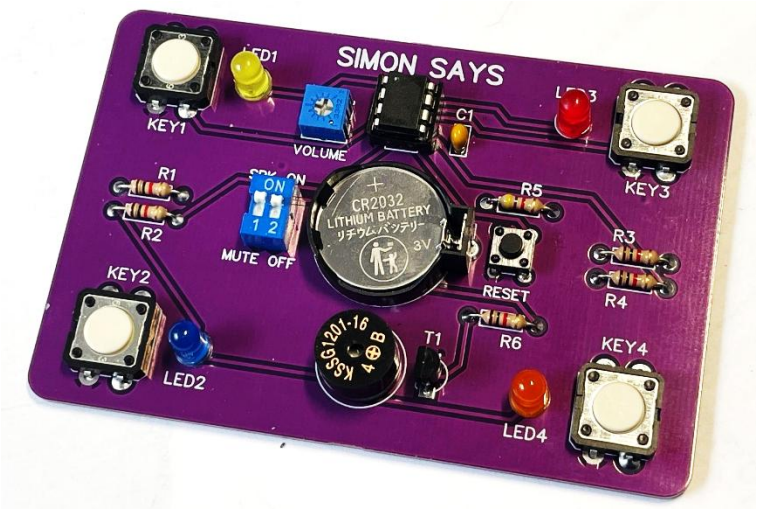
KANGA PRODUCTS
Electronic Kits For The Radio Amateur

Kanga ‘Simon Says’ Solder Practice Kit



Many Years ago, when I was much younger and before games like space invaders, Pacman etc became titles that many played on home computers I received a simple electronic handheld game as a birthday present, it was a round shaped black plastic game with 4 large illuminated coloured panels that lit in a random sequence that you needed to copy by pressing the panels, each time you got the sequence right it played a little tune and added another step to the sequence, the sequence got longer and longer and remembering the patten became harder. A simple game but one that kept me and others entertained for hours.

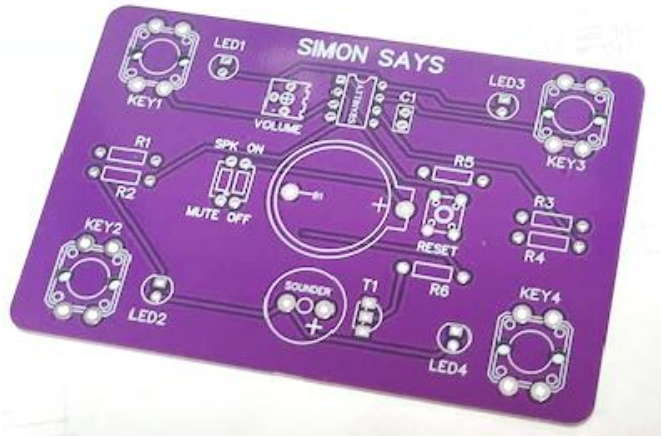
Well now with the power of the modern microcontroller we can build our own copy of this game, since it’s an easy to build kit it makes a good started kit for people with little kit building experience or for anyone just wanting to bring back some old time fun for a few hours!

The kit uses open source software (which can be downloaded from our kits web page) if you wish to experiment with the source code to make your own version of this game feel free to do so, if you make a good job of it I will be happy to put a copy on the web site for others to try out.

Parts List

Simon Says PCB
Attiny85 pre-programmed control chip & 8 Pin IC socket
4 off 12mm x 12mm push buttons
1 off 6 x 6mm push switch
1x Red 5mm LED, 1x Orange 5mm LED
1x Blue 5mm LED, 1x Yellow 5mm LED
5x 1K Resistor
2 x 10K Resistor
1 x Switch Block
1 x 2N2222A Transistor
1 x 10k Trimmer (Preset Volume Control)
Battery Holder & Battery (1 x 3v CR2032)
Mini Speaker
0.1uF Capacitor
4 x Stick on Feet

Lets look at our PCB



The position for all the parts is shown so it should be easy to put this together.

Let's start with the resistors

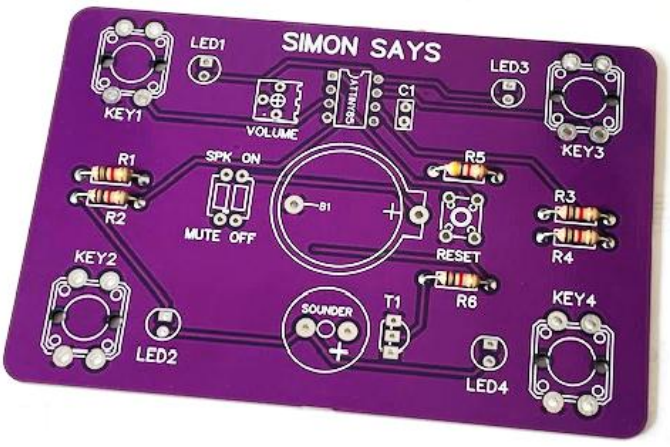
Most of the Resistors control the current that that the LEDs draw and so controls how bright they are, different colour LEDs need different amount of current to be the same brightness as other colours so we have different value resistor for some of the LEDS, make sure you put the right colour LED in the right place when we get to that stage.

Resistors can be fitted either way round.

There are 6 Resistors in total, the photo showing the resistors is of our prototype version, now some of the resistor values may be different than the photo, follow the instructions NOT the resistors in the pictures.

First fit the odd ones out, R5 & R6 Both are 10k in value (Coloured bands are Brown, Black, Orange, Gold)

Be carful you pick the right ones for these as all the resistors have the same colour first two bands. Make sure you have picked the two with the ORANGE third band!



Now fit the remaining resistors

R1, R2, R3, & R4 are all 1K resistors, colour bands are Brown, Black, Red, Gold
When all resistors are fitted trim the leads nice and flush on the back of the board.

Next fit the 8 pin IC socket, you will notice that the socket as a little notch cutout on one end. This notch should be towards the top of the board when fitted, make sure all the pins go through the board and none are missed when you solder them, also be sure that no solder bridges between pins have been made, take a good luck at the soldering when you have finished mounting this part.

Now fit the one and only capacitor C1, this can be mounted either way round. Trim the leads after soldering.

Next we can fit the preset volume control, this is a small blue trimmer, its value is 10K. It will only fit one way round. Trim the leads after soldering.

You will find 5 push buttons, one will be much smaller than the others, fit this first. This smaller button is the Reset (Start the game from the beginning again) button. It is fitted just above the word 'RESET' on the board. The leads are offset so it needs to be postponed so the leads fit into the mounting holes correctly. Now fit the larger 12mm buttons in the same way.

We also have a small two-way switch block, this block will allow us to mute the game sounds and turn the game on/off. Look carefully at the switch and you will see the ON position is marked. Position the switch so the 'ON' label of the switch is next to the 'ON' marking on the PCB. Solder and trim the leads.

The Game uses a large button battery (CR2032) these batteries are a choking hazard if swallowed, Please be sure that this is not handled by young un-supervised children!

Now fit the Battery holder, position it so that it matches the outline on the PCB.

Next fit the Sounder, look at the top of the sounder and you will see one side on the top there is a small '+' mark (its in a small circle) this is the positive side of the sounder and on the PCB you will see that the positive side is also marked. Make sure you position the sounder so the positive sides of the board and sounder match.

The sounder will have a small black round sticker in the centre, this is covering the speakers hole. This seems backwards really but leave the hole covered, it will be louder! Why do you think that is?

The reason is the sounder has a resonate frequency much higher than the tones we are using in our game due to its size it doesn't have very good efficiency at low frequencies. By blocking the sound hole we cause back pressure and this lowers the resonance frequency down to the range we are using, this makes the sounder much louder for our use, don't be tempted to remove the sticker.

Now we can fit the 4 larger game control buttons, all four are the same so any can be fitted in any position. Makes sure they sit nice and flush on the board when soldering them.

Not much left now. Now the parts we are fitting are relatively sensitive to heat so I hope by now you have had a little practice fitting parts so we can solder these next parts with more confidence.

The first of these parts is a transistor, its marked T1 on the PCB. There are thousands of different transistors widely used , for our simple project we are using a general-purpose device to amplify the game sound to the little on-board speaker. The transistor type is marked on the flat side of the transistors body. Our device is marked 2N2222A.

Position it so that its outline matches the outline on the board next to the sounder.

Check that there are no solder bridges between the legs when soldered. You may have to bend the legs out a little before fitting this part. After soldering trim the leads.

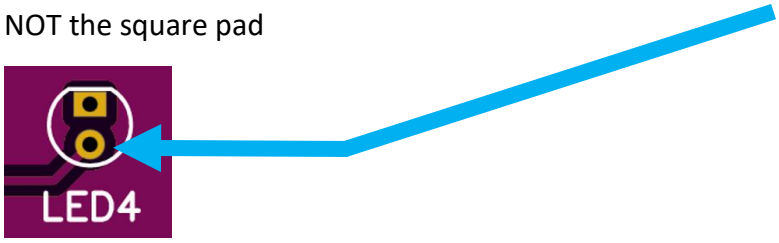
We have left the hardest parts to fit to the end.

The LEDs (Light Emitting Diode), you have 4 different colour LEDs in your kit the order of each LED on the board doesn't matter as the lighting sequence is random and changes each time.

What does matter is which way round the LEDs are fitted, this is VERY important, get this wrong and the LEDs will not light!

Look at the LEDs and you will notice that one leg is longer than the other

This is VERY important, the longest leg MUST go into the Round Pads hole, NOT the square pad



Now choice the order that you want the LEDs to be fitted in and fit them into positions LED1 to LED4, making sure the longest leg goes into the ROUND pads hole. Another way to check this, the body of the LED will also have a flat edge on one side. This flat edge should also line up with the shape printed on the PCB for the LED.

That's all the parts fitted now, good job!

Before we do anything else double check everything. Are all the parts the right way round? All the leads trimmed flush? No solder bridges between pads? If all ok then we can move on.

Now find and fit the little processor chip. Looking at the top of the chip you will see a small dot and a small notch, the dot identifies PIN1 (will be near the notch). This end of the chip should be nearest to the top of the board when plugged into the socket.

Before fitting the battery make sure this chip is fitted the right way round.

The final stage is the button battery. **A reminder again about letting young children handle this. It's a choking hazard if swallowed**.

The battery MUST be fitted the correct way round, one side of the battery has some engraving and '+' mark on it, this side should be visible on top of the battery when its fitted.

Congratulations the kit is complete!

Fit the 4 stick on feet, one in each corner of the board and your ready to go.

Now adjust the volume trimmer so its about halfway to start with and turn on the game with the little switch, in fact both switches should be in the 'UP' position now.

A word of warning about the volume control, the more you turn it up the quicker the battery will go flat!, I suggest leaving the control about half way, turning it lower doesn't save much power but turning it up will use up the little battery much quicker.

You should be greeted by a little musical sequence followed by one of the LEDs flashing, the game is on!

To play the game press the button next to the LED that illuminated, if you pressed the correct button you will get a little 'Correct' tune and the game will move to the next level. Each level will play the light sequence from previous levels and add an extra random LED at the end. Follow the sequence at each level. If you get it wrong the game ends and you get a 'Wrong' tune and the game starts from the beginning again, this time a new sequence of LEDs will begin. If half way though the game you want to start again, press the reset button.

At times you will be playing the game in a place other people are around and they may not want to hear the game tones, in this case the first switch can be moved down to the mute position.

When you have finished the game don't forget to turn it off.

The game draws just a few microAmps when not flashing the LEDs so if you leave it on don't worry too much about it if coming back to the game later but if you have finished with it for the day save the battery and turn it off.

Hope you enjoyed building and using the game.