Circuit & Design Ideas

Car alarm

This simple car alarm detects small voltage drops across the car battery when, for instance, a door is opened and switches on the courtesy light. After about 5 seconds, the alarm will sound at a 2Hz rate for 1 minute unless the circuit is switched off before this time. A red LED is used to indicate that the alarm is armed by flashing at a 2Hz rate and then continuously lights after the alarm is triggered before sounding the alarm. The circuit is designed to drive the car horn.

IC1 is used to detect the change in battery voltage and to provide the 5-second delay time. Pin 2 of IC1 is held close to the trigger voltage, as set by VR1. When a change in battery voltage occurs, a small voltage pulse is transferred to pin 2 via the 4.7μF capacitor. The 820Ω resistor and .0033μF capacitor filter out fast electrical disturbances which may falsely trigger the alarm. Once triggered, the output of IC1, pin 3, goes high. This does two things:

Firstly it continuously drives the LED via D1. This is otherwise flashing and is driven by diode D2 from the 2Hz oscillator formed by inverters IC3a and IC3b. Secondly it triggers IC2.

Subsequently, pin 3 of IC2 goes high to provide the 1 minute alarm time. During this time IC1 is prevented from further triggering by the action of diode D3 which holds pin 2 well above its triggering threshold point. The high output from IC2, pin 3, is inverted by IC3d and allows the 2Hz signal from IC3b to pass through NOR gate IC3c. Transistor Q1 is thus turned on at the 2Hz clock rate which in turn energises the relay.

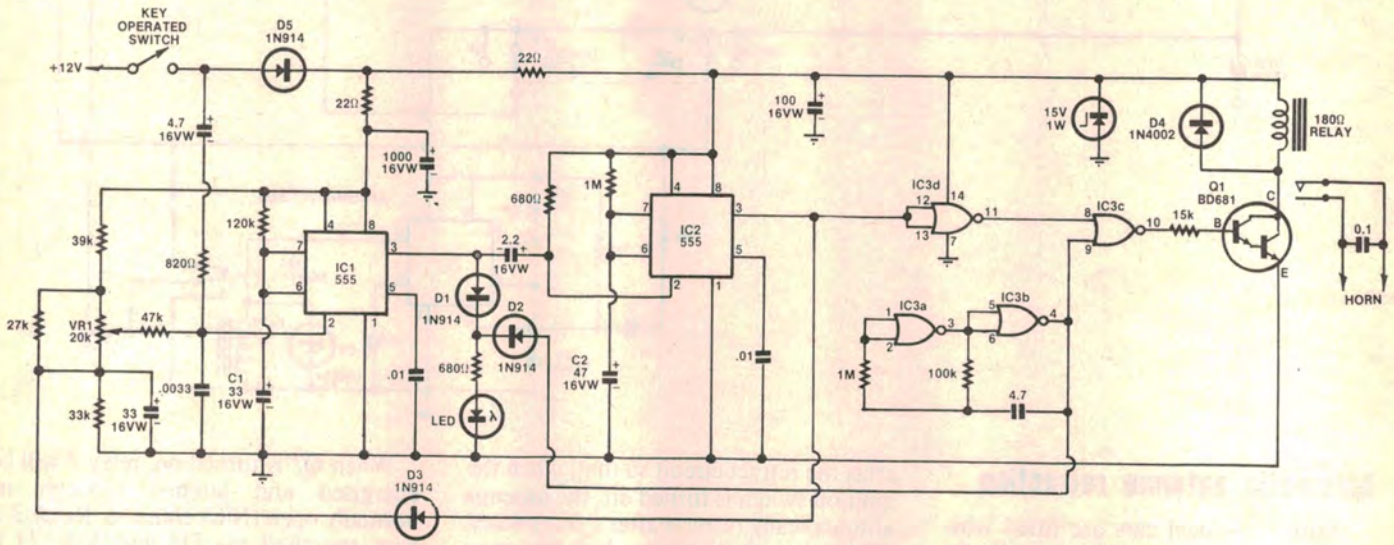
After the one-minute alarm time, pin 3 of IC2 goes low and the alarm stops. The circuit is now ready to detect another voltage drop. Note that switch S1 will deactivate the alarm circuit at any time. After a valid entry to the vehicle it is necessary to switch the alarm off before the five-second entry time. On exiting from the vehicle, open the door first before setting the alarm. Failure to do this will result in the alarm sounding when the door is opened.

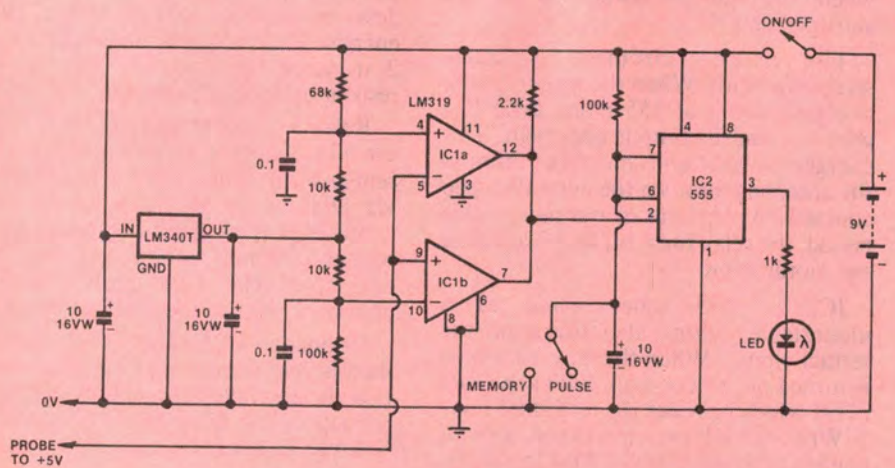
VR1 should be adjusted so that the alarm reliably triggers on opening a door without making the alarm too sensitive. Note that C1 can be made larger to provide a longer entry time and C2 can be altered to lengthen or shorten the alarm time. The alarm time should not exceed two minutes.

Switch S1 should be installed inside the vehicle since and external switch is subject to tampering.

J. Rodgers,
Northmead, NSW.

$25



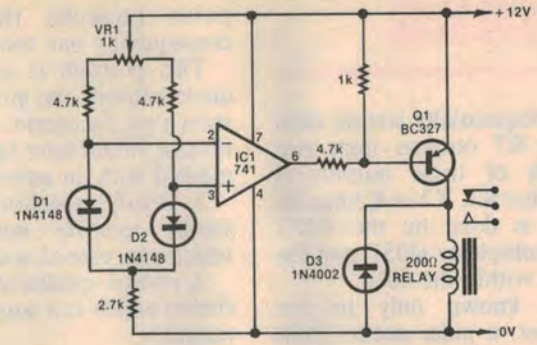


Glitch catcher and line filter

Power line glitches or spikes can be a problem in some computer systems where they can result in unexplained resets, garbled discs etc.

To find out whether you actually have a problem with supply line glitches try this simple glitch catcher. It can also be used to check the operation of commercially available line conditioners designed to remove glitches and also the filter described here.

The glitch catcher circuit utilises a very fast window comparator that determines if the +5V logic supply for the computer exceeds the ±10% limits. This glitch is indicated by a LED which can be selected to show either a short flash for each glitch or set to remain lit



Thermal balance switch

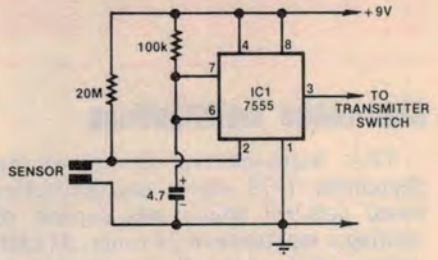
Originally designed to compare the temperature of one chemical chamber against another in an industrial control application, this circuit should prove useful for many temperature control systems.

The relay will only be energised when the temperature at diode D1 is higher than the temperature at diode D2. The relay can then be used to remove power to a heater which controls the temperature measured by D1. The temperature at D1 will thus closely follow the temperature measured by D2.

Circuit operation relies upon the temperature coefficient of the silicon diodes D1 and D2. As the temperature rises, so does the voltage drop across the diode. Initially trimpot VR1 is adjusted so that the output of op amp IC1 just stays low when the temperature at both diodes is the same. The diodes are connected so that the non-inverting input, pin 2, measures the voltage at D1.

When the voltage at the inverting input of IC1 becomes greater than the voltage at the non-inverting input, the output of IC1 goes low, turning on Q1. This in turn switches the relay. Diode D3 is used to short-circuit the back EMF developed by the relay coil when power is removed.

J. Date,
Maharashtra, India. **$15**



CMOS touch switch for Infrared TV Sound Control

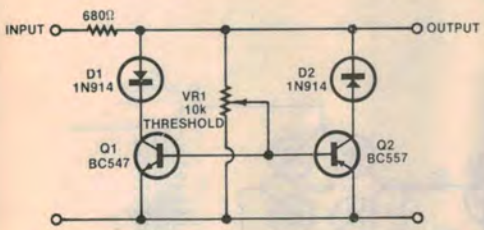
This simple circuit is designed to replace the mechanical switches in the Remote Infrared TV Sound Control (Jan '83) with the convenience of touch switching. It consists of a 7555 timer IC (the CMOS equivalent of the 555) wired as a monostable. When the sensor plates are touched, the pin 2 input is pulled low and the output (pin 3) switches high for 0.5s (approx).

Note that two such circuits will be needed: one to replace the UP button and one to replace the DOWN button. The two 0.1μF switch debounce capacitors should be removed from the existing circuit.

D. Thornton,
Magill, SA. **$10**

Adustable peak limiter

This adjustable peak limiter will symmetrically limit a signal input from 450mV RMS upwards over a frequency range from DC to several hundred kilohertz.

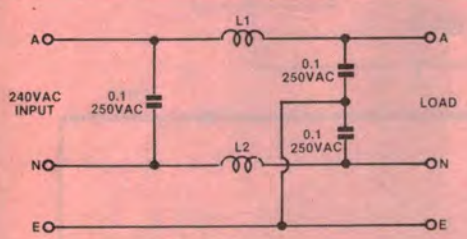


When the output voltage, or fraction thereof set by VR1, exceeds about 0.6V, Q1 or Q2 conducts and limits the output to this level. Diodes D1 and D2 prevent base-collector conduction in Q1 and Q2 which control the positive and negative signal peaks respectively.

The circuit was designed to limit an audio signal feed to a high-power amplifier to prevent it damaging a relatively low-power loudspeaker. The limiting action is quite positive but without the hard clipping of many other circuits. It can be used in a balanced line as it is completely floating with respect to ground.

Note that resistor R1 should be chosen to suit the drive capabilities of the source. Most op amps will drive 680Ω without problems.

P. Allison,
Summer Hill, NSW. **$15**



after a glitch.

An LM340 positive 5V regulator is used to derive a 5V reference to within 0.5V. If the logic supply at the probe input exceeds these limits one of the wired-OR comparator outputs will go low and trigger the 555 timer and the LED will light.

If the Memory/Pulse switch is off, then the LED will remain on only for the time it takes the 10μF capacitor at pins 6 and 7 to charge via the 100kΩ resistor to 2/3rds the supply voltage (about 1 second).

If the switch is on, the LED will remain on since the capacitor cannot charge.

The circuit is powered by a 9V transistor battery and on standby draws about 18mA. It can be housed in a small plastic utility case with power and memory/pulse switches and LED on the front panel.

The circuit should detect pulses as narrow as 40ns.

The line filter circuit is designed to filter out signals other than the 50Hz mains frequency and this includes glitches. It comprises a passive filter using inductors and capacitors. Note that the capacitors must be rated at 250VAC.

The inductors are made by purchasing two plastic bobbins of 1mm diameter enamelled wire and rewinding each one so that each layer is separated by two layers of insulating tape to reduce the interwinding capacitance.

Mount the components in a large diecast case using tagstrip to terminate the components. Use a grommet for the incoming mains lead, which should be securely clamped with a mains cord clamp. Solidly earth the case and bolt a surface-mount general purpose mains outlet on the case for the filtered outlet.

You will be able to test its operation with the glitch catcher.

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