

flickering flame

The simplest possible flasher device is a bimetal switch. This construction can be found in 'blinker bulbs' and in the starter-switch associated with a fluorescent lamp.

The possibility immediately comes to mind of using a fluorescent-lamp starter as a flasher for Christmas-tree or other decorative lights. If one uses more than one starter in some combination of several lamps or lamp-groups, highly varied and interesting effects can be obtained.

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Figure 1. Photograph of a partly dismantled fluorescent-lamp glow-starter. Note the suppression capacitor.

Figure 2. The simplest possible flasher circuit consists of a single starter wired in series with a filament-lamp load.

Figure 3. Example of a more complicated arrangement. Two starters and three lamps (or lamp-strings) of unequal wattage will provide a highly variable flickering-effect.

The basic idea is shown in figure 2. The starter is wired in series with the lamp or lamp-string (such as Tree-lights).

When mains voltage is applied across the series combination the inert-gas mixture in the starter becomes conductive and a current-carrying glow-discharge occurs between the electrodes. One of these electrodes is actually a 'bimetal', two thin strips of different metals - having two different thermal expansion coefficients - welded together. Such a bimetal will curl (or uncurl) when it is heated. In the fluorescent-lamp starter the discharge current through the gas provides the heating, and the curling of the bimetal is arranged to cause a short-circuit between the glow-electrodes. This removes the supply of heat, so that the cooling bimetal reopens the circuit a second or two later.

The lamp connected in our arrangement will therefore flash more or less regularly on and off. The current which may be switched by the starter depends on the rating of the lamp for which the manufacturer intended it. The best place to find this rating is the label on the 'ballast' device. Alternatively, assume that if the starter (e.g. Philips type S10, see photo) is intended for fluorescent tubes up to 80 watt rating, that it will safely switch ordinary filament lamps to this amount.

Note that the starter normally becomes 'dormant' when the arc-type gas discharge in the fluorescent tube 'strikes'. This is because the voltage across the steadily

burning arc is too low to allow the starter-glow to re-ignite. In our application there is no such effect, so that the 'starter' will flash its load continuously.

It is however possible to dream up circuits in which more than one starter is combined with a split-up load in a way which makes fuller use of the properties of a given type of device. As an example take figure 3. This circuit will do the wildest things, depending on the individual starters and on the load values.

Suppose that L_2 has the lowest wattage. When the mains is applied it will burn more or less brightly. As soon as one of the starters makes contact, either L_1 or L_3 will come on full and L_2 will go out. When the second starter makes contact all the lamps have the full voltage applied - but almost immediately the first starter will reopen ...

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