FREQUENCY CENTRAL
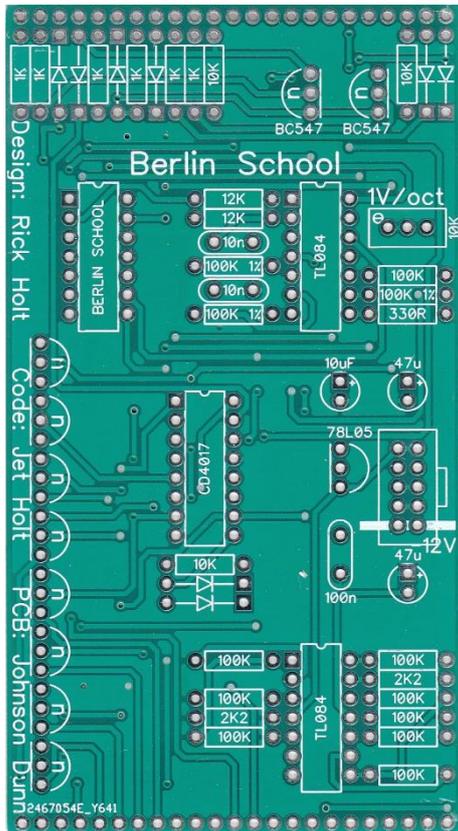
Build documentation for:

BERLIN SCHOOL
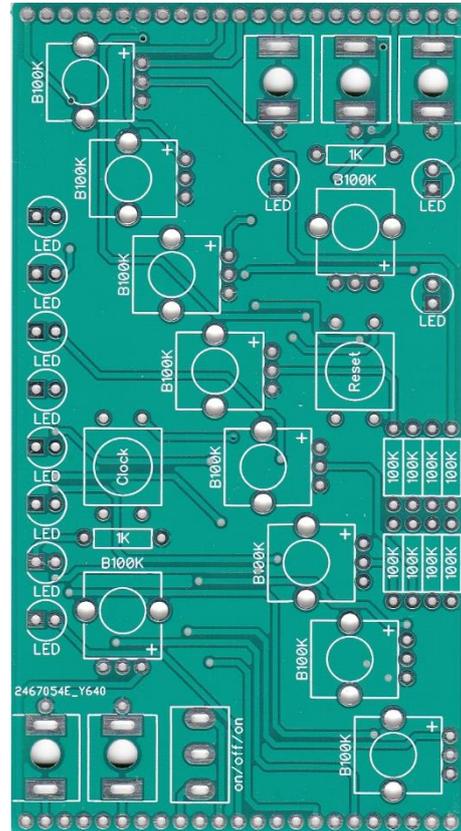
A flexible 8 step analogue sequencer under digital control

Main PCB   Control PCB

(top)

(bottom)

Berlin School is based around the classic CD4017 Johnson counter chip, under the control of a 16F1765 PIC which provides a few novel features:

- Onboard clock division: /1, /2, /3, /4, /5, /6, /7, /8
- External voltage control of clock division
- Quantised output (chromatic)
- Quantised manual transpose (chromatic)
- Quantised voltage controlled transpose (chromatic)
- 4 step / 6 step / 8 step options

Bill of Materials

|			
330R x 1	10nF x 2	BERLIN SCHOOL PIC	B100K tall trimmer x 10
1K x 8			
2K2 x 2	100nF x 1	CD4017	Tall trimmer toppers x 8
10K x 3			
12K x 2	10uF electrolytic x 1	TL084 x 2	10K trimmer
100K x 17			
100K, 0.1% x 3*	47uF electrolytic x 2	BC547 x 10	SPDT toggle x 1
		78L05 x 1	(on/off/on)
All resistors ¼ watt metal film.		1N4148 x 8	Tactile switch x 2
		3mm red LED x 8	3.5mm socket x 5
		3mm green LED x 3	
			Male 40 pin header x2
		14 pin socket x 3	Female 40 pin header x2
			10 pin box header
		16 pin socket x 1	

*100K 0.1% x 3 These are the three matched resistors for the output stage. They don't have to be 100K exactly, they just have to be matched to each other, so for example if they are all 99.9K that's fine. Grab a bunch of 100K resistors, measure each one, make little piles of 100.1K, 100K, 99.9K etc. Before long one of the piles will have three resistors in it, that's your matched set! Should only take 5 minutes – like this!

Please observe the correct polarity of the electrolytic capacitors and diodes.
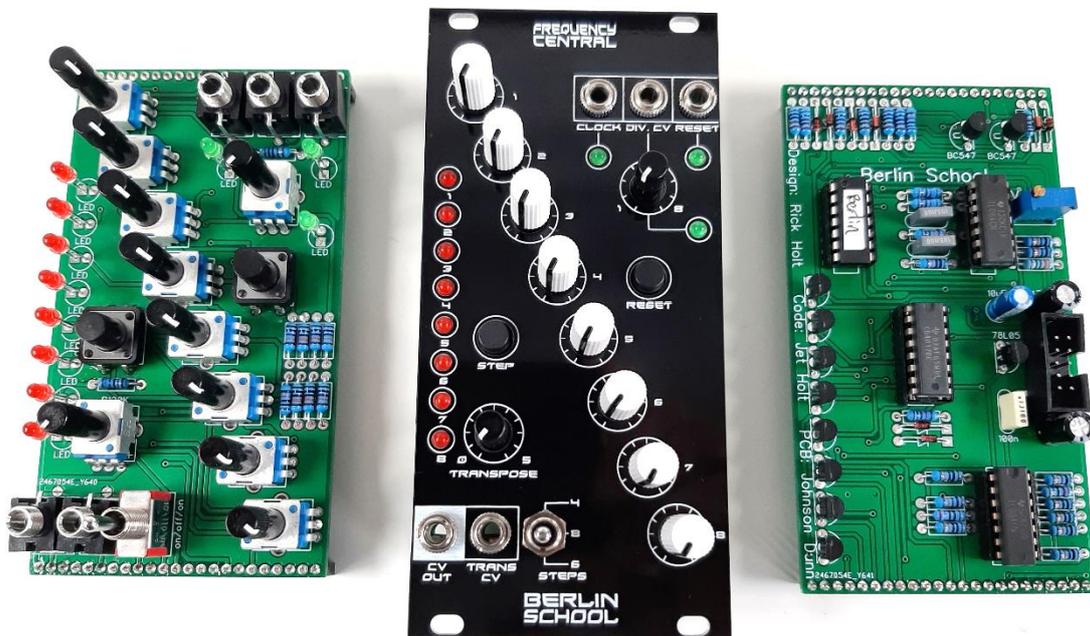
Main PCB assembly

1. Solder all diodes and all resistors.

2. Solder all IC sockets

3. Solder all non-electrolytic capacitors

4. Solder all 10 transistors and the 78L05

5. Solder the power header – if you're using box type, observe correct polarity

6. Solder all electrolytic capacitors and the 10K trimmer

7. Cut male headers to size and solder them into place. Make sure that they stick out of the bottom of the PCB.
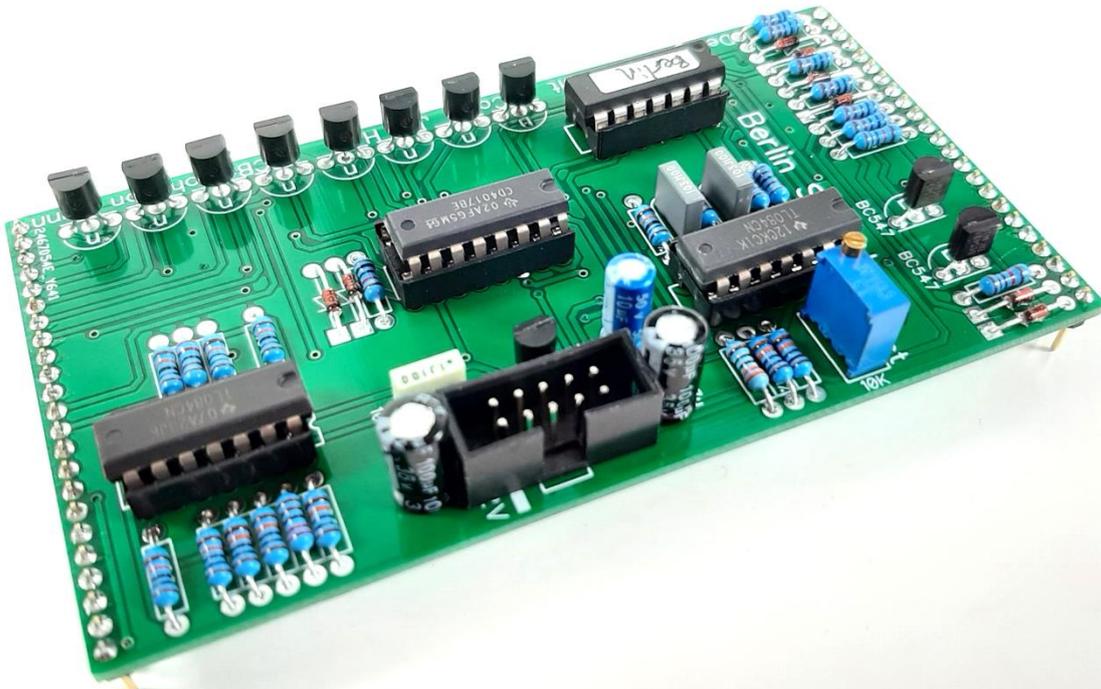

Control PCB assembly

1. Place the PCB on a flat surface. Place the 2 tactile switches into their solder pad. Do not push them all the way through, they should sit proud of the PCB (see photo), their legs should not protrude through the other side. Solder them into place from the top of the PCB.

2. Solder all resistors

3. Place all sockets, pots and the toggle switch on the PCB, then place the panel over them. This will assure that they are correctly positioned. Flip the whole lot over and into place. I find it useful to first solder the middle legs of the pots then inspect and re-seat to ensure that they are well placed.

4. Put the LEDs through their pads (short leg to square hole). Present the panel to the PCB, flip the whole lot over, make sure the LEDs stick though the holes in the panel, solder in place.

5. Cut female headers to size and solder them into place. Make sure that they stick out of the bottom of the PCB.

6. Put the 8 tall trimmer toppers on the tall trimmers
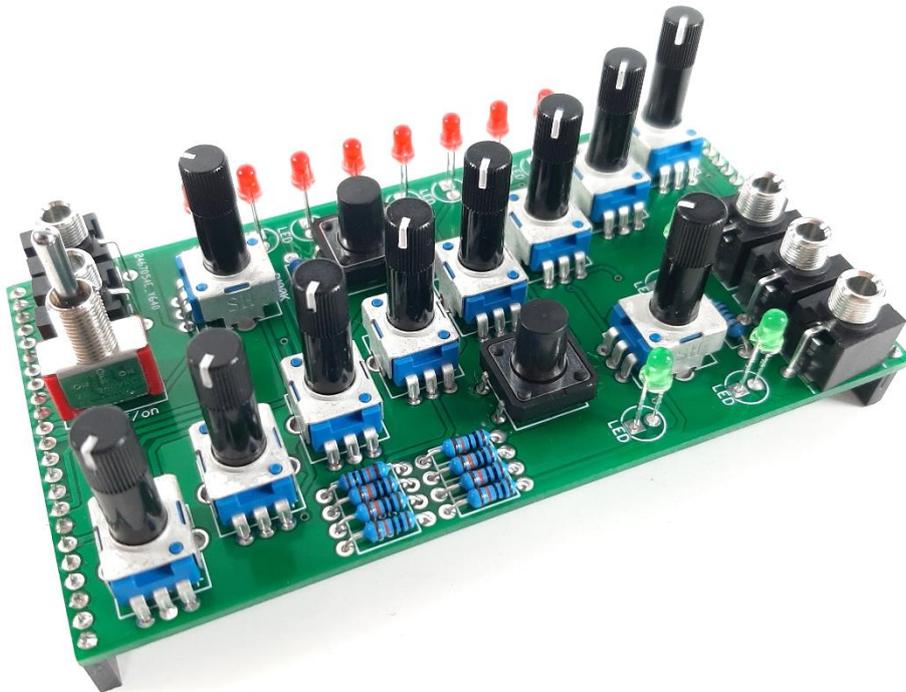
Note: Not all pots and sockets are equal in height. Providing you use the ones in the links provided, everything will line up perfectly.

Make sure that you plug the **Main PCB** into the **Control PCB** the right way around – see image on page 1.

Calibration

1. Set all 8 step knobs fully clockwise
2. Plug a patch cable into Berlin School's CV Out
3. Using the STEP button, advance Berlin School to any step
4. Using a [digital multimeter](#) (DMM), connect the black probe to the sleeve of the patch cable (ie ground), connect the red probe to the tip of the patch cable (I find a couple of [crocodiles](#) can help here)
5. Set the DMM to read DC voltage
6. Adjust the trimmer on the back of Berlin School until the DMM reads 5.00V

Berlin School is a genre of electronic music which originated in West Berlin in the 1970s. The sound consists of ambient elements combined with short, repeating sequences.

RDH 03/03/22