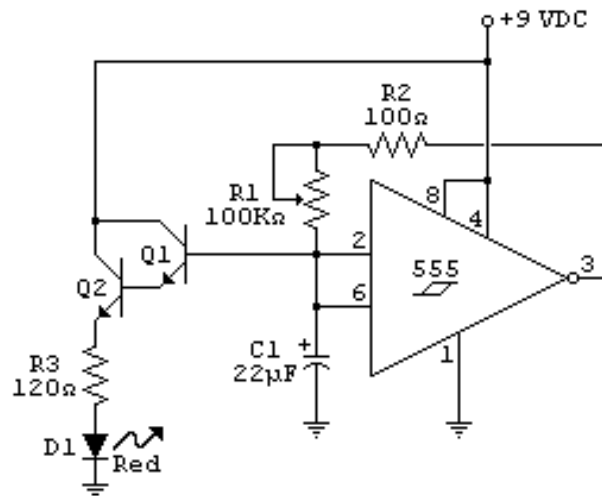
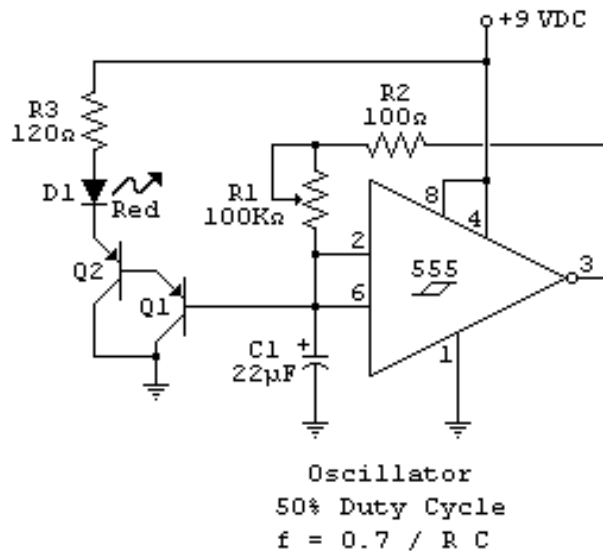
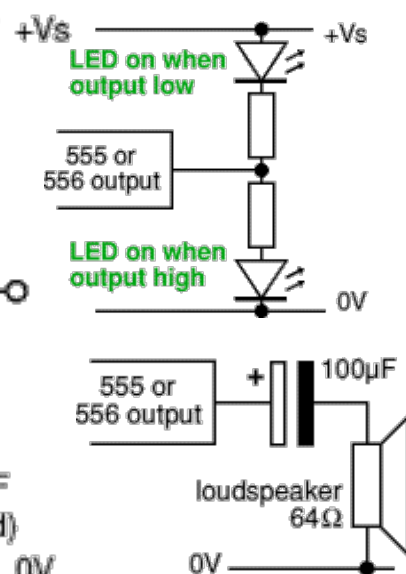
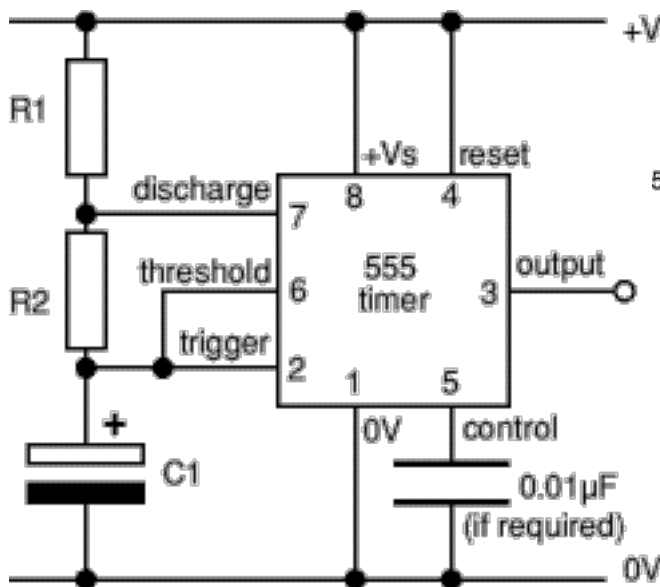




Throbbing LEDs [PNP transistor]

[NPN transistor]

**555 Timer  
Astable Mode**

$$T = 0.7 \times (R1 + 2R2) \times C1 \quad \text{and} \quad f =$$

$$\frac{1.4}{(R1 + 2R2) \times C1}$$

T = time period in seconds (s)

f = frequency in hertz (Hz)

R1 = resistance in ohms ( )

R2 = resistance in ohms ( )

C1 = capacitance in farads (F)

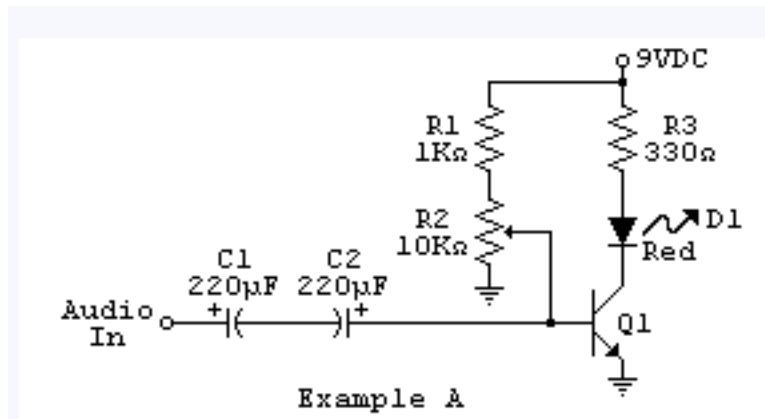
The time period can be split into two parts:  $T = T_m + T_s$

**Mark time** (output high):  $T_m = 0.7 \times (R1 + R2) \times C1$

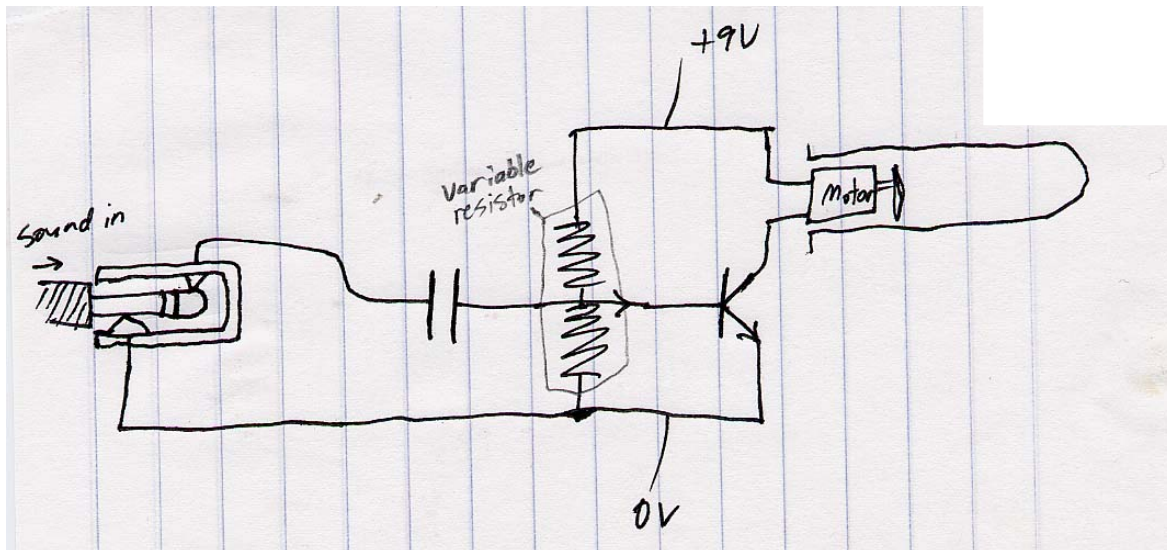
**Space time** (output low):  $T_s = 0.7 \times R2 \times C1$

**555 astable frequencies**

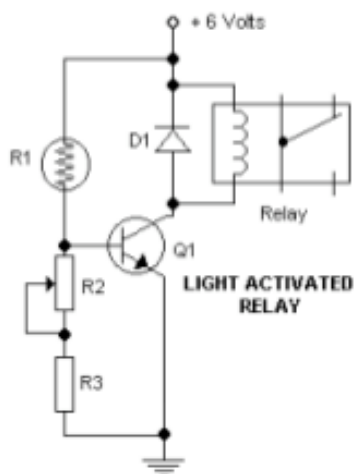
| C1      | R2 = 10kΩ<br>R1 = 1kΩ | R2 = 100kΩ<br>R1 = 10kΩ | R2 = 1MΩ<br>R1 = 100kΩ  |
|---------|-----------------------|-------------------------|-------------------------|
| 0.001μF | 68kHz                 | 6.8kHz                  | 680Hz                   |
| 0.01μF  | 6.8kHz                | 680Hz                   | 68Hz                    |
| 0.1μF   | 680Hz                 | 68Hz                    | 6.8Hz                   |
| 1μF     | 68Hz                  | 6.8Hz                   | 0.68Hz                  |
| 10μF    | 6.8Hz                 | 0.68Hz<br>(41 per min.) | 0.068Hz<br>(4 per min.) |



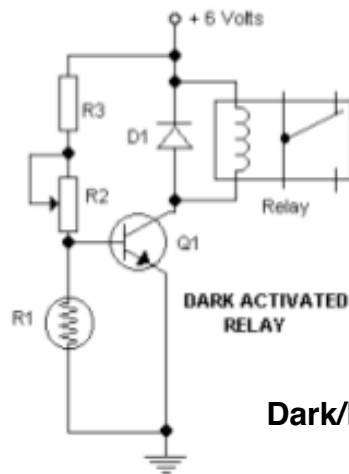
LED flickers to audio signal

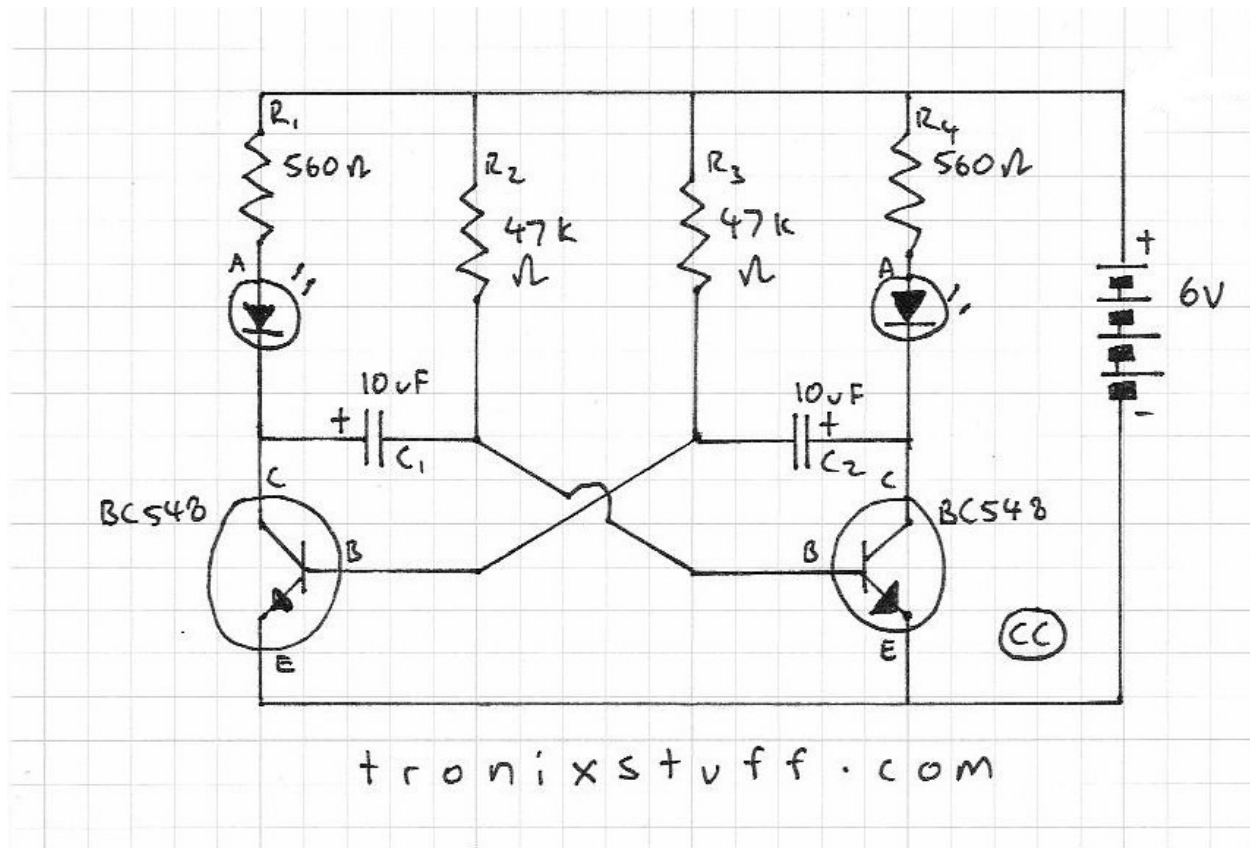


Use audio to control motor speed

**Parts List**

D1 = 1N914 diode  
 Q1 = 2N2222 or similar NPN transistor  
 R1 = photoresistor  
 R2 = 50K variable resistor  
 R3 = 1K  
 Relay = 5 to 6 volt relay.

**Dark/Light Activated Relay**



Multivibrator using RC circuits

**REFERENCES**

Throbbing LEDs and LED flickering to audio signal

<http://forum.allaboutcircuits.com/showpost.php?p=117649&postcount=13>

555 Timer (Astable mode)

<http://www.kpsec.freeuk.com/555timer.htm#bistable>

Audio controls motor speed

<http://www.afrotechmods.com/reallycheap/ghett-oh/ghett-oh.htm>

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<http://www.uoguelph.ca/~antoon/circ/actrelay.htm>

Multivibrator RC circuit

<http://tronixstuff.wordpress.com/2010/06/11/education-the-rc-circuit-2/>