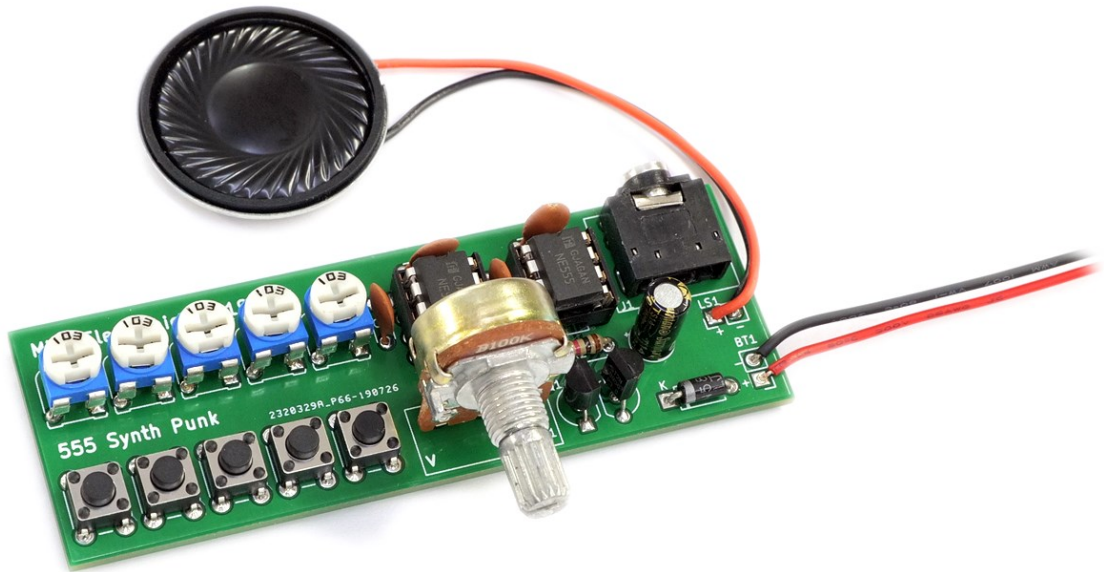


555 Synth Punk Kit

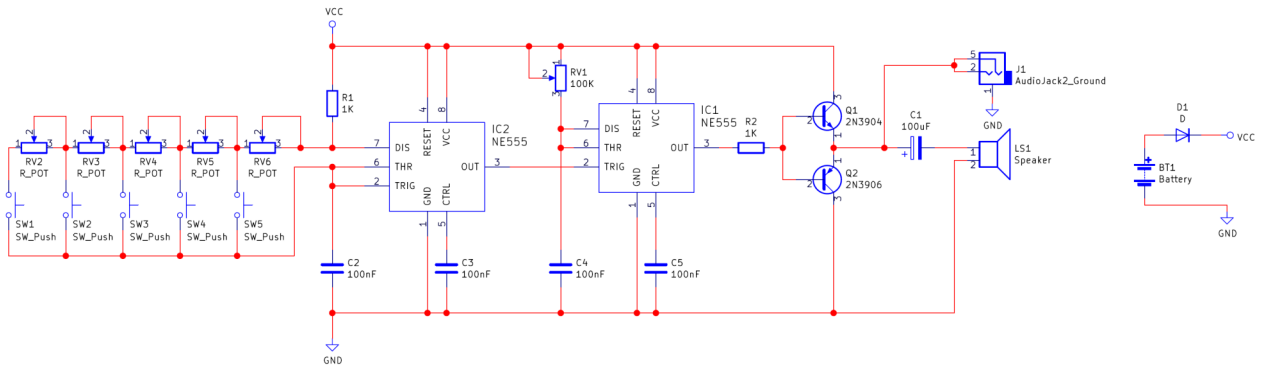
MitchElectronics® 2019



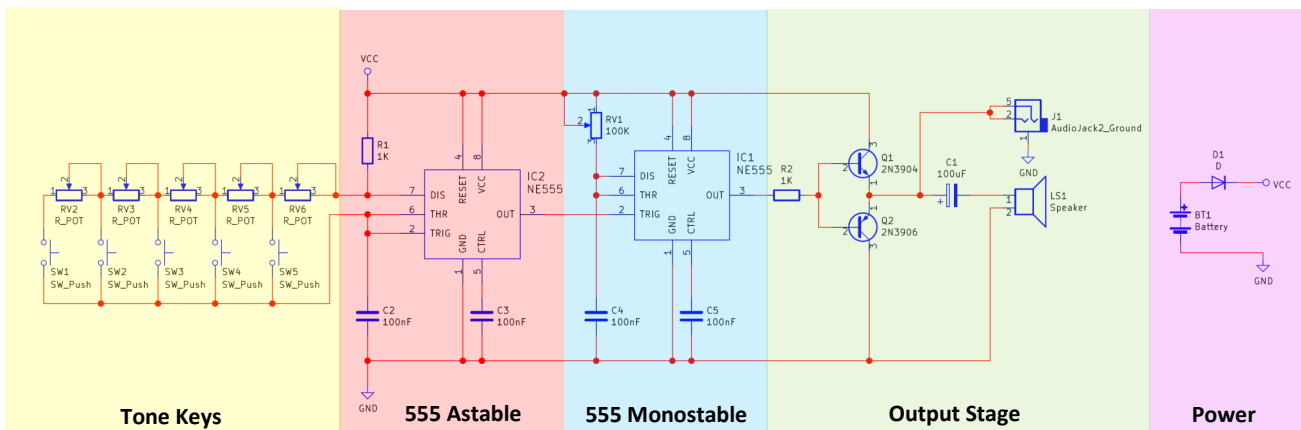
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SCHEMATIC



Schematic (Blocktised)



SCHEMATIC EXPLANATION

The 555 Synth Punk Kit is arguably one of the hardest kits to explain how it works. One of the reasons for this complexity is that it includes some music theory, an astable, and a monostable circuit which all work in a very specific way to produce some rather wacky tones.

To start, the 555 Synth Punk is made up of the following sub-circuits

- Tone Keys—These are the keys that you press to produce a tone
- 555 Astable Oscillator—This produces a square wave signal
- 555 Monostable—This is a triggerable monostable that produces the output audio wave
- Output stage—This converts the weak 555 signal into one that can drive a speaker

The first stage is the tone keys which are the same as those on a keyboard; each one produces a different tone. If you look at the schematic carefully you will see that these buttons are in series with potentiometers. When a key is pressed, the voltage signal from pin 7 on the 555 IC2 has to go through all the potentiometers up to the pressed switch whereby it can return back to the 555s pin 6. The result is that switch 5 has the least resistance while switch 1 has the most resistance and therefore pressing switch 5 will produce the highest output frequency while pressing switch 1 will produce the lowest frequency.








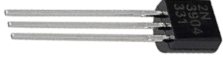







The second stage is where the magic behind the 555 Synth Punk happens. If a speaker was connected to the output of the 555 astable you would have a simple circuit which would produce different tones depending on the switch that you pressed. However, in the Synth Punk circuit the 555 astable is triggering a 555 monostable whose “on” time is tuneable with a potentiometer. If a button is held and the potentiometer adjust from one extreme to the other you will hear a stepped pattern. Why does this happen?

The reason for this is that the 555 monostable is NOT a re-triggerable monostable. When the monostable is triggered its output turns on for a set amount of time. During this time, if the TRIG pin is re-triggered the monostable does not restart itself but instead ignores it. If the potentiometer is left at a specific position then a specific output frequency will be produced which relates the input trigger frequency to the output of the monostable. If the potentiometer is adjusted so that the length of the output of the 555 monostable is increased and crosses a pulse from the 555 astable then suddenly the output of the 555 monostable will drop significantly as the pulse that was crossed is not longer able to trigger the 555 monostable and therefore reduces the frequency. This is a very hard concept to explain and best seen with an oscilloscope or on a video.

The final stage is a push pull amplifier that improves the output impedance of the 555 monostable so that a speaker can be properly driven. The circuit also has a 3.5mm phono output so that an external speaker can be connected to the 555 Synth Punk for live audiences!

MATERIALS

Check that you have the following components (traffic light controller)

Component	Component Name	Quantity	Looks like
555 IC	IC1, IC2	2	
8 DIP Socket	IC1, IC2	2	
1K Resistor	R1, R2	2	
10K Potentiometer	RV2, RV3, RV4, RV5, RV6	5	
100K Potentiometer	RV1	1	
100nF Capacitor	C2, C3, C4, C5	4	
100uF Capacitor	C1	1	
2N3904	Q1	1	
2N3906	Q2	1	
1N5817 Diode	D1	1	
Tactile Switch	SW1, SW2, SW3, SW4, SW5	5	
Speaker	LS1	1	
3.5mm Stereo	J1	1	
PP3 Connector	BT1	1	
PCB	-	-	

CONSTRUCTION

Download the electronics construction manual

To learn how to construct circuits on PCBs download the Electronics Construction Manual from MitchElectronics using the link below. This document shows you how to install all electronic components used in MitchElectronics kits. The list below shows the sections relevant to this kit so do not worry if you see component sections in the document that don't come with this kit!

www.mitchelectronics.co.uk/electronicsConstructionManual.pdf

Relevant sections in the electronics construction manual

Resistors

Capacitors

ICs

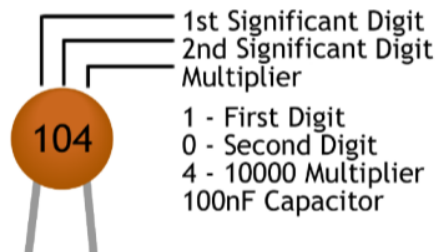
Connectors

Speakers

Wires

RESISTOR AND CAPACITOR IDENTIFICATION

Colour	1 ST Band	2 ND Band	3 RD Band	Multiplier	Tolerance
BLACK	0	0	0	1Ω	
BROWN	1	1	1	10Ω	±1%
RED	2	2	2	100Ω	±2%
ORANGE	3	3	3	1kΩ	
YELLOW	4	4	4	10kΩ	
GREEN	5	5	5	100kΩ	±0.50%
BLUE	6	6	6	1MΩ	±0.25%
VIOLET	7	7	7	10MΩ	±0.10%
GREY	8	8	8		±0.05%
WHITE	9	9	9		
GOLD					±5%
SILVER					±10%



IMPORTANT INFORMATION



RoHS Compliant Kit (Lead free)



Low Voltage Kit



Caution! Soldering Required

TERMS AND CONDITIONS

MitchElectronics Mission

The main goal of MitchElectronics products is to provide safe electronics to makers and professionals alike while keeping the cost affordable. MitchElectronics kits are ideal for classrooms whereby students can learn about electronics using a hands-on approach which is not only highly effective at teaching students but also improves hand-eye co-ordination as well as grow interest in electronics. Since MitchElectronics kits are aimed at novices and those who are new to electronics they are designed to use low voltage power supplies such as 9V batteries which are inherently safe due to their limited voltage and current capabilities.

MitchElectronics Liability

MitchElectronics kits must be inspected and tested by a competent individual before use and must be constructed by those who are competent to do so. MitchElectronics is not liable for kits and products that are constructed incorrectly or to a poor standard whereby poor standard includes (but not limited to) poor solder connections, overheated components, and damaged components. MitchElectronics is not liable for harm, injury, or damage caused by the misuse of kits and/or products if

- Incorrectly constructed
- Powered by sources other than “portable batteries” or the specified power supply
- Kits used outside their operational range (such as voltage supply, temperature etc.)
- Used as a sub-system (i.e. connected to additional circuits and modules)
- Used in a non-educational environment
- Used in a commercial environment
- Used in any dangerous or potentially hazardous environment
- Purchased from an unauthorised third party

Portable batteries refers to low powered alkali batteries. Lithium-based batteries and those with large current capabilities (such as lead-acid batteries) are not considered portable or safe

The use of the kits or products in the above scenarios automatically voids any warrantee or guarantee of that kit or product.

Kits must be

- Inspected for damage before and after construction
- Inspected for missing parts
- Constructed correctly by a qualified individual
- Used in an appropriate manner (i.e. within operational ranges)
- Purchased from an authorised seller

Those who are not competent to construct, inspect, and test kits and products must be accompanied by a competent individual and that competent individual assumes all responsibility for harm or damages and MitchElectronics is not liable for any harm or damage.

Missing Parts

MitchElectronics is only liable for missing parts for kits that have been purchased within 28 days and that have been purchased directly from www.mitchelectronics.co.uk. MitchElectronics is not liable for any product sold by an unauthorised third party.