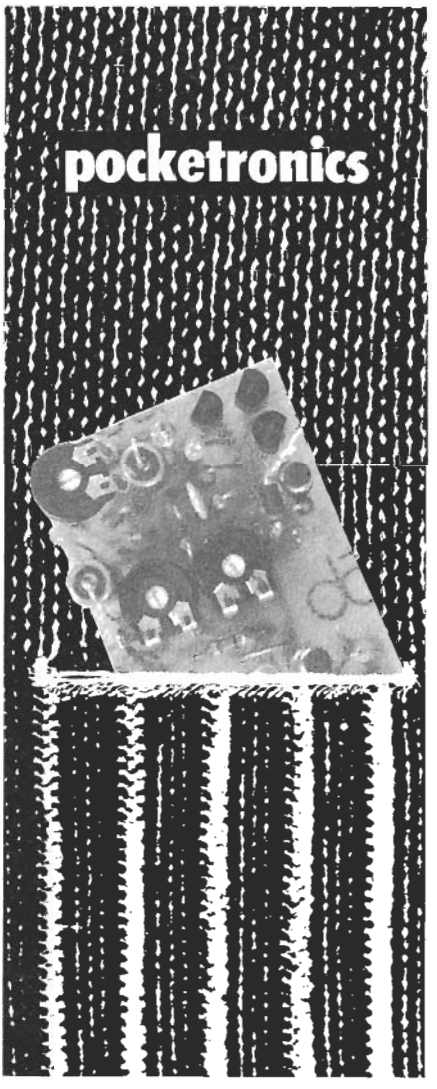
eggtimer-with-a-difference

J. Schmitz

Relatively few components are used in this eggtimer. The 'boiling time' is automatically determined according to the size of the egg and the degree of hardness required.

Eggtimers range from miniature hourglasses to sophisticated digital clocks. The more modern versions usually give an audible indication that the alotted time has elapsed. The timer described here differs from all conventional units in that there is no time scale on it. Instead, there are two scales that are used to set the timer; one is calibrated in egg sizes (from 'canary' through 'hen' to 'ostrich') and the other in degrees of hardness (from 'runny' through 'medium' to 'bullet').

The timing interval is started by touching a TAP sensor; this is indicated by an LED lighting up. At the end of this period the unit produces a distinctly audible tone, signalling that the egg has been in hot water long enough. After a short time this tone is switched off and the unit puts itself completely out of action: the current consumption drops to zero. There is no need for a switch.



The circuit

The complete circuit (figure 1) consists of two main parts: the timer proper (T1 . . . T4, with associated components) and the warning tone generator (T5 . . . T7).

The timing sequence is started as soon as the TAP sensor is touched. Sufficient current passes through the skin resistance to turn on T3, and this transistor drives T4 into saturation. The timing circuit is now under power, and LED D1 lights up.

For a very short time, a charging current flows through C1 into the base of T1. This drives T1 into saturation, charging

1

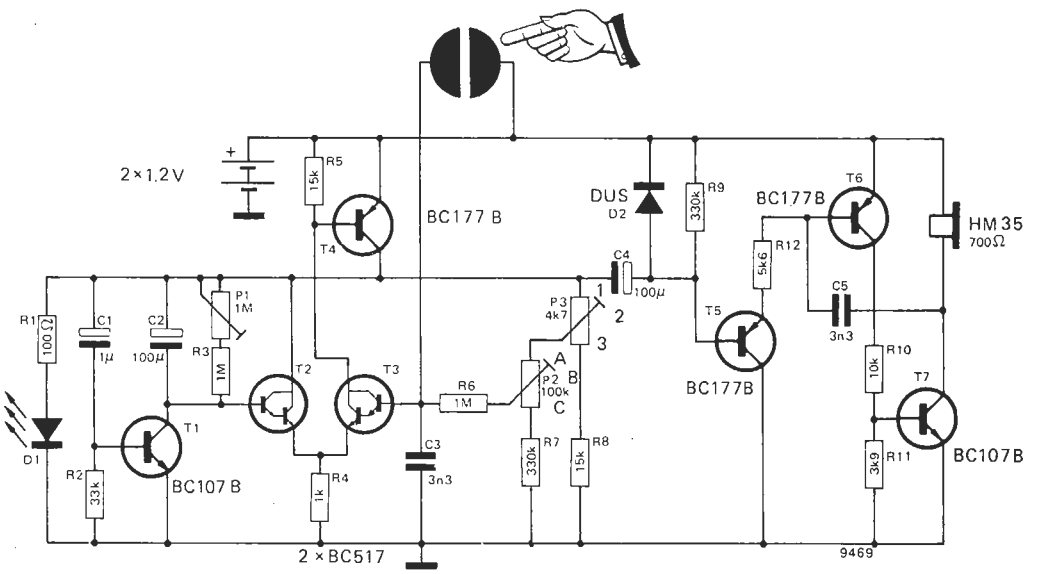
Parts list

Resistors:
R1 = 100 Ω
R2 = 33 k
R3,R6 = 1 M
R4 = 1 k
R5,R8 = 15 k
R7,R9 = 330 k
R10 = 10 k
R11 = 3k9
R12 = 5k6
P1 = 1 M (preset)
P2 = 100 k (preset)
P3 = 4k7 (preset)

Capacitors:
C1 = 1 µ/4 V
C2,C4 = 100 µ/4 V
C3,C5 = 3n3

Semiconductors:
T1,T7 = BC107B
T2,T3 = BC517
T4 . . . T6 = BC177B
D1 = LED
D2 = DUS

Sundries:
2 miniature mercury batteries, 1.2 V
dynamic microphone,
Sennheiser type HM35



C2 rapidly. When C1 is fully charged, T1 turns off and C2 starts to discharge through R3 and P1.
Initially, T2 is turned off and T3 is conducting. As C2 discharges, the base voltage of T2 rises. After a certain time T2 will start to conduct, the voltage across R4 increases and T3 is turned off. This happens as soon as the voltage at the base of T2 has become equal to that at the base of T3 (T2 and T3 form a so-called 'long-tailed pair'). The latter voltage depends on the setting of P2 and P3.
When T3 stops conducting, T4 is also turned off. The supply voltage to the timer proper now falls away (the collector voltage of T4), and this voltage drop is passed via C4 to the oscillator circuit. T5 is turned on, enabling the oscillator proper (T6 and T7). This produces the tone which signals 'egg ready'.
C4 now starts to charge through the timer circuit on the one side and R9 on the other. After a short time, it will have charged so far that T5 is no longer held in conduction. When this transistor stops conducting, the oscillator is also turned off.
The timer can be re-used immediately: C1 . . . C3 are already discharged sufficiently, and C4 will be discharged via D2 and T4 as soon as the TAP sensor is activated.

Calibration

Start with P2 and P3 in the mid-positions ('B' and '2', respectively). Now try a 'dry run' – i.e. no water and no egg – to see how many minutes the timing interval is. If this interval is shorter than required for boiling a medium-sized egg to a medium degree of hardness, the resistance of P1 should be increased (turn the slider clockwise). If the time is too long, P1 should be turned the other way.
After several dry runs, the correct setting of P1 should have been found. It is left in this position, and P2 and P3 can be used to vary the timing according to taste (P2) and/or size of the egg (P3). Position 'A' of P2 corresponds to 'hard as a bullet' whereas position 'C' is for 'runny', position '1' of P3 is for over-sized eggs, and position '3' is for the miniaturised kind.

2

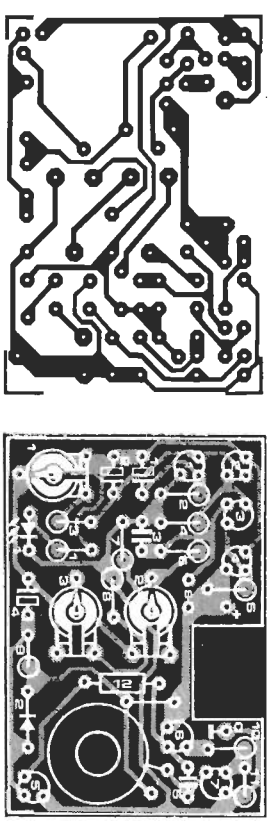


Figure 1. The eggtimer-with-a-difference. There are three timing adjustments: P1 is preset for normal boiling of average-sized eggs; P2 is for setting the consistency required ('runny' to 'bullet') and P3 is to compensate for differing egg sizes.

Figure 2. Printed circuit board and component layout.