

Combine two popular projects to build this:

Remote controlled car burglar alarm

Protect your home or car with this unit. It combines the UHF remote switch featured in January with the ultrasonic alarm described in April. Together, the two make a very effective radio-controlled burglar alarm which is comparable to commercial units costing hundreds of dollars more.

by **BRANCO JUSTIC**

The two main components of this project are not new. We published the UHF Remote Switch in January 1987 and it has proved very popular indeed. It seemed that everybody who had a

burglar alarm wanted to add UHF remote control.

The Ultrasonic Burglar Alarm was published in April 1987 and, as described, was activated by a remote me-

chanical switch. It is a versatile low-cost unit that could be used as a self-standing alarm for the home or car, or as an ultrasonic movement detector.

The combined alarm system presented here features the ultrasonic alarm with the added luxury of activation by the UHF remote control switch. Some of our more experienced readers may already be using a similar combination. The unit described here is the simplest version possible in order to keep installation simple.

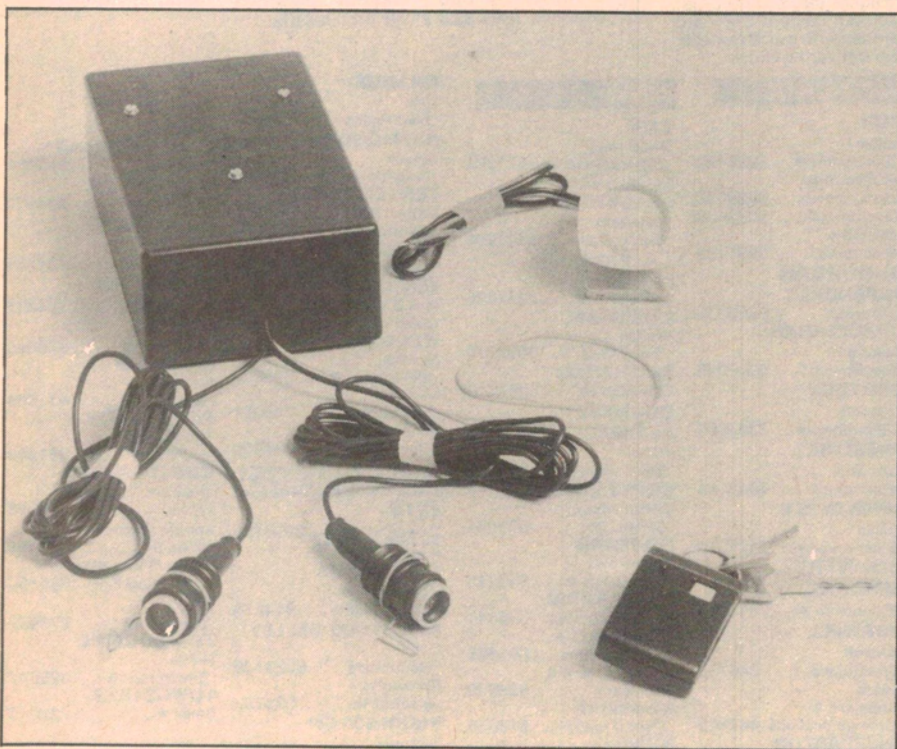
In its simplest form you will only need to make two connections to the vehicle's electrical system; ie, to +12V and chassis. If you want to protect the bonnet and boot, you may add an extra wire and connect it to several normally open automotive switches. Alternatively, for a home system, this extra lead could be connected to normally open reed window/door switches.

We've also managed to eliminate the need for an extra off/on indicator loudspeaker. Instead we've wired the system so that the existing siren/screamer doubles up as the off/on indicator. This was achieved simply by connecting the indicator speaker output from the UHF receiver PCB to the siren via an isolating diode (see wiring diagram).

For a car burglar alarm, you will find that the receiver PCB from the remote switch fits comfortably in the plastic zippy case used for the ultrasonic alarm. The best approach is to mount the receiver PCB on the lid of the case and secure it using machine screws and nuts. The antenna can exit through the same slot as the transducer leads.

Some notes on the UHF remote switch

When the UHF remote switch is correctly assembled and tuned it should have a range of approximately 50 metres in an open field (no obstructions). Some readers have, however, struck problems due to incorrectly in-



All you need for a complete car burglar alarm system: main alarm module, piezoelectric siren, ultrasonic transducers, and remote control transmitter.



The remote control transmitter is small enough to attach to your key ring.

stalled trimmer capacitors.

An incorrectly installed trimmer results in a reduced range (approximately 10cm) of operation. When using a trimmer which has three legs, note that the legs opposite each other are actually

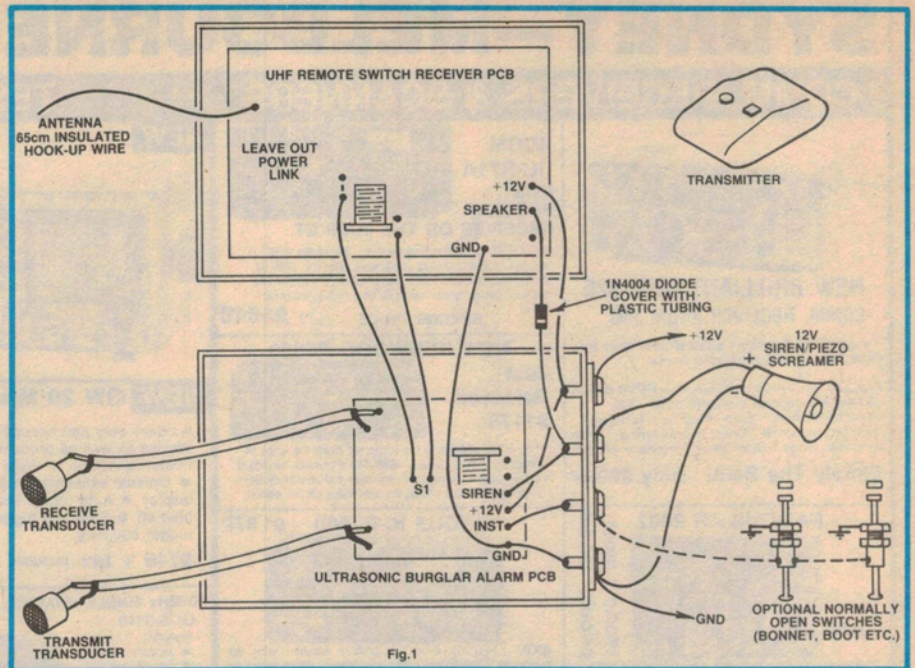


Fig.1

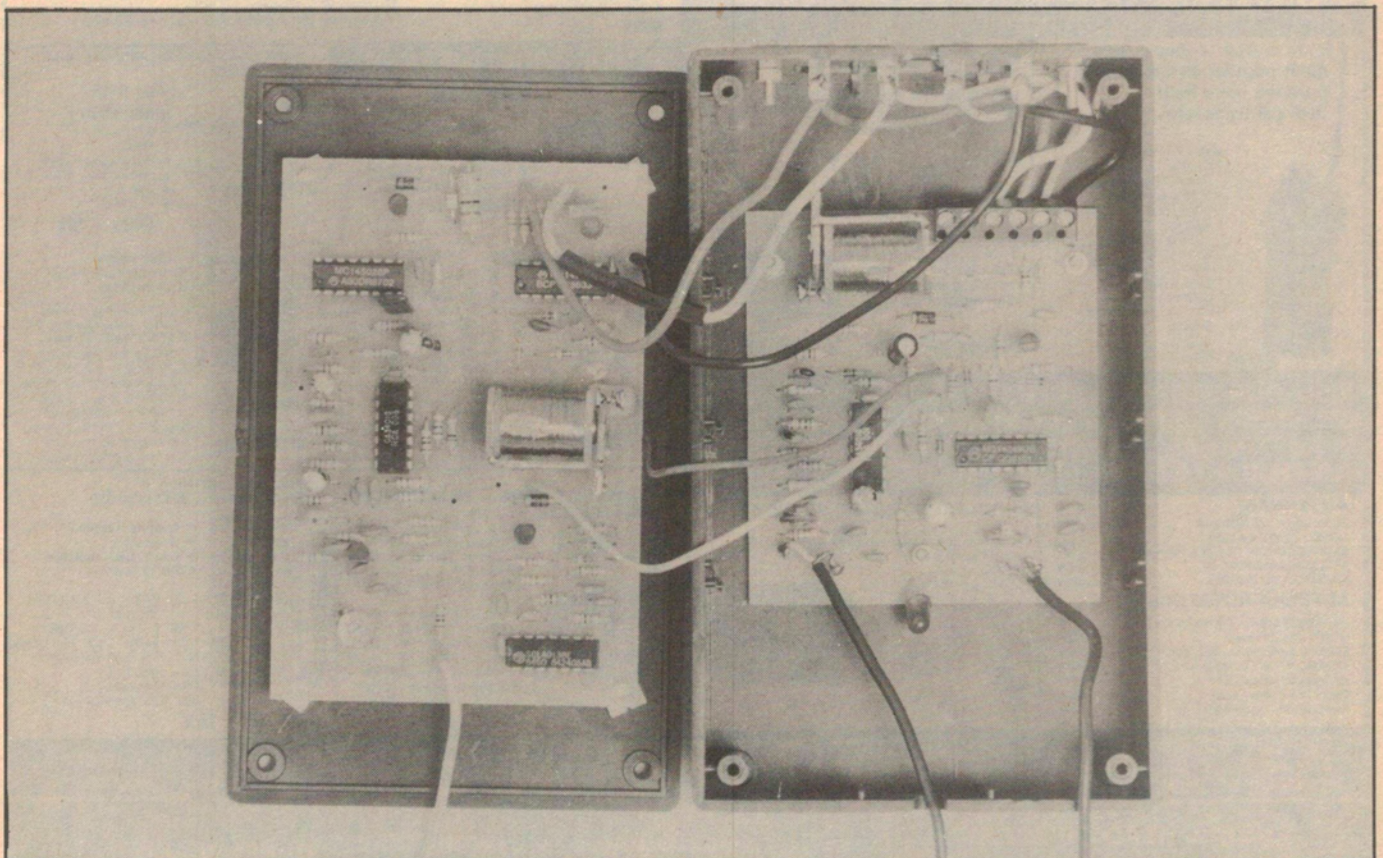
Fig.1: this wiring diagram shows how to combine the UHF remote control switch with the ultrasonic alarm module. The boot and bonnet switches connected to the instant trip line are optional.

short circuit. Only one of these legs should be used.

Some readers also installed the three disc ceramics in the front end in the wrong locations. This is mainly due to confusion regarding the coding systems

used. Note that a 330pF capacitor is normally coded 331. Also, the decimal point on the 3.3pF capacitor is sometimes very small.

You don't need an oscilloscope to align the unit. An analog multimeter



View inside the main alarm module. The PCBs should be mounted using machine screws and nuts fitted with shakeproof washers.

switched to its lowest AC voltage range, and with a $0.1\mu\text{F}$ capacitor series with the positive test lead, is sufficient. The test leads are connected between TP1 and earth on the receiver PCB.

Not all of us have access to a frequency counter which is suitable for 304MHz operation and offers good sensitivity. However, a counter is not really needed to test the unit. Simply set the transmit trimmer to the middle of its travel (half mesh) and adjust the receiver trimmer for a maximum waveform amplitude as measured at TP1. Having quickly tested the unit for proper operation, you must now adjust the frequency to 304MHz to meet DOC (Department of Communications) requirements.

If you don't have a counter, a calibrated signal generator with amplitude modulation can be used to set the correct frequency of operation. With the signal generator's output lead placed in the vicinity of the receiver, adjust the trimmer on the receiver PCB for maximum amplitude at TP1. This done, switch off the signal generator, activate your transmitter (link included), and adjust the trimmer on the transmitter for maximum amplitude at TP1.

Current consumption

Some readers have expressed concern at the 100mA of current drawn by the relay on the receiver PCB when the alarm is switched on. This will not normally cause problems as a car battery should be able to provide this amount of current for hundreds of hours. However, you could strike trouble on with a partially run down battery on a cold winter's day.

The way around this problem is to wire your alarm unit to the relay contacts so that the alarm is on when the relay is off (ie, just use the other relay contact). In this case, 100mA will be consumed by the relay only when the

Wireless Home Burglar Alarm

As mentioned in the January 1987 issue, the UHF Remote Switch can be used to eliminate the wiring between the various sensors and the control unit in a home burglar system. This, however, requires a small modification to the transmitter circuit so that it only transmits for a short period of time when the sensor is tripped.

The required modification is quite simple and involves the addition of a parallel $100\text{k}\Omega$ resistor and $1000\mu\text{F}$ capacitor in series with the positive supply rail. Fig.2 shows the details.

Now, when the sensor contacts close, the transmitter will only transmit for a brief period until the $1000\mu\text{F}$ capacitor charges up. This brief transmission is more than enough to trigger the control unit and ensures that the device

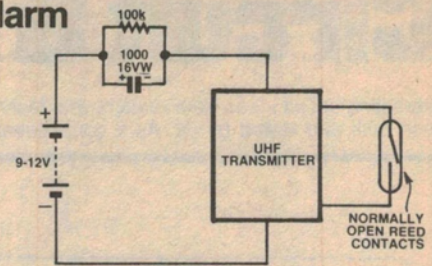


Fig.2

Fig.2: how to wire the UHF transmitter for use in a home burglar alarm system.

meets the required regulations.

At the end of the transmission, the circuit draws negligible current as set by the $100\text{k}\Omega$ resistor. This means that you can turn the alarm off and leave a window open without flattening the transmitter battery. Changing the $100\text{k}\Omega$ resistor to $180\text{k}\Omega$ will reduce the quiescent current even further but increase the reset time from 100 seconds to 180 seconds.

car is running and the battery is being charged. However, you will now have a long "beep" for on indication and a short "beep" for off indication unless R27 and R28 on the receiver PCB are reversed.

Note that a power link was included in the final version of the PCB between the +12V rail and the relay wiper. With the power link included, the relay switches the +12V rail as per the prototype described in January. With the power link removed, the relay contacts are isolated and may simply be used as a switch.

Finally, readers should note that, as far as this project is concerned, the fol-

lowing ICs are direct equivalents: MC145026 = SG41342; MC145028 = SG41344; 74C14 = 40106 = 4584.

Feedback on the ultrasonic alarm

Construction of the ultrasonic alarm is straightforward, although some readers have encountered difficulties in correctly adjusting the unit.

The first thing to note is that the transmitter frequency adjustment is fairly critical. To adjust the unit, the two transducers should be placed side by side closely facing towards a blank wall. Alternatively, they can be posi-

continued on page 129

Footnote: kits for the UHF Remote Switch and the Ultrasonic Burglar Alarm are available from Oatley Electronics, 5 Lansdowne Pde (PO Box 89), Oatley, NSW 2223. Phone (02) 579 4985.

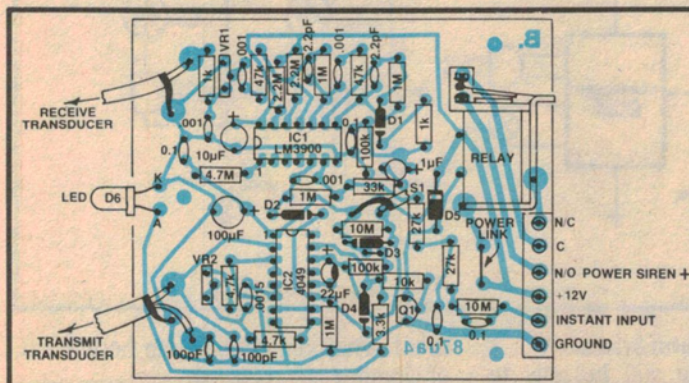


Fig.3a: twin core shielded cable must be used to wire the transmitter for maximum drive.

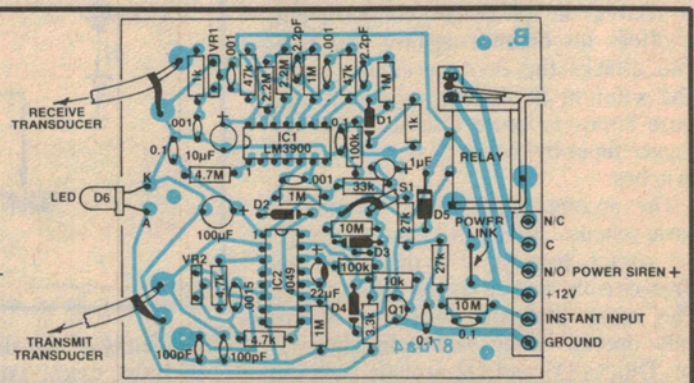


Fig.3b: how to wire the transmitter for reduced drive. Single core shielded cable can be used here.

Car Burglar Alarm ... ctd from page 63

tioned 10-15cm apart and facing towards each other.

Whatever arrangement you use, make sure that the environment in the vicinity of the transducers is perfectly still. This is to ensure that the signal picked up by the receiver remains constant.

Initially, the sensitivity control (VR1) should be set to minimum; ie, fully anti-clockwise (not clockwise as incorrectly stated in the April issue). It's then a matter of carefully adjusting VR2 for maximum waveform amplitude at pin 9 of IC1b as shown on a CRO.

If you don't have a CRO, adjust VR2 for maximum DC voltage across C6.

One problem that's likely to be encountered here is that the metal adjustment tab of the trimpot makes the unit sensitive to the presence of the screw-

driver. For this reason, it's best to use a plastic tool to adjust VR2.

Once VR2 has been correctly adjusted, it's simply a matter of adjusting VR1 to give the required sensitivity.

Note that twin core shielded cable must be used to connect the transmitter if it is wired in maximum drive configuration (ie, connected between pins 2 and 4 of IC2). The braid of the cable should be connected to the earth pad on the PCB between the two transmitter terminals. Fig.3a shows the details.

Note: the wiring diagram in the April issue incorrectly shows the use of single core shielded cable for the maximum drive configuration. This results in greatly reduced sensitivity.

Single core cable should only be used when the transmitter is wired in mini-

imum drive configuration as shown in Fig.3b. This should provide adequate sensitivity for most situations, including car burglar alarms.

Another problem with the ultrasonic alarm can occur if the transducers are soldered directly to PC pins on the PCB. In this case, mechanical noise generated when the relay turns off can cause repeated false triggering, particularly at high sensitivity settings.

This problem can easily be solved by isolating the transducers from the PCB. Alternatively, the relay can be quietened by sticking a small piece of tape to the end of the relay armature and by bending the two outer relay contacts towards each other to reduce the travel of the changeover contact.

Finally, readers should note that the C and N/C terminals were shown transposed on the wiring diagram on page 47 of the April issue.