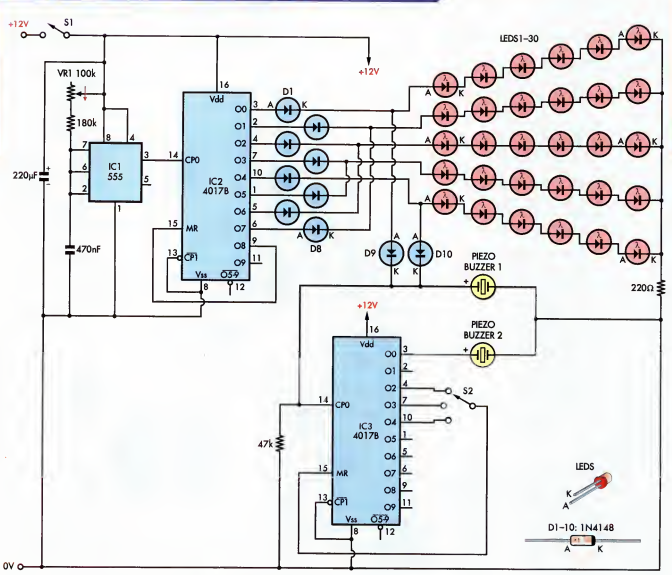

Audio-visual metronome

This circuit is essentially the digital equivalent of a regular metronome. It has an adjustable beat frequency and the beat is indicated both audibly (with a beep) and visually. Every second, third for fourth beat is audibly accented, to indicate the start of each bar.

555 timer IC1 provides the adjustable beat period and its timing is controlled by potentiometer VR1. It forms a simple astable oscillator, where VR1 and the 180kΩ resistor control the rate at which the 470nF capacitor is charged.

When pin 6 reaches about 8V, pin 3 goes low and the 470nF capacitor is discharged via pin 7. When pin 6 subsequently reaches 4V, the pin 3 output goes high again and the process repeats.

The generated square-wave drives the clock input (CP0, pin 14) of IC2, a 4017 decade counter/divider. The first eight outputs of IC2 drive five strings of red LEDs (LEDs1-30) via diodes D1-D8. These LEDs are arranged so that as successive outputs go high (with each pulse from IC1), the LEDs light in a 1-2-3-4-5-4-3-2 pattern, simulating a swinging pendulum.

This sequence repeats indefinitely as IC2's ninth output is connected to its master reset (MR, pin 15) input.

When the first and last LED strings light, IC2 also drives piezo buzzer 1 via diode D9 or D10, so the beat sounds as the "pendulum" reaches the limits of its "swing". At the same time, a clock pulse is delivered to IC3, a second 4017 decade counter. Rotary switch S2 selects between two, three and four beats per bar.

At the start of each bar, IC3 drives piezo buzzer 2 to accent the beat (they should ideally be different types). Switch S2 determines how many clock pulses IC3 requires before it is reset (via its MR input, pin 15) and therefore how often the accented beat sounds.

The circuit runs from a regulated 12V supply and can be turned on and off by power switch S1.

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