

### THANKS FOR CHOOSING ONE OF OUR KITS!

This assembly guide has been designed 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 take the time to read the steps thoroughly before starting.

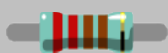
If this is your first project, please read this article before you start assembling the kit:

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

### GOOD LUCK!

## MAIN PCB (WITH "IN" & "OUT" WRITTEN ON IT)

### OPEN MAIN BOARD BAG A

RESISTORS 			
Qty	Value	Code	Name on PCB
14	100k	Brown, black, black, orange, brown	R1, R21, R25, R26, R27, R40, R42, R47, R51, R53, R56, R62 (place and solder with R61 (1k) & D7 at same time), R63, R67
11	10k	Brown, black, black, red, brown	R2, (R3 & R4 - solder at same time), R10, R12, R15, R16 (place and solder with D2 at same time), R20, R22, R28, R29
7	1M	Brown, black, black, yellow, brown	R9, R19, R23, R24, R33, R58, R66
4	470 OHM	Yellow, violet, black, black, brown	R35, R36, R48, R49
4	680 OHM	Blue, gray, black, black, brown	R34, R38, R43, R46
4	15k	Brown, green, black, red, brown	R39, R44, R45, R50
3	47k	Yellow, violet, black, red, brown	R13, R30, R37
3	120k	Brown, red, black, orange, brown	R7 (place and solder with R8 (150k) at same time), R54, R55
2	2.2 OHM	Red, red, black, silver, brown	R17 & R18 - place and solder at same time
2	47 OHM	Yellow, violet, black, gold, brown	R57, R65
2	560 OHM	Green, blue, black, black, brown	R60, R64
2	1k	Brown, black, black, brown, brown	R5, R61
2	56K	Green, blue, black, red, brown	R31, R32
2	150k	Brown, green, black, orange, brown	R8, R14
1	7k5	Violet, green, black, brown, brown	R41
1	82k	Gray, red, black, red, brown	R52
1	200k	Red, black, black, orange, brown	R59
1	220k	Red, red, black, orange, brown	R6
1	560K	Green, blue, black, orange, brown	R11

**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	D1, D2, D3, D4, D5, D7
2	1N5817	D8, D9
1	1N5231	D6

**FERRITE** 

Solder the two ferrite beads 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-

**OPEN THE ICS BAG**

**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
2	TL074	IC1, IC5
2	LM13700	IC3, IC4
1	TL072	IC2

**[CONTINUED ON THE 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>

Qty	Value	Code	Name on PCB
11	100n	104	C2, C6, C7, C11, C13, C14, C15, C19, C20, C22, C24
4	100p	101	C4, C10, C16, C18
3	47p	47	C5, C12, C17
1	330p	331	C3
1	1n (Polyester)	102J	C9
1	15n	15n (Polyester) (15k63)	C8

### 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
3	10µF	10µF	C1, C21, C23

### 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
6	2N3906	T2, T3, T4, T5, T6, T7
1	2N3904	T1
1	BC517	Q1
1	BC516	Q2

### TRIMMERS


Solder the four 100k trimmers at Offset 1, 2, 3, 4 with the screw facing out from the edge of the PCB.

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**MALE PIN HEADERS**

Place and solder the three male pin headers at COMP.B (3x2), COMP.C & COMP.D (2x2) where the silkscreen indicates (it is the shorter pins that you are soldering).



**POWER CONNECTOR**

Solder the power connector at EPOWER, ensuring the position is correct: it must be soldered where it is indicated by the silkscreen on the *opposite* side of the board to the rest of the components.

**RCA CONNECTORS**

Solder the RCA connectors on the PCB where the silkscreen indicates. Use the white one for "OUT" and red for "IN".

**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? Maybe you could call someone you haven't talked to in a while or go for a nice walk? Maybe 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
4	1k	Brown, Black, Black, Brown, Brown	R101, R104, R106, R114
4	100k	Brown, Black, Black, Orange, Brown	R100, R110, R111, R113
3	10k	Brown, Black, Black, Red, Brown	R103, R108, R112
2	1M	Brown, Black, Black, Yellow, Brown	R105, R107
1	2.7k	Red, Purple, Black, Brown, Brown	R102
1	180 Ohm	Brown, Gray, Black, Black, Brown	R109

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**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
1	1N4148	D100
1	1N5231	D101

**ICs**

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

Next place the ICs in their respective sockets (again taking note of their polarity - the mark or “notch” on the front of the IC must match that of the socket and silkscreen).

Qty	Value	Name on PCB
1	LM3914N	IC100
1	TL072/82	IC101

**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
2	100n	104	C101, C102
1	680n	68k63	C100

**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
1	10µF	10µF	C103

**FEMALE PIN HEADERS**

Place the female pin headers where the silkscreen indicates at positions “CONTROL\_B” (3X2), “CONTROL\_C” (2X2) and “CONTROL\_D” and solder.

## OPEN CONTROL BOARD BAG B

### FADERS

Solder the faders on the PCB where it is indicated by the silkscreen (on the reverse side to the smaller components).

Qty	Name on PCB
2	SLIDER_1, SLIDER_2

### SPACERS

Secure the spacers onto 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.

### FRONT PANEL COMPONENTS MOUNTING TIPS:

Now we will proceed to mount the jacks, potentiometers 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

### MINIJACKS

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

**Caution:** the switch nut and the jack nuts look the same, but they are not equally sized and will not fit in each others' thread, so make sure to keep them separate!

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**POTENTIOMETER**



Cut and remove the locating lug with cutting pliers as pictured. Now place potentiometers on the PCB but... **don't solder them.**

Qty	Type	Name on PCB
2	Single (3pin) 100K	HPF, MIX

**LEDs**



Place the LEDs onto the PCB, minding their polarity, but **don't solder them** until the front panel is in place. This is the only way to solder them in the right position. They are to be placed on the same side as the slider potentiometers.

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
4	LEDs_04, 05, 06, 07 Green
2	LEDs_02, 03 Yellow
1	LED_01 Red
1	Duoled

**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:

- Secure the parts to the panel 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!
- Next, adjust the **LEDs** so that they are flush with the panel and solder them.
- Connect the **main PCB** to the **control PCB** 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 **knobs** on the potentiometers and the red end-**caps** on any switches/faders

- 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

We are now going to calibrate the offset of the module's VCAs to prevent the CV signal from leaking into the audio signal.

For this procedure we will use an audio cable connected to a sound system (not headphones) to listen to how much CV signal is leaking into our audio path. We will then use the trimmers to reduce this leakage to a minimum.

Start by unplugging all cables from the front panel. Next, make sure your power connector is attached to the module. With the volume on your system turned all the way down, connect "**MIX**" to your sound system.

### - "**CV IN**" calibration.

**1** - Plug an oscillator into "**IN 1 CV**". Set the fader above the input to max and the "**DRY/WET**" pot to the wet position. Slowly turn up the volume of your audio system until you begin to hear the bleed of the oscillator. If you do not hear anything, move onto the next step (after checking all your connections). If you hear the oscillator, turn the trimmer above **TP1** until you find the setting with the least presence of the oscillator.

**2** - Plug an oscillator into "**IN 2 CV**". Set the fader above the input to max and the "**DRY/WET**" pot to the wet position. Slowly turn up the volume of your audio system until you begin to hear the bleed of the oscillator. If you do not hear anything, move onto the next step (after checking all your connections). If you hear the oscillator, turn the trimmer above **TP2** until you find the setting with the least presence of the oscillator.

### - "**DRY/WET**" Calibration.

This will be an iterative procedure between DRY and WET positions. We will set each of them to get the minimal signal leakage, going back and forth until we get the best result.

Connect an oscillator to "**MIX CV**".

**1** - Set the "**DRY/WET**" Pot to the dry position.

Turn the trimmer above **TP3** until you find the setting with the minimum volume of the oscillator in your audio system.

**2** - Set the "**DRY/WET**" Pot to wet position.

Turn the trimmer above **TP3** until you find the setting with the minimum volume of the oscillator in your audio system.

**3** - Repeat steps 1 and 2 until you get the minimum volume of the oscillator in your audio system in both scenarios.

**4**- Move the "**DRY/WET**" potentiometer to check if you get a louder leakage in any position. If so, gently tweak **TP3** and **TP4** until you get rid of it or minimize it.

**[CONTINUED ON THE NEXT PAGE]**



**CONNECTING TO THE REVERB TANK**

**WARNING: DO NOT CONNECT THE SPRING REVERB MODULE TO THE TANK WHILE THE MODULE IS POWERED. DISCONNECT THE POWER FROM YOUR MODULE BEFORE YOU ATTEMPT TO CONNECT THE REVERB TANK!**

RCA-OUT on the PCB (White connector) ---> IN on Reverb Tank (White connector)

RCA-IN on the PCB (Red connector) ---> OUT on Reverb Tank (Red connector)

**ENJOY YOUR NEW BEFACO MODULE!**