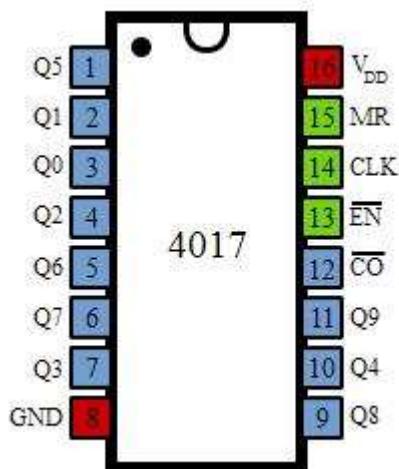


IC 4017 – Pin Configuration & Application

An Introduction to IC4017

Most of us are more comfortable with 1, 2, 3, 4... rather than 001, 010, 011, 100. We mean to say that we will need a decimal coded output in many cases rather than a raw binary output. We have many counter ICs available but most of them produce binary data as an output. We will again need to process that output by using decoders or any other circuitry to make it usable for our application in most of the cases.

Let us now introduce you to a new IC named IC 4017. It is a CMOS decade counter cum decoder circuit that can work out of the box for most of our low range counting applications. It can count from zero to ten and its outputs are decoded. This saves a lot of board space and time required to build our circuits when our application demands using a counter followed by a decoder IC. This IC also simplifies the design and makes debugging easy.



IC 4017 Pin Diagram

It has 16 pins and the functionality of each pin is explained as follows:

- Pin-1: It is the output 5. It goes high when the counter reads 5 counts.
- Pin-2: It is the output 1. It goes high when the counter reads 0 counts.

- Pin-3: It is the output 0. It goes high when the counter reads 0 counts.
- Pin-4: It is the output 2. It goes high when the counter reads 2 counts.
- Pin-5: It is the output 6. It goes high when the counter reads 6 counts.
- Pin-6: It is the output 7. It goes high when the counter reads 7 counts.
- Pin-7: It is the output 3. It goes high when the counter reads 3 counts.
- Pin-8: It is the Ground pin which should be connected to a LOW voltage (0V).
- Pin-9: It is the output 8. It goes high when the counter reads 8 counts.
- Pin-10: It is the output 4. It goes high when the counter reads 4 counts.
- Pin-11: It is the output 9. It goes high when the counter reads 9 counts.
- Pin-12: This is divided by 10 output which is used to cascade the IC with another counter to enable counting greater than the range supported by a single IC 4017. By cascading with another 4017 IC, we can count up to 20 numbers. We can increase and increase the range of counting by cascading it with more and more IC 4017s. Each additional cascaded IC will increase the counting range by 10. However, it is not advisable to cascade more than 3 ICs as it may reduce the reliability of the count due to the occurrence of glitches. If you need a counting range of more than twenty or thirty, I advise you to go with the conventional procedure of using a binary counter followed by a corresponding decoder.
- Pin-13: This pin is the disable pin. In the normal mode of operation, this is connected to ground or logic LOW voltage. If this pin is connected to logic HIGH voltage, then the circuit will stop receiving pulses and so it will not advance the count irrespective of several pulses received from the clock.
- Pin-14: This pin is the clock input. This is the pin from where we need to give the input clock pulses to the IC to advance the count. The count advances on the rising edge of the clock.
- Pin-15: This is the reset pin which should be kept LOW for normal operation. If you need to reset the IC, then you can connect this pin to HIGH voltage.
- Pin-16: This is the power supply (Vcc) pin. This should be given a HIGH voltage of 3V to 15V for the IC to function.

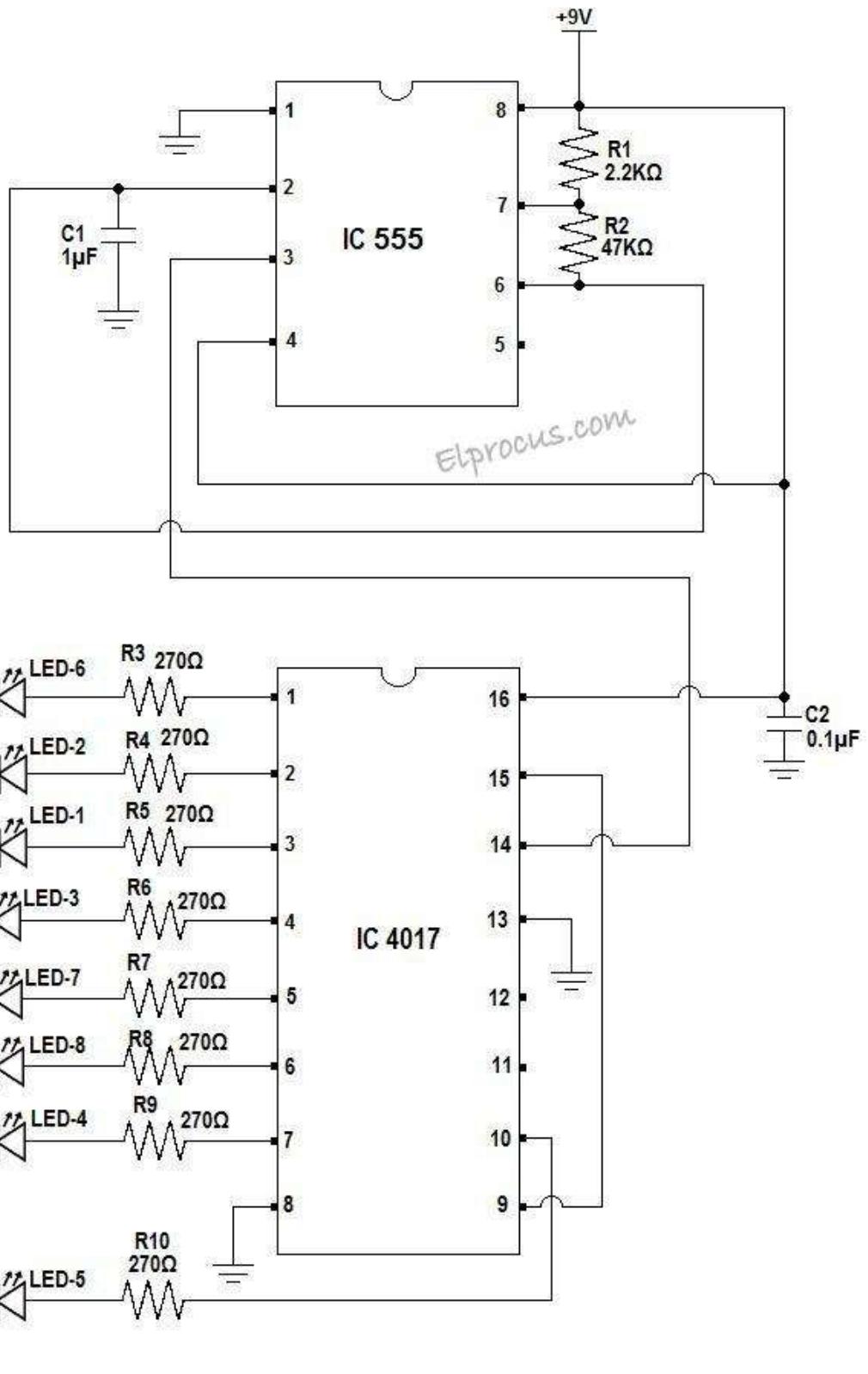
This IC is very useful and also user friendly. To use the IC, just connect it according to the specifications described above in the pin configuration and give the pulses you need to count to the pin-14 of the IC. Then you can collect the outputs at the output pins. When the count is zero, Pin-3 is HIGH. When the count is 1, Pin-2 is HIGH, and so on as described above.

2 Application circuits of IC4017

1. Circling LEDs effect

In this, we have eight LEDs that glow one after the other to form a circling effect. My intention in publishing this circuit is not just to make some artwork

with electronics but also to illustrate the working principle and circuit design using IC 555 in astable mode, 4017 counter, and to explain the related concepts.



Circuit Diagram of Circling LEDs effect involving IC4017

Circuit Explanation

The 555 IC will operate in astable mode with a frequency of 14Hz. The 555 IC in the circuit is used as a clock pulse generator to provide input clock pulses to the counter IC 4017. The IC 555 in the circuit operates at a frequency of 14Hz, which means that it produces about 14 clock pulses every second to the IC 4017.

Now we shall analyze what happens at IC 4017. IC 4017 is a [digital counter](#) plus decoder circuit. The clock pulses generated at the output of IC 555 timer (PIN-3) is given as an input to IC 4017 through PIN-14. Whenever a clock pulse is received at the clock input of the IC 4017 counter, the counter increments the count and activates the corresponding output PIN. When the count is zero, PIN-3 is HIGH, which means LED-1 will be ON and all the other LEDs are OFF. After the next clock pulse, PIN-2 of IC 4017 is HIGH, which means that LED-2 will glow and all the other LEDs can be turned OFF. This repeats and the LEDs turn ON and OFF successively on each clock pulse thereby producing a circling effect which I have demonstrated in the animation above.