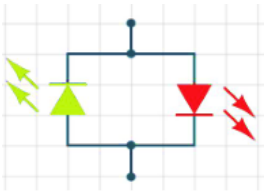


Bipolar LEDs Driver/Flasher

Abstract

This is a simple circuit that will blink the LEDs in regular time period. It is made up of a series of Bi-Color LEDs which are driven either by a 555 timing circuit or by a PNP transistor interchangeably.

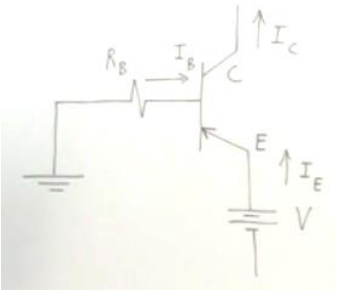
Circuit Components

- 555 timer
- PNP Transistor e.g. BC557
- Bi-Color LEDs
- Capacitors
- Power Source

Bi-Color LEDs

Bi-Color LED-consist of two diodes connected in inverse direction to each other inside a package. Consist of 3 terminals: a common pin (connected to ground) and two separate pins (determines the led color e.g. red pin or green pin).

555 Timer

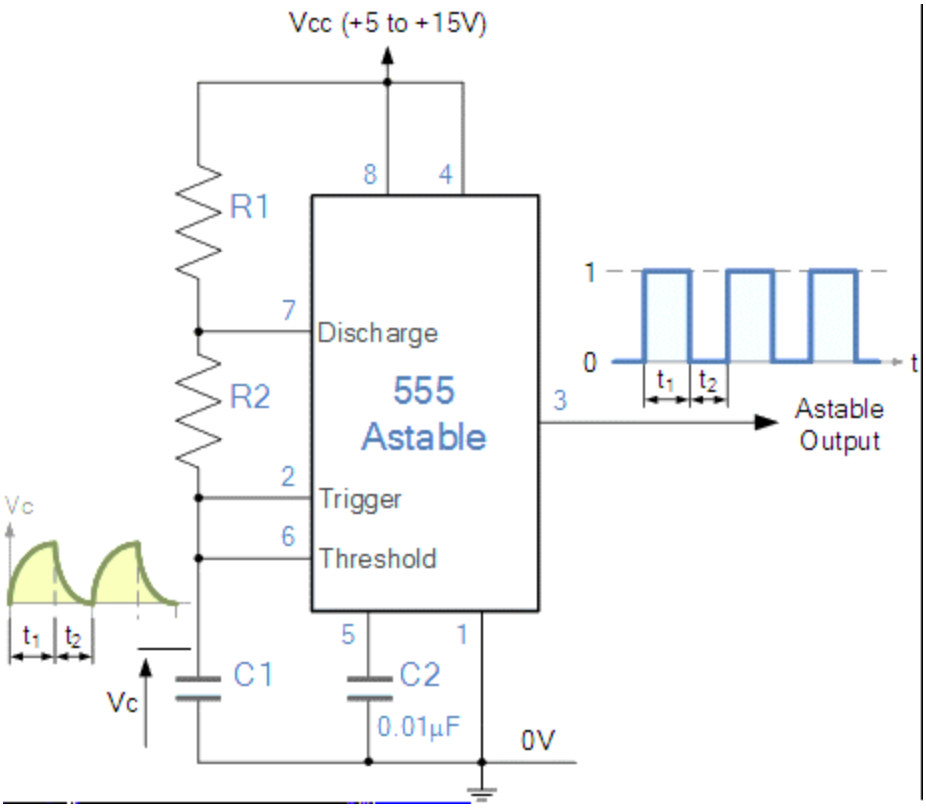


It is connected to operate in Astable mode by connecting the trigger input (pin 2) and the threshold input (pin 6) together, thus allowing the device to re-trigger itself on each and every cycle allowing it to operate as a free running oscillator, therefore it has no stable states as it continuously switched from one state to another.
Also the single timing resistor of the Monostable circuit should be split into two separate resistors R1 and R2 with their discharge connected to *discharge* input (pin 7) as shown in the diagram.

During each cycle capacitor, C1 charges up through both timing resistors, R1 and R2, but discharges itself only through resistor, R2 as the other side of R2 is connected to the *discharge* terminal, pin 7. Then the capacitor charges up to 2/3Vcc (the upper comparator limit) which is determined by the 0.693(R1+R2) C1 combination and discharges itself down to 1/3Vcc (the lower comparator limit) determined by the 0.693(R2*C1) combination. This results in an output waveform whose voltage level is approximately equal to VCC – 1.5V and whose output "ON" and "OFF" time periods are determined by the capacitor and resistors combinations.

Connected in Astable-mode (frequency generator). The output frequency is given by;

$$f = \frac{1}{T} = \frac{1.44}{(R1 + 2R2) * C}$$

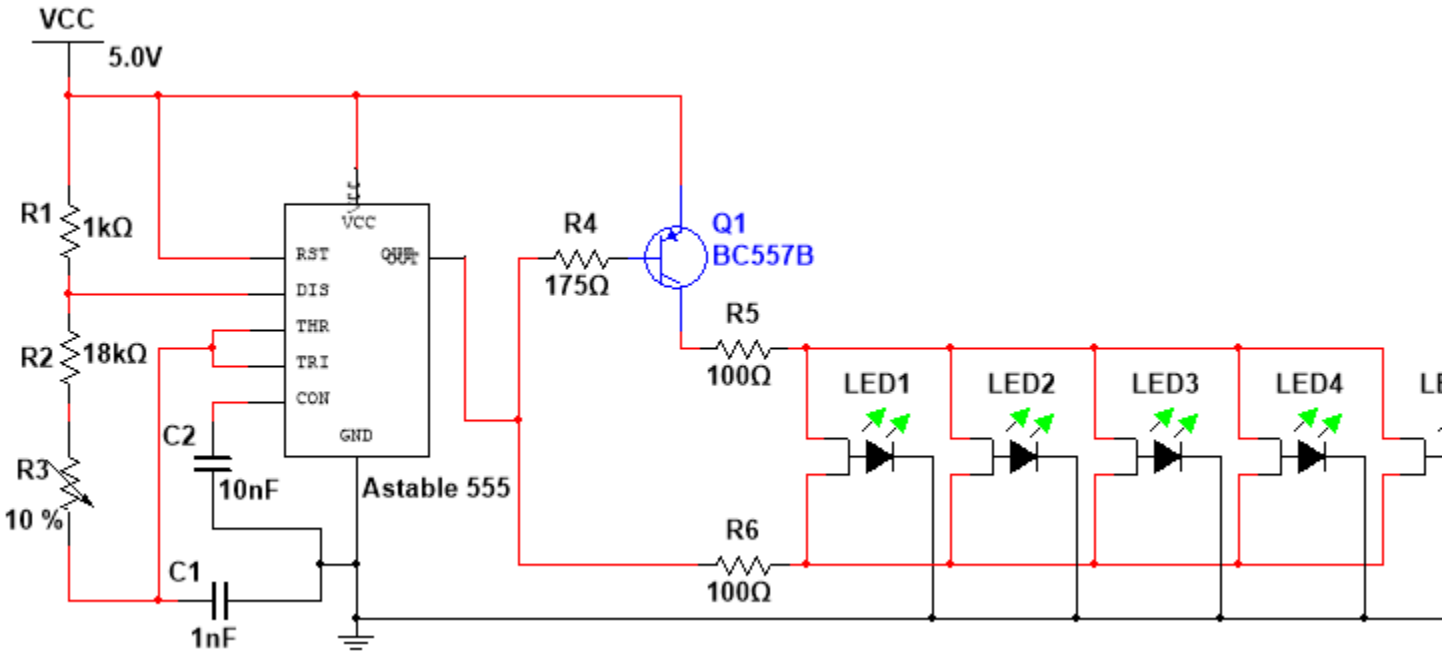


PNP Transistor

Is a type of a bipolar junction Transistor, whereby Holes are the majority charge carriers and electrons are the minority charge carriers. Small base current Ib is used to control the large emitter current Ie, the drives the load, I repeat:

The base voltage is generally 0.7V (Check datasheet).

Circuit Diagram



Circuit Explanation (Mathematical)

- **PNP Transistor**

  I_E=o only when I_B>o(OFF) and
  I_B=o only when I_E>o(ON);

  So the transistor basically operates like a switch. A small amount of current in the base controls the flowing of large current through emitter to collector region.

- **555Timer**

  The 555 timer is used to generate the PWM signal which will cause the LEDs to blink. The speed of the blinking by LED is determined by the potentiometer connected to the 555 timer. The PNP transistor is used to flash or blinks the LEDs.
  The PWM signal is the output of the 555 timer given to transistor, which acts as an inverter. When the pulse generated by 555 timers is low, transistor will get ON and LEDs will get ON. When the input of transistor is high, transistor will get OFF and LEDs are

made OFF. This ON/OFF of LEDs will go for every pulse width signal cycle. This mechanism will make the LEDs flashing.

The potentiometer which is connected to the timer should be present and also helps to adjust the blinking or flashing speed of the LEDs.

LED Blinking Circuits Applications:

- Dancing LED circuit can be used for any visual sign indication in any highways or it can be used in advertisement hoarding also.
- LED blinking circuit can be used in signaling purpose (It can be used as signal for help, if you are in danger)
- LED blinking circuit can be used as flashing beacon.
- LED blinking circuit can be used as vehicle indicator when it is broke down in the middle of the road. It can be used in operation theaters or offices as an indication that you are engaged in work.