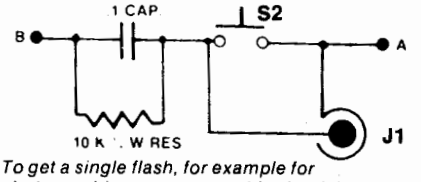
Simple Strobe

This circuit uses a xenon strobe to give single or variable rate multiple flashes.

PARTS LIST

RESISTORS all ½W 5%	
R1	20k
R2	1M Potentiometer
R3	1M2
R4	100k
CAPACITORS	
C1, C2, C4	10u 450V
C3	220n 250V
SEMICONDUCTORS	
D1, D2	1A 600V
MISCELLANEOUS	
I1	neon bulb
F1	Xenon flash tube
S1	part of R2
T1	trigger transformer (Jana LJ 12150)

A kit of parts is available from Jana — see their ad in this issue.



To get a single flash, for example for photographic use, connect this circuit between A and B in the main circuit. With R2 in the position for slowest flash rate (ie no flashes!) S2 will provide the desired single flash. Alternatively J1 can be used to allow the camera's flash contacts to trigger the strobe.

The stroboscopic effect, where a flashing lamp is used to illuminate some moving process, is extremely useful for stopping the action. For example, a dripping tap observed using a strobe allows the viewer to see the drops apparently suspended in the air. Similarly, the bending of fan blades may be seen as the fan is in action. This simple strobe project provides the basics needed for experimentation in this area.

HOW IT WORKS

Initially the neon and xenon lamps are not conducting and act like a very high (almost infinite) resistance. Capacitors C1 and C4 in conjunction with D1 and D2 act as a "voltage doubler" circuit, which can charge C2 up to about 300V DC after several AC cycles. (See if you can figure out how this action occurs.)

Meanwhile, back at C3, the voltage is increasing as current is supplied through R1 and R2. Neon bulb I1 has the characteristic that at a certain voltage (varies from bulb to bulb) it will all of a sudden start to conduct (conduction through the neon gas causes the orange glow). While conducting the resistance of the bulb will be relatively low.

Due to this sudden conduction a pulse of current will pass through the primary of T1. The turns ratio is such that about 4000V will be developed at the secondary. The xenon tube is similar to the neon bulb in that it produces light when the gas ionizes and conducts. However, it is designed so that an external signal (the 4kV on the metal ring around the tube) ionizes the gas and initiates the conduction.

When F1 conducts it discharges C2. At this point the whole cycle starts over again. The purpose of R2 is to vary the rate at which C3 charges, and hence the repetition rate of the strobe.