

# FREQ FM

8-BIT GENERATIVE  
DIGITAL FM SYNTHESIZER

## QUICK START CONSTRUCTION GUIDE

The kit is quite simple, but there are some important things to know before starting.

### POLARISED COMPONENTS

Components with a polarity will only work if they are inserted in the correct orientation. Incorrect placement will cause them to not work correctly, and...

**IN SOME CASES THIS WILL DESTROY THE COMPONENT!**

- Illuminated switches SW1 – SW6
- 100uF Electrolytic capacitors C2, C4, C6
- NPN transistor Q1
- Diode D1
- Arduino Nano V3
- MAX7221 LED matrix driver IC
- 8x8 LED Matrix

All other components can either be inserted any orientation, or the PCB will only allow the correct orientation.

### ALIGNMENT WITH FRONT PANEL

To ensure the interface components align with the holes in the front panel, it is good practice to place them firmly into the PCB and then...

**TEST-FIT THE FRONT PANEL BEFORE SOLDERING**

Even small misalignment of these components can make things not fit together during assembly or can make knobs and switches fail to function smoothly.

- Switches SW1-SW6
- Potentiometers
- 3.5mm jacks
- LED matrix

### ARDUINO NANO PINS

To enable the Arduino Nano to fit into the DIP30 socket, the legs must be shorter than a standard Nano. The best way to do this is to **insert the long-ends of the pin header into the Nano**, then trim the excess from the top-side of the Nano.

### IMPORTANT - SOLDERING TEMPERATURE

Some components are very sensitive to overheating, especially the LED switches. Be careful not to apply heat for too long, otherwise switches and knobs may not operate correctly.



**DETAILED INSTRUCTIONS / DETAILLIERTE ANLEITUNG / INSTRUCCIONES DETALLADAS / INSTRUCTIONS DÉTAILLÉES**

Detailed construction and operations manuals are available at [wireheadinstruments.com/support](https://wireheadinstruments.com/support)

# WIREHEAD FREQ FM – BILL OF MATERIALS – PCB REVISION 1.5

PCB Reference	Part Type	#	Description
	FREQPCB15A	1	Main PCB Revision 1.5a
	FREQFACE16A	1	Front panel Revision 1.6a
	FREQREAR13	1	Rear Panel Revision 1.3
MAX7219	MAX7221	1	8-Digit LED Display Driver IC with SPI.  MAX7221 and 7219 are functionally interchangeable, however the 7221 is classed as low-EMI so introduces less noise
U1	ARDNANO3	1	Arduino Nano v3.0 with micro-USB connector. Note to fit into the dip socket I have shortened the legs when soldering the pin headers.
	LED8X8	1	8x8 LED matrix display common cathode
470	R470	6	470Ω resistor If desired this value can be replaced with higher/lower resistance to reduce/increase LED button brightness (and current draw)
1M	R105	3	1MΩ resistor
1K	R102	1	1KΩ resistor
10K	R103	1	10KΩ resistor
100K	R104	2	100KΩ resistor
3k9	R392	1	3.9KΩ resistor
200K	R204	1	200KΩ resistor. If desired this value can be replaced with higher/lower resistance to reduce/increase LED matrix brightness (and current draw).
4n7	C472CER	1	4.7nF ceramic capacitor
100n	C104CER	3	100nF ceramic capacitor
1u	C105MON	1	1uF monolithic capacitor
100u	C107ELEC	3	100uF electrolytic capacitor
D1	1N4004	1	1N4004 diode
Q1	BC337TO92	1	BC337 NPN transistor
MAX7219	DIPSKT24	1	DIP socket for MAX7219/MAX7221
U1	DIPSKT30	1	DIP socket for Arduino Nano
J2, J3	IDCSKT8X1	2	1x8 pin header socket 8.5mm height
J6, J7, J8	PJ360A	3	3.5mm audio jack stereo 3-pin, unswitched
SW1, SW2, SW3, SW4, SW5	PB6149L	5	Illuminated LED tact switch (main colour)
SW6	PB6149L	1	Illuminated LED tact switch (secondary colour)
Various	PTV09A-4025U-B103	8	9mm 10k linear potentiometer (25mm shaft, 40-knurl)
7-12VDC	PWRDCSKT2.1	1	2.1mm pin DC power socket
	SCREWHEXM310	4	10mm long M3 hex-head screws (for rear panel)
	NUTHEXM3	4	M3 nut (for between the main pcb and rear panel)
	SPACEHEXM312	4	12mm M3 nylon spacer
	SCREWHEXM306	4	6mm long M3 hex-head screws (for front panel)