

# Momentary Action with a Wireless Switch



Matthias Haselberger (Germany)

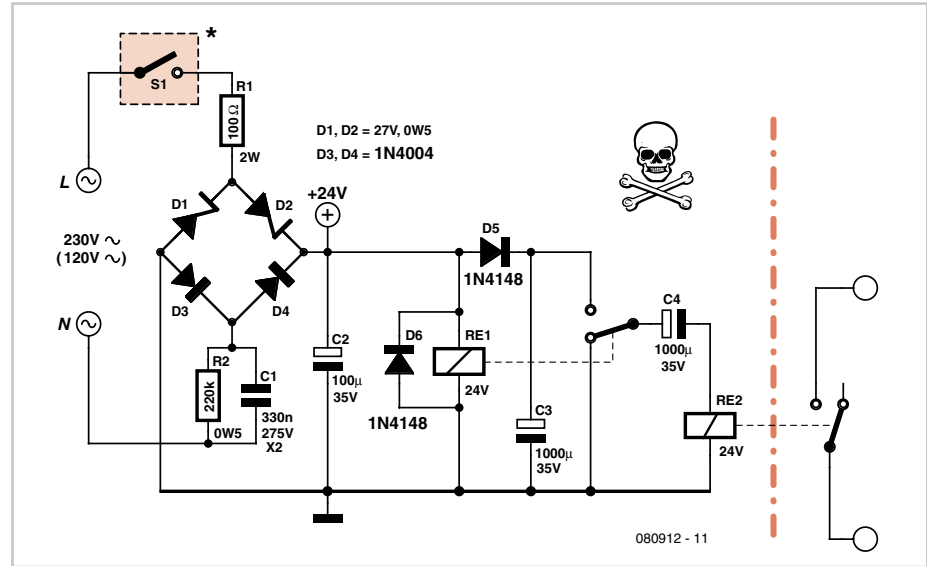
Many different types of wireless switch modules with a relay for switching AC power loads are commercially available. However, some applications require a short On or Off pulse, such as is provided by a momentary-action (pushbutton) switch. Here we describe a solution that simulates a pushbutton switch with a standard wireless switch. A supplementary circuit converts the switch module into a remotely controllable momentary-action switch.

In the supplementary circuit, S1 is the switching contact of the relay in the wireless switch module. This contact energises a 24-V power supply connected directly to the AC power outlet, consisting of a bridge rectifier (D1–D4) with a series resistor (R1), a series capacitor (C1), and a charging capacitor (C2). The two Zener diodes in the bridge rectifier (D1 and D2) limit the DC voltage on C2 to approximately 24 V.

When the wireless switch module closes contact S1, 24 VDC is applied to the coil of relay

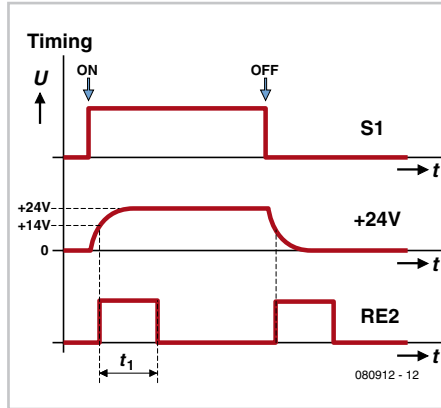
RE1, which closes. At the same time, capacitor C3 charges via D5. When the contact of RE1 switches, capacitor C4 provides the charging current for C3. The charging current flows through the coil of RE2, which remains

actuated as long as the current is sufficiently large. The current decreases as the voltage on C4 rises, with the result that RE2 drops out and the contact of RE2 (the 'momentary' contact) opens again.



S1 opens when the relay in the wireless switch module is de-energised, which causes RE1 to drop out shortly afterward and connect capacitor C4 to ground. The capacitor discharges through the coil of RE2, causing its 'momentary' contact to be actuated again. The timing diagram shows the switch-on and switch-off sequences of the wireless switch (S1 contact).

The duration of the 'button press' (engagement time of RE2) depends on the capacitance of C3 and C4. The equation  $Q = C \times U = I \times t$  can be used to calculate suitable capacitor values for a specific hold time ( $t_1$  in the timing diagram) with a given relay current. The value shown in the circuit diagram (1000  $\mu\text{F}$ ) corresponds to a hold time of 1 second with a relay current (holding current  $I_H$ ) of 10 mA:  
 $C = I_H \times t_1 / U = (0.01 \text{ A}) \times (1 \text{ s}) / 10 \text{ V} = 1000 \mu\text{F}$ .  
 A reed relay cannot be used for RE2 because the voltage across the coil reverses. This



also means that a free-wheeling diode cannot be used, but it is anyhow not necessary due to the slow discharge of C4. RE2 should be a 'Class II' relay (such as the Omron G6D-1A-ASI 24DC) to provide adequate insulation of the switch contact. RE1 does not have

to be a Class II relay. Due to the presence of AC power line voltage, R1 and R2 must have a rated working voltage of 250 V (150 V), although they can also be formed from two resistors with half this rated working voltage connected in series, each with half of the specified power rating. In this case, R1 consists of two 47  $\Omega$  / 1 W resistors and R2 of two 100 k $\Omega$  / 0.25 W resistors. Readers on 120 VAC 60 Hz power networks should change C1 into 680 nF.

The circuit can be fitted in a plastic enclosure with an integrated AC power plug, which can easily be plugged into the wireless switch module. The contact of RE2 can then be fed out to a terminal strip as a floating contact. For adequate AC isolation, a safety clearance of at least 6 mm (air and creepage paths) to other conductors must be maintained, in addition to using a Class II relay.