555 / 4017 Experiment Board

www.MaximumOctopus.com/electronics/eb5554017.htm

You’ll find the latest versions of the instructions at the address above.

Thank you for purchasing the 555 and 4017 experiment board! I hope you have lots of fun with it!

If you have any suggestions for future boards then please let me know. I’ll send you some free boards if I like your idea!
Kit Contents

This kit was put together by a team of highly skilled octopuses; it should contain the following items:

1) The main PCB
2) 1x 555 timer IC
3) 1x 4017 decade counter IC
4) 1x 8 pin socket
5) 1x 16 pin socket
6) 1x 1N4001 diode
7) 1x 6 pin header
8) 1x 3 pin header
9) 2x 0.1uF capacitors
10) 1x battery connector clip
11) 1x 3xAA battery box
12) 10x 5mm LEDs
13) 10x 330 ohm resistors

Plus:

A selection of resistors and capacitors to get you experimenting!

Important Things to Remember

This kit is designed to run from 5V (using 330 ohm resistors). Do not exceed the suggested voltage or the LEDs will be damaged. Never connect a 9V battery to the battery clip, always use the battery box supplied.

The resistors and capacitors controlling the 555 timer may become warm during extended use. Always use caution when inserting/removing any of the resistors or capacitors in the header next to the 555 IC.

Before soldering any components check and then double-check that they are correctly oriented.

Don’t rush, and have lots of fun!

If you need a good tutorial on soldering then SparkFun Electronics has a good one (https://www.sparkfun.com/tutorials/106) as does Adafruit Industries (http://www.ladyada.net/learn/soldering/thm.html).
Building Instructions

You will need a soldering iron, solder, an octopus (or a set of handy helper things) and wire cutters. To keep some of the large components in place while soldering you might find Blue-Tac useful to stop them moving around or falling off.

Take your time and check the placement of every component before soldering them in place!

The 555 timer chip and associated socket must be placed on the top side of the board; the other components can go on either the top or bottom.

STEP 1 – 8 pin socket (for the 555 timer)
Don’t put chips in until the end.
Place it on the board so that the “notch” is facing inwards. Pin one on the chip is the top left corner, to the left of the “notch”. Pin one on the PCB is identified by a square solder pad, the others are circular.

STEP 2 – 16 pin socket (for the 4017 decade counter)
Don’t put chips in until the end.
Place it on the board so that the “notch” is facing inwards. Pin one on the chip is the top left corner, to the left of the “notch”. Pin one on the PCB is identified by a square solder pad, the others are circular.

STEP 3 – Capacitors
The two orange (or yellow) capacitors are placed in position at the “front” of each IC (see images above). They are not polarised, they can be placed any way around.

STEP 4 – Resistors (330 or 560 ohm)
The 10 330 ohm resistors are placed on the PCB in locations R0 to R9 (representing the 10 outputs of 4017 decade counter, Q0 – Q9). These are also unpolarised, but I like to place them so they are all facing the same way!

STEP 6 – Diode
The diode is polarised, it must be placed in position such that the silver end (cathode) is facing away from the LEDs/Resistors.
**STEP 7 – Headers**

The 6 pin header holds the resistors, R1 and R2, and the capacitor C1 that control the 555’s oscillation speed. Place it on the PCB next to the 555 chip.

The 3 pin right-angled header has three outputs:

- CTRL, the CTRL pin from the 555 chip
- OUT, the output from the 555’s square wave output (pin 3)
  This is an easy way of connecting an oscilloscope to the board.
- /10, this output is taken from the 4017's /10 output, it will oscillate 1/10th of the speed of OUT.

![Header Image](image)

**STEP 8 – LEDs**

The 10 5mm LEDs are located at the edge of the board, next to the resistors.

The LED should have a flattened side, this should be placed so that it lines up with the flattened side of the label on the PCB (this is the cathode); the anode has a longer lead and will go on the side closest to the resistors.

![LED Image](image)

**STEP 8 – Battery Clip**

The battery clip must be connected so that the red lead connects to the side marked Vin and the black lead connects to GND. This board is designed to run from 5v.

When using 330 ohm resistors the kit should be run from either 3x 1.5V AA batteries (using the supplied battery box) or 4x 1.2V AA rechargeable batteries. Never connect a 9V battery to the clip when in this configuration.

When using 560 ohm resistors the kit can be powered by a single 9V battery connected to the supplied battery clip.
Now all of the components have been soldered to the board it’s time to place the 555 and 4017 chips in to their sockets. They should be socketed so the notch on the chip is on the same side as the notch on the socket – facing the 0.1uF capacitor.

Before you try to carefully slot the chip in to socket you’ll notice that the legs are spread out too much to fit. They’ll need to be bent inwards before they’ll fit. DO NOT FORCE IT.

The way I like to do this is by very carefully pressing each side of the chip on my desk until both sets of pins are parallel. Once the legs are parallel it will take a bit of force to push the chips in to the sockets, be gentle and patient.
How To

This is the astable circuit configuration of the 555 IC in this kit. R1, R2 and C1 represent the relative connections on the 6 pin header at the top of the board (next to the 555 timer). These labels can also be found on the PCB.

The 555 will output a square wave controlled by resistors R1 and R2, and capacitor C1. The formulae for calculating the parameters of the square wave are found above.

Pin 3 is taken directly from the 555 and used as the input to the 4017’s CLOCK. With every clock pulse the counter will increment its count; this will light the next LED in the sequence. After the 10th LED has been lit (this is connected to Q9) it will output a pulse through the /10 output and start again from 1 (the LED connected to Q0).
Experiment with different sized resistors, capacitors, LDRs (light dependent resistors), thermistors, variable resistors and variable capacitors.

If you have any comments or suggestions for this kit then please let us know.

For more information, updates and details of new kits check out the following links:

- Website: www.MaximumOctopus.com
- Twitter: http://www.twitter.com/maximumoctopus
- Blog: http://maximumoctopus.wordpress.com
- Online store: http://store.MaximumOctopus.com
- YouTube: https://www.youtube.com/user/freshneyorg

This kit was designed and manufactured in the UK.

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