

## 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.

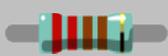
If this is your first project, please read this article before you start assembling the kit

[www.befaco.org/howto/](http://www.befaco.org/howto/)

## GOOD LUCK!

## MAIN PCB (THE SMALLER ONE)

### OPEN MAIN BOARD BAG A

RESISTORS 			
Qty	Value	Code	Name on PCB
32	100k	Brown, black, black, orange, brown	R6, R8, R9, R10, R11, R14, R15, R18, R23, R24, R26, R28, R30, R32, R33, R34, R35, R37, R38, R41, R42, R48, R49, R54, R56, R57, R59, R61, R69, R80, R81, R85
16	10k	Brown, black, black, red, brown	R17, R21, R22, R31, R46, R55, R60, R63, R66, R67, R71, R75, R82, R83, R84, R87
6	560k	Green, blue, black, orange, brown	R1, R4, R12, R27, R72, R74
6	1M	Brown, black, black, yellow, brown	R19, R36, R39, R40, R65, R76
4	1k	Brown, black, black, brown, brown	R79, R88, R89, R90
4	2k2	Red, red, black, brown, brown	R43, R44, R45, R47
4	4K7	Yellow, violet, black, brown, brown	R70, R73, R77, R78
4	110k	Brown, brown, black, orange, brown	R2, R3, R50, R51
4	3M	Orange, black, black, yellow, brown	R13, R16, R20, R29
2	22k	Red, red, black, red, brown	R68, R86
2	180k	Brown, gray, black, orange, brown	R53, R64
2	470k	Yellow, violet, black, orange, brown	R58, R62
1	20k	Red, black, black, red, brown	R52
1	75k	Violet, green, black, red, brown	R25
1	10M	Brown, Black, Black, Green, brown	R5

DIODES 		
Solder the diodes <b>observing their polarity</b> . 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
23	1N4148 (orange)	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D24, D25
2	1N5817 (black)	D22, D23

**FERRITE**

To solder the two ferrite beads use a recycled resistor leg passed through each ferrite and proceed as if it were a resistor. Leave this step until **after you have fitted the power connector**. Ferrite beads don't have polarity.

Qty	Name on PCB
2	FERRITE+, FERRITE-

**OPEN INTEGRATED CIRCUITS BAG**

**ICs**

First **place the sockets** (taking care to orientate them properly - the notch 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 on the top of the IC must match that of the socket and silkscreen).

Qty	Value	Name on PCB
8	TL074	IC1, IC2, IC3, IC4, IC5, IC6, IC7, IC8

**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>

**NOTE** The 2x 2n2 WIMA capacitors (C15 & C16) have no markings on the board due to a printing error. They are easy to find however. They are the two larger rectangles with the capacitor symbols next to IC5 and IC6.

Qty	Value	Code	Name on PCB
20	100n	104	C3, C4, C5, C7, C8, C12, C13, C14, C17, C18, C19, C21, C23, C24, C25, C26, C27, C28, C31, C32
2	100p	101	C20, C22
2	560p	561	C10, C11
2	2n2	2200 (WIMA)	C15, C16

**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	10uf	10uf	C29, C30

**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
4	2n3904	T1, T2, T3, T4

**MALE PIN HEADERS** 

Place and solder the Male Pin Header on the silkscreen side at "CON\_A" and "CON\_B". 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.

**Buen trabajo! You've already made it quite far through the build. How are your focus and energy levels? Do you think a 15 minute break would better prepare you for the rest of the build (this is a big one!)? Maybe you could call someone you haven't talked to in a while or do something useful like debate politics on facebook or look at videos of cats being jerks?**

## CONTROL PCB

### OPEN CONTROL BOARD BAG A

**RESISTORS** 

Qty	Value	Code	Name on PCB
13	1k	Brown, black, black, brown, brown	R100, R101, R102, R103, R105, R106, R118, R119, R123, R125, R134, R135, R140
10	100k	Brown, black, black, orange, brown	R110, R111, R112, R115, R120, R121, R128, R131, R148, R149
6	2k2	Red, red, black, brown, brown	R104, R107, R108, R109, R136, R137
6	10k	Brown, black, black, red, brown	R116, R117, R122, R124, R145, R147
4	24k	Red, yellow, black, red, brown	R138, R142, R143, R146
4	110k	Brown, brown, black, orange, brown	R113, R114, R126, R127
3	4k7	Yellow, violet, black, brown, brown	R129, R130, R139
2	22k	Red, red, black, red, brown	R132, R133
2	4M7	Yellow, violet, black, yellow, brown	R141, R144

**DIODES**

Solder the diode **observing its polarity**. The black 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
4	1N4148	D100, D101, D102, D103

**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>

Qty	Value	Code	Name on PCB
4	10n	10n	C106, C107, C108, C109
2	470n Polyester	.47k	C104, C105
2	100n	104	C102, C103
2	47n Polyester	47n	C100, C101

**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
4	2n3904	T100, T101, T102, T103
2	2n3906	T104, T105

**TRIMMERS**

Solder the two 10k trimmers at "SYMETRY\_A" and "SYMETRY\_"B on the reverse side of the PCB (opposite side to the components) with the screws facing the edge of the PCB.

**OPEN CONTROL BOARD BAG B**

**FEMALE PIN HEADERS**

Place the female pin headers at positions "TO\_CON\_A" and "TO\_CON\_B" and solder.

FADERS	
Solder the faders onto the PCB at the positions indicated by the silkscreen on the opposite side of the board to most of the components (but the same side as the two trimmer potentiometers you previously soldered).	
Qty	Name on PCB
4	FALL_POT, FALL_POT_B, RISE_POT, RISE_POT_B

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

**Bravo! You're nearly at the end, but the next part is critical and takes a good bit of concentration. If you're feeling a bit strained a break would definitely help. Did you know that if you click the 1<sup>st</sup> lowercase link in the main text of any wikipedia article, and repeating the process in subsequent articles, you will usually end up on the Philosophy page?**

### FRONT PANEL COMPONENTS MOUNTING TIPS

Now we will proceed to mount the jacks, potentiometer, switches and LEDs. 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. In the case of the LEDs, they are almost impossible to set to the correct height without reference to the front panel.

### OPEN MINI-JACKS BAG

MINI-JACKS
Place the mini-jacks on the PCB ensuring they are on the side with the silkscreen but <b>don't solder them until the front panel is in place</b> , with all nuts screwed to it. This way it's easier to solder them in the right position. Keep in mind that the front panel holes are quite narrow and it is almost impossible to place it with all the components already soldered.
<b>Caution</b> the switch nuts and the jack nuts looks the same but they are not and will not fit in each others' thread so don't mix them!

**[CONTINUED ON THE NEXT PAGE]**

POTENTIOMETERS		
Now place the potentiometer on the PCB. Do not place them all the way down, leave them loose and... <b>don't solder them yet!</b>		
Qty	Type	Name on PCB
2	Dual (6pin) 10K	SHAPE_A, SHAPE_B
1	Single (3pin) 1M	CROSSFADER

SWITCHES		
Remove the two nuts and the tabbed washer from the toggle switches. Discard one nut and the tabbed washer, but keep one nut for securing to the front panel later. Place the four toggle switches on the PCB but <b>don't solder them yet.</b>		
You will know which ones are the two and three position switches because when switching, two will have just two positions it can rest in and the other two will have a third rest position (in the center).		
Remove the nut from the push button but leave the washer in place. Now fit the push button onto the PCB but again... <b>don't solder it yet.</b>		
Qty	Type	Name on PCB
2	Single two position	CYCLE_A, CYCLE_B
2	Single tree position	RANGE_1, RANGE_2
2	Push Button	M_TRIG_A, M_TRIG_B

LEDs	
	
Place the LEDs onto the PCB minding their polarity, but <b>don't solder them</b> until the front panel is in place. This is the only way to solder them in the right position.	
The long leg is the positive and the short the negative. On the PCB the square pad indicates the negative side and there is a + symbol to indicate the positive.	
Qty	Name on PCB
9	F_A_LED, F_B_LED, LED_A, LED_A>B, LED_B, LED_MAX, LED_MIN, R_A_LED, R_B_LED

FRONT PANEL
Attach the <b>front panel</b> adjusting the parts one by one if necessary until it fits. At this point a pair of fine tweezers can be helpful.
To Finish
- Screw in the parts in this order A) <b>Mini-jacks</b> B) <b>Switches</b> C) <b>Pots</b> D) <b>Push buttons</b>
- Ensuring all of the above parts are flush with the panel then you can <b>finally solder</b> them!
- Next, adjust the <b>LEDs</b> so that they are flush with the panel and solder them.
- Connect the <b>main PCB</b> to the <b>control PCB</b> by threading the 2x M3 screws through the main PCB and securing them to the 2 spacers. The main PCB should be orientated so that the component side is facing towards the front panel.
- Put the <b>knobs</b> on the potentiometers and the red end- <b>caps</b> on the switches/faders.

**CALIBRATION**

Sometimes, due to the tolerance of the potentiometer, the response of the **SHAPE** pot may not be quite symmetrical. If this is the case, adjust **SYMETRY\_A** and **SYMETRY\_B** trimmers as required.

To do this

1. Connect the Rampage's **OUT A** to an oscilloscope. A software oscilloscope on your computer is fine but in this case the signal needs to be attenuated to avoid clipping. If attenuation is needed you can use the **MAX OUT** in place of **OUT A** and adjust the amplitude with the **BALANCE** pot
2. Set **RANGE** switch A to MID (bottom position).
3. Set the **CYCLE** Switch A to CYCLE (Top position).
4. Push the manual trigger A (**TRIGG**) button, to put your rampage into oscillation.
5. Set **RISE** and **FALL** faders at minimum.
6. Turn the **SHAPE A** pot to the center (so you have a perfect triangle wave on your scope). Check if rise and fall times are equal. If so you are done. If not go to the next step.
7. Turn the **SYMETRY\_A** trimmer and try to match (as much as possible) the rise and fall times.
8. Repeat the previous steps for **SYMETRY B**.

**ENJOY YOUR NEW BEFACO MODULE!**