

GOVERNMENT TECHNOLOGICAL COLLEGE (KALAY)

DEPARTMENT OF ELECTRONIC ENGINEERING

**ELECTRONIC SIREN**

BY

GROUP IV

A.G.T.I. (EC); Year II

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GOVERNMENT TECHNOLOGICAL COLLEGE (KALAY)

DEPARTMENT OF ELECTRONIC ENGINEERING

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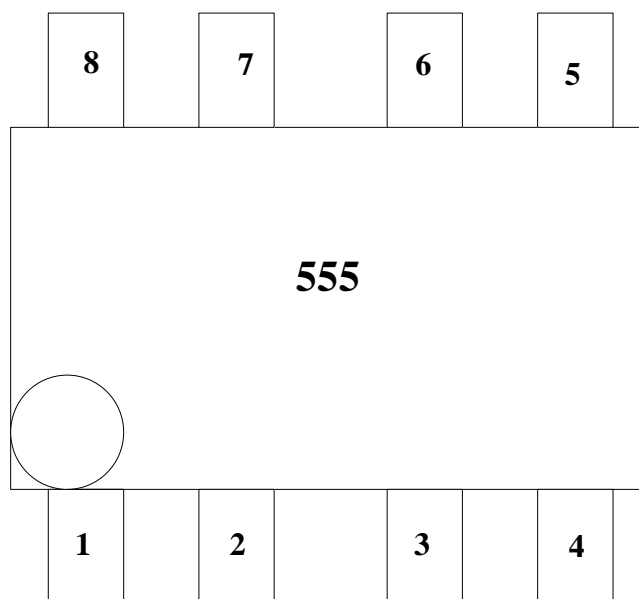
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## C HAPTER 1

### 555 IC

#### 1.1 The 555 IC Circuit

The 555 monolithic integrated circuit timer was first introduced by Signetis Corporation in 1972 using bipolar technology. It quickly became an industry standard for timing and oscillation functions. Many manufacturers produce a version of a 555 IC, some in the CMOS technology. The 555 is a general-purpose IC that can be used for precision timing, pulse generation, sequential timing, time delay generation. The 555 can operate in both astable and monostable modes, with timing pulse ranging from microseconds to hours. It also has an adjustable duty cycle and can generally source or sink output currents up to 200mA.



#### 1.2 Basic Operation

The basic block diagram of the 555 IC is shown in Fig. The circuit consists of two comparators which drive an RS flip-flop, an output buffer, and a transistor that

discharges an external timing capacitor. The actual circuit of an LM555 timer is also shown.

The RS flip-flop is a digital circuit that will be considered in a later chapter. Here, we will only describe the basic digital function of the flip-flop with voltage references set at  $(2/3)V$  by the voltage divider comparator output goes high, producing a high output at flip-flop terminated Q. This turns the discharge transistor on and an external timing capacitor starts to discharge.

The output state of the 555 IC is driven by output Q of the RS flip-flop. This output is usually a totem-pole circuit, or a simple buffer, and is generally capable of sourcing or sinking 200mA.

An external reset input to the RS flip-flop overrides all other inputs and is used to initiate a new timing cycle by turning the discharge transistor on.

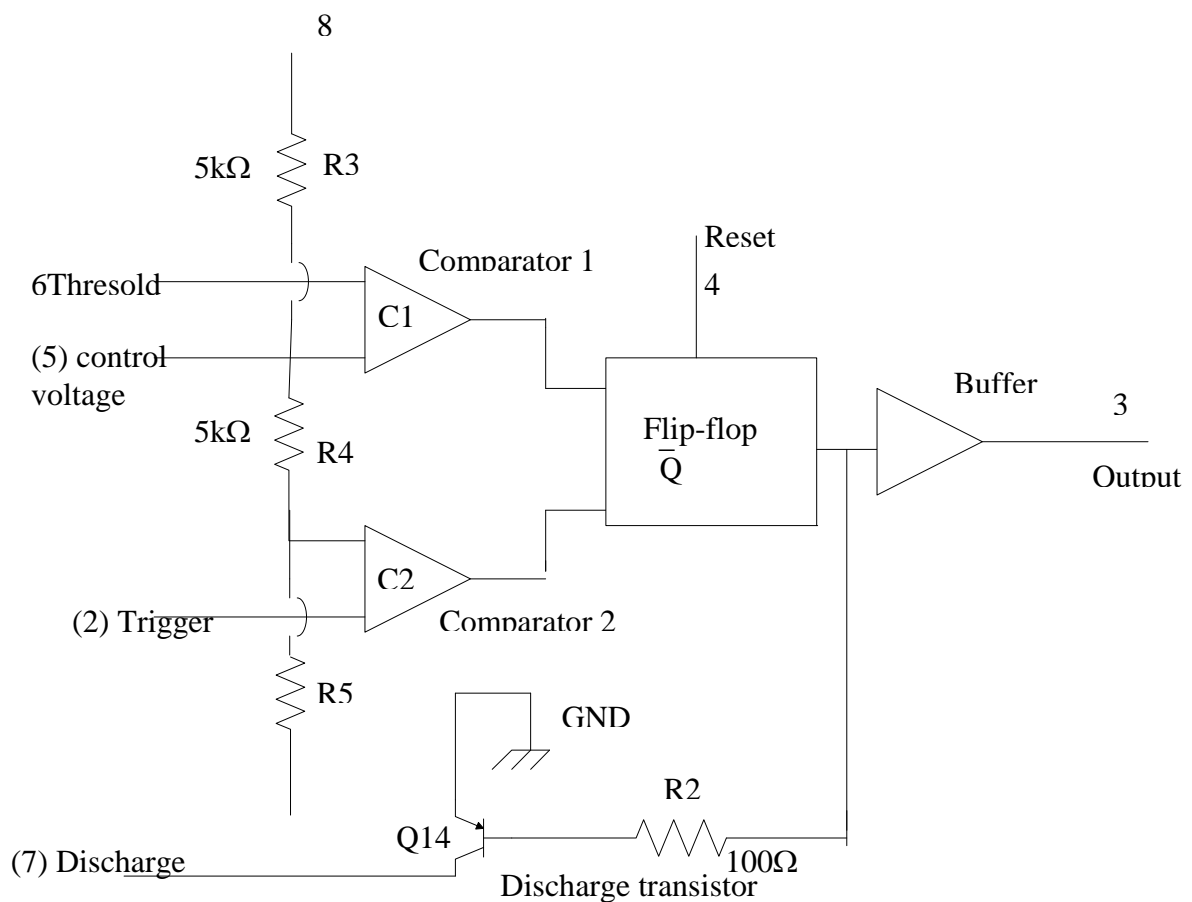
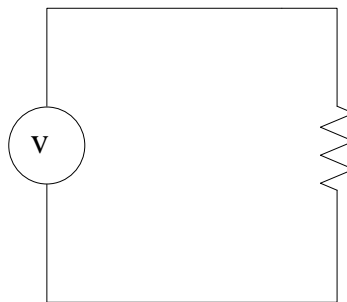


Fig. Basic Block Diagram 555 IC Timer Circuit Diagram, LM555 Timer Circuit

## CHAPTER 2

### RESISTER

A component is used for its resistance. In the past, most resistors were manufactured from carbon composition, a baked mixture of graphite and clay. These have been almost completely superseded by carbon or metal film resistor. Wire-wound resistors are used for comparatively low values of resistance where precise value is important, or for high dissipation. They are unsuitable for RF use because of their reactance.



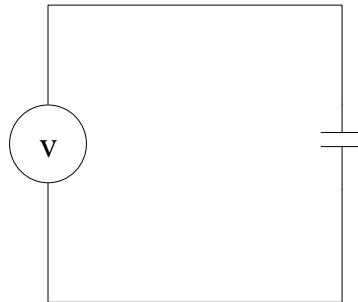
## CHAPTER 3

### CAPACITOR

A passive circuit component is a capacitance. A capacitor is formed from a pair of conducting surfaces separated by a layer of insulator. A capacitor made from a pair of parallel conducting plates of area  $S$  separated by a distance  $d$ , with the gap between the plates filled by a dielectric of relative permittivity  $\epsilon_r$ , will have a capacitance  $C$  given by

$$C = \frac{\epsilon_r \epsilon_0 S}{d}$$

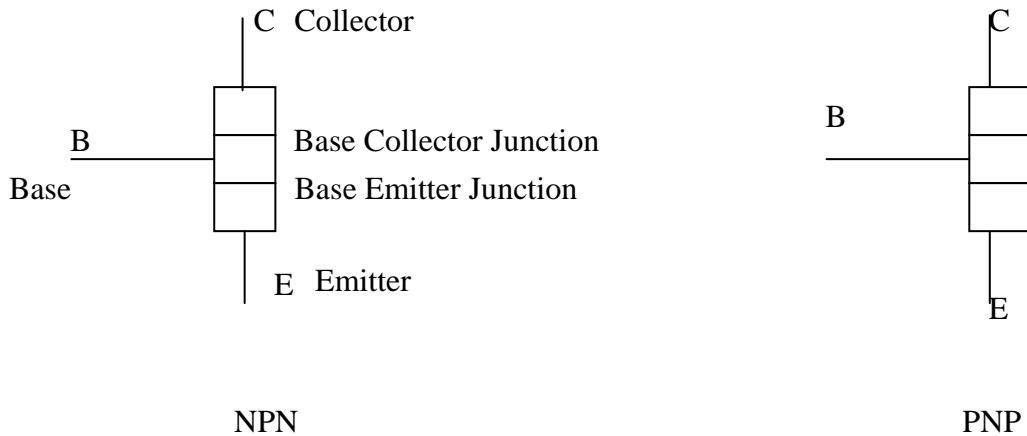
where  $\epsilon_0$  is the permittivity of free space.



A component that converts electrical signal into light signal can be injected into the Fiber.

## CHAPTER 4

### TRANSISTOR



The bipolar junction transistor (BJT) is constructed with doped semiconductor regions separated by two pn junctions. The three regions are called emitter, base, and collector. Physical representations of the two types of bipolar transistors are shown in Fig; One type consists of two n regions separated by a p region (npn) and the other consists of two p regions separated by an n region (pnp).

The pn junction joining the base region and the emitter region is called the base-emitter region. The junction joining the base region and the collector region is called the base-collector junction.

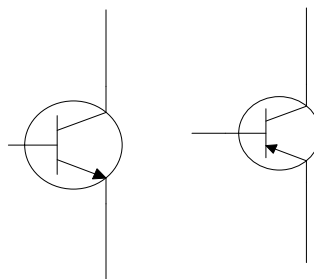


Fig. Standard Bipolar Junction Transistor (BJT) Symbols

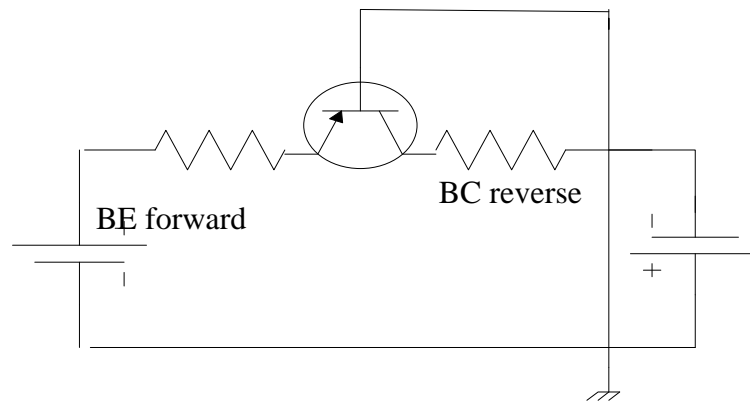
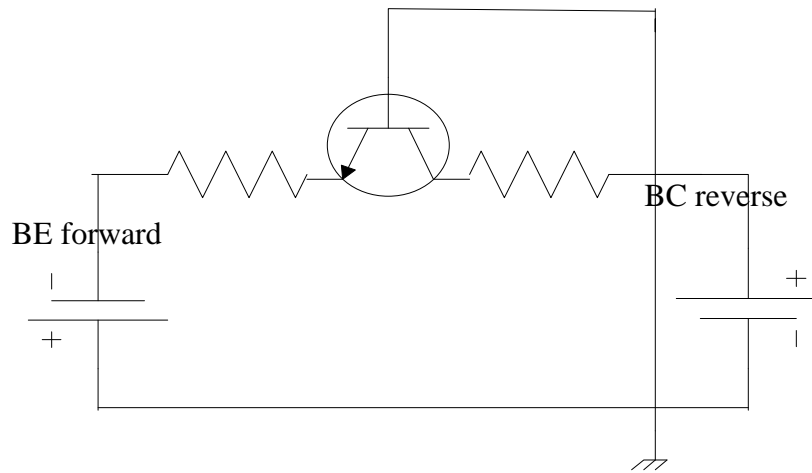


Fig. Forward Reverse Bipolar Transistor

The directions of the current in on npn transistors are as shown in Fig; These diagrams show that the emitter current ( $I_E$ ); the same of the collector current ( $I_C$ ) and the base current ( $I_B$ ).

## C HAPTER 5

### RECTIFIER



Fig. Block Diagram of Rectifier Circuit

Power supply consists of transformer, receiver, and filter circuit. The transformer is probably one of the most useful electric devices. Transformer provides a simple means of changing an ac voltage or current from one value to another. A simple transformer consists of two coils (windings). The coil connected to the source is called primary winding and the other one is called the secondary winding. The coils are insulated from each other and from the core.

If a transformer receives energy at a low voltage and delivers it at a higher voltage, it is called step up transformer. When a transformer is supplied some lower voltage, it is called step-down transformer. We used step-down transformer in the circuit.

For an autotransformer, the secondary winding is actually part of the primary winding. Rectifier circuit is the process of converting an alternating (ac) voltage into one, that is limited to one polarity.

Rectifier circuit that contains diode is called rectifier diode. Diode can pass current easily in one direction only.

Rectifier diode can be used to charge a RESERVOIR CAPACITOR in order to obtain smooth DC. Rectifier circuit is classified as half-wave and full-wave rectifier.

The output voltage appears only during the positive cycle of the input signal, the circuit is called a half-wave rectifier.

A rectifier output voltage occurs during both the positive and negative cycles of the input signal, this circuit is called a full-wave rectifier.

Full-wave rectifier consists of

- (a) Central-tapped full-wave rectifier; and
- (b) Bridge full-wave rectifier.

We used Bridge full-wave rectifier.

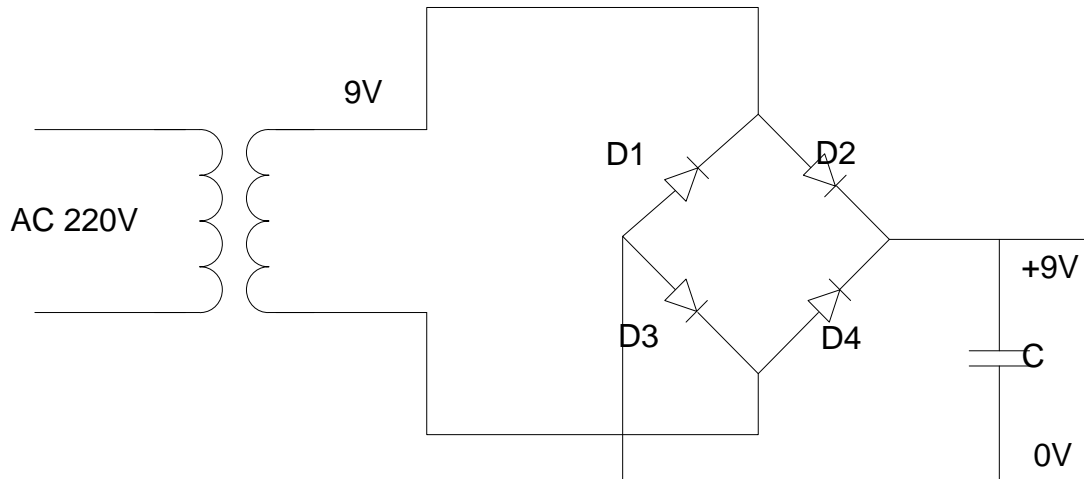


Fig. Schematic Circuit Diagram of Rectifier

Filter circuit provide a constant voltage to a load. Capacitor used in filter circuit.

## C CHAPTER 6

### DIODE

Diode can be made of either two of semiconductor materials, silicon and germanium. Power diodes are usually constructed using silicon and germanium. Silicon diode can operate at higher current and at higher junction temperature, and they have greater reverse resistance.

The structure of a semiconductor diode and its symbol are shown in Figure. The diode has two terminals, an anode, A terminal ( P junction ) and a cathode K terminal ( N junction ). When the anode voltage is more positive than the cathode, the diode is said to be forward biased and it conducts current readily with a relatively low voltage drop. When the cathode voltage is more positive than the anode, the diode is said to be reverse biased, and it blocks current flow. The arrow on the diode symbol shows the direction of convection current flow when the diode conducts.



Fig. Structure of a Diode

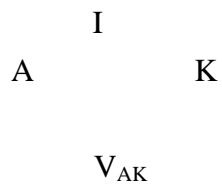


Fig. Symbol of a Diode

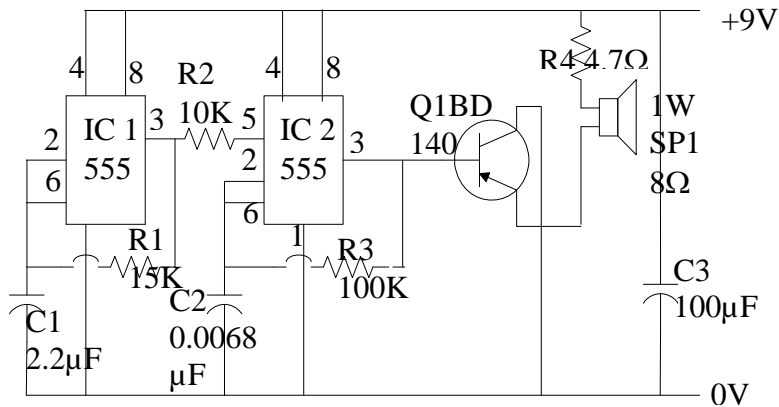
## C H A P T E R 7

### CIRCUIT OPERATION OF ELECTRONIC SIREN

The electronic siren using op-amp 555IC is shown in Fig. This circuit can be used for calling Bell or the emergency etc.

IC<sub>1</sub> produce the low frequency square wave pulses that can be used as the oscillator and IC<sub>2</sub> also work for the high frequency oscillator. The 5<sup>th</sup> supplied node of IC<sub>2</sub> is connected at the end of IC<sub>1</sub> output by connecting R<sub>2</sub>. At low state IC<sub>1</sub> output reach 0V and the ground will be simultaneously cutoff. In this way the output signal (high frequency) of IC<sub>2</sub> will cause the sound that is simultaneously cutoff. The output signal of IC<sub>2</sub> will increase by transistor Q<sub>2</sub>.

By changing the value of R<sub>3</sub> and C<sub>2</sub> it can be used as the siren of ambulance and the police cars.



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