

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:

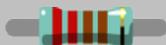
www.befaco.org/howto/

You will be soldering both boards at the same time. Keeping them in the panel together might help you through the build. Check last pages of the Build for PCB pics to help you identify components.

BEWARE OF EXPOSED VIAS. This build is tight and you might short one if not careful.

HAVE FUN!

BAG A

RESISTORS 			
Color code can be difficult to identify, we strongly recommend to use a multimeter .			
Qty	Value	Code	Name on PCB
33	100k	Brown, black, black, orange, brown	R8, R9, R13, R15, R16, R22, R24, R33, R36, R37, R52, R53, R54, R59, R61, R63, R65, R66, R67, R69, R76, R80, R84, R85, R88, R89, R100, R103, R104, R105, R106, R107, R111
14	1k	Brown, black, black, brown, brown	R1, R3, R20, R21, R26, R27, R43, R44, R47, R70, R75, R109, R110, R112
8	91k	White, brown, black, red, brown	R4, R11, R29, R32, R46, R48, R50, R60
9	470 Ohm	Yellow, violet, black, black, brown	R82, R90, R91, R92, R93, R95, R96, R98, R99
8	330k	Orange, orange, black, orange, brown	R12, R14, R34, R35, R49, R51, R58, R62
7	33k	Orange, orange, black, red, brown	R73, R81, R83, R86, R87, R101, R102
4	220k	Red, red, black, orange, brown	R17, R38, R55, R64
4	120k	Brown, red, black, orange, brown	R5, R30, R68, R77
3	3M3	Orange, orange, black, yellow, brown	R19, R40, R57
3	110k	Brown, brown, black, orange, brown	R7, R23, R42
3	47k	Yellow, violet, black, red, brown	R6, R25, R45
3	39k	Orange, white, black, red, brown	R18, R39, R56
3	1k2	Brown, red, black, brown, brown	R2, R28, R41
2	200k	Red, black, black, yellow, brown	R94, R97
2	24k	Red, yellow, black, red, brown	R10, R31
2	10k	Brown, black, black, red, brown	R71, R72
2	1k5	Brown, green, black, red, brown	R74, R108
1	56k	Green, blue, black, red, brown	R79
1	27k	Red, violet, black, orange, brown	R78



DIODE

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
3	1N4148	D1, D2, D5
2	1N5817 (black)	D3, D4



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



ICs

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.

Qty	Value	Name on PCB
5	DIL8	IC2, IC4, IC7, IC9, IC12
2	DIL14	IC8, IC10,
4	DIL18	IC1, IC3, IC5, IC6

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
19	100n	104	C1, C2, C4, C13, C14, C15, C19, C21, C23, C30, C35, C36, C39, C40, C41, C42, C45, C48, C53
8	270p	271	C3, C9, C12, C18, C20, C22, C27, C28
6	1n	1nK	C43, C44, C46, C47, C49, C50
4	56p	56	C8, C17, C24, C32
1	150p	150 (Red)	C34
1	DO NOT PLACE!		C51



ELECTROLYTIC CAPACITORS

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

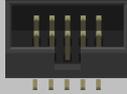
Qty	Value	Code	Name on PCB
7	10uF	10uF	C6, C10, C26, C31, C37, C38, C52
6	2.2uf	2.2uf	C5, C7, C11, C16, C25, C29
1	4.7uF	4.7uF	C33



REGULATORS

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
1	LM4040	REG-1
1	AMSR-7805	5V_REG



POWER CONNECTOR

Solder the power connector at “POWER” ensuring it is facing out from the edge of the PCB.



ICs

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
4	TL072	IC2, IC4, IC7, IC9
1	TL074	IC8
4	AS3320	IC1, IC3, IC5, IC6
1	MCP6022	IC12
1	MCP6024	IC10

Now it's a good moment to split the boards apart.

BAG C



PIN HEADERS

Place and solder the Pin Headers on the silkscreen side of the main board (It is the shorter pins that you are soldering). Double check they all are perfectly straight.

Qty	PINs	Name on PCB
2	2x2	CON1, CON3
2	2x5	CON2, CON4
1	2x8	CON5

SOCKET CONNECTORS

Place the socket connectors on the control board over the silkscreen markings at positions and solder. Double check they all are perfectly straight.

Qty	PINs	Name on PCB
2	2x2	#CON1, #CON3
2	2x5	#CON2, #CON4
1	2x8	#CON5

PREPARING TEENSY AND CODEC

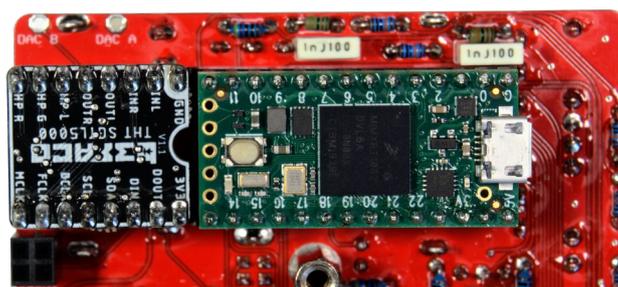
Now we will place Teensy and the codec, Please follow the instructions carefully. **Make sure orientation and placement is good before soldering. CHECK PICTURE.**

SOCKET CONNECTORS

Place all pins on the PCB to fit Teensy and the codec size, at components side, **but do not solder them.**

Qty	Size	Place on PCB
2	1x8	IC11
2	1X14	Long sides of teensy footprint

Place pin headers into the sockets, the long side of the pins that will fit in.
 Place **Teensy (USB facing up)** and **codec (Befaco name facing up)** boards on the pins, watch the footprint for the orientation. Do this **gently**.
Double check they all are perfectly straight, Once all pins are in place, **proceed to solder them all Pushing down the teensy and codec gently**.



POGO PIN HEADER

Remove the teensy and Place the Pogo pin header on the PCB, then place back the teensy pushing the pogo pins, **Double check they all are perfectly straight and solder them.**

Qty	Size	Place on PCB
1	2X5	Between the 1x14 pins

3 POSITION SWITCHES

Place the switches on their right places, push them till are flush to the PCB.
Double check they all are perfectly straight and solder them.

Qty	Type	Name on PCB
3	Mini. 2 circuits 3 position	SW1, SW2, SW3

SPACERS

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

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.

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.

MINI-JACKS

Place the mini-jacks on the PCB ensuring they are on the side with the silkscreen. Some of the minijacks ground legs will share the same solder holes. **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.

POTENTIOMETERS

Now place the potentiometers on the PCB but... **don't solder them yet! Before going ahead, take this in consideration:**

- * Pots are really tight. Be SUPER CAREFUL when soldering, as its easy to burn headers or short with close by pins.
- *Pay special attention when soldering F_ATEN_1, as there is an exposed via close by that might short.
- *POT_A1, POT_A2, and CUTOFF_1 need one of the location lugs to be cut, check silkscreen for details.

Qty	Type	Name on PCB
15	Single (3pin) B100k	POT_A1, POT_A2, CUTOFF_1, F_ATEN_1, RES_1, POT_B1, POT_B2, CUTOFF_2, F_ATEN_2, RES_2, GRIT_QTY, RES_3, CUTOFF_3, F_ATEN3.

SWITCH

Place the switch his right places. **don't solder them yet!**

Qty	Type	Name on PCB
1	Mini. One circuit 2 position	Source

ENCODER

Place the encoder on the PCB where the silkscreen indicates. Leave an hex nut placed on the encoder, this will give encoder the right height and avoid damaging your module. **Don't solder it yet.**

LEDs



Place the LED onto main PCB minding its polarity, but **don't solder them** until the front panel is in place. This is the only way to solder them the right position.

Qty	Type	Name on PCB
1	Red LED 2mm	LED_1

7 SEGMENT DISPLAY



Place the display, **minding that dot will face down (Segment dot) but don't solder it yet.**

FRONT PANEL

Place the **plastic windows** into Display holes, from the back side of the panel. Remember to remove the protection plastic from **both sides**. Use some hot glue, tape or any method of your choice to stick it.

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.

FINISH YOUR BUILD!

- Screw in the parts in this order: A) **Mini-jacks** B) **Pots and encoder**.
- Take off the Teensy and the Codec to be able to solder the points below.
- 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!
- Fit the LED on the panel holes and solder them
- Flip the module and make sure that LED display is flat against the window and centered. Proceed to solder it.
- Put the **knobs** on the potentiometers.
- Connect both boards together.
- 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.

IMPORTANT INFORMATION

Connecting **DIY** devices to your computer USB ports can be tricky as you can fry the ports by plugging malfunctioning devices.

To avoid this unlikely but unfortunate situation, please follow these two safety rules:

-1 Check if the module works right before updating the firmware. If you are unsure about this, **unplug** the teensy board from the Noise Plethora, and do the firmware update **with the teensy alone**.

The teensy board comes preprogrammed with this kit, so there is no need to flash it to test the module.

-2 **Always unplug** the module from your Eurorack power supply before connecting the USB.

