

## THANKS FOR CHOOSING ONE OF OUR KITS!

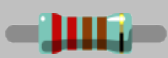
This manual has been written taking into account the common issues that we often find people experience in our workshops. The order in which the components are placed on the board is meant to make assembly as easy as possible.


Some steps are not obvious, so even if you're an experienced DIYer please read the steps thoroughly before starting.

If this is your first project, please read this article before you start assembling the kit:  
[www.befaco.org/howto/](http://www.befaco.org/howto/)

## MAIN PCB (The one with the square cut out from one side)

### OPEN MAIN BOARD BAG A


			
RESISTORS			
Qty	Value	Code	Name on PCB
10	100k	Brown, Black, Black, Orange, Brown	R16, R17, R18, R20, R22, R25, R27 (close to IC6), R30, R36, R45
7	10k	Brown, Black, Black, Red, Brown	R11 (close to D5), R31, R33, R35, R37, R38, R40
4	22k	Red, Red, Black, Red, Brown	R12, R15, R24, R44
3	1K	Brown, Black, Black, Brown, Brown	R5, R41, R43
2	1.5k	Brown, Green, Black, Brown, Brown	R9, R10 (close to T2)
2	43k	Yellow, Orange, Black, Red, Brown	R29, R32
2	220k	Red, Red, Black, Orange, Brown	R23, R42
1	150k	Brown, Green, Black, Orange, Brown	R8
1	390Ω	Orange, White, Black, Black, Brown	R34
1	4Ω22	Yellow, red, red, silver, brown	R3 *
1	270Ω	Red, Purple, Black, Black, Brown	R7
1	510Ω	Green, brown, black, black, brown	R4
1	2.2k	Red, Red, Black, Brown, Brown	R14
1	20k	Red, Black, Black, Red, Brown	R28
1	47k	Yellow, Purple, Black, Red, Brown	R21
1	82k	Grey, Red, Black, Red, Brown	R39
1	200k	Red, Black, Black, Orange, Brown	R46
1	330k	Orange, Orange, Black, Orange, Brown	R13
1	430k	Yellow, Orange, Black, Orange, Brown	R26
1	6k2	Blue, red, black, brown, brown	R1,
1	95k3	White, green, orange, red, brown	R6
1	820k	Gray, red, black, orange, brown	R2
1	2M	Red, Black, Black, Yellow, Brown	R19
* This resistor must be placed standing in order to fit in the PCB silkscreen.			



**DIODES**

Solder the diodes **observing their polarity**. The black or white line on the diode must match with the white line on the diode symbol on the PCB silkscreen.


Qty	Value	Name on PCB
6	1N4148 (Orange)	D1, D2, D3, D4, D5, D8
2	1N5817 (Black)	D6, D7



**FERRITE**

Solder the two ferrite beads by using a recycled resistor leg passed through each ferrite and proceed as if it were a resistor. Ferrite beads don't have polarity.

Qty	Name on PCB
2	FERRITE+, FERRITE-



**ICs**

First **place the sockets** (taking care to orientate them properly – the notch or dot on one end of the IC should match the image on the silkscreen) and solder them into their correct positions.

Next place the ICs in their respective sockets (again taking note of their orientation – the notch or dot on the top of the IC must match that of the socket and silkscreen).

Qty	Value	Name on PCB
1	LM393	IC4
3	TL072	IC5, IC6, IC7
2	LF412	IC2, IC3

**[CONTINUED ON NEXT PAGE]  
OPEN MAIN BOARD BAG B**

## CAPACITORS

Identifying capacitors can be quite tricky. Codes stated are indicative, please take a look at this guide for help identifying capacitors: <http://www.wikihow.com/Read-a-Capacitor>.

\*Find QR at the end of the documentation.

Qty	Value	Code	Name on PCB
1	3p*	030	C22 ( <b>*This cap is redundant and no longer needed</b> )
11	100n	104	C2, C4, C5, C8, C10, C15, C17, C19, C20, C23, C25
3	10p	10J	C13, C18, C26
3	1n	102	C1, C3, C12
2	680n	.68J63	C11, C24
2	47p	47	C6, C9
1	2.2n	2n2k100	C21
1	2.2n	2200 (red)	C7 (WIMA)



## ELECTROLYTIC CAPACITORS

Values are written on the side of the capacitor. Mind their polarity (The long leg of the capacitor is the positive (+)).

Qty	Value	Code	Name on PCB
2	10µF	10µF	C14, C16



## TRANSISTORS

Be sure they are orientated correctly. The curved and flat sides of the silkscreen outline of the transistor on the PCB must match that of the transistor's body.

Qty	Value	Name on PCB
3	2n3904	T1, T3, T4
1	2n3906	T2
1	LM336	IC1

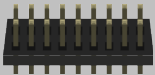


## TRIMMERS

Solder the trimmers onto the PCB where the silkscreen indicates, with the screw facing out from the edge of the PCB.

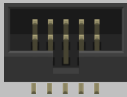
**Doublecheck trimmer values before sodlering!!**

Qty	Value	Name on PCB
2	10k	REF_ADJ, WIDTH (identifying text on opposite side of PCB)
1	1k	V/OCT_LIN



**MALE PIN HEADERS**

Place and solder the male pin headers at “MAIN\_A100” & “MAIN\_B100” where the silkscreen indicates (it is the shorter pins that you are soldering).

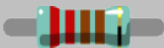


**POWER CONNECTOR**

Solder the power connector at “POWER”, ensuring it is facing out from the edge of the PCB. The small arrow on the connectors must be on the side with the thick white line.

## CONTROL PCB


### OPEN CONTROL BOARD BAG A



**RESISTORS**

Qty	Value	Code	Name on PCB
4	1k	Brown, Black, Black, Brown, Brown	R101, R103, R104, R105
3	100K	Brown, Black, Black, Orange, Brown	R108, R111, R112
2	3.3k	Orange, Orange, Black, Brown Brown	R100, R102
2	10k	Brown, Black, Black, Red, Brown	R120, R124
1	12k	Brown, Red, Black, Orange, Brown	R106
1	47k	Yellow, Purple, Black, Red Brown	R107
1	36k	Orange, Blue, Black, Red, Brown	R109
1	130k	Brown, Orange, Black Orange, Brown	R114
1	50K 0.1%	Brown background, “DALE 5002B” written on it	R121
2	100K 0.1%	Brown background, “DALE 1003B” written on it	R110, R113

R115 – This resistor is no longer used so we must bridge the solder points with the leg of a resistor or wire.



**DIODES**

Solder the diodes **observing its polarity**. The black or white line on the diode (which indicates the cathode – the negative side) must match the white line on the diode symbol on the PCB silkscreen.

Qty	Value	Name on PCB
2	BZX550 4V7	D100, D101

CAPACITORS			
Qty	Value	Code	Name on PCB
1	1n	102	C101
1	100n	104	C100



### TRIMMERS



Solder the trimmer where the silkscreen indicates at "INIT" with the screw facing out from the edge of the PCB. (On the opposite side of the PCB)

### FEMALE PIN HEADERS



Place the female pin headers over the silkscreen markings at positions "TO\_MAIN\_A" & "T0\_MAIN\_B" and solder.

## OPEN CONTROL BOARD BAG B

### SPACERS

Secure the spacers onto the CONTROL PCB (through the two holes with silver outlines) with the main body of the spacer on the component side, and the nut on the opposite.

### FRONT PANEL COMPONENTS MOUNTING TIPS:

Now we will proceed to mount mechanical components. This part of the assembly is CRITICAL. Please take your time and read the following instructions carefully.

These components must **NOT** be soldered until they are placed on the PCB and fully attached to the front panel.

There are two reasons for this:

- The height of the panel components are not all the same. Because of this, if not attached properly before soldering, they will not stay properly seated against the panel. This might cause mechanical stress reducing their life expectancy and in the worst case cause them to break.
- The second reason is that it is very difficult to align the components to the holes if the panel is not positioned prior to soldering.

## OPEN MINI-JACKS BAG

### MINI-JACKS

Place all the mini-jacks onto the PCB ensuring they are on the silkscreen side, but **don't solder yet.**

## POTENTIOMETERS

Place the potentiometers, making sure they do not go all the way down. They need to be flat against the panel. **Do not solder them yet!**

Qty	Type	Name on PCB
2	Single (3pin)	FINE_TUNE, PW

## ROTARY SWITCH

Cut and remove the locating lug. Place and solder the rotary switch "OCTAVE\_SELECTOR" **on the silkscreen side** of the PCB

Once soldered, also cut the long central leg so it won't touch components on the other PCB.

Qty	Type	Name on PCB
1	Rotary Switch	OCTAVE_SELECTOR

## FRONT PANEL

Attach the **front panel** adjusting the parts one by one if necessary until they fit. At this point a pair of fine tweezers can be helpful.

To finish:

- Screw in the parts in this order: A) **Mini-jacks** B) **Pots**

- Ensuring all of the above parts are flush with the panel then you can finally **solder** them!

- Connect the **main PCB** to the **control PCB** using the pin headers and by threading the M3 screws through the main PCB and securing them to the spacers. The main PCB should be orientated so that the component side is facing towards the front panel.

- Put the **knobs** on the potentiometers.

- Connect the **power ribbon cable**: The red wire (-12V) on the power ribbon cable corresponds to pin number one on the male power connector. The number one pin is indicated with a small triangle on the male power connector and a white line on the main PCB. A white or black line (or "-12v") marked on your power bus normally indicates the corresponding pin.

## CALIBRATION

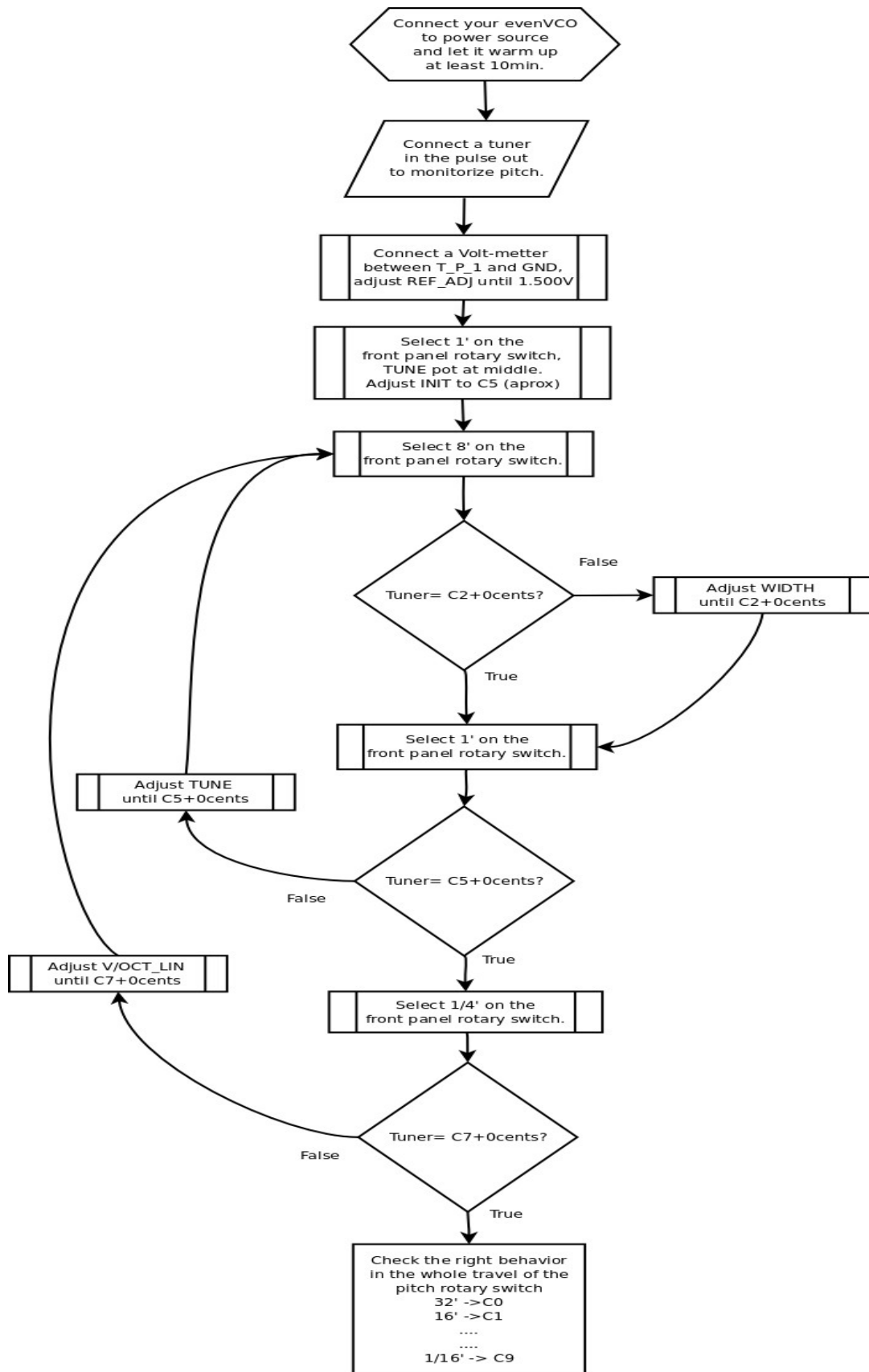
The tuning process is an iteration of successive approximations. We will try in each iteration to get closer to a perfect tune.

First step will be to get **TP\_1** (located in control Board) to measure 1.5v using **REF** trimmer.

With the **INIT** trimmer and the **TUNE** potentiometer we will adjust the relationship between the actual pitch and the values written in the front panel. If during the process the **TUNE** potentiometer is not enough, use the **INIT** trimmer to bring the whole scale up/down.

With the **WIDTH** trimmer we will adjust the relationship between the actual pitch and the input voltage. Then, with the **V/OCT\_LIN** trimmer we will adjust the curve at the end of it's range is needed.

Follow the flow diagram **on the next page** to help you calibrate the EvenVCO:



**ENJOY YOUR NEW BEFACO MODULE!**

