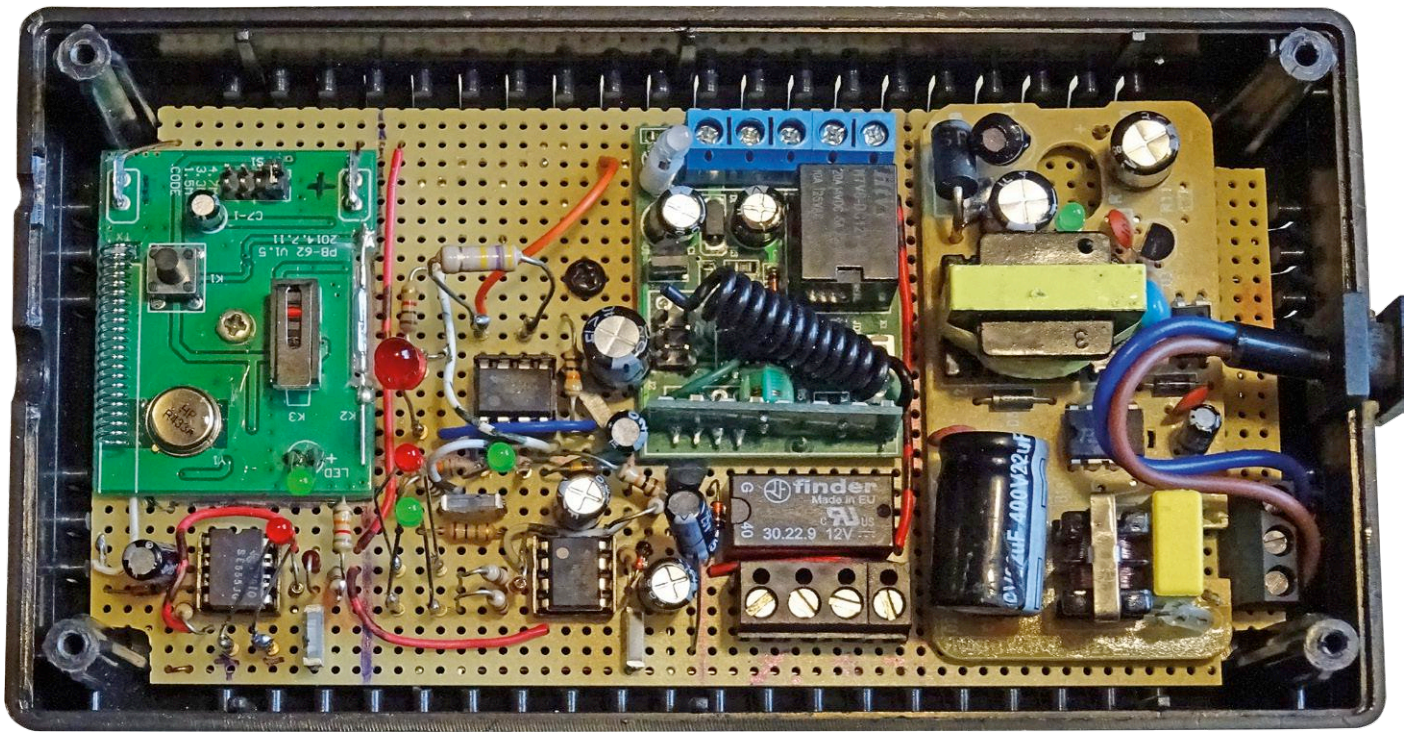
Jammer Alarm

Secondary device protects alarm systems against deliberate interference



Widely sold, keenly priced and easy to install: what's not to like about wireless alarm systems? Just this: they are totally unprotected against any villain using a jamming transmitter. This project will warn you when criminals disable your security system!

By **Walter Meyer** (Germany)

The weak point of wireless alarm set-ups ought to be well known, following numerous warnings in the media. Using a dedicated jammer device or even a 433-MHz keyfob 'zapper' (as used for opening garage doors from your car), the functionality of a wireless alarm system can be permanently obstructed. Generating a radio carrier will swamp (override) the relatively weak signal from the radio alarm and prevent the system from operating correctly. What an out(r)age! Jammer devices are advertised in Internet advertisements as a means to block mobile phones, GPS, WLAN and other types of radio communication for privacy protection. But let's make it crystal-clear: *jamming transmitters of this kind may not be advertised, marketed, purchased, or even used in the European Union (and the USA and Japan) by private individuals or organizations* [1],[2]. Privacy protection is not the real function of these gadgets. Instead, these now inexpensive and small devices usually serve criminal purposes: they are used to deactivate the tracking systems for locating stolen vehicles or neutralize the wireless alarm systems of residential properties. Jammers can also be used to prevent emergency calls being made to fire brigades, the police or other emergency services. Severe legal sanctions appear justified from this perspective: anyone caught using a jammer can expect a penalty upwards of ten thousand euro, pounds or dollars!

What's in the box?

The circuitry of the jammer alarm remains on permanent standby for trouble, ready to sound the alarm by means of a siren and a wireline connection to the main alarm system. As can be seen in **Figure 1**, it consists of five functional elements (or six if you count the power supply). Three of them are shown in green for a reason: they are ready-made modules that can either be salvaged from old gadgets or else can be purchased

so cheaply on the Internet that building them yourself is hardly worthwhile. But let's start at the beginning.

At upper left we have a 555 timer that is wired as an astable multivibrator and sends a brief negative-going pulse every 13 seconds to a 433.92-MHz transmitter. In this respect it behaves like standard types of wireless door or window contact sensor. On the schematic this is shown as the first of the ready-made (shown in green) elements and can be recognized in the header photo as the green PCB on the left.

The signal from the timer is connected here to the voltage-facing side of the normally-open (NO) reed contact. According to how door or window contacts are handled, this may need to be altered; the negative pulse must have the same effect as opening an alarm-protected window. Two LEDs indicate that the transmitter is delivering a pulsed 433-MHz carrier to the antenna (visible at the outer edge of the header image). During the actual pulse the green LED of the door contact comes on and goes out briefly, with the red LED flashing simultaneously. The small pressbutton on the transmitter, if provided, enables a manual function test to be made.

The wireless signal is received on the antenna of a small single-channel universal receiver module with a 'code learning' capability. Receivers like this can be found on the Internet (for example on eBay; include '433 MHz' and 'learning' in your search terms) for as little as €10 / £9 / $11 or less during price wars. The type of receiver you need is one designed to handle ASK-coded signals, evaluate their coding and switch a relay as required. The model that I used (OC-433L1) lets you define various switching modes of the relay (momentary contact, changeover, on/off switch or timer with various durations). Because we need the module only to output the pulse received (indicated by a white LED on the OC-433L1), the momentary contact ('pushbutton') function is what we need. The relay on the PCB is not required at all and should be removed or deactivated for noise reduction.

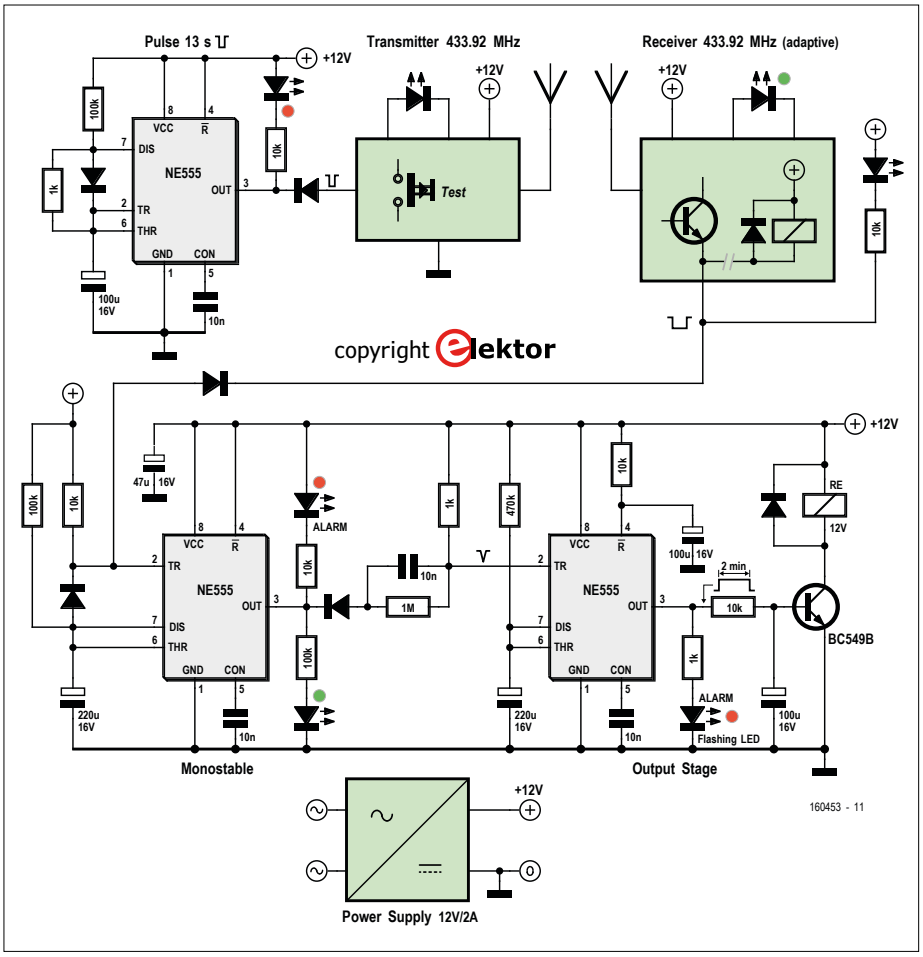


Figure 1. The functional elements of the jammer alarm.

Pulse forming

Now for some more homebrew circuitry! A second NE555 timer IC is wired as a retriggerable multivibrator. Its output is normally High (with the green LED on its output lit), switching to Low after around 25 seconds, when the red Alarm LED lights up. Under normal conditions, when the wireless link is not being jammed, this is prevented from happening by the regular sequence of negative-going pulses produced every 13 seconds. The multivibrator will flip over to Low only when the wireless link is interrupted and the pulses fail to be received.

The last functional element is the output stage; once more this is formed of a 555 timer used a monostable multivibrator. When it is triggered, its output changes to High for around two minutes. The relay can be used to activate a siren and/or set off the alarm in the security system. For the alarm indicator lamp I used a flashing LED. Its data sheet indicates a forward voltage of 3.5 to 5 V and a current of 8 to 20 mA, so the value of the dropper resistor should be in the order of 1kΩ. For other LEDs the value may differ, so consult the data sheet for your flashing LED!

One more detail needs to be mentioned, namely the 10-nF capacitor between the two timers. This functions as an integrator. When the first monostable multivib changes to Low in the event of an alarm, only the negative edge is passed to the output stage, as a short negative-going pulse. This prevents the output stage from being triggered permanently (and not only for two minutes).

Not much needs to be said about the final ready-made building block in the circuitry. This is simply the innards of a perfectly normal 'wall wart' power supply that can provide +12 V direct current at 2 A.

On test

I have checked out this device extensively with a radio ham using two 433-MHz handhelds at various transmit power levels. The jammer alarm worked exactly as designed (and hoped). If the wireless link is jammed, the device triggers the alarm reliably as soon as the radio signal is lost. ⏮

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Web Links

[1] www.ofcom.org.uk/spectrum/radio-spectrum-and-the-law/jammers or

[2] www.fcc.gov/general/jammer-enforcement