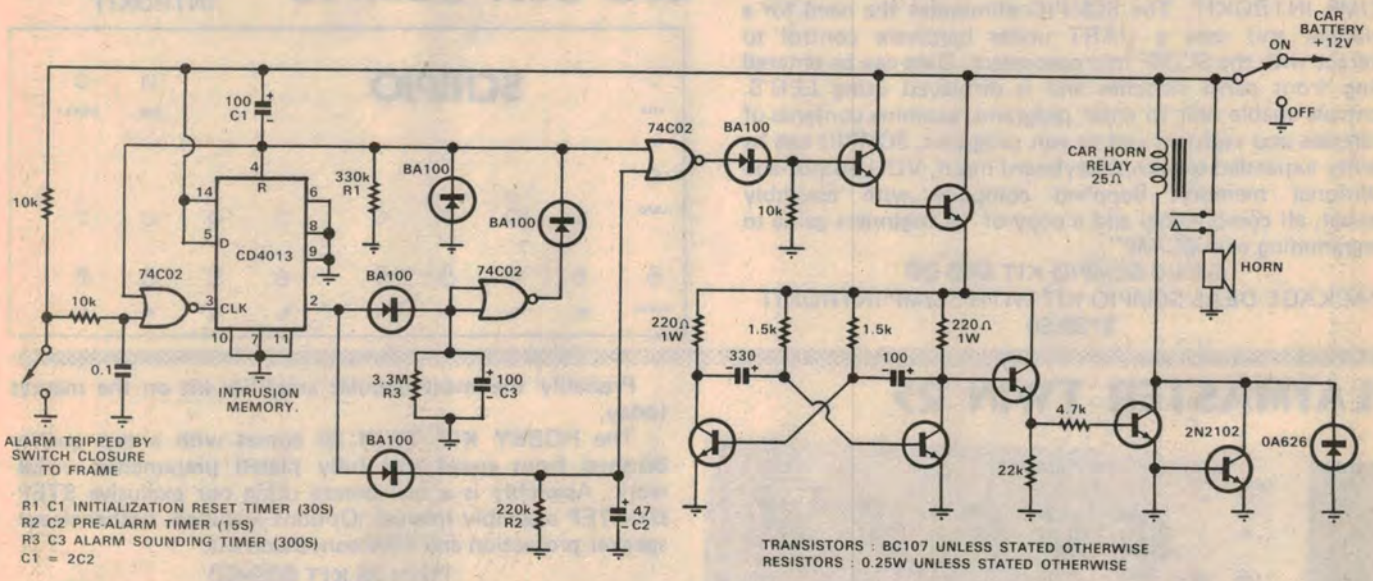
Reliable, low-cost auto intrusion alarm



Many car alarms operate by sensing any change in battery voltage caused, for example, by courtesy lights coming on when a door is opened. This voltage drop, particularly for a new battery, may only be of the order of millivolts, which means that the required sensitivity of the alarm may cause it to be susceptible to noise and temperature.

In the auto intrusion alarm shown, this problem is avoided by taking the input circuit from the door switches that control the interior and boot lights. The circuit is designed around two CMOS packages, the CD4013 flip-flop and the 74C02 quad 2-input NOR gate. The resistor-capacitor combination R1, C1 develops a reset command signal to the intrusion memory when the alarm is enabled to allow exit of passengers. Once the reset time expires, the flip-flop is ready to detect a switch closure to frame at the input. Thereafter, opening a door or the boot will trigger the alarm and, following another short interval (to permit the driver to enter the car and disable the alarm by a hidden switch), the horn is pulsed approximately 50 times per minute so as not to sound stuck. After several minutes, the alarm circuitry resets itself ready for another intrusion. All the time delays can be adjusted by changing resistor values.

The Darlington pair at the output of the third 74C02 IC is used as a switch performing a function similar to an SCR but not latching with the removal of bias from the input. The simple astable circuit based on a long-tail pair is self-starting and reliable. The circuit was designed as a pulse generator rather than a square wave generator because the former was found to produce a more urgent sound. The Darlington output pair acts as a current booster to supply the 0.5A peak needed to drive the car horn relay while requiring a bias current that does not load down the astable circuit. Furthermore, the sensitivity of the Darlington pair ensures instantaneous switching of the relay during the short period in which the output of the astable is building up following the triggering of the alarm. A diode (OA626) across the 2N2102 output transistor affords protection against reverse voltages.

The circuit current drain in the quiescent state is approximately 20uA. The total cost of parts is around $5.00 at present prices, which makes the alarm both an economical proposition and a worthwhile project for the do-it-yourself electronics enthusiast.

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