

Circuit & Design Ideas

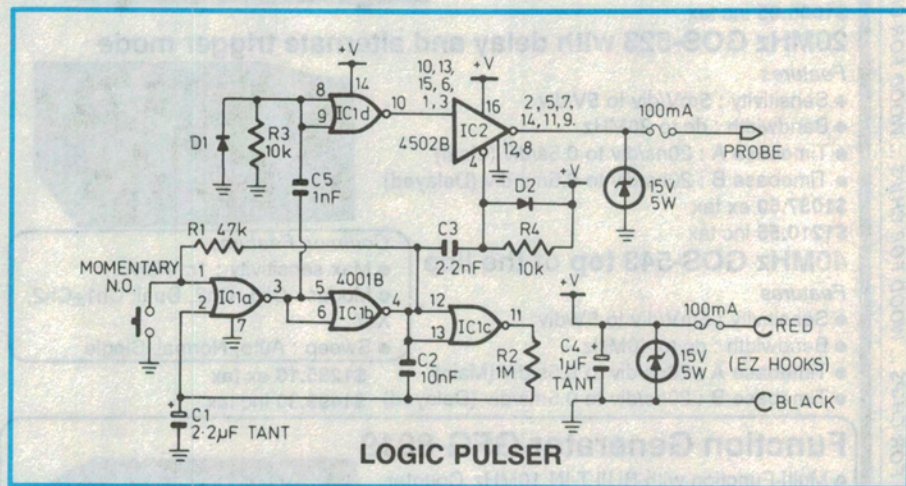
Interesting circuit ideas from readers and technical literature. While this material has been checked as far as possible, the circuits have not been built and tested by us. As a consequence, we cannot accept responsibility, enter into correspondence or provide constructional details.

Simple Logic pulser

This simple circuit uses only two common CMOS integrated circuits, yet gives excellent performance. When the normally-open momentary switch is depressed, the probe produces a single pulse of duration approximately 5 microseconds, of a level opposite to the pre-existing state of the node under test. If the finger is held on the switch, after a short pause the probe produces a continuous train of pulses at about 50Hz, each pulse of 5 microsecond duration.

The momentary switch could be a touch-switch, if R1 is changed to a large value, say 10M, and a path through the finger is provided to earth, say via a metal casing for the pulser. The loop formed by the three 4001B gates is an oscillator.

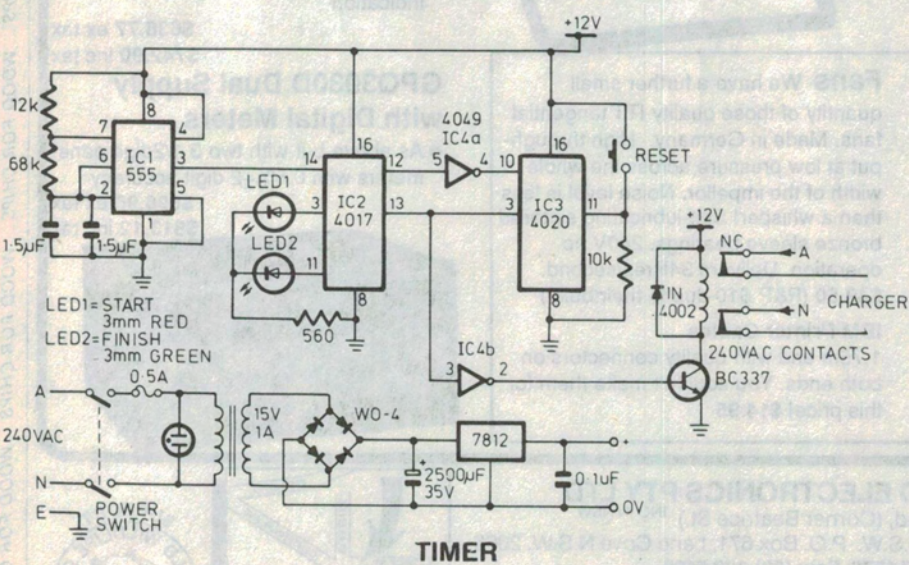
Initially, C1 is completely discharged, which is the normal state when no pulses are being produced. Depressing the switch puts pin 11 high, charging C1 through R2. When C1 reaches the threshold voltage into pin 2, pin 4 flips high, and pin 11 low. The action of pin 4 going high causes C2 to inject a



charge into C1, raising its voltage slightly above pin 2's threshold. C1 discharges through R2, and when C1 falls to the threshold again, the gates again flip, causing C2 to extract a small charge from C1, pulling C1 slightly below the threshold. Pin 11 is at this point in time high, and causes C1 to charge back toward the threshold through R2. C2 introduces a hysteresis

into the operation, to ensure oscillation, and adjustment of C2 can set the continuous pulse frequency.

The reason that the oscillator produces one pulse, followed by a delay before the continuous pulse-train starts, is that initially C1 must charge from zero volts, to reach the threshold; thereafter it oscillates about the threshold by only a small amount, as set by C2.



14H battery charging timer

This circuit was designed to automatically switch off a NiCad battery charger after the appropriate period of 14 hrs.

The circuit is based on an analog timer followed by counters, used to provide the relatively long timing period. In detail, IC1 (555) is operating in the astable mode oscillating at a frequency of 3.24Hz. This signal is fed into IC2 (4017) and further divided by a factor of 10, thus giving the desired frequency of 0.324Hz.

This output frequency is taken from pin 12 or IC2 and is inverted by IC4a, then fed into a 14 stage binary counter. After 16384 pulses (2¹⁴), pin 3 of IC3 will go high hence switching the transistor and relay on via IC4b. Pin 3 of IC3 is also directly connected to the clock

disable of IC2, hence terminating the timing period until the reset button is pressed.

With the values shown, a timing period of approximately 14 hrs is achieved. However, this timing period can be changed by varying the input frequency or the binary output or both. The frequency for this circuit was calculated using the formula

$$f = 2^n / T$$

where f = frequency; n = binary exponent and output; T = timing period in seconds.

Finally, LED1 indicates the start of the timing period whilst LED2 will indicate when the charging is finished. During the operation, these LEDs will flash alternately. A master reset is also added to ensure flexibility of usage.

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