

# Orbital Device

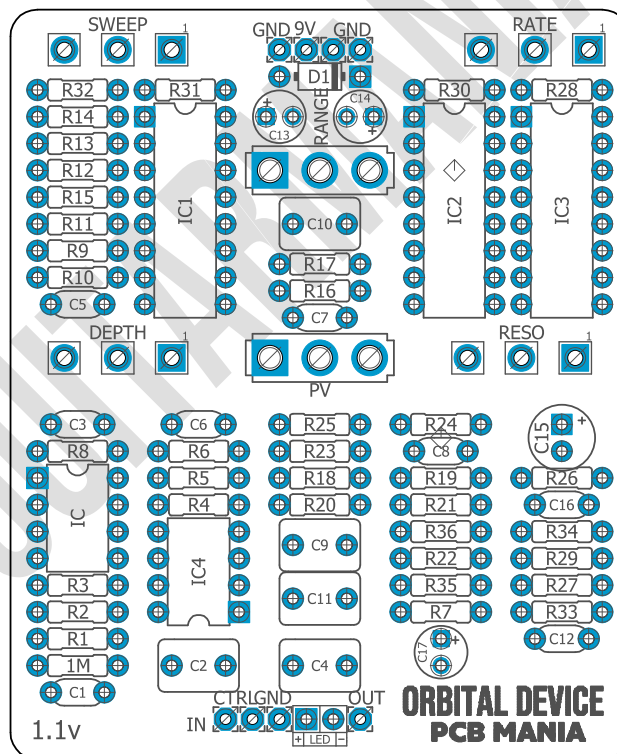
**Based on:**  
EQD Grand Orbiter  
Phase Machine  
**Effect type:**  
Phaser machine  
**Build difficult:**  
Intermediate

**Amount of parts:**  
Average, total 64 components  
**Technology:**  
Controlled transconductance amplifiers  
**Power consumption:**  
9V

**Enclosure type:**  
125b  
**Get your board at:**  
[Orbital Device](#)  
**Get your kit at:**  
[Das Musikding \(Europe\)](#)

## Project overview:

The Orbital Device sounds are definitively from outer space and will take your brain out of this world. The EQD Grand Orbiter Phase Machine inspires this all-analog, true bypass, 4 stages OTA-based phaser.



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## Introduction

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3, 2, 1, Liftoff! The main engines ignite, the entire orbiter clatter and shudder like a skyscraper in an earthquake. A deep rumble jolts the cabin as the main engines come up to full thrust. You and your crew are ready; you are going up in search of the ultimate cosmic sound. Lucky for you, the Orbital Device has a resourceful panel control that gives you the ability to craft and fine-tune the exact effect you're after:

This 4 stage OTA-based phaser has a diverse feature set that can go from motionless and resonant to slow and smooth and on through fast and elliptical.

With the Three-way toggle switch, you can select between different ranges of modulation. Try a slow, clean sound with the Rate 1 mode. Kill the LFO and use the Orbital Device as a fixed resonant filter with the Rate 2 mode. Finally, change to a fast sweep mode with Rate 3. Altogether, control the fine-tune speed of the LFO in each of these modes with the master Rate control. The flashing LED acts as a visual indicator, even when the effect is in bypass mode.

Use the "Phase/Vibrato" switch to make a true pitch vibrato; when in "Vibrato" mode, the dry signal is removed, and the Depth controls act as a volume control.

The Depth control blends the shifted signal in with the dry signal and controls the effect's intensity. The Rate control fine-tunes the speed of LFO. With Sweep, you will be able to control the frequency range. And the Resonance controls the effect regeneration.

This phaser will sound interestingly different when placed either before or after distortion, with spectacular extragalactic results either way!

## Controls

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### *Potentiometers*

- Depth
- Rate
- Reso
- Sweep

### *Switches*

- Range
- PV

# Bill of materials

Resistors	
Part	Value
1M*	1M
R1	1M
R2	10K
R3	10K
R4	10K
R5	10K
R6	470R
R7	100K
R8	27K
R9	1K2
R10	27K
R11	10K
R12	27K
R13	1K2
R14	27K
R15	10K
R16	27K
R17	1K2
R18	27K
R19	10K
R20	27K
R21	1K2
R22	10K
R23	27K
R24	27K
R25	8K2
R26	220K
R27	100K
R28	150K
R29	10K

R30	4K7
R31	4K7
R32	470K
R33	RLED*
R34	56K
R35	56K
R36	27K

Capacitors	
Part	Value
C1	100n
C2	1u
C3	100p
C4	1u
C5	2n2
C6	2n2
C7	2n2
C8	2n2
C9	1u
C10	1u
C11	1u
C12	47n
C16	100n

Electrolytic Capacitors	
Part	Value
C13	1u
C14	4u7
C15	100u
C17	10u

Potentiometers	
Part	Value
DEPTH	25K B
RATE	1M C
RESO	1M C
SWEEP	50K B

IC	
Part	Value
IC1	LM13700N
IC2	LM13700N
IC3	LM13700N
IC4	TL072
IC5	TL072

Switches	
Part	Value
PV	SPDT On-On
Range	SPDT On-Off-On
3PDT Stomp foot	-

Diodes	
Part	Value
D1	1N5817
LED	3mm red LED

# Shopping list

Resistors		
Qty	Value	Parts
2	100K	R7, R27
9	10K	R2, R3, R4, R5, R11, R15, R19, R22, R29
1	150K	R28
4	1K2	R9, R13, R17, R21
2	1M	1M*, R1
1	220K	R26
10	27K	R8, R10, R12, R14, R16, R18, R20, R23, R24, R36
1	470K	R32
1	470R	R6
2	4K7	R30, R31
2	56K	R34, R35
1	8K2	R25
1	RLED	R33

Capacitors		
Qty	Value	Parts
2	100n	C1, C16
1	100p	C3
5	1u	C2, C4, C9, C10, C11
4	2n2	C5, C6, C7, C8
1	47n	C12

Electrolytic Capacitors		
Qty	Value	Parts
1	100u	C15
1	10u	C17

1	1u	C13
1	4u7	C14

Potentiometers		
Qty	Value	Parts
1	25K B	DEPTH
1	50K B	SWEEP
2	1M C	RATE, RESO

IC		
Qty	Value	Parts
3	LM13700N	IC1, IC2, IC3
1	TL072	IC4, IC5

Switches		
Qty	Value	Parts
1	SPDT On-On	PV
1	SPDT On-Off-On	Range
1	3PDT Stomp foot	-

Diodes		
Qty	Value	Parts
1	1N5817	D1
1	3mm red LED	LED



# 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

### 1M\*

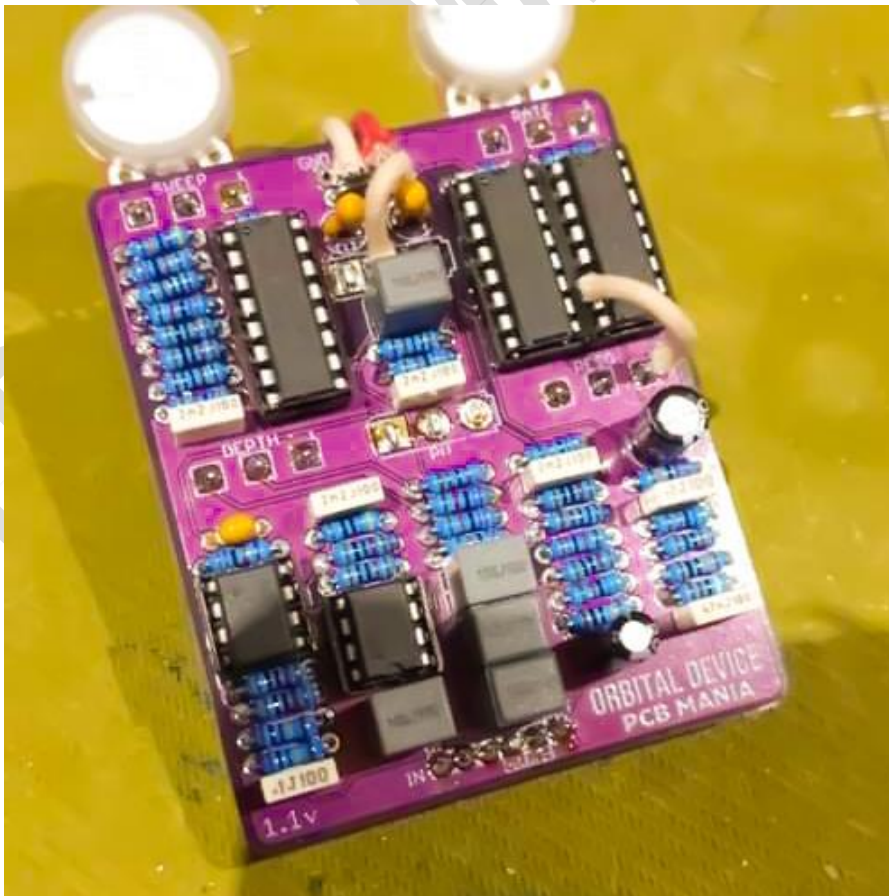
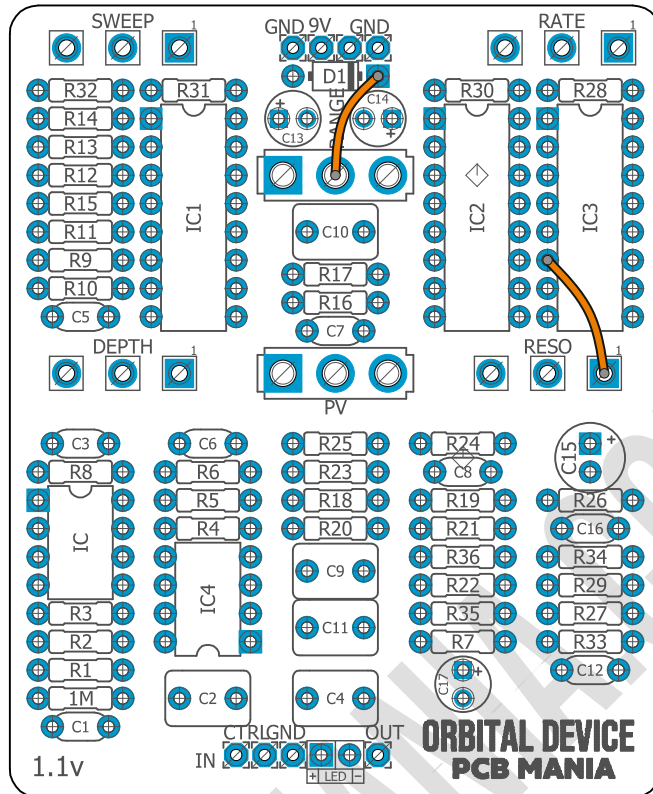
Just a typing error in the 1.1 version. 1M is a regular resistor with a value of 1M.

### RLED\*

This resistor controls the brightness of the LED light. You can place any value between 4k7 and 100k. The bigger the value, the lesser the brightness of the light.

### Jumpers

The 1.1 version needs two jumpers, as shown in the pictures below. We corrected this in the following version (1.2v and so on), so you don't need to place them anymore.



# 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](#).

# 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 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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