KITS
EDUCATIONAL ELECTRONIC

AVT 788

LED lamp on and off by a clap of hands

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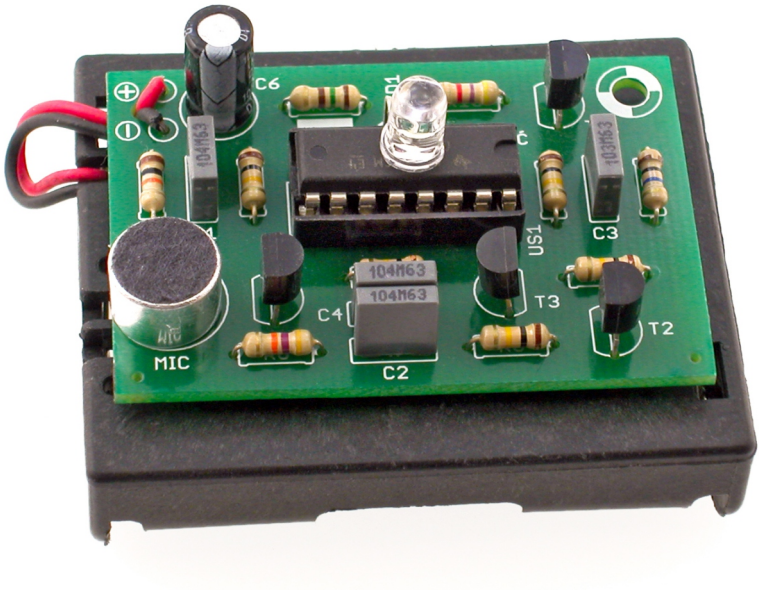

This incredibly attractive and easy-to-build device will astound your colleagues and family. LED lamp reacts to a single clap of hands. It has minimal sensitivity to typical ambient sounds such as: speech, music, dog barking and other. Each subsequent clap of hands makes the output IC to the opposite, enabling or disabling the high brightness white LED. After the power is turned on, the system is reset and it enters into standby mode until it "hears" the clapping of hands. Regardless of the status it draws little power from the battery. The printed circuit board was designed to fit in the battery basket.

Specifications

- under typical conditions, LED "hears" a clap of hands from a distance of up to 3 meters
- LED switching on/turned off by a clap of hands
- light source: high brightness, white LED
- powered from 3 batteries AA size

Functional description

The diagram is shown in Figure 1. The light switch is made up of three blocks: a transistor amplifier, a "T" trigger with a 4017 chip, output buffer with T4 transistor. The microphone signal is amplified by an amplifier with three T1-T3 transistors. R4 resistor and capacitor C2 provide negative feedback. This amplifier amplifies only high-frequency signals from the acoustic band. This makes it less responsive to typical ambient sounds. A strong acoustic signal containing a large amount of high-frequency components causes the transistors T1 and T3 to open. Once receiving clap of hands, positive pulse will occur on the clock input of the 4017 integrated circuit. It causes the change of the state of the counter chip (US1), which through the transistor T4 turns on the white, high brightness LED. Resistor R5 and capacitor C3 reset the counter chip after power up. To supply the LED lamp use 3 R6 (AA) batteries. In the standby state, the LED consumes less than 200uA, while in the active state up to 10mA.

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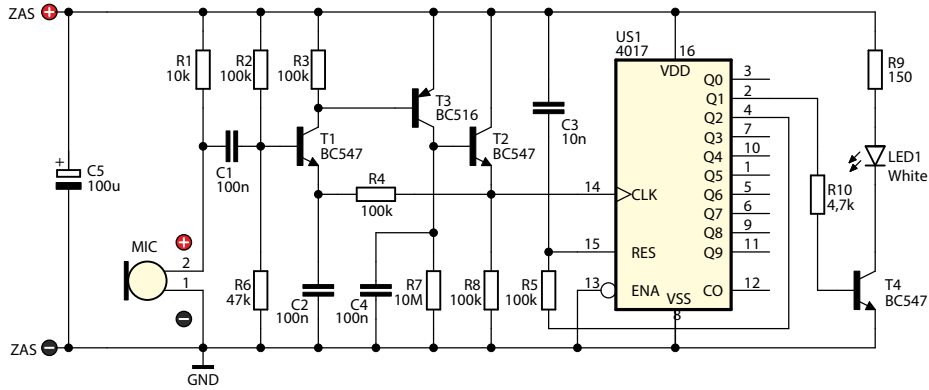

Figure 1. Schematic diagram

Assembly and test

The assembly diagram is shown in Figure 2. Assembling should start with soldering resistors. Then, the larger components should be soldered. At the end, the US1 chip should be inserted into the socket.

Before soldering the LED, its pins must be bent in "Z" -shape and it should be placed just above the chip. In the next step, the red wire from the battery basket to the "+" and black to the "-" should be soldered (shortening to the required length). To save battery use a battery basket with a switch.

The LED lamp assembled correctly from the tested components operates immediately after the power is turned on. To disperse the emitted LED light, module can be covered with a roller or paper cone, or a disposable white beverage cup. For alkaline batteries, the average lamp life will be approximately 100 hours.

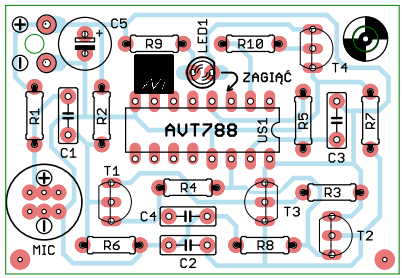

Figure 2. Components layout

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Start off by soldering the printed circuit elements in order from smallest to largest. The unit assembled flawlessly, using the supplied components will operate immediately after switching on the power supply.

Component list

Resistors:

R1:.....10kΩ (brown-black-orange-gold)
R2-R5, R8:....100kΩ (brown-black-yellow-gold)
R6:.....47kΩ (yellow-violet-orange-gold)
R7:.....10MΩ (brown-black-blue-gold)
R9:.....150Ω (brown-green-brown-gold)
R10:.....4,7kΩ (yellow-violet-red-gold)

Capacitors:

C1, C2, C4:....100nF (also marked as 104)
C3:.....10nF (also marked as 103)
C5:.....100µF !

Semiconductors:

LED1:.....white LED diode !
T1, T2, T4:.....BC547 (BC548) !
T3:.....BC516 !
US1:.....CMOS 4017 IC with 16-pin IC socket

Others:

MIC:.....microphone
Battery holder 2×AA (R6) with switch (red wire ⊕ ; black wire ⊖)

While assembling the components marked with an exclamation mark attention should be paid to their polarity. Symbols of the components on the PCB as well as photos of assembled sets may come in useful. To access high-resolution images, download the PDF file.

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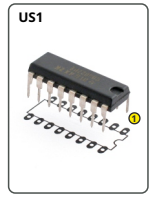
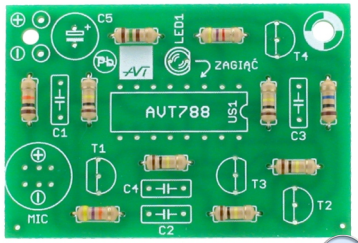
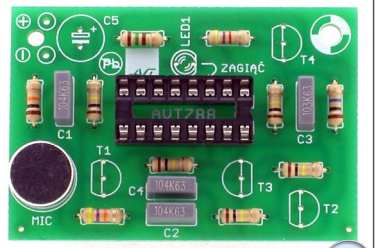


Assembly in 4 steps

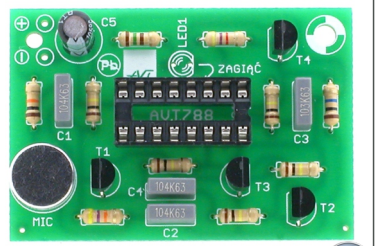
1 Solder resistors R1-R10



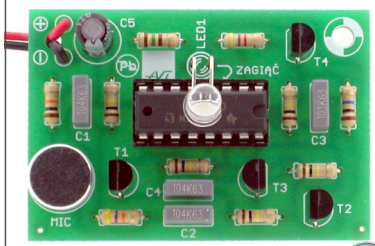
2 Solder IC socket and capacitors C1-C4 and microphone



3 Solder transistors T1-T4, and capacitior C5



4 Solder diodes LED1 and the battery connector, insert chip into socket.



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Notes

Thank you for purchasing AVT product. Please take your time to read carefully the important information below concering use of this product.

Educational Electronics Kits are intended for educational and demonstration purposes only. They are not intended for use in commercial applications. If they are used in such applications the purchaser assumes all responsibility for ensuring compliance with all local laws. In addition, they cannot be used as a part of life support systems, or systems that for use as or as a part of life support systems, or systems that might create a hazardous situation of any kind.

• Battery or wall-adaptor are safe devices. They do not require special attention unless main voltage is connected to an output e.g. a relay.
• If the kit is used to switch currents greater than 24V it is necessary to have the installation and performed by a trained professional authorized for such work. The kit may only be used in such application if it was installed in a safe to touch enclosure.
• Never exceed the limits or ratings listed in the 'Specifications' section at the this user guide.
• If the kit is used in schools or educational facilities or similar institutions the operation must be supervised by trained and authorized staff.
• The product itself and all parts thereof (including packing material) are not suitable toys for childern! (choking hazard, risk of electric shock, ...)

Failures in modern electronic component are very rare as 95% of non-working kits are due to poor soldering or components placed in the wrong location or orientation so please check your work carefully.

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