Burglar ALARM

by B.H.BAILY

MANY OF us have, at some time or other, spent considerable time and money on our doors, ensuring that they are quite secure against the threat of the nocturnal prowler. But how many stop to think how easy it is for the would-be thief to slip the catch on a ground floor window.

For less than the price of a good lock, it is possible to ensure the safety of the whole house. The burglar alarm described here can be made up from equipment to be found in most experimenters' spares boxes. Even if all parts had to be purchased, the total cost need not exceed 35s.

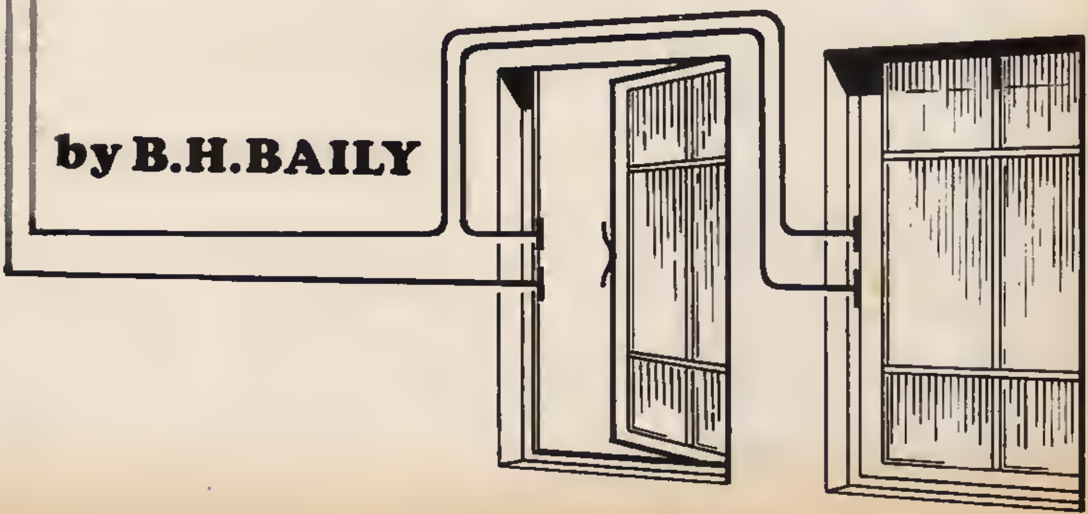
OPERATION

The device operates on a simple but most effective principle employing a continuous "loop" of fine enamelled wire, such as found in a.f. chokes and transformers. Since the loop carries only a few microamps of current, its resistance is not likely to affect the operation. If the loop is broken at any point, the cessation of the small flow of current immediately results in the ringing of an alarm bell, which will not be stopped by the subsequent closing of the broken loop. Hence, even if the thin inconspicuous wires are traced and cut, the alarm will still be operated. A switch, conveniently mounted on the main alarm unit, enables the unit to be made inoperative whilst doors and windows are in use during daylight hours.

ALARM POSITIONS

All windows and doors are fitted with simple contacts made from thin brass shim. Stationary contacts are arranged in pairs, secured close together by means of small brads on the closing side of the casement. A moving contact, having bowed ends, is fixed to the door or window such that it bridges the two stationary contacts. A self-cleaning action takes place when the moving contact on the window passes over the fixed contact.

Using the twin wire technique, installation is simplicity itself, since the twin loop is simply run from one pair of contacts to the next, in strict rotation. No short circuit must be allowed across the twisted pair, except by the contact pair at the window end of a run. Any number of individual or collective runs can be joined into the main loop circuit by splicing them into one leg of the existing run.



COMPONENTS . . .

Resistors
R1 15kΩ R2 220Ω
Both 10%, ½ watt carbon

Transistor
TR1 NKT217 (Newmarket)

Diode
D1 OA81 (Mullard)

Relay
RLA 150Ω (G.P.O. type 600) with set of change-over contacts (available from G. W. Smith & Co. (Radio) Ltd.)

Switch
S1 Single-pole on/off toggle switch

Bell
3–8 volt bell

Miscellaneous
Two flat pack 4½ volt batteries
Chassis 6in × 4in × 2½in (aluminium)
Eyelet board or laminated wiring board for mounting TR1, D1 and R1
Enamelled copper wire (about 30 s.w.g.)
Two-way clip terminal block
Spring clip (see photograph)
P.V.C. covered wire, 4 B.A. and 6 B.A. nuts and bolts.

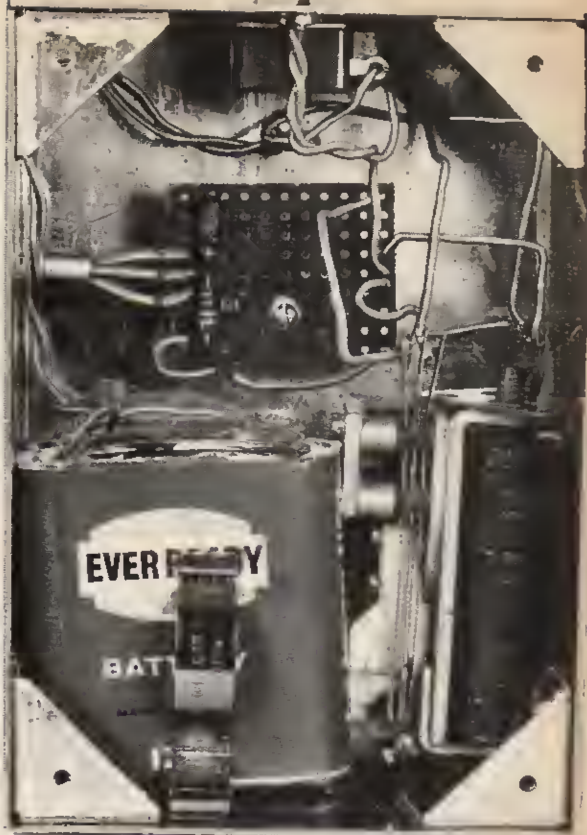


Fig. 2. Layout of components under the chassis. R2 is mounted inside the bell housing.

CIRCUIT

With the alarm loop circuit completed the quiescent current drain via R1 is about 300 microamps. Slightly higher quiescent currents may occur if the unit is mounted near a radiator, but this current will never normally build up sufficiently to operate the relay.

Battery economy can be achieved by experimenting with the value of R1, as the current gains of a batch of transistors of the same type can be diverse in value. This can be achieved by replacing R1 by a 50 kilohm potentiometer. The base-emitter circuit is left open and the potentiometer reduced from 50 kilohms until the relay operates. Remove the potentiometer and measure its resistance. Reduce this value by ten per cent as this compensates for battery deterioration, then insert a preferred value resistor approximating to this calculated resistance but not exceeding it. The relay used was a 150 ohm G.P.O. 600 type with two sets of changeover contacts. The unused contacts were removed to improve its sensitivity, the packing spacers being replaced and the securing screws carefully adjusted so as not to damage the bobbin. Other switching transistors may be tried as there is nothing critical in their choice, however the selection of R1 will have to be ascertained for each transistor type as previously described.

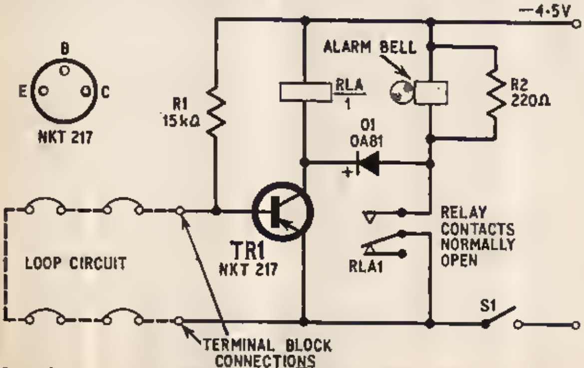


Fig. 1. Circuit diagram of the burglar alarm. The transistor connections are shown looking at the underside

Diode D1 prevents the collector current from taking the low resistance bell path and so not actuating the relay. It also acts as a hold-in path for the relay when the contacts close. It can be seen that the bell maintains its clamour even though the loop circuit may be completed.

Testing of the system is just a matter of listening for the bell when the alarm is switched on, and then checking windows and doors to ensure that the contacts are closed. Resistor R2 damps the transient "ringing" spikes that appear across the bell in its action. These induced back e.m.f.s. could easily damage the transistor if they were not suppressed.

CONSTRUCTION

The unit was assembled on a chassis 6in × 4in × 2½in. This makes a compact and attractive mounting for the bell. A piece of copper clad wiring board or a tagstrip serves to mount TR1, D1, and R1. The board is fitted to the chassis with a spacer so that it stands clear from the chassis. The board and spacer are fixed with a 6 B.A. nut and bolt. The relay position is not critical provided sufficient space is left for the two 4½ volt batteries which are held by a cut down spring clip. The batteries are wired in parallel, i.e. with positive terminals common and negatives common. The loop circuit from the windows is connected to the unit via the two-way plastics covered terminal block. ★