

Unijunction Transistor Circuit

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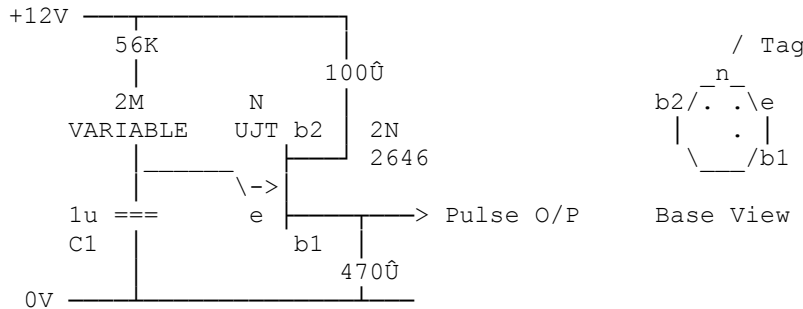
By G8MNY

(Correction Aug 05)

Unijunction transistors are strange animals, not often found they have 2 bases that are on the same bar of silicon with an emitter in the middle. They exhibit a -ve impedance characteristic emitter to base 1 & as such easily form simple oscillators. But as they are slow devices they are not useful for radio work.

TIMEBASE

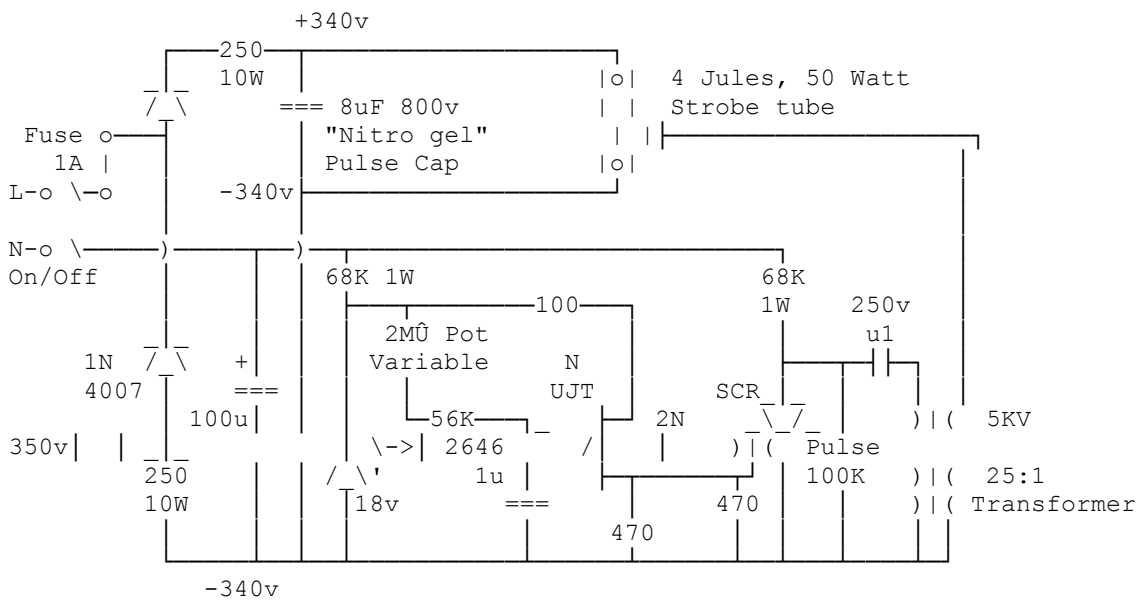
Here is an example of a Unijunction transistor used for a simple time base from 5 sec period to 20Hz, for higher speeds change C1 for 0.1u or 10n.



HOW IT WORKS

When C1 charges up to the trigger voltage of the UJT, it fires & discharges the C1 producing a voltage spike on the Base 1. The 100uF is for protection of the load & UJT.

PRACTICAL MAINS LIVE STROBE CIRCUIT



This strobe circuit uses the UJT pulse circuit to trigger a small SCR that discharges a 250V u1 cap into an pulse ignition transformer (small highly insulated coil). The AC pulse of the 0.1uF & Transformer, the brief gate

trigger pulse & the low current through the 68K insure the SCR can't remain on between pulses. The 100K limits the trigger circuit voltage to 200V.

This stepped up high AC voltage spike applied to the outer trigger electrode starts up a discharge in the 50W strobe tube that discharges the special pulse capacitor that was charged up to 680V DC.

The whole circuit is mains live & housed in a well earthed metal box with plastic shafted pot & main switch frame mounted off the case.

The large coiled strobe tube is at the prime focus of a reflector (car headlight sized reflector). Smaller power tubes can be used just change the 8uF for a smaller value to suit the tube flash & continuous power ratings.

Strobe Energy = $\frac{1}{2}CV_s^2 - \frac{1}{2}CV_d^2$, Where V_s = start volts, & V_d = discharged Volts.

But as V_s^2 is much smaller than V_d^2 it can be ignored.

$$\frac{1}{2} \times 8 \times 10^{-6} \times 680 \times 680 = 1.85 \text{ Watts}$$

But @ 20 Pulses per second that is 37 Watts! Hence the 50W rating of the tube.

The common photographic flash gun tubes, are over run at 100x brighter than strobe tubes & last only a few thousand flashes as they suffer immense thermal shock at each flash.

Strobe tube flashes for several tens of million of flashes!

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73 De John, G8MNY @ GB7CIP