

## 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:

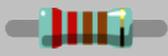
[www.befaco.org/howto/](http://www.befaco.org/howto/)

Or Take a look to our youtube channel:

<https://www.youtube.com/user/Befacosynth/videos>

## HAVE FUN!

## Populating the PCB... OPEN MAIN BOARD BAG A

| RESISTORS  |         |                                      |   |
|---|---------|--------------------------------------|---|
| Qty   | Value   | Code                                 | Name on PCB                               |
| 8   | 10k     | Brown, black, black, red, brown      | R1, R5, R13, R14, R16, R20, R22, R23      |
| 6   | 100k    | Brown, black, black, orange, brown   | R2, R10, R15, R18, R19, R29 (close to D4) |
| 4   | 1k      | Brown, black, black, brown, brown    | R7, R9, R17, R24                          |
| 3   | 120 Ohm | Brown, red, black, black, brown      | R11, R26, R27                             |
| 3   | 1k8     | Brown, gray, black, brown, brown     | R12, R25, R28                             |
| 2   | 200k    | Red, black, black, orange, brow      | R3, R4                                    |
| 1   | 3k9     | Orange, white, black, brown, brown   | R6  |
| 1   | 4k7     | Yellow, violet, black, brown, brown  | R21                                       |
| 1   | 470k    | Yellow, violet, black, orange, brown | R8  |

| DIODES    |                         |                        |
|--|-------------------------|------------------------|
| Qty  | Value                   | Name on PCB            |
| 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. |                         |                        |
| 6  | BAT48 (blue small ones) | D1, D2, D3, D4, D5, D6 |
| 2  | 1N5817 (black)          | D7, D8                 |
| 1  | 4.7V Zener              | D9                     |

**FERRITE**

To solder the two ferrite beads use 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   | F1, F2      |

**OPEN ICs FOAM** (Keep the main board bag B remaining Components for later)

**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.  
Place the ICs in their respective sockets 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   | DG408DJ    | IC4, IC5    |
| 1   | ATMEGA328P | IC6         |
| 1   | TL072      | IC1         |

**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                                 |
|-----|-------|------|---|
| 10  | 100nF | 104  | C2, C4, C7, C8, C9, C10, C11, C12, C14, C15 |
| 2   | 22pF  | 22   | C5, C6                                      |
| 1   | 150n  | 154  | C17   |
| 1   | 10nF  | 10n  | C1  |

**CRYSTAL OSCILLATOR**

This component does not have polarity.

| Qty | Value | Name on PCB |
|-----|-------|-------------|
| 1   | 16MHz | Q4          |



**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        |
|-----|--------|--------------------|
| 5   | 2n3904 | Q1, Q2, Q3, Q5, Q6 |



**Voltage Regulators...“Transistor Looking” ICs**

This Regulator ICs look like transistors (but they are not) This shape is better known as TO-92 Package. Used mostly for transistors but also many other devices.  
Watch Polarity!

| Qty | Value | Name on PCB |
|-----|-------|-------------|
| 1   | 79L05 | IC2         |
| 1   | 78L05 | IC3         |



**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   | 10uf  | 10uf | C3, C13, C16 |



**DIP SWITCH**

Solder the DIP switch at SW1. This switch will set the range of Address CV IN (0-5v or 0-10v)



**MALE PIN HEADERS**

Place and solder the Male Pin Headers on the silkscreen side at ICSP (2x3 Pins) and Expansion EXPANSION\_PORT (2X5 Pins).  
It is the shorter pins that you are soldering. Double check they all are perfectly straight.

|   |
|---|
|  |
| <b>POWER CONNECTOR</b>  |
| Solder the power connector, taking care of notch orientation                        |

**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. Reply to those unread messages or prove someone wrong in Internet, for example. Mechanical parts are really delicate and will need your full attention.**

**OPEN MAIN BOARD BAG C**

|   |  |
|---|--|
| <b>FADERS</b>   |  |
| 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).<br>Ensure they are totally straight. Other wise they will touch the panel slots.<br>If necessary, cut the pins of all components underneath, until the surface is sufficiently flat (taking care of not destroy the solder joints) |  |
| Qty   | Name on PCB                                    |
| 8   | S100, S101, S102, S103, S104, S105, S106, S107 |

**FRONT PANEL COMPONENTS MOUNTING TIPS:**

Now we will proceed to mount mechanical parts to panel. 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.

|   |                    |                   |
|---|--------------------|-------------------|
| <b>POTENTIOMETERS</b>   |                    |                   |
| Now place the potentiometer on the PCB but... <b>don't solder it yet!</b> |                    |                   |
| Qty   | Type               | Name on PCB       |
| 2   | Single (3pin) B10k | ADDRESS_P, MULT_P |

**ROTARY ENCODER**

Screw a nut into the encoder, and put a washer as pictured.  
 This will keep the encoder at the correct height when you screw it to the panel  
 Then place it on the PCB according to the drawing, but again ...

**don't solder it yet!**



| Qty | Type    | Name on PCB |
|-----|---------|-------------|
| 1   | Encoder | SW100       |

**TOGGLE SWITCH**

Remove the two nuts and the tabbed washer from the toggle switch. Discard one nut and the tabbed washer, but keep one nut for securing to the front panel later. Place the toggle switch on the PCB but **don't solder it yet**.

Orientation of the switch doesn't matter this time because this one is symmetric.

| Qty | Type                               | Name on PCB |
|-----|------------------------------------|-------------|
| 1   | Single two position, (ON)-OFF-(ON) | PLAY_SW     |

**OPEN MINI-JACKS BAG**

**MINI-JACKS**

Place the mini-jacks on the PCB ensuring they are on the side with the silkscreen but **don't solder them until the front panel is in place 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.

**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.

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   | D10, D11, D12, D13, D14, D15, D16, D17, D18 |

**FRONT PANEL**

Attach the **front panel** 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) **Mini-jacks** B) **Pots**.
  
- Ensuring all of the above parts are flush with the panel and both PCB and panel are perfectly parallel. Then you can **finally solder** them!
  
- Put the **knobs** on the potentiometers and the red caps on the 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.

**ENJOY YOUR NEW BEFACO MODULE!**