

Dual Tone Generation Using Timer 555

DEEPAK GUPTA



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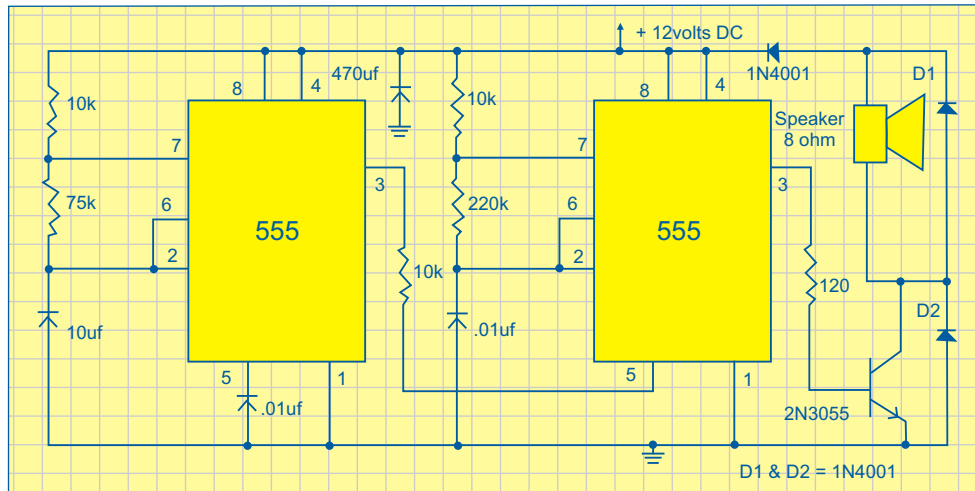
A dual tone siren, generally used in police vans can be built using two timers 555 IC. The timer on the left is configured as an astable multivibrator.

An astable multivibrator is a timing circuit whose 'low' and 'high' states are both unstable. As such, the output of an astable multivibrator toggles between 'low' and 'high' continuously, in effect generating a train of pulses. This circuit is therefore also known as a 'pulse generator' circuit. Capacitor

C1 charges through R1(10K) and R2(75K), eventually building up enough voltage to trigger an internal comparator to toggle the output flip-flop. Once toggled, the flip-flop discharges C1 through R2 into pin 7, which is the discharge pin. When

C1's(10uF) voltage becomes low enough, another internal comparator is triggered to toggle the output flip-flop. This once again allows C1 to charge up through R1 and R2 and the cycle starts all over again. C1's charge-up time t_1 is given by: $t_1 = 0.693(R_1 + R_2)C_1$. C1's discharge time t_2 is given by: $t_2 = 0.693(R_2)C_1$. Thus, the total period of one cycle is $t_1 + t_2 = 0.693 C_1(R_1 + 2R_2)$. The frequency f of the output wave is the reciprocal of this period, and is therefore given by: $f =$

$1.44/(C_1(R_1 + 2R_2))$, wherein f is in Hz if R_1 and R_2 are in megaohms and C_1 is in microfarads. The 555 on the right is wired as an alarm tone generator. The output of the left timer is to frequency modulate the right timer. This causes the right timers frequency to alternate between 440Hz and 550Hz at a 1 Hz cyclic rate. The transistor is used to help strengthen the signal to the



speaker. Thus the output of first generates a fast rising but slow falling saw tooth waveform. This waveform is buffered by the transistor and used to frequency modulate the tone generator and making its frequency rise slowly during the falling parts of the saw tooth but collapse rapidly during the rising part of the saw tooth. The output starts as a low frequency, rises for 1.15 seconds to a high tone, ceases for .35 seconds and then repeats the cycle.