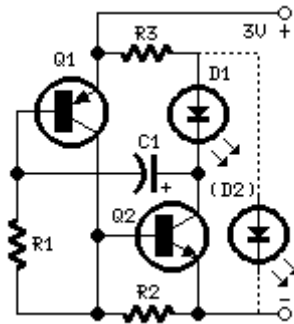


# LED or Lamp Flasher

**Minimum parts counting**  
**Designed for 3V battery operation**

## Circuit diagram:



## Parts:

R1 \_\_\_\_\_ 33K 1/4W Resistor  
R2,R3 \_\_\_\_\_ 47R 1/4W Resistors

C1 \_\_\_\_\_ 10 $\mu$ F 25V Electrolytic Capacitor

D1,(D2) \_\_LED(s) (Any type and color)

Q1 \_\_\_\_\_ BC560 45V 100mA PNP Transistor  
Q2 \_\_\_\_\_ BC337 45V 800mA NPN Transistor

## Notes:

- | Power supply can vary from 2 to 4.5V.
- | Add D2 to obtain two LED alternate blinking.
- | D1's on-time is shorter than off-time. The opposite regarding D2.
- | You can also use D2 only, shorting D1.
- | Don't change resistors' values.
- | Flashing frequency can be varied changing C1 value from 2.2 $\mu$ F to 100 $\mu$ F and higher.
- | This circuit is very efficient when driving a 3.2V lamp. In this case omit the LEDs and R3, connecting the lamp at Q2's collector and to positive supply, further reducing parts counting.

