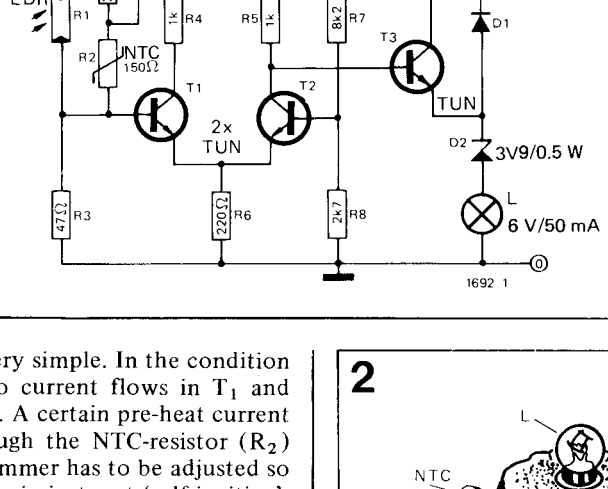
electronic candle

The starting point for design of this electronic candle was a desire to reduce the fire risk associated with the Christmas season, at the same time providing a candle which would not burn up so quickly. Naturally, the electronic candle can be lit with a match (but a pocket torch will do the job too!); it can be blown out or 'nipped out' with the fingers.

1



The circuit is very simple. In the condition 'candle out' no current flows in T_1 and T_2 is saturated. A certain pre-heat current is passed through the NTC-resistor (R_2) via P_1. This trimmer has to be adjusted so that the candle is just not 'self-igniting'. Strong illumination of the LDR (R_1) will cause T_1 to conduct. The circuit is arranged so that even bright room lighting will not cause things to happen – a burning match held close to the LDR will however do the trick nicely.

When T_1 starts to conduct, the current through T_2 is reduced until ultimately this transistor cuts off. T_3 will meantime start to conduct, lighting the candle flame. As T_3 approaches saturation an extra heating current flows via D_1 into the NTC, causing this to drop in resistance value. If the match is held long enough in position – it should almost burn down to the fingers – the circuit will hold in the 'candle lit' condition.

The candle can be blown out if one blows long and hard enough on the NTC. The ultra-slow triggering action of starting up is now reversed and the lamp-current falls away to zero – the flame goes out. It is also possible to 'nip out' the candle by cooling the NTC between two fingers. The prototype candle used a miniature NTC having a resistance at room temperature of about 150 ohm.

2

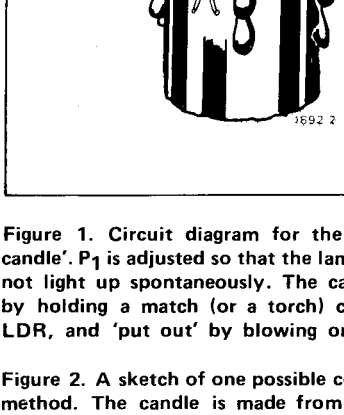


Figure 1. Circuit diagram for the 'electronic candle'. P_1 is adjusted so that the lamp just does not light up spontaneously. The candle is 'lit' by holding a match (or a torch) close to the LDR, and 'put out' by blowing on the NTC.

Figure 2. A sketch of one possible construction method. The candle is made from a piece of PVC electric-wiring conduit.

If desired, one can replace the zener-diode D_2 by 5 series-connected DUS universal diodes.