Electronic Bird Scare

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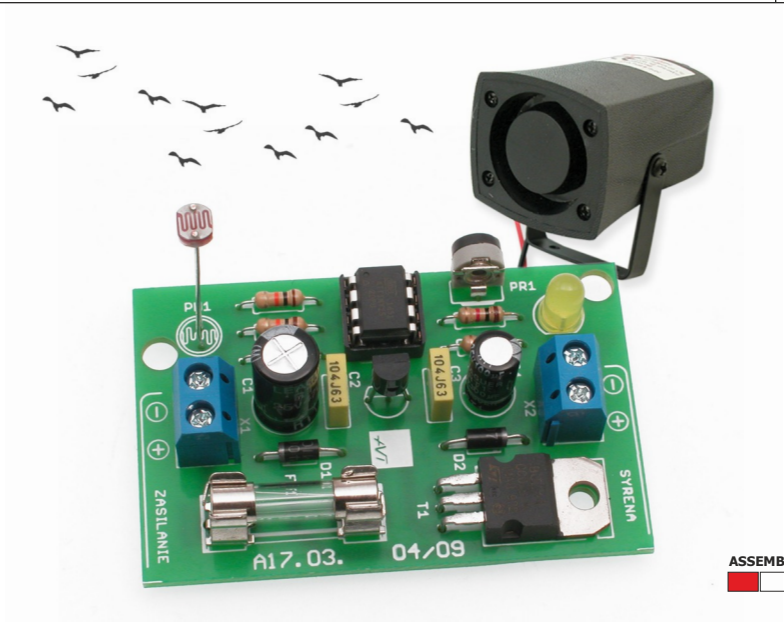
AVT 3135



ASSEMBLY DIFFICULTY

The presented scare is a very effective and environmentally friendly method of bird deterrence. It is a microprocessor-based version of the scare for starlings. The sound emitted, with a volume of more than 100 dB, will successfully flush out not only birds but also small rodents from the garden or warehouse.

Characteristics

- randomly activated beep
- smooth adjustment of siren on frequency
- integrated twilight switch
- supply voltage level check - LED
- light sensor function check - LED
- power supply 12 V / 1 A (battery)
- board sizes: 40×62 mm

Circuit description

Flushing out birds from certain locations sometimes becomes a necessity. Above all, the mass occurrence of starlings can destroy the many-month work by fruit growers. The presented microprocessor-based bird scare was designed to effectively control bird pests. It is sufficient as basic protection against birds consuming the fruit from the plantation. The repellent is a device that randomly emits a one-tone sound at a very high volume. Thanks to the twilight switch, the sound signal will only be activated during the day and, regardless of the settings selected, the user can be sure that the scare will not switch on at night.
The schematic diagram of the scare is shown in Figure 1. The circuit must be powered from a 12 V battery, e.g. gel battery or stabilised power supply also with 12 VDC and an output current of approximately 1 A.

D1 diode in series with the power supply protects the circuit against incorrect input voltage polarity. Capacitors C1...C4 act as a supply filter. Input voltage from the screw connector X1 goes to the US2 stabiliser. The LDO stabiliser was used to reduce current consumption. The scare operation is controlled by a US1 ATtiny25 microcontroller clocked by an internal clock signal. Resistive divider made up of resistors R3 and R4 connected to port PB3 allows the programme in the microcontroller to measure the battery voltage without the risk of damaging it with too high a voltage. To make the circuit work sparingly and only during the day, a photoresistor PH1 was used, which, together with resistor R5, forms another resistance divider. Voltage signal, dependent on lighting, goes to the PB4 port of the microcontroller.

To simplify operation, the circuit uses only one setting element. This is potentiometer PR1, which is used to set the siren switching on frequency. Adjustment times range from 5 to 30 minutes. For the device to generate a deterrent sounds randomly, the programme was developed in such a way that using the value set by the potentiometer, it recalculates it together with the signal from the photoresistor.
The design of the programme also takes into account the number of signals and the duration of the siren at the designated time. This can be from 3 to 8 signals lasting from 2 to 5 seconds. Figure 2 shows LED "flashing" to interact with the user. When the battery is discharged, three short flashes appear every few seconds. From dusk to dawn, the LD1 diode is extinguished in order to minimise current consumption. During the day, every few seconds the LED flashes, indicating correct operation of the scare. When the scaring is activated, the LED is switched on and 2 seconds later, via transistor T1 starts the acoustic siren that must be connected to screw connector X2, bearing in mind its polarity.

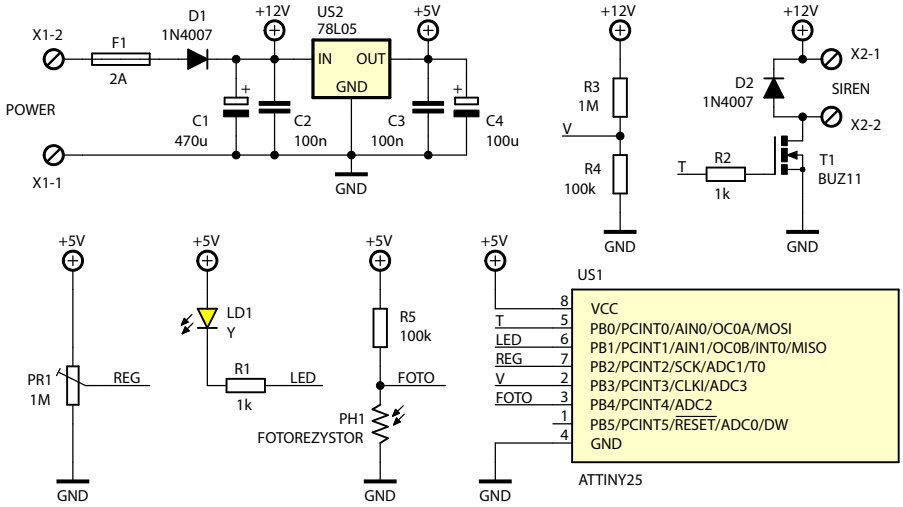


Fig. 1. Schematic diagram

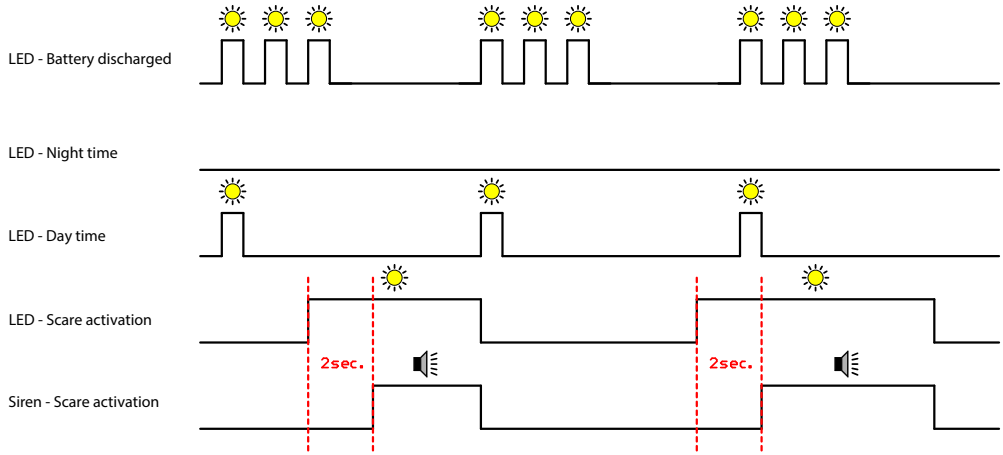


Fig. 2.

Mounting and start-up

Mount the circuit on a board whose design is shown in Figure 3. Photographs will be also helpful when mounting. All components are mounted on a single-sided printed circuit board with size 40 x 62 mm. Start mounting the circuit from soldering resistors and other small-size components and end up with screw connectors and insertion of the US1 integrated circuit into the socket. Once the circuit is mounted, you need very carefully check that the components have not been soldered in the wrong direction or at the wrong locations and that no short-circuits of the soldering points have occurred during soldering. A mistake at this stage of the mounting work can result in damage to components or even explosion.

Circuit flawlessly assembled from functioning components will work straight away.
Figure 4 shows the correct way to connect the siren and power supply to the board. If the scare will be exposed to direct weather conditions, it can be built into the optional Z-54 enclosure to which the PCB is fitted. Photograph 2 shows the board housed in the aforementioned enclosure. When using the AC adapter to power the scare, it must also be protected from rain and moisture to prevent possible damage or electrocution to the user.

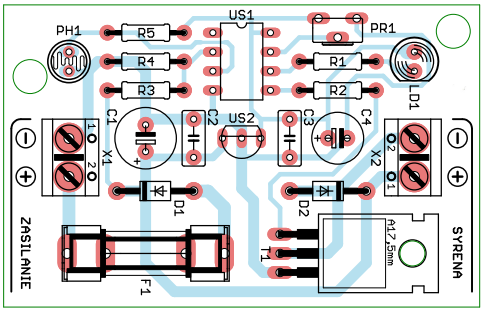


Fig. 3.

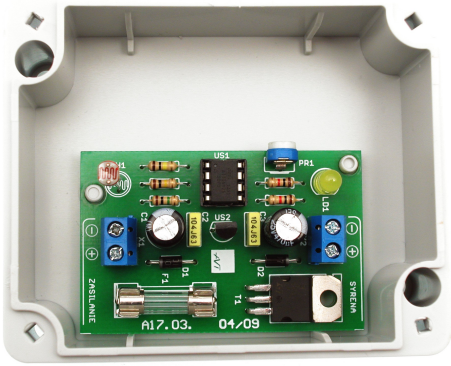
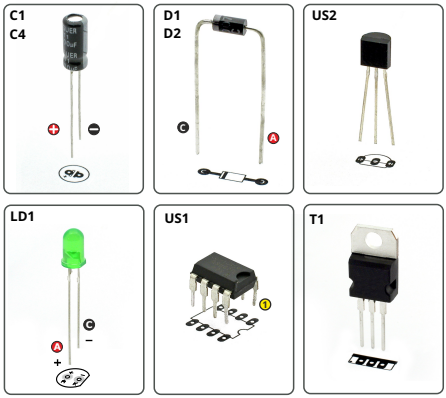


Photo 2

List of components

Resistors:
R1, R2:.....1 kΩ (brown-black-red-gold)
R3:.....1 MΩ (brown-black-green-gold)
R4, R5:.....100 kΩ (brown-black-yellow-gold)
PR1:.....mounting potentiometer 1 MΩ (105)
PH1:.....photoreistor
Capacitors:
C1:.....470 µF !
C2, C3:.....100 nF (may be designated 104)
C4:.....100 µF !
Semiconductors:
D1, D2:.....1N4007 !
LD1:.....any LED !
US1:.....ATtiny25 + socket !
US2:.....LM2931 !
T1:.....BUZ11 (or similar) !
Other:
F1:.....fuse 2 A
X1, X2:.....screw connectors
Alarm siren 12 V



Start mounting from soldering the components onto the board in order of size from smallest to largest. When mounting components marked with an exclamation mark, pay attention to their polarity. Photographs of the mounted kit may be helpful. To access the high-resolution images as links, download the PDF.

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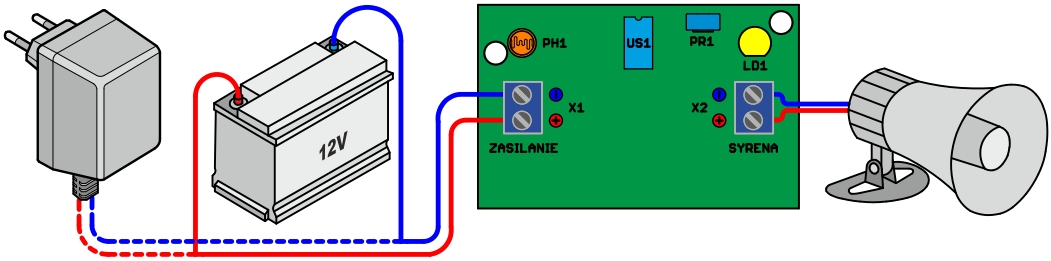
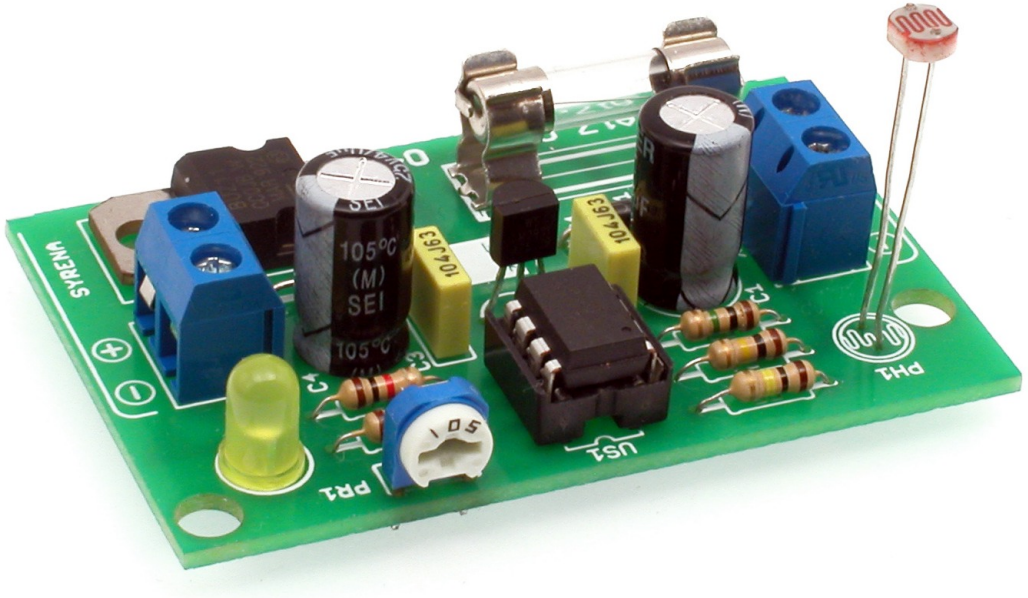


Fig. 4



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