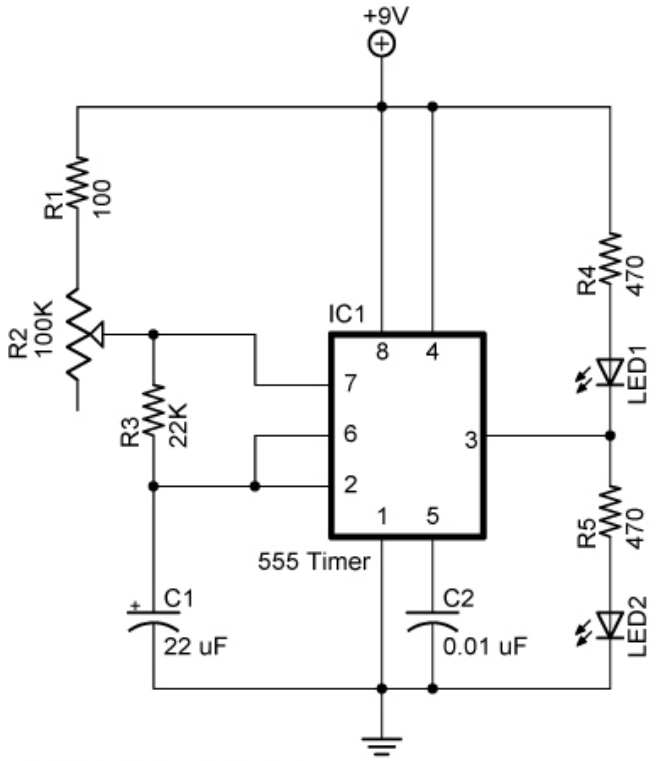
Dual LED Flasher Using a 555 Timer



Dual LED Flasher

Explanation: R1, R2, R3, C1, and the supply voltage determine the flash rate. The lower the value of R1, R2, R3, and C1, the faster the flash rate. The *duty cycle* of the circuit (the time LED 2 is on divided by the period of the cycle expressed as percent) is determined by the ratio of R1 + R2 to R3.

$$\text{Duty Cycle} = ((R1 + R2 + R3) / (R1 + R2 + 2R3)) * 100\%$$

Where:

R1 = resistance of R1 in Ω

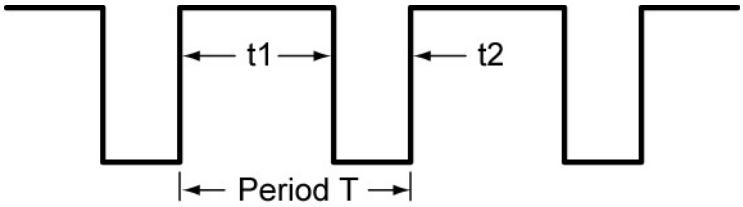
R2 = resistance of R2 in Ω

R3 = resistance of R3 in Ω

If the value of R1 + R2 is low in relationship to R3, the duty cycle will be near 50 percent. (If you assume R1 + R2 = 0, the Duty Cycle = R3/2R3 * 100%, which equals 50%) If you use both LEDs, you will probably want a 50 percent duty cycle. On the other hand, if R3 is low compared to R1 + R2, the duty cycle will be greater than 50 percent.

Other related formulas:

Output Waveform from Astable 555 Timer Circuit:



$t1 = 0.693(R1 + R2 + R3)*C1$

$t2 = 0.693(R3)*C1$

$f = 1 / T$
$f = 1/ (t1 + t2)$
$f = 1 / (0.693(R1 + R2 + R3)*C1 + 0.693R3*C1)$
$f = 1 / 0.693(R1*C1 + R2*C1 + R3*C1 + R3*C1)$
$f = 1.44 / (R1 + R2 + 2R3)*C1$

Where:

t1 = the time the pulse is HIGH in sec
t2 = the time the waveform is LOW in sec
R1 = resistance of R1 in Ω
R2 = resistance of R2 in Ω
C1 = capacitance of C1 in Farads
f = frequency in Hertz

The purpose of R4 and R5 is to limit current through the LEDs to the maximum they can handle (usually 20 milliamps). You should select the value of these according to the supply voltage. 470 ohm resistor works well with a supply voltage of 9-12 volts. You will need to reduce the value for lower supply voltages.

Related Lessons:
http://cornerstonerobotics.org/curriculum/lessons_year2/erii5_555_timer.pdf

http://cornerstonerobotics.org/curriculum/lessons_year2/erii5_555_timer_astable_operation.pdf

Related Web Sites: http://wild-bohemian.com/electronics/flasher.html