

Simple, effective car burglar alarm

This project was the third prize winner in our recent Parameters/Electronics Australia Instrument Contest No. 1. For those readers who would like to build a car alarm, but who may have been deterred by more elaborate designs, this project should have a special appeal. Though of simple design and modest cost it has, according to the owner, already proved its worth on a number of occasions.

by JOHN RUSSELL

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This alarm was designed approximately two years ago and a number have been fitted to cars owned by friends and acquaintances. The unit has been so successful, in fact, that I have had nine reports of them going off in anger, thus foiling the attempted theft of car and/or valuables.

Basically the circuit monitors the battery voltage of the vehicle and detects when any load is applied to it (courtesy light, ignition, etc). The vehicle must obviously have a door

operated courtesy light system but no direct connection to this is required.

There is a hidden switch inside the vehicle which the driver turns on when getting out. The unit waits for 20 seconds (exit time) and arms itself. This allows time for doors to be shut without setting off the alarm.

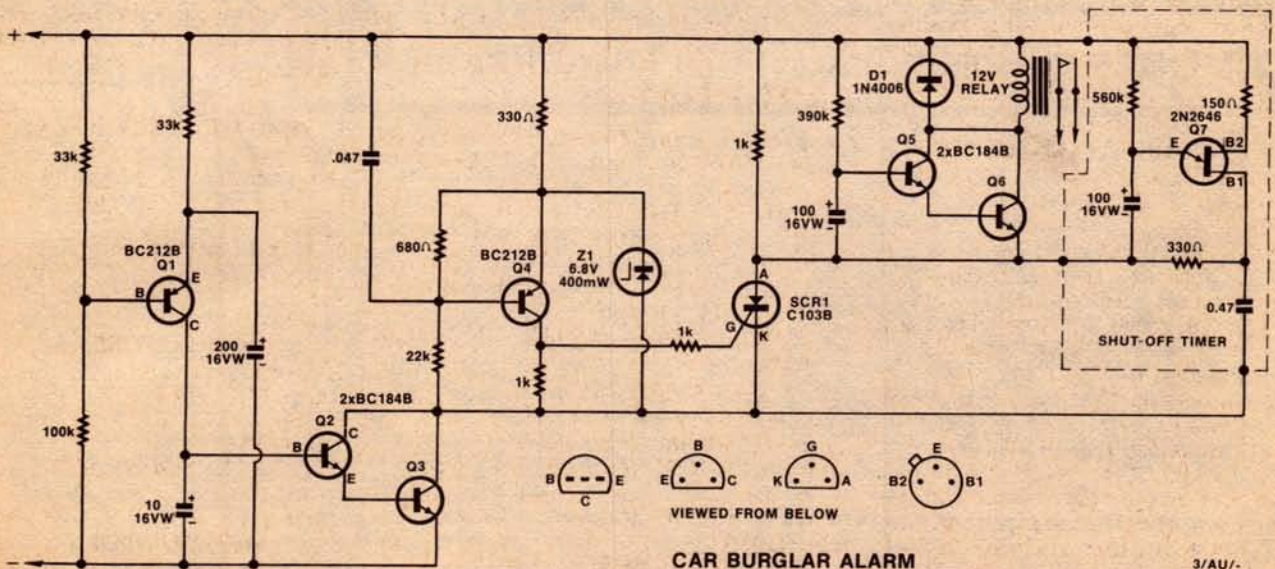
With the unit armed, the next time the door is opened, the alarm latches, but waits for seven seconds (entry time) before activating the horn. If the driver opens the door he would, of course,

turn the hidden switch off before the seven seconds elapsed. The horn would not sound at all in this case.

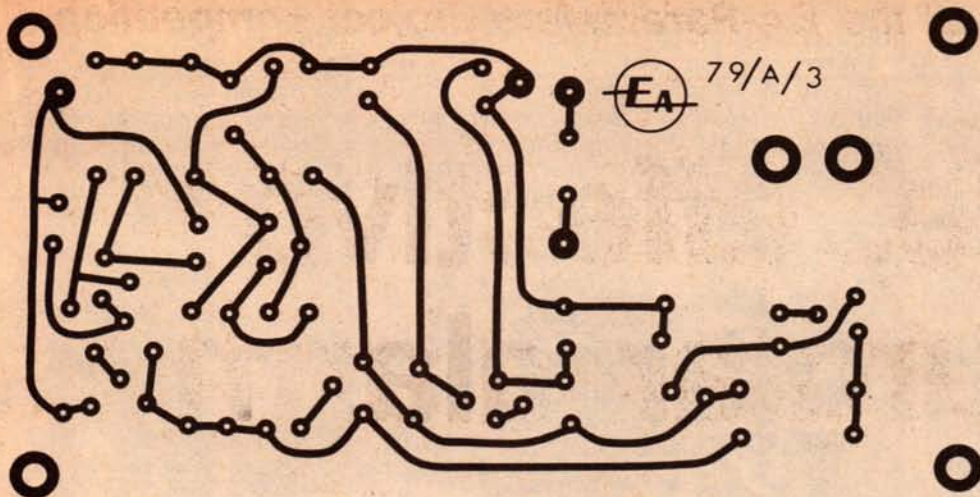
Once the horn starts, it would keep sounding until the hidden switch was turned off. By adding a simple shut-off timer, as shown, the horn will turn off after a predetermined time. After the automatic shut-off, the unit is still armed and will await the next entry to the vehicle and go through the entry time/shut-off time again ad infinitum.

The exit timer of approximately 20 seconds is made up of Q1, Q2, Q3 and associated components. On application of power by the hidden switch in one of the supply rails, Q1 base is held at a fixed potential and Q1 emitter voltage rises exponentially by the 200 μ F capacitor charging through the 33k resistor. When Q1 saturates, it supplies base current to the darlington pair Q2, Q3.

As the collectors of Q2, Q3 fall at the end of the exit time, power is applied to the detector circuit, which consists of

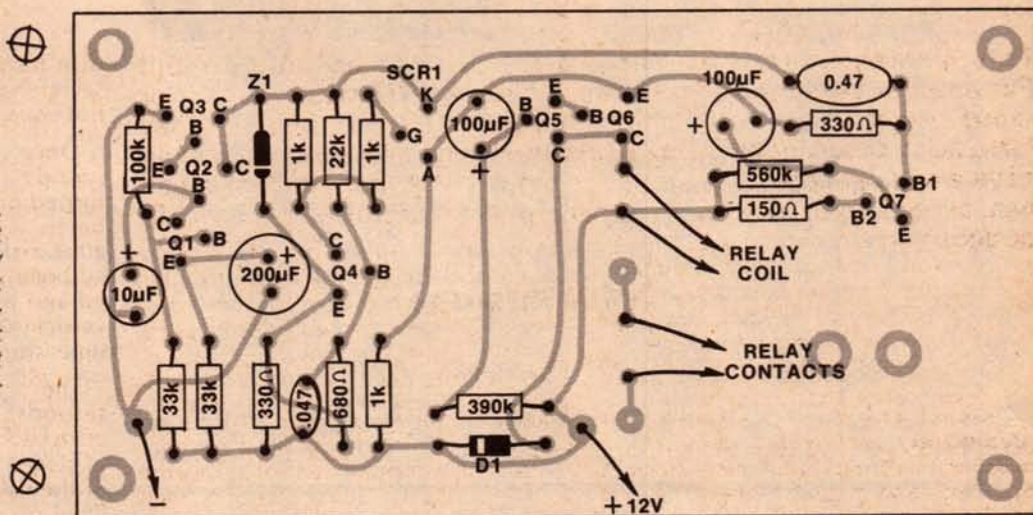


CAR BURGLAR ALARM
The circuit is relatively simple and uses readily available components, none of which is particularly critical. The shut-off timer (in dotted box) is optional. The "secret switch" may be anywhere in the positive supply line.



The printed board, shown full size, from the copper side. It incorporates both the alarm circuit proper, and the optional automatic shut-off timer. Note the mounting holes (beneath the code number) to suit one of the suggested relays.

The component layout, shown from the component side of the board. The relay may be mounted in the blank area in the lower right corner. The optional automatic shut-off components are at the top right near (and including) the unijunction Q7.



Q4, SCR1, and associated components. The emitter of Q4 is clamped at 6.8 volts by the zener diode, while its base is biased fairly hard off. The 0.05μF capacitor will couple any sudden voltage change on the battery (from courtesy light, etc coming on) to the base of Q4 from which will be amplified and inverted. This positive going pulse is fed to SCR1 which conducts and latches.

This action takes the emitter of Q6 and the negative end of the 100μF capacitor to almost negative rail. This applies voltage across the entry timer consisting of Q5, Q6 and associated components.

The 100μF capacitor charges via the 390k resistor and after approximately seven seconds turns on the darlington pair Q5, Q6. With Q5, Q6 collectors going low, the relay pulls in and thus sounds the horn.

By connecting the shut-off timer as shown, the moment SCR1 latches it initiates the shut-off timer. This consists of Q7 which fires after the timing period set by the 560k resistor and the 100μF capacitor. The unijunction firing pulse is coupled via the 0.47μF capacitor to the cathode of SCR1, which turns off the latched SCR.

To install the alarm in a vehicle, merely connect the positive lead from

the unit to the positive terminal of the battery via the hidden switch, and the negative lead to the negative terminal of the battery. The hidden switch does not carry horn current so it can be of a low current type.

It is imperative that the positive and negative leads make good connections and it is preferable to take them straight to the battery posts, although the

chassis may be used as the common if desired.

The relay contacts which will control the horn may be wired in several ways, depending on the vehicle and horn switching used by the manufacturer. If the horn can be operated with the ignition turned off, it is then a simple matter of connecting the relay contact wires straight across the horn button. If

PARTS LIST

- 1 Box Aluminium, 2-piece, 133 x 76 x 54mm, or Plastic (Zippy) 150 x 90 x 50mm
- 1 Relay. 12V DC. Contacts to suit horn current. "Keyswitch" KMK3, "Pye" 265 or similar
- 1 Switch, single pole, for "secret switch" as selected
- 1 Printed board, 79/A/3, 125 x 65mm

TRANSISTORS etc

- 1 6.8V 400mW zener diode
- 1 1N4001 diode (or similar)
- 4 BC184B NPN transistor (BC183, BC237)
- 2 BC212B PNP transistor (BC307, 2N3702)
- 1 C103B SCR (C106A)

EXTRA FOR TIMER

- 1 2N2646 Unijunction

RESISTORS (1/2W)

- | | |
|-----------|--------|
| 1 330 ohm | 2 33k |
| 1 680 ohm | 1 100k |
| 3 1k | 1 390k |
| 1 22k | |

EXTRA FOR TIMER

- 1 150 ohm
- 1 330 ohm
- 1 560k

CAPACITORS

- 1 10μF 16V
- 1 200μF 16V
- 1 .047μF
- 1 100μF 16V

EXTRA FOR TIMER

- 1 0.47μF
- 1 100μF 16V

MISCELLANEOUS

Connecting cables, hardware, nuts and bolts, support spacers for printed board, etc.

CAR ALARM

not, it will be necessary to check with the vehicle wiring diagram, and possibly supply a new live feed to the horn via the relay contacts.

It would be advisable to let the alarm actually sound the horn at least about once a fortnight, to test the complete system.

If the exit/entry/shut-off times are not quite as required, they can be altered by changing the appropriate charging resistors. Increasing the resistor value increases the time period.

Editorial comment: Mr Russell submitted two separate board patterns; one for the alarm proper and one for the optional shut-off timer. In the interest of economy, we have combined these two patterns into one board and provided an area on which the relay can be mounted. This still leaves the option of fitting the timer or not, simply by fitting or omitting the components.

The board, with relay fitted, should fit easily in at least two popular boxes, as suggested in the parts list. Although not essential, most builders would probably prefer to provide a box as a means of protecting the components.

The author suggested the "Pye" type 265 relay, and that this could be mounted on its side by glueing it to the component side of the board. The

"Pye" relay is available in Australia from Davred Electronics Pty Ltd.

Another very suitable relay is the "Keyswitch" type KMK3 which, although designed as a 24V AC relay, functions quite reliably from about 9V DC upwards. It is fitted with heavy duty contacts which may be paralleled for

involved, unless the car is already fitted with its own horn relay.

It only remains to find a suitable location for the hidden switch. It would be unwise to suggest any particular places, since this tend to make them unduly popular and, therefore, well known.

While it need hardly be stressed that



Two relays suitable for the alarm. At left is the "Keyswitch" KMK3 and at right the "Pye" 265. The "Keyswitch" mounts with a single screw, while the author suggests that the "Pye" may be laid flat and glued directly to the board.

increased reliability. It is a 2-hole mounting type (screw and locating spigot) and the positions for these two holes have been marked on the board pattern. The "Keyswitch" relay is available from Radio Despatch Service.

Some cradle type relays may also be suitable, but it is important that the contacts be suitable for horn current

the location should not be obvious, it is also important that it can be operated without the need for an obvious movement. Would-be car thieves are not above studying a driver's regular parking habits if his particular car is the one they have set their sights on.

So here is a chance to exercise your ingenuity.