Minimal Parts Strobe Light

C. Bond, 2009

Here is a schematic for a low cost, minimal parts count, xenon flash strobe. It uses parts which may be taken from easily obtainable, discarded items so not only is the parts count low, the cost is low. The most distinctive novelty of this circuit is the use of a piezo-electric igniter, rather than a coil, to trigger the stobe. This method has proven to be extremely reliable for a wide range of flash tubes.

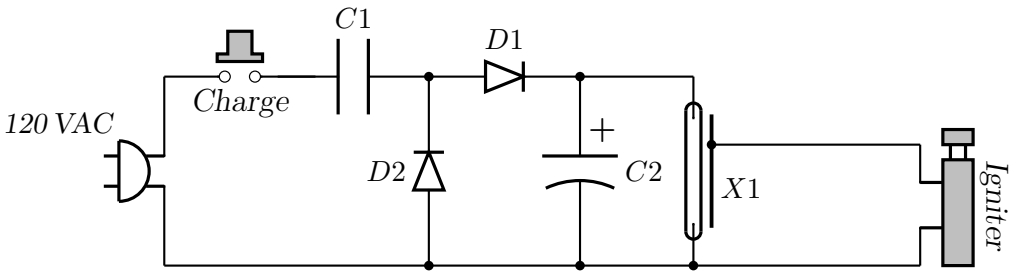

Figure 1: Piezo-electric Igniter Triggered Strobe

— Parts List —		
Reference	Value	Comment
C1	$1 - 10\mu f, 250V$	Non polarized!
C2	$80 - 160\mu f, 330V$	(from camera)
D1,D2	1N4004	$400V, 1A$
X1	xenon flash tube	(from camera)

The design is unique in a number of ways. First, it contains no active components – transistors, SCRs, TRIACs, etc. This lowers the cost and complexity compared with most other designs. Second, it contains no transformers for step up DC-DC conversion or flash triggering. This also reduces complexity and cost. Note that there are no resistors required by the design.

There are many, many sites on the internet which explain how to obtain and disassemble disposable flash cameras to remove the flash unit. Both the xenon flash tube and the discharge capacitor are used by this design. It is easy to obtain used disposable cameras free, with a little charm or ingenuity.

The *igniter* is a piezo-electric spark generator which can be scrounged from a used or worn-out electronic lighter or BBQ igniter. At least one wire will be attached to the spark unit and the bottom metal cap is the other electrode. Even if you can't find a discarded unit, you may be able to find a new one at a dollar store. You may also have to improvise a holding fixture for the spark unit to make it easy to use.

The AC line cord can be cut from a discarded appliance, unused AC power adapter, etc. Since the current will be low, any line cord will serve.

To operate the circuit, plug in the line cord, then press the charge button for about 10 seconds, release the charge button. Press the igniter button to fire the strobe.

CAUTIONS and CAVEATS

This is a line operated device. Exposure to lethal voltage is possible unless adequate precautions are taken. Although any line cord would be suitable for the device, as stated above, it is strongly urged that you find a polarized line cord and connect it with the ground side at the lower pin of the AC plug as shown on the schematic. This assures that the *hot* side is only accessible at the entry pin for the push button, except during charging.

The capacitor, $C1$, must be non-polarized. This requirement is not clear in the schematics for other line operated strobes shown on the internet. The reason is that for a significant number of charging cycles the capacitor may be reverse biased by a considerable voltage. Such a situation can be dangerous for polarized capacitors.

There are two reasons for the low value of capacitance for $C1$. One is that small non-polarized capacitors are cheaper. Low capacitance here has the benefit that it raises the impedance to the power source so that limiting resistors are not required. The penalty paid is that the charge time for $C2$ is fairly long – 8 to 10 seconds using the $1\mu f$ value. Do not exceed the $10\mu f$ value for $C1$ or else a limiting resistor will be required.

Note that when the capacitor discharges through the xenon flash tube, it does not discharge down to 0 volts. It only discharges down to the extinguishing voltage of the flash tube. This voltage may be about 50 volts, so beware that

the capacitor may still carry a charge long after the strobe fires.

Finally, $C2$, if taken from a flash camera, is usually rated at 330 VDC. The actual voltage available from the doubler which drives the charging circuit may exceed this slightly. Most electrolytics will tolerate small overvoltage without problems, but forewarned is forearmed.