

PRACTICAL TRAINING REPORT



ULTRASONIC PARKING SENSOR

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ULTRASONIC PARKING **SENSOR**

It is based on the application of SONAR technology which uses the ultrasonic waves to detect the obstacle position.

The range of the ultrasonic transmitter and receiver working is approximately 25-30cm. Its range can be varied with the help of adjustable variable resistor VR1.

INTRODUCTION

Population all over the world is rising day by day and also the requirement of a good transportation system equipped with latest technology. Such a kind of technology is the ultrasonic parking sensor which enables the drivers to park their vehicles efficiently in difficult places and also avoiding minor accidents caused to their vehicles. The ultrasonic car parking sensor uses ultrasonic waves to detect the distance from the obstacle and emits a beep noise when the optimum distance between the vehicle and the obstacle reaches. Ultrasonic waves are generated by ultrasonic transducers which comprises of transmitter and receiver working in alternate to one another. There are many other types of sensors such as infrared parking sensors which use electromagnetic waves to detect the obstacle distance. But they are very expensive to implement. On the other hand the ultrasonic sensors are cheaper and easier to implement.

COMPONENTS

Components required for assembling the transmitter PCB

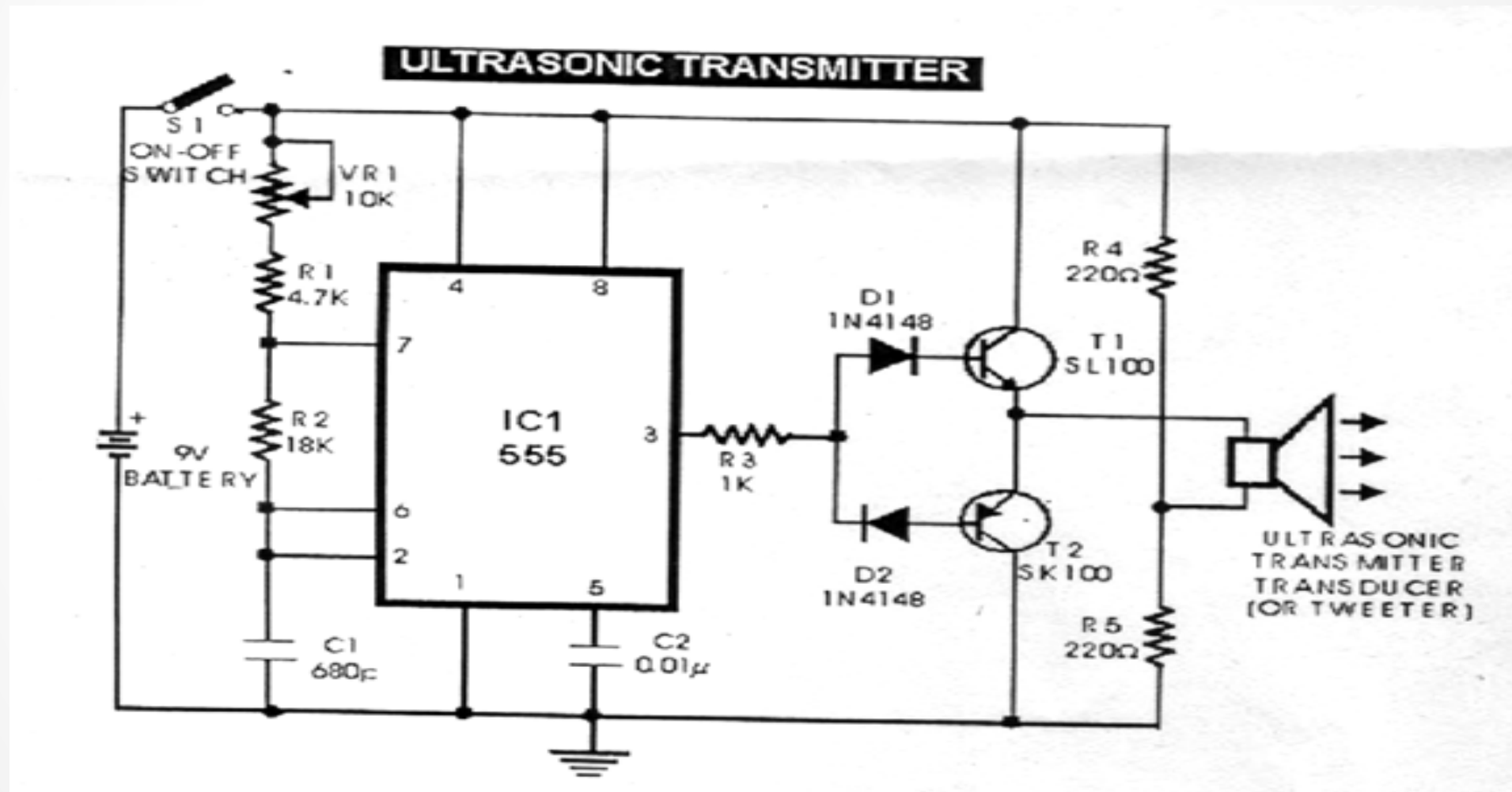
- 1) Connecting wires
- 2) Resistors - R1: 4.7K, R2: 18K, R3: 1K, R4: 220 Ω , R5: 220 Ω
- 3) Diodes- D1: 1N4148, D2: 1N4148(It is used to maintain unidirectional flow of current).
- 4) IC1- 555 timer (used to produce accurate and stable time delays of oscillation).
- 5) Capacitors: C1 : 680pF, C2 :0.01 μ F(stores energy in the form of charge).
- 6) Trim potentiometer- VR1- 10k Ω
- 7) Buzzer
- 8) Transistors- T1: SL100, T2: SR100(Used for switching and amplification purposes).

COMPONENTS CONTD...

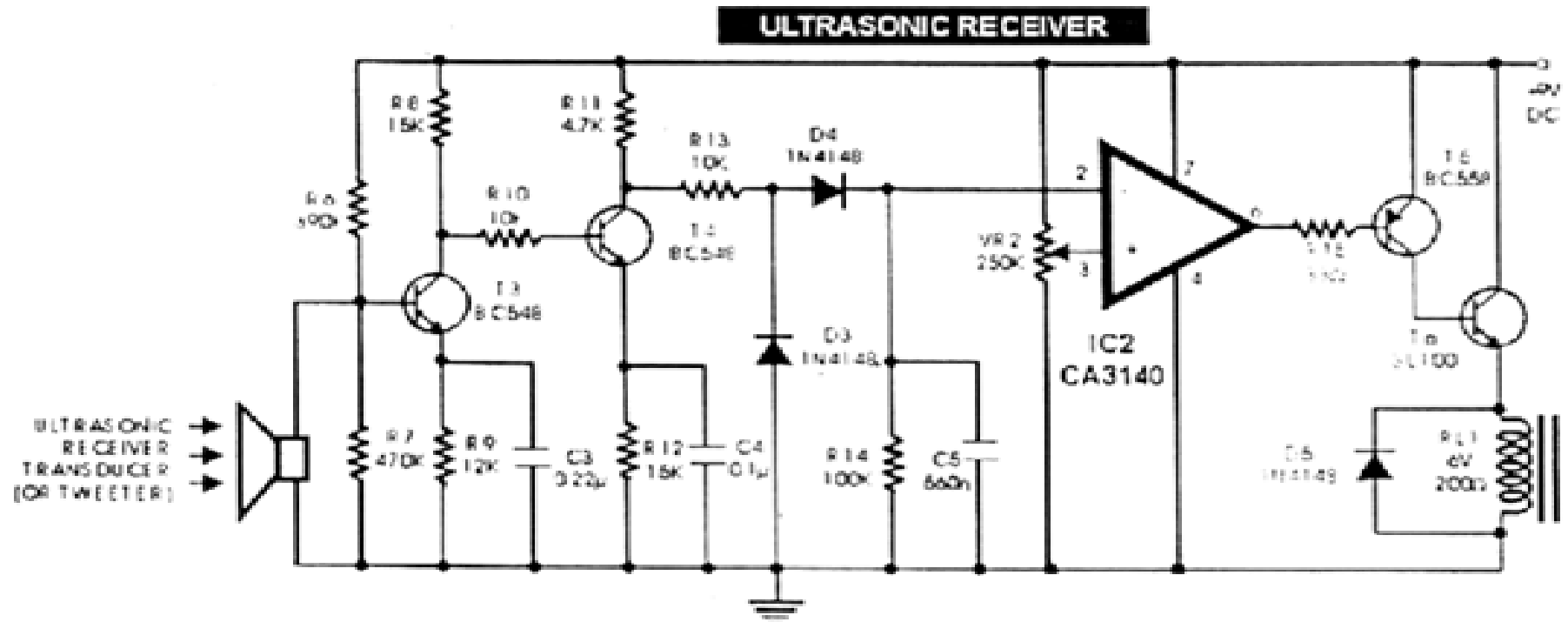
Components required for assembling the receiver PCB

- 1) R7 : 470K, R8 : 90K, R9: 12K, R10: 10K, R11: 4.7K, R12 : 15K, R13: 10K, R14-100K, R15: 5K, R16: 200Ω.
- 2) IC2 : CA3140 (Used as frequency divider to divide the frequency generated by ultrasonic transmitter).
- 3) Transistors- T3: BC548, T4: BC548, T5: BC559, T6: SL100
- 4) Capacitors : C3 : 0.22μF, C4: 0.1μF, C5 : 560nF
- 5) Ultrasonic sensors: transmitter, receiver
- 6) Trim potentiometer: 250K
- 7) Diodes: D3: 1N4148, D4: 1N4148, D5:1N4149

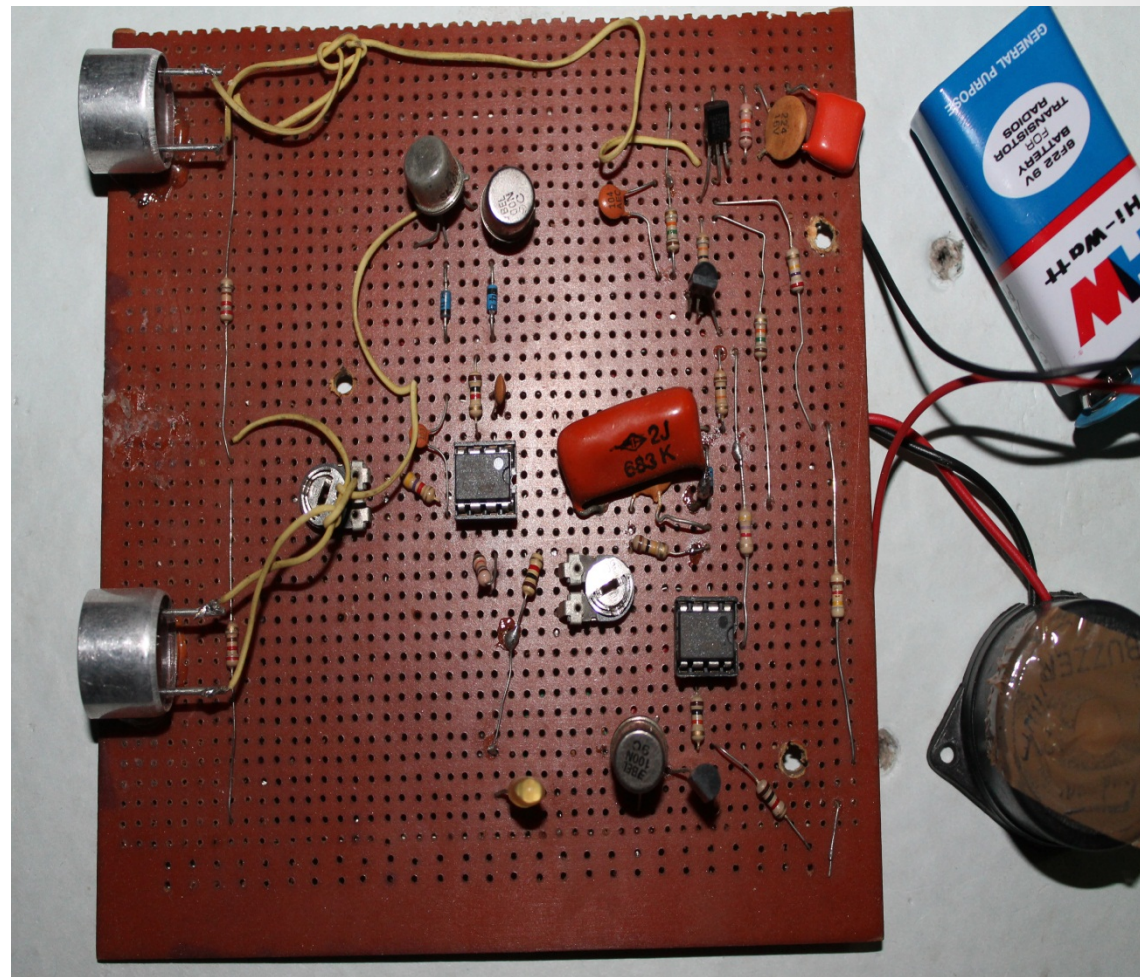
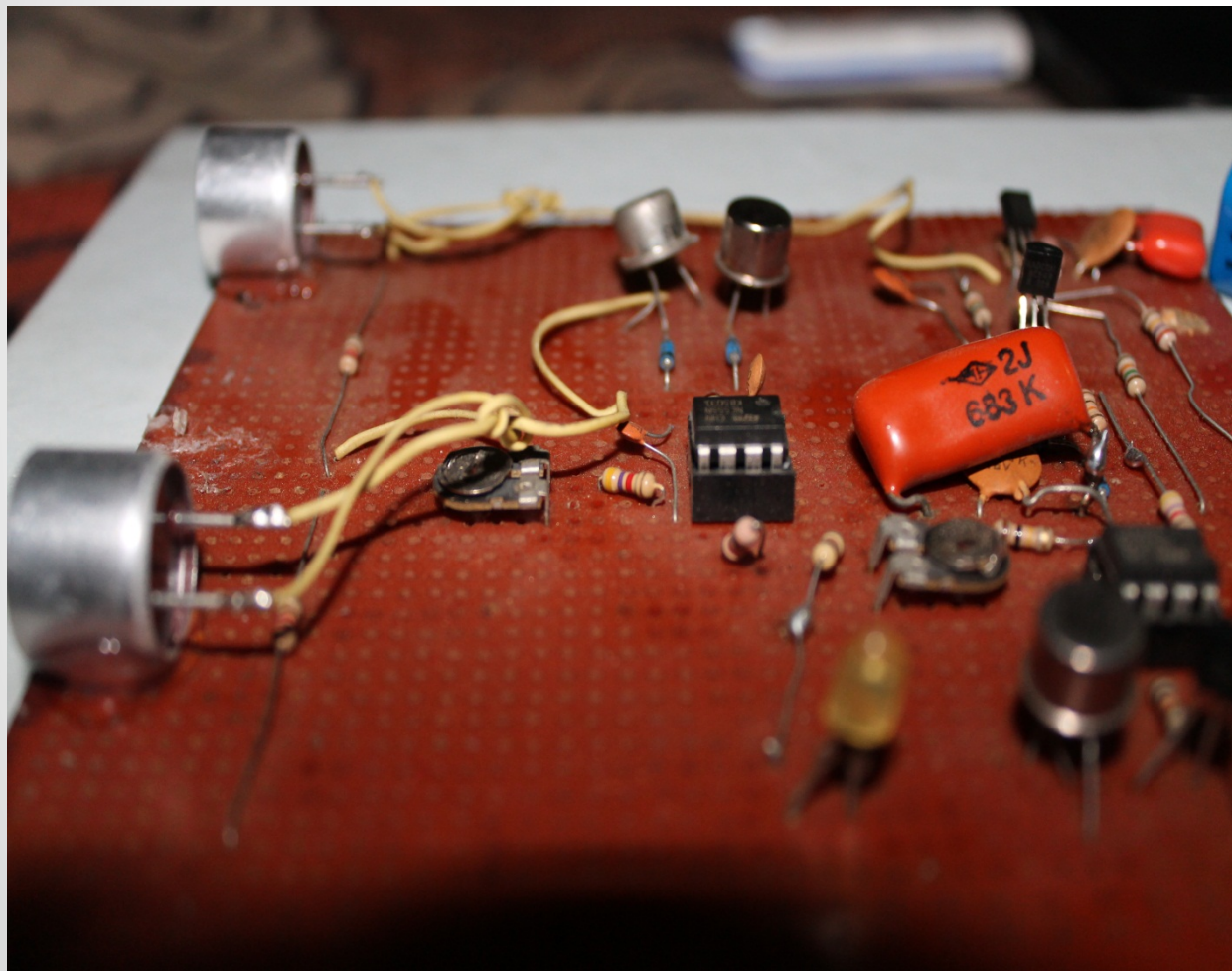
TRANSMITTER CIRCUIT

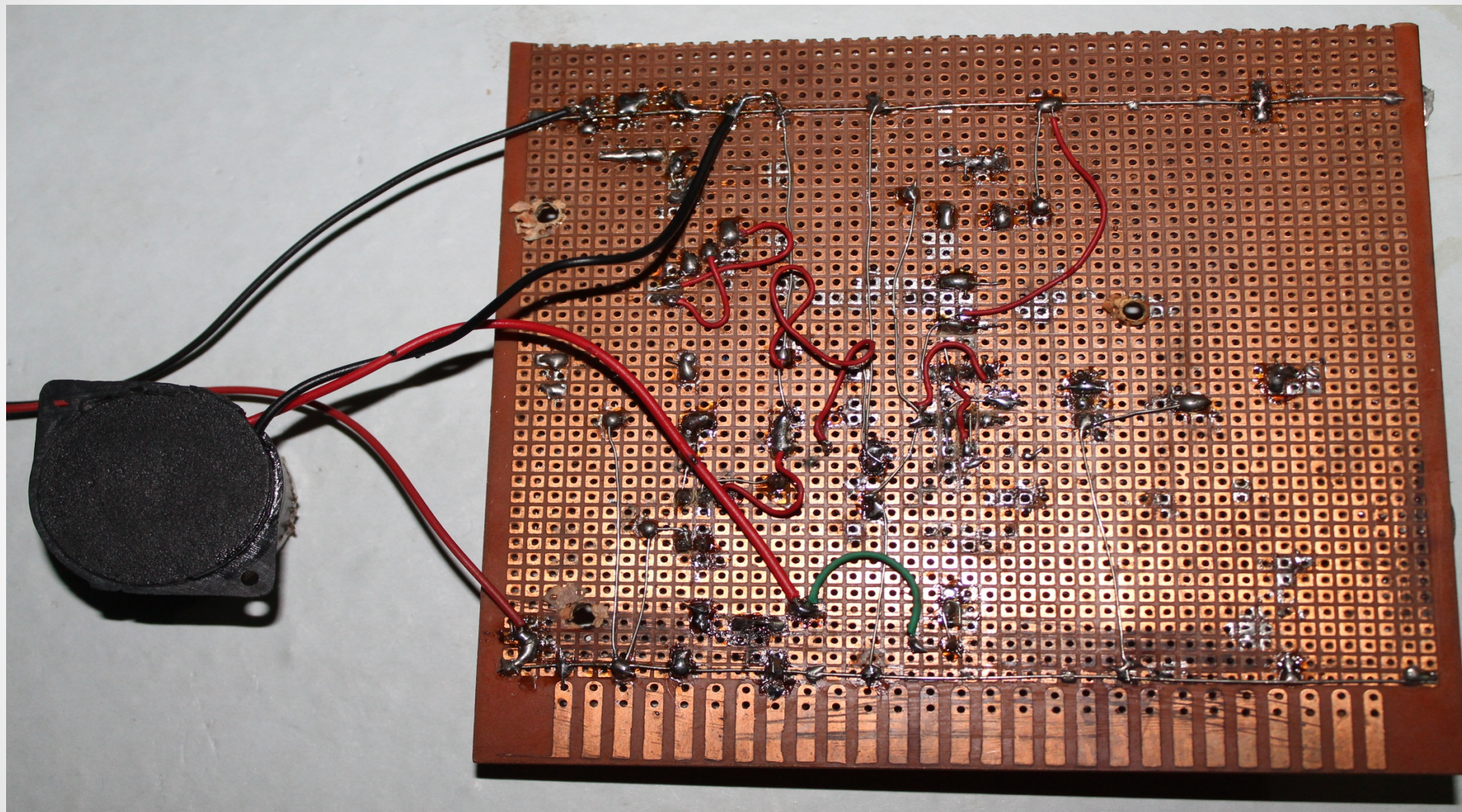


RECEIVER CIRCUIT



IMPLEMENTATION OF CIRCUIT ON PCB





RESULT AND DISCUSSION

- 1) If we hold our hand or a sheet of paper in front of the sensors, we hear the sound of the buzzer when the distance from the object to the sensor decreases to about 30cm.
- 2) After installation in the car, the circuit is activated as soon as the gear is shifted in reverse (this is marked by a 'bip' tone) and will detect any obstacle within the range of the sensors, the detection distance (i.e the sensitivity) being adjusted by means of trim potentiometer. A distance of approx.. 25 to 30cm from the backside of the car seems to be a value of practical use. First of all we make some tests with the help of the second person who can survey the distance from outside (in order to avoid damaging the circuit).
- 3) In case if buzzer's sound is not heard properly, bring the buzzer closer to the driver by means of a 2 conductor extension cord.

REFERENCES

- [1] Datasheet of 'SL100 silicon transistors' manufactured by **Semiconductor Technology**.
- [2] Datasheet of 'SK100 silicon transistors' manufactured by **Semiconductor Technology**.
- [3] Datasheet of 'LM555 timer as astable Multivibrator' manufactured by **Fairchild Semiconductor**.
- [4] Datasheet of 'CA3140E- 4.5MHz, BiMOS operational amplifier with MOSFET input/bipolar output' - *Intersil Corporation*.
- [5] Ultrasonic Transmitter and Receiver '**Electronics For You**' magazine [123-124] January 2012.