

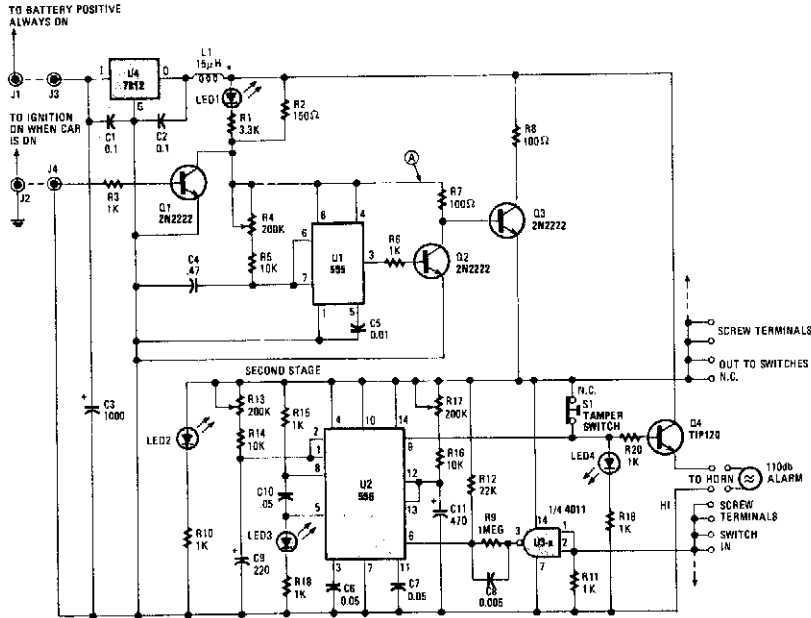
10

Automotive Security Circuits

The sources of the following circuits are contained in the Sources section, which begins on page 662. The figure number in the box of each circuit correlates to the entry in the Sources section.

Automatic Arming Auto Alarm
Backup Beeper
Auto Turn-Off Alarm with 8-Minute Delay
Auto Alarm
Auto Ignition Cut-Off
Car Alarm with Horn as Loudspeaker
Automotic Turn-Off Alarm with Delay
Single-IC Alarm
Low-Current Simple CMOS Alarm
Back-Up Alarm

AUTOMATIC ARMING AUTO ALARM



POPULAR ELECTRONICS

Fig. 10-1

The circuit automatically turns on when the car is turned off. It gives you a variable time to get out and lock up, and also provides a variable time delay to get in and start the car.

The 555 oscillator/timers are always powered down when the car is on. That keeps the alarm from going off while you're driving. As soon as the car is turned off, Q2 switches off and shunts power to U1. When that happens, U1 immediately sends its output high, keeping Q3 on, and thereby prevents power from returning to U2.

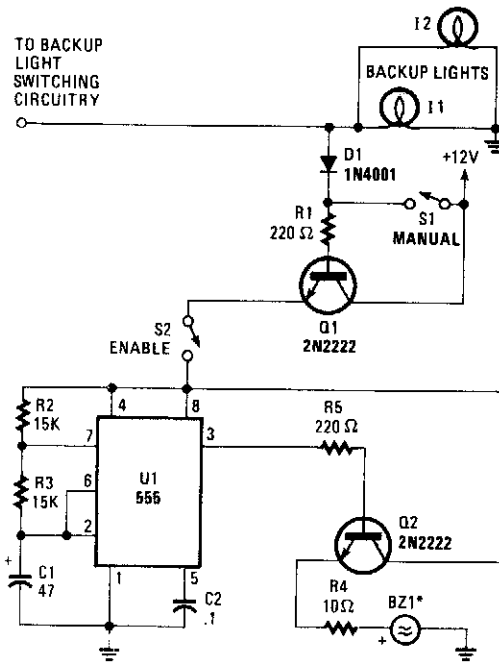
Transistor Q2 also sends power to Q3's collector to be used only when U1 has completed its timing cycle. When U1 has finished, it turns Q3 off, which in turn activates Q4, and sends power to the balance of the circuit. That timing period was the time needed to get out of the car. LED1 indicates that the system is disarmed and LED2 indicates that the system is armed.

At this point, U2 waits for a trigger pulse from the car's door switches or dome light. A positive impulse at the 4011's input sends a negative trigger pulse to the first stages of U2, which is connected as a cascading timer. The first stage's output becomes high for a time to allow the car to be turned on.

If that does not happen, the first stage's output lowers, which sends a low trigger pulse to the second stage. The second stage then sends its output high, turning on Q5, which sounds the alarm for a given time. Once that time has elapsed, the alarm is shut off by a low output to Q5 and the system is reset. If the car door is closed or a second door opened while the alarm is sounding, the first stage retriggers and prepares to extend the ON-time of the alarm.

The cascading or counting action continues until the car is left alone. You can add a switch on the positive supply rail at J3 to override and silence the alarm, if (for example) you plan to work on the car. Switch S1 is a normally closed type that is built into the case of the alarm; S1 is pushed to the open position when the case is mounted flush with a surface. Any attempt to remove the alarm will sound the alarm.

BACKUP BEEPER

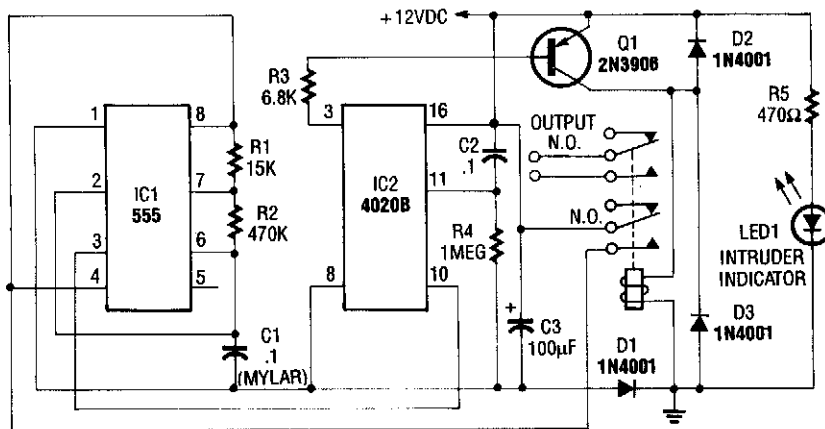


POPULAR ELECTRONICS

Fig. 10-2

When the vehicle's backup lights kick on, or when the manual switch (S1) is closed, a small current is fed to the base of Q1. Transistor Q1 allows current to flow through it and, if the enable switch (S2) is closed, it sends 12 V to U1, a 555 timer. Timer U1 sends high pulses that last 0.977 13 s and low signals that last 0.488 565 s to the base of Q2. When U1 switches Q2 on, it sends 12 V to BZ1, a piezoelectric buzzer. For best results, the buzzer should be mounted under the vehicle—somewhere where people around the car can hear the warning beeps.

AUTO TURN-OFF ALARM WITH 8-MINUTE DELAY

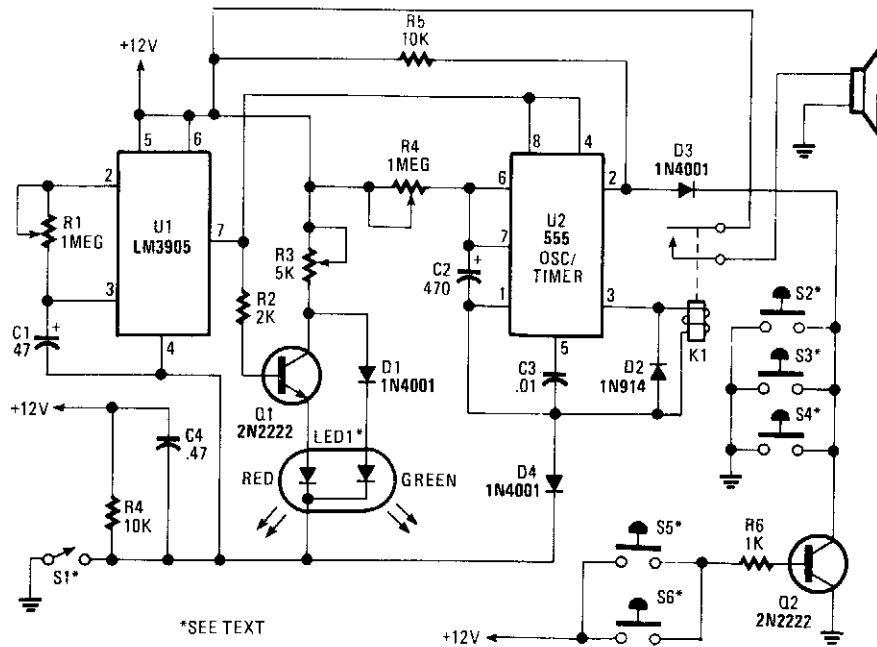


RADIO-ELECTRONICS

Fig. 10-3

This circuit uses a NE555 timer and CD4020B. When +12 Vdc is applied to the circuit, the output of IC2 is set low via C2, which turns on the relay, and IC1, a pulse generator. IC1 pulses counter IC2. After 8192 clocks, IC2 output (pin 3) goes high, cuts off Q2, and completes the cycle.

AUTO ALARM

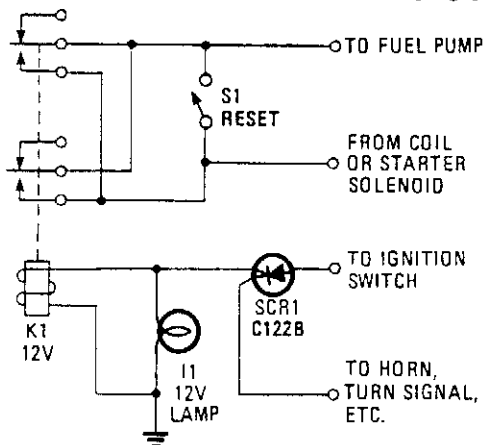


POPULAR ELECTRONICS

Fig. 10-4

S1 is external key switch. The alarm allows a 0- to 45-s delay after S1 is operated before the circuit is armed. During this period, LED1 lights green. After this delay, LED1 lights red, which indicates that the circuit is armed. Then, sensors S2 through S4 - (NO) or S5 through S6 (NO) pull pin 2 of U2 low, which activates K1 and sounds the alarm. The alarm sounds for a duration determined by R4 and C2. After this time, K1 releases and the circuit is again ready. Manual reset is via the key switch, S1.

AUTO IGNITION CUT-OFF

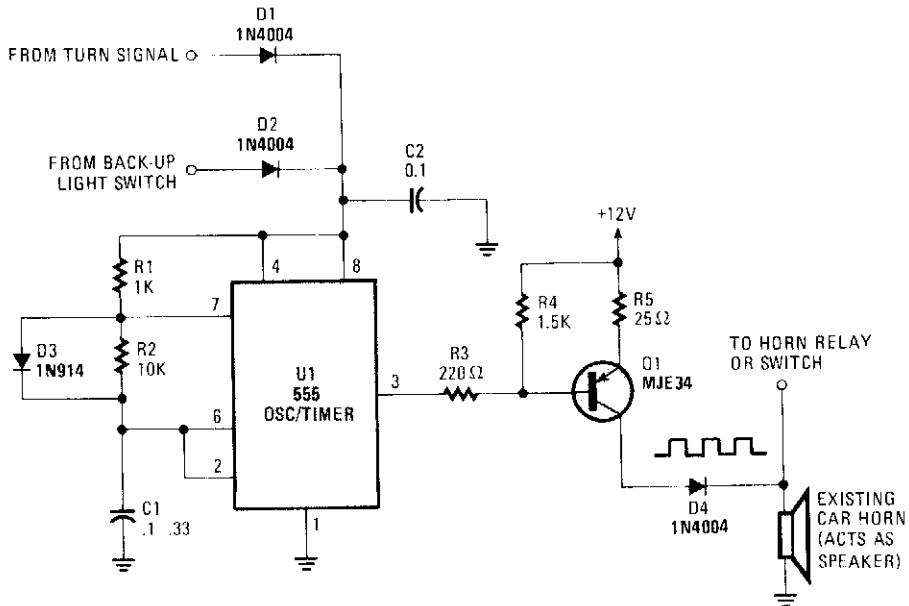


POPULAR ELECTRONICS

Fig. 10-5

Using an SCR/relay combination, this circuit can be made to cut off ignition, unless a positive voltage is applied to the gate of the SCR. This is useful as an anti-theft device, because depending on hook-up, the car will not start unless a certain accessory or a hidden switch is closed.

CAR ALARM WITH HORN AS LOUDSPEAKER

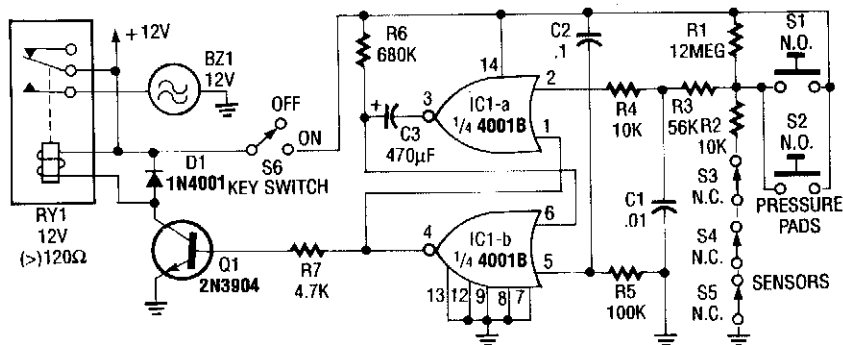


POPULAR ELECTRONICS

Fig. 10-6

An auto horn will work as a speaker of limited audio-frequency range. This circuit uses a 555 timer as an oscillator to drive an MJE34 transistor, which in turn drives the horn. Normal horn operation is ensured by blocking diode D4.

AUTOMATIC TURN-OFF ALARM WITH DELAY

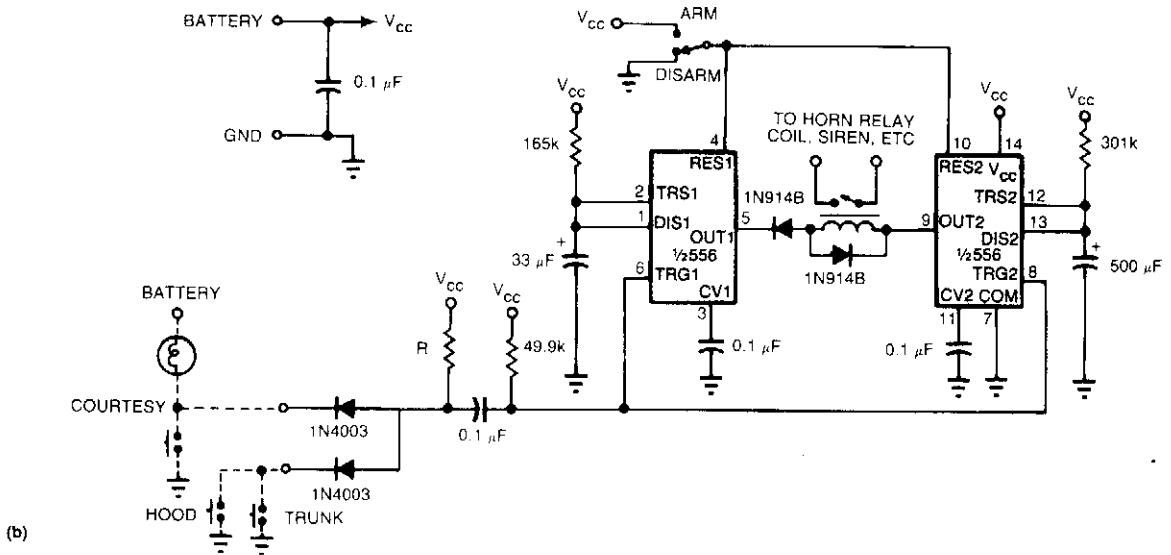
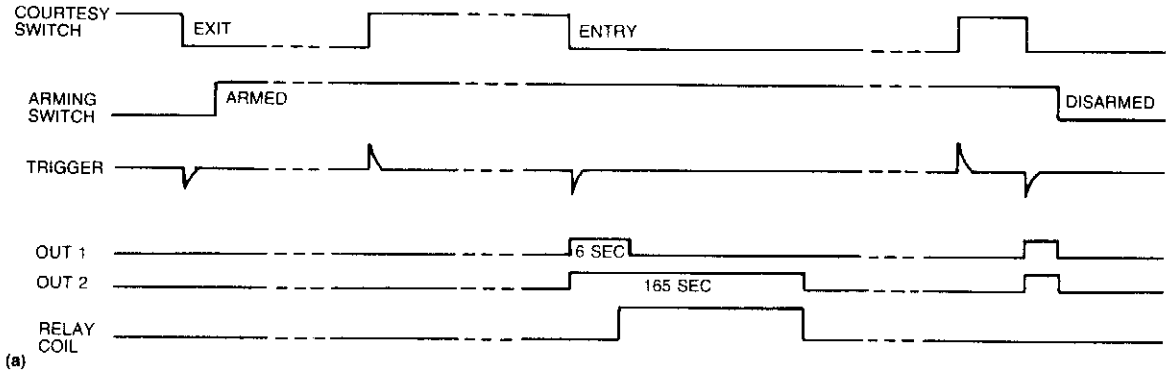


RADIO-ELECTRONICS

Fig. 10-7

In this circuit, IC1A and IC1B act as a monostable multivibrator. Any input from the sensors S1 through S5 forces IC1A to produce logic low, which causes IC1B to turn on Q1 until C3 changes through R6. This action resets the latch formed by IC1A and IC1B.

SINGLE-IC ALARM



EDN

Fig. 10-8

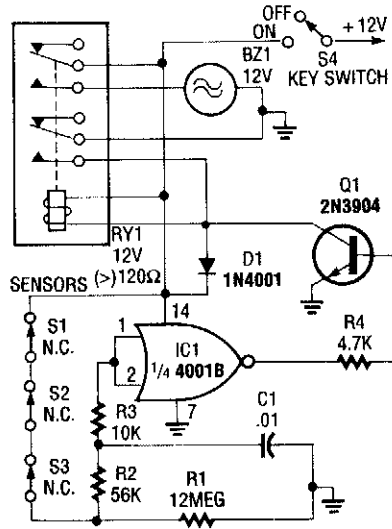
With a single IC, you can build a simple, reliable auto burglar alarm or a similar alarm. See (a) for the timing information for the alarm circuit in (b).

When you leave your vehicle, flip the arming switch and close the door behind you to arm the device. Subsequent opening of an entrance triggers both timers. After the expiration of the entry delay timer, the alarm sounds for a time that is determined by the second timer.

The value of R should be less than $1\text{ k}\Omega$. If you use an incandescent lamp instead of a resistor, you get an extra function—an open-entrance indicator. By keeping the resistance low, you avoid false tripping should water collect under the hood.

If your door switch connects the courtesy light to 12 V rather than to ground, use a single transistor as an inverter at the input. Although this circuit's simplicity has its drawbacks, you can add more features, such as no-entry delays for the hood and trunk, and retriggering when doors remain open.

LOW-CURRENT SIMPLE CMOS ALARM

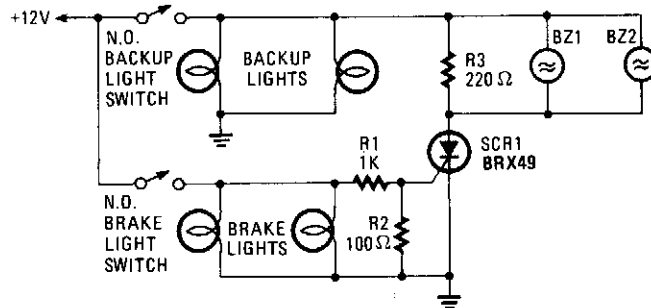


RADIO-ELECTRONICS

Fig. 10-9

This CMOS-aided alarm draws only $1 \mu\text{A}$ standby current. An open sensor allows IC1 to bias Q1 on, activating RY1.

BACK-UP ALARM



POPULAR ELECTRONICS

Fig. 10-10

The brake lights of the automobile trigger this circuit on and off. This saves the annoyance of the alarm when it is not needed.