# Build this sneaky antitheft device

by JEFF SKEEN

# Ignition killer for cars

**Car burglar alarms are fine except that most are easily circumvented. This cunning antitheft device is cheap, easy to fit, and effective.**

We may be in the midst of an economic recession, but no such recession has been reported in the car theft "industry". Last year, more than 70,000 cars were stolen in Australia, this despite the existence of car steering locks and the increasing use of car burglar alarms.

A problem concerning the car alarm concept is how to make it most effective. One philosophy – usually expounded by the commercial alarm manufacturers – is that the alarm is most effective if its presence is clearly advertised and made obvious. The thief will then, according to theory, bypass that vehicle and attack one whose owner has not been astute enough to fit the "Little Beaut Red and Green Flashing Car Alarm". (What would happen if everybody fitted the "Little Beaut . . . etc" is not clear).

But that question aside, the opposite alarm philosophy contends that a warning sticker only makes the thief aware that there is an alarm to be circumvented. And professional thieves are not above familiarising themselves with the various commercial alarms and how best to disable them.

In fact many car alarms can be effectively disabled by the simple measure of disconnecting or cutting the horn wires without lifting the bonnet. It is not generally realised that most horns can be reached without much effort from underneath the vehicle. An experienced thief can pull this trick in a few seconds.

Even if the alarm does sound, the thief usually has sufficient time to disable it. Surveys have shown that people tend initially to disregard a car burglar alarm, assuming that the owner has set it off accidentally. Provided he keeps his "cool", the thief has only to cut the wires to the horn or siren and drive away.

One of the worst thieves, as far as the car owner is concerned, is the "joyrider". This is the person who grabs your lovingly cared for Ford, Holden, Porsche, etc and takes it for a "spin around the block" to see for himself just how fast it will go. If the owner is lucky, the car will be found intact a day or so later, usually minus the radio-cassette player and any other valuable accessories that may have been fitted.

But even this can have a sting in the tail, with the real damage to the car often unseen. After all, the thief doesn't care two hoots about your property. The engine could well have been overheated or had the inside revved out of it. Or the car could have been used to show off innumerable "wheelies" to the detriment of the tyres and suspension.

Often, of course, the car will not be recovered or will be damaged beyond repair. Many cars are stolen by professional thieves to be stripped and used for spare parts. But whatever the circumstances, car theft causes the owner a great deal of expense and inconvenience.

## Ignition killer

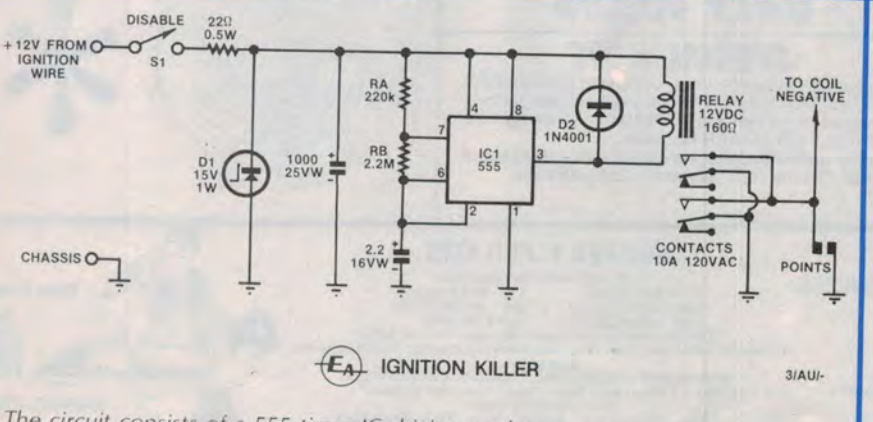
In order to protect your car against the above situations we have devised a rather cunning little circuit. We've christened it the "Ignition Killer".

It works like this: imagine a thief has just broken into your car. He starts the engine and begins to drive off. Just as he does, the engine dies. He immediately cranks the engine and a few seconds later it starts. Again he begins to drive off and again the engine dies. In desperation he tries a third time only to have the engine die again.

The above sequence of events should automatically deter any joyriders and many so-called professional thieves as well. After all, it is difficult to get any joy out of the car that only moves a few metres at a time. In this situation, most thieves will simply assume that the car has an engine problem and will abandon it for easier "game".

The simple circuit that creates this mayhem is simply an astable oscillator based on the ubiquitous 555 timer IC. The output of the 555 oscillator is connected to a relay which in turn has its normally open contacts wired in parallel with the car's points or coil switching transistor (see Fig. 1).

A few seconds after the car is started,




*The circuit consists of a 555 timer IC driving a relay.*

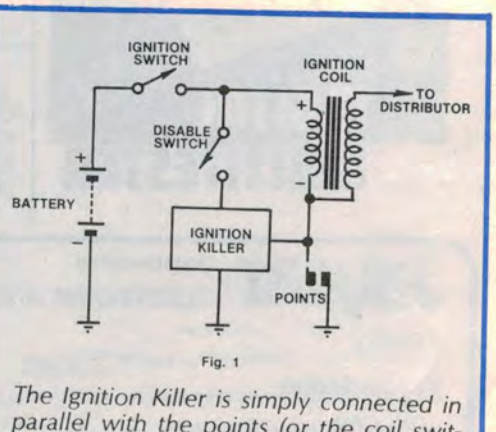
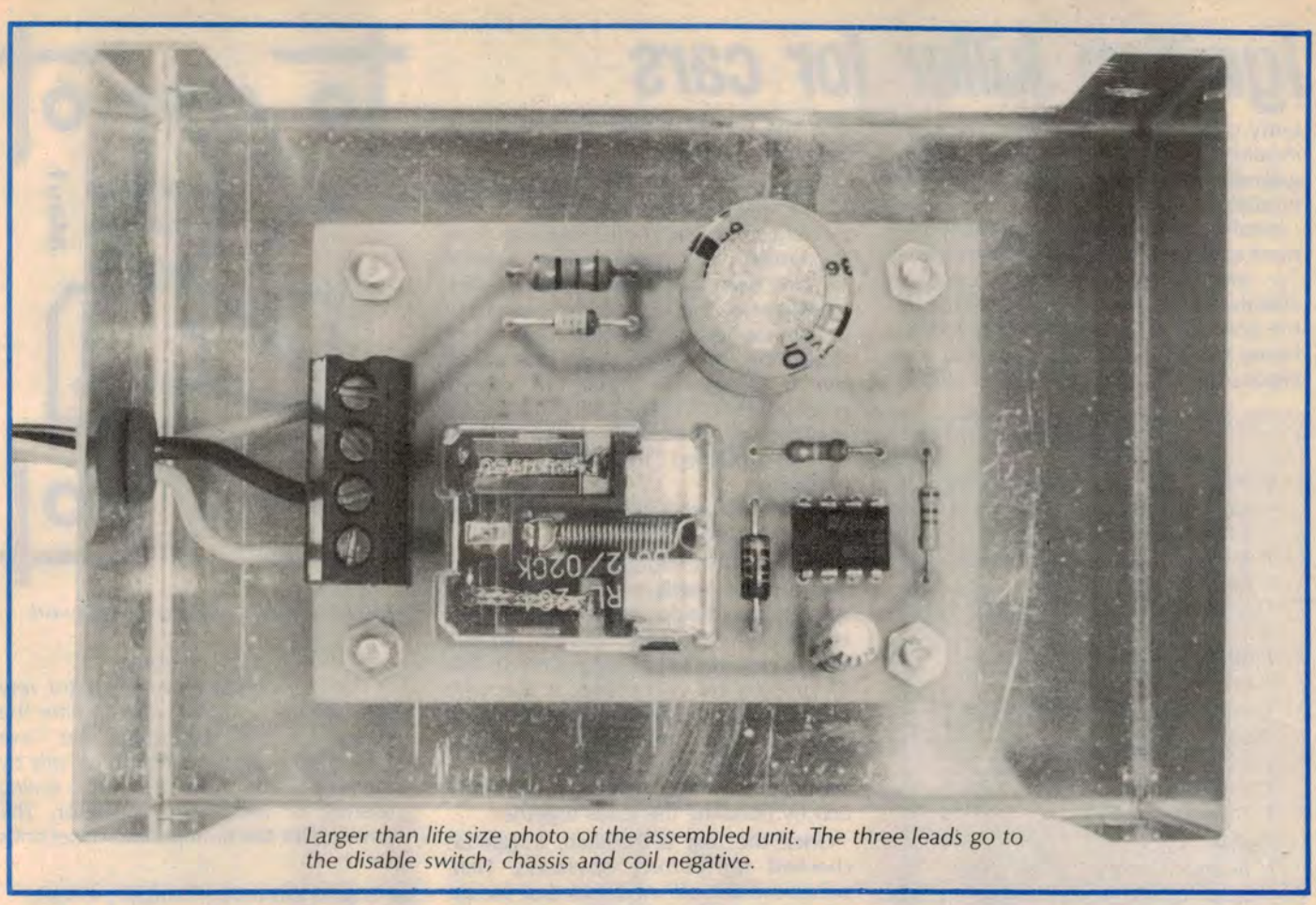



Fig. 1

*The Ignition Killer is simply connected in parallel with the points (or the coil switching transistor).*



*Larger than life size photo of the assembled unit. The three leads go to the disable switch, chassis and coil negative.*

the oscillator output goes low, causing the relay to operate and short out the car's points. With no points signal the ignition system cannot produce a spark and so the engine dies. A few seconds later the oscillator output returns to the high state, the relay turns off and the contacts open. The engine can now be started and will run for a few seconds until the next low cycle of the oscillator.

The circuit is powered from the car's ignition wire and uses no power when the ignition is not switched on. Thus it will not flatten the battery when used to protect the car for extended periods.

## How it works

The circuit consists of astable oscillator IC1 (555), a relay and a handful of minor components.

Inside the 555 timer IC is a resistor divider network which sets reference voltages of 1/3 Vcc and 2/3 Vcc on internal comparators. At switch on, the pin 2 trigger input is pulled low by an external 2.2μF capacitor, while the output is high. This means that the relay will be off and so the engine can be started.

The 2.2μF capacitor immediately begins charging via the 220kΩ and 2.2MΩ timing resistors. When the voltage across it reaches 2/3 Vcc, the 555 output (pin 3) switches low and the relay turns on to short out the points (or the coil switching transistor). At the same time, pin 7 goes low (ie, the discharge transistor turns on) and the 2.2μF capacitor begins discharging.

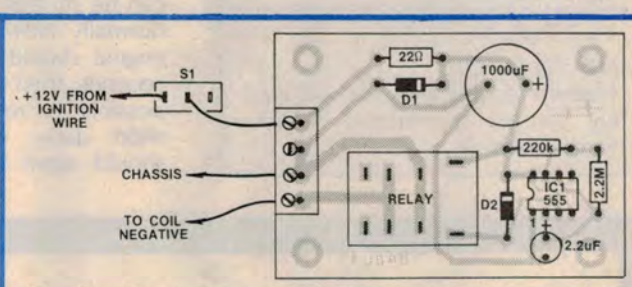
Pin 3 will remain low, and hence the relay remains on, until the capacitor is discharged to 1/3 Vcc. At this point, pin 3 switches high again, the pin 7 discharge transistor turns off, and the 2.2μF capacitor re-charges towards 2/3 Vcc. Thus, the cycle repeats indefinitely while ever power is applied. It follows, therefore, that the car can be started only during the charging cycle and stalls immediately the voltage across the timing capacitor reaches 2/3 Vcc.

The 1N4001 diode connected across the relay contacts shorts out the relay coil back EMF to prevent damage to the output circuit of the 555. The 22Ω resistor, 15V zener and 1000μF capacitor provide supply line filtering and decoupling. The 15V zener clamps supply line transients to 15V, thus protecting the 555 from excessive voltages.

We estimate that the current cost of parts for this project is approximately

**$13.00**

This includes sales tax.




*Construction is easy – just follow this parts overlay diagram. Note component orientation.*

## Construction

Construction is straightforward with all parts except the switch mounted on a small printed circuit board (PCB) coded 84au1 and measuring 69 × 48mm. This is housed in a metal case measuring 102 × 70 × 51mm, although any similarly-sized plastic case would also be suitable.

We mounted the PCB assembly on the lid of the case using four 6mm brass spacers and machine screws and nuts. A small hole was drilled in the end of the lid closest to the terminal block to allow

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entry of the connecting leads. This hole should be fitted with a small rubber grommet to prevent damage to the lead insulation.

Installation of the unit is probably the most important part of the construction. To enable the unit to function effectively, it must remain undetected by the potential thief. This not only means hiding the unit itself and disguising any exposed wiring, but locating the unit so that the sound of the relay operating cannot be heard.

The best place for the unit is probably in the engine bay against the firewall. Power for the unit should be taken from the ignition wire, preferably at a point remote from both the ignition switch and the coil. This reduces the chances of a thief spotting the extra lead when "hotwiring" the car. A single-pole on-off switch, accessable from the driver's position, should be placed in the power lead running to the unit so that the unit can be disabled and the car driven normally.

It goes without saying that this switch should also be well hidden.

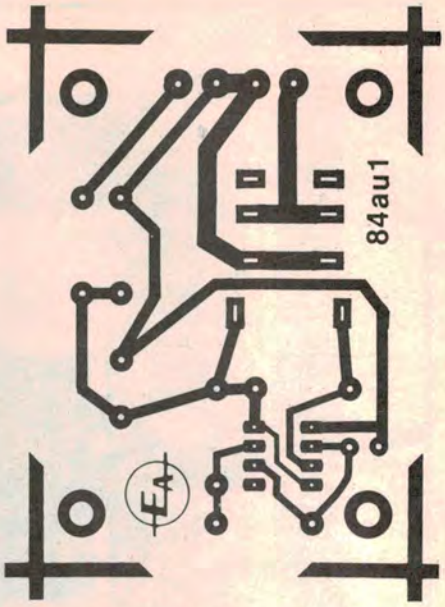
The earth wire should be connected to the nearest earth point, which may actually be inside the case if this is electrically connected to the vehicle chassis (say via self-tapping screws). The most exposed connection is the wire leading to the negative or points side of the coil. This connection should be disguised by using wiring similar in appearance to the existing coil leads, and by bundling the leads together.

Once the unit is installed, it can be checked for correct operation. First, switch the unit off and check that the car can be started and that the engine runs normally. Now switch the unit on – the engine should run normally for a few seconds, then cut out. It should now be possible to restart the engine after a short delay, whereupon the engine should again run normally for a few seconds before cutting out.

If your car's engine is very easy (or very hard) to start you may wish to alter the engine run and stop times we have chosen. This can be done quite easily by changing either of the two timing resistors or the timing capacitor. The formulae for the time periods in seconds are:

- Engine run time = $0.685(R_A + R_B)C$;
- Engine stop time = $0.685(R_B)C$.

In our circuit, $R_A = 220k\Omega$, $R_B = 2.2M\Omega$, and $C = 2.2\mu F$. By substituting these figures into the above equations, we get an engine run time of 3.6 seconds and an engine "kill" time of 3.3 seconds.




*Above is the actual size PCB artwork.*

## PARTS LIST

*1 PCB, code 84au1, 69 × 48mm*
*1 aluminium case, 102 × 70 × 51mm*
*1 4-way PC-mounting terminal block*
*1 DPDT 12V relay with 10A 120VAC contacts*
*1 SPST toggle switch*
*4 6mm or 8mm spacers*
*1 small rubber grommet*

*SEMICONDUCTORS*
*1 555 timer IC*
*1 15V 1W zener diode*
*1 1N4001 diode*

*CAPACITORS*
*1 1000μF 25VW PC electrolytic*
*1 2.2μF 16VW PC electrolytic*

*RESISTORS (¼W, 5% unless stated)*
*1 x 2.2MΩ, 1 x 220kΩ, 1 x 22Ω ½W*

*MISCELLANEOUS*
*Machine screws and nuts, self tapping screws, automotive hook-up wire, solder etc.*