods your own personal experimentation.

These boards may be used for commercial endeavors in any quantity unless specifically noted. No attribution is necessary, though accreditation or a link back is always greatly 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 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 silk screen, 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 own designs, with your brand and logo we could certainly reach an agreement.

Follow us on [Instagram](#) and [Facebook](#) to stay in tune with the latest projects!