

Single-Shot Auto-Charge Flash Circuit

1 Introduction

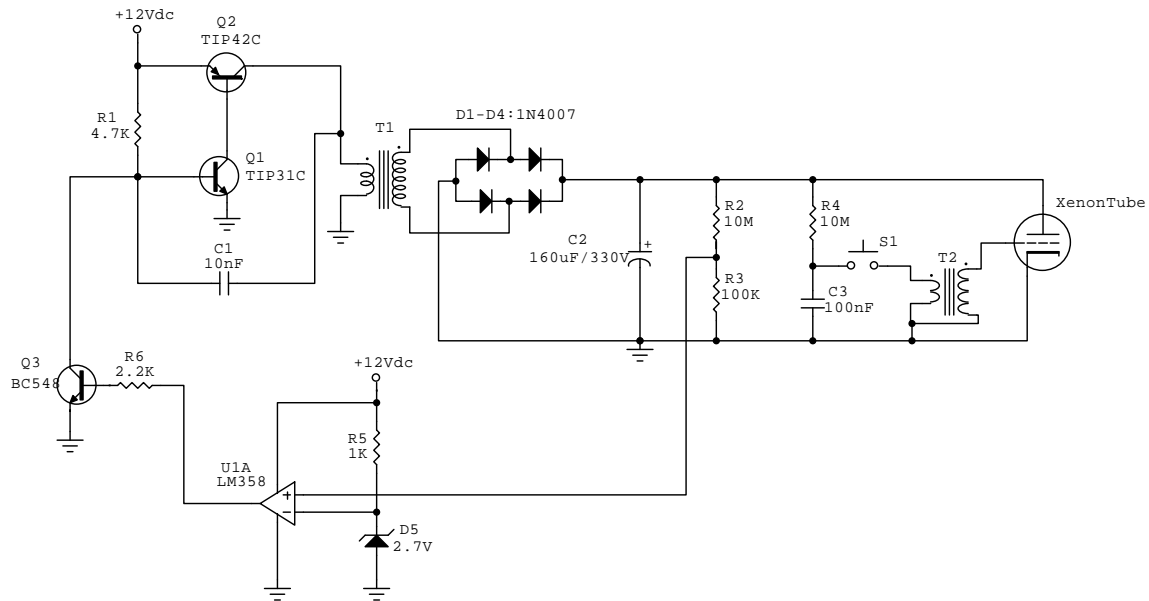


Fig. 1. The single-shot flash circuit with auto charge cut-off feature.

There is a voltage divider composed of R2 (10M) and R3 (100K) which effectively divides the voltage across C2 by about 100. Also note the ground of C2. It is connected to the inverter ground for reference. I used an LM358 comparator to keep track of the charging status. A 2.7V zener diode makes the reference voltage at about 2.85V (it's slightly overdriven by 1K resistor). The voltage across R3 will be about 2.85V when the cap is charged to 285V. Till that time, the comparator output is low, and hence Q3 is OFF. After that, Q3 will be turned on and saturated. And it will steal the base current from Q1 and fix the VBE of Q1 to about 0.2V. That act will turn off the oscillator and stop the charging process. During the experiments, with the values shown in Fig. 1, the capacitor was charged to 300V in about 4 sec. and was kept at that value till I pressed the fire button. I also observed that discharging the cap with a higher voltage rating, i.e. 400V version, will make an intense light explosion such that the interior of the Xenon tube will be damaged, as shown in Fig. 3. There is one problem with the circuit. During normal operation, Q2

shorts out the supply and the reference voltage changes slightly over the time. I believe that a 555 based oscillator will solve this problem.

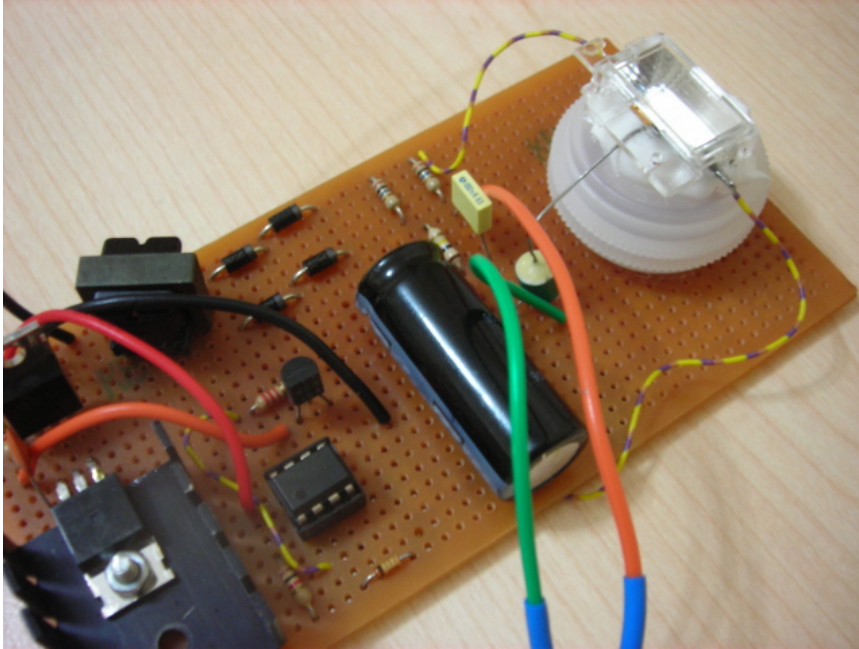


Fig. 2. The circuit.



Fig. 3. Interior damaged Xenon tube due to intense light burst caused by a high energy discharge.

During the tests, the cap was charged to 300V with 12VDC. When the supply voltage lowered to 7VDC, the cap was charged to 270V. Below 7VDC is not useful

since the Xenon tube will not fire. So the useful range for the DC supply is 7-12V for this circuit.

APPENDIX

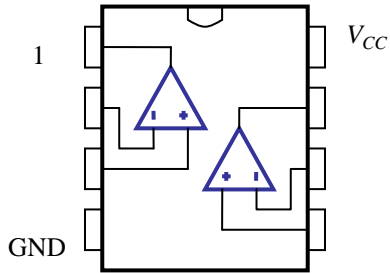


Fig. A1. LM358 op-amp.

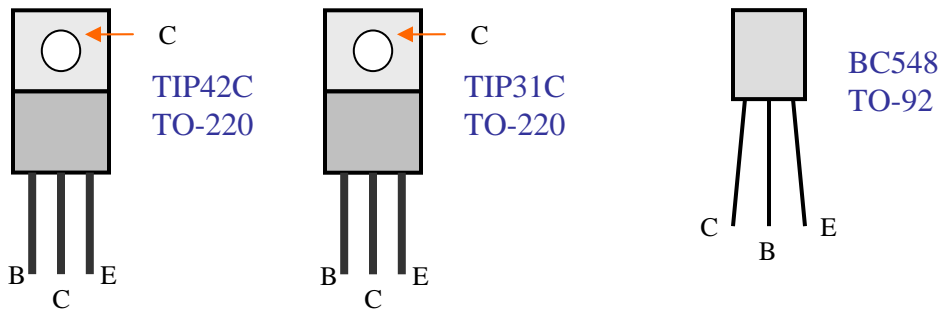


Fig. A2. TIP42C, TIP31C, and BC548 pinouts.

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