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DEPARTMENT OF ELECTRONIC ENGINEERING

CLAP-OPERATED SWITCH

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Introduction

The clap-operated circuit is a circuit which operates by clapping from a remote point. When a person claps one, the first output of the circuit is turned on. If another one is clapped, the second output is switched on and then another one will cause to energize the third output. For example, fan, fluorescent light, TV and other appliances can be switched on (or) off by clapping. This circuit can be used by changing individual situations.

Circuit Operation

Clapping sound is sensed by condenser mic and is converted as a electronic signal. The signal obtained from condenser mic is amplified by transistor T_1 and then is sent to the pin 2 of 555 timer via a capacitor C_2 .

In this circuit, 555 IC is composed of as a monostable (one shot) multivibrator. When the electronic signal getting at pin 2 is low, the output pin 3 of the 555 will reach high. To calculate the time during high period, the following formula can be used.

$$\begin{aligned} T &= 1.1 R_T C_T \\ &= 1.1 \times 220 \text{ k} \times 4.7 \text{ uF} \\ &= 1.14 \text{ s} \end{aligned}$$

Therefore the output situation does not change during the 1.14s although another clapping is done.

4017 is a decade counter IC. The pin 14 of IC is a input and this IC has 10 output pins (3,2,4,7,10,1,5,6,9,11). At first , pin 3 of IC₂ is high. When pin 14 is changed high, pin 3 is low and the second output of IC₂ (pin 2) is become high. So every time pin 14 is high, the output is orderly changed another one.

Pin 15 is a reset input and when it is high, the output of IC₂ is reached to pin 3 at high.

As soon as this circuit is connected with power supply, pin 3 of IC is high. When clapping one is done, the output of 555 (pin 14 of 4017) is high and then the pin 2 of IC₂ is become high. The relay connected with pin 2 is energized and the first output of the circuit is turned on.

The next clapping causes high the output of IC₁ (pin 14 of IC₂). Therefore , the pin 2 of IC₂ goes low and the output pin 4 is high. Then, the relay connected with pin 4 operates to switch on the second output of the circuit.

Similarly, if the third clipping is done, the final output of the circuit is energized.

To turn off all outputs of the circuit and to reset the IC₂, pin 10 connected with reset input (pin 15) is caused by final clapping. Since all relays are deenergized , the power supply for the appliances is cut out.

Clap Operated Circuit

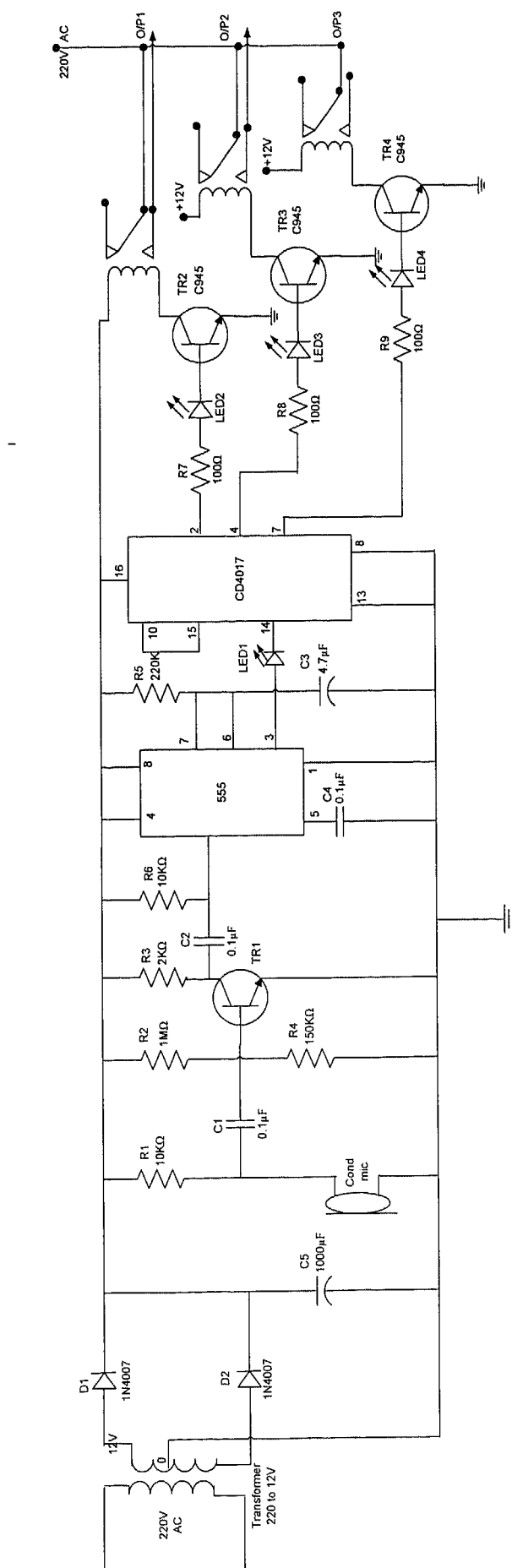


Figure. Clap Operated Circuit

Components list

Semiconductor

Diode 1 N 4007	2
Transistor TR ₁ C945	4
LED	4

Integrated Circuits

IC ₁ – 555	1
IC ₂ – CD4017	1

Resistors

R ₁ (10 kΩ)	1
R ₂ (1.2 MΩ)	1
R ₃ (2.2 kΩ)	1
R ₄ (150 kΩ)	1
R ₅ (220 kΩ)	1
R ₆ (10 kΩ)	1
R ₇ , R ₈ , R ₉ (100 Ω)	3

Capacitors

C ₁ , C ₂ (0.1 μF)	2
C ₃ (4.7 μF)	1
C ₄ (0.01 μF)	1
C ₅ (1000 μF, 25 V)	1

Miscellaneous

Relays, 12 V, 100 Ω, 15 A (single contact)	3
Transformer 220 V to 12 V	1
S ₁ , on /off switch	1
Output Sockets	3
Condenser mic	1