Mains Appliance Timer – cooked up in the kitchen!

THIS design makes use of a low-cost digital kitchen timer to control mains appliances. No modification is needed to the timer, the only requirement being that it must beep both when the start button is pressed, *and* when the period has expired.

The circuit diagram for the Mains Appliance Timer shown in Fig. 1 detects the supply current flowing through the timer, and drives an external relay circuit which operates mains loads for a period set by the kitchen timer.

A low-voltage supply is formed by transistors TR1 and TR2, being a ring-of-two constant current source adapted to provide about 1·5V at TR1 emitter (e). This powers the timer. The supply for the complete circuit is mains derived via transformer T1 and regulated down to 12V by IC4.

At power on, capacitor C3 provides a positive pulse which sets IC3a (pin 8), one half of a dual D-type flip-flop. Output QA (pin 13) goes high which resets IC3b so that QB (pin 1) is low. Transistors TR4 and TR5 are off and so the relay RLA does not operate. However, transistor TR3 is driven on which illuminates the green l.e.d. D1 to indicate reset.

The digital timer can now be set to the desired duration. Then switch S1 is pressed, which resets IC3a, QA goes low which enables IC3b.

On pressing the timer's "Start" button, the increase in its supply current caused by the beep rises from a few microamps to 5mA or more. The voltage across resistor R5 rises and comparator IC1, whose threshold is set by resistors R4 and R6, will output a brief positive pulse.

This is cleaned up by the monostable formed from IC2a and IC2b, and clocks IC3b. Output QB (pin 1) now goes high and powers the relay via the Darlington transistor pair. Red l.e.d. D2 illuminates to indicate timing is in progress.

At the end of the period, the first beep clocks IC3b again. Output $\overline{QB}$ (pin 2) goes high to clock IC3a (pin 11); QA goes high and resets IC3b so that the relay switches out.
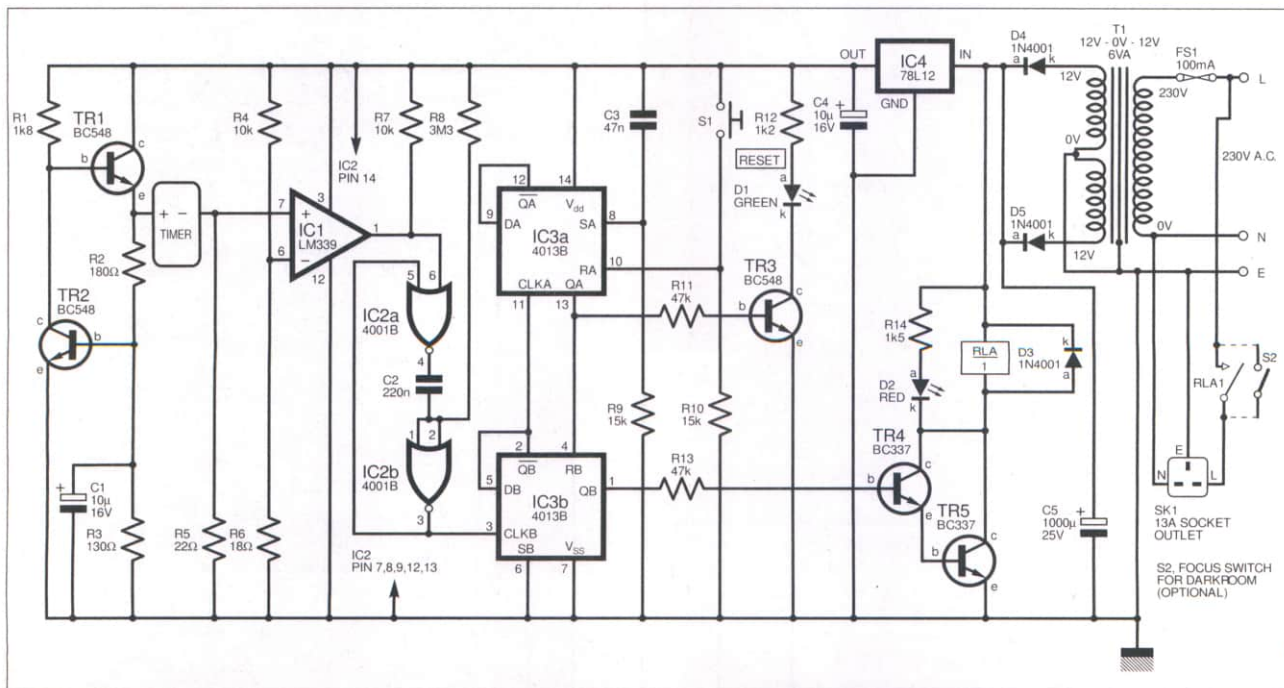
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Fig. 1. Circuit diagram of the Mains Appliance Timer.