



## DESCRIPTION OF THE COMPONENTS FOR THE DESIGN OF AN AUTOMATIC CHANGEOVER SYSTEM

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### ABSTRACT

This automatic changeover system is designed to transfer a house (or business) electricity from the commercial power grid to a local generator and vice versa when an outage occurs. Also known as “transfer switches” they connect directly to the generator, commercial power supply or line, and the house loads. In this system, when the commercial power gets to the automatic changeover system while the generator is still on, the system will automatically switch from the generator to the commercial power source without the load noticing a change in the switching. This work gives a breakdown of the components used for the design of the automatic changeover system.

**Keyword: changeover, switching, components, automatic**

### INTRODUCTION

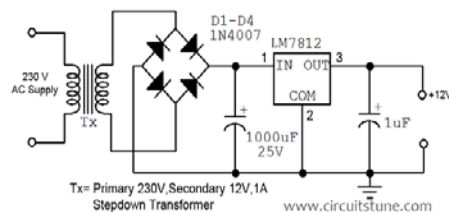
Most industries and commercial processes depend a lot on electrical power. When power is interrupted, the change-over which will move our electric source from the power been supplied by the public utility to that of a generator was done manually. This takes a lot of time to achieve. In such cases, some of our appliances or machines are exposed to the risk of damaging because of human errors. These can cause significant financial losses. This report presents the components, circuit diagram and flow chart of an automatic change over switch that switches the power supply from public supply to generator or from generator to public supply. The system uses electronics control circuit involving resistors, capacitors, transistors, diodes and electromagnetic devices. A changeover can be of great use at home, industry, offices as well in schools.

## Components used for the design

- ❖ 12V power supply x 1
- ❖ 12V/40A relay x 2
- ❖ 12V/10A relay x 1
- ❖ Zener diode 5.2V x1
- ❖ Capacitor 100uF/25V x 1
- ❖ 100k Resistor x 1
- ❖ 1k resistor x 1
- ❖ Buzzer
- ❖ Ac indicator bulb
- ❖ Ac connectors x 3 , two red and one green
- ❖ Diodes 1N4007 x 4
- ❖ Transistors ( BC547 and TIP14C) x 1
- ❖ Two ON/OFF switches
- ❖ Jumper and connecting wires
- ❖ Veroboard
- ❖ 3” x 3” box for packaging

## DESCRIPTION OF EACH COMPONENT

### Power supply:



The 12V power supply above, is to supply to the electronic circuit , The transformer label **T<sub>x</sub>** is a step down transformer which step down the 220V ac to 12V ac. The four diodes (D1 – D4) forms a bridge rectifier, which convert the alternating current(ac) to direct current(dc) . the 1000uF/25V capacitor is the filtering capacitor, the helps to remove the ripples in the dc output. The LM7812 is the 12V voltage regulator which keeps the output at a constant 12V dc. The 1uF capacitor is for further filtering.

### Relay:



The 12V relay is an electromagnetic switch that is been activated when its coil is been powered by a 12V power supply. When this happens, the pole of the relay is switched from normally close(NC) to normally open(NO) in this automatic changeover switch, it is responsible for the switching from commercial power to generator and vice-versa, and is equally responsible for the switching of the generator.

### Resistor:



The resistor in this automatic changeover system is use to reduce the amount of current flowing in the circuit. The resistors used are 1k and 100k.

### Diodes:



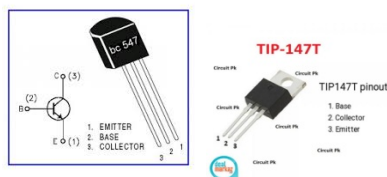
The diode used in the circuit is 1N4007. This diode allows direct current to flow only in one direction, which is in the forward biased mode. The diode connected to the relay is called a free wheel diode because it silence the noise generated by the relay.

### Capacitor:



The electrolytic capacitor used in this circuit function in the filtration of the dc from the power supply side and for delay time circuit, it is used for storing of charge.

### Transistor:

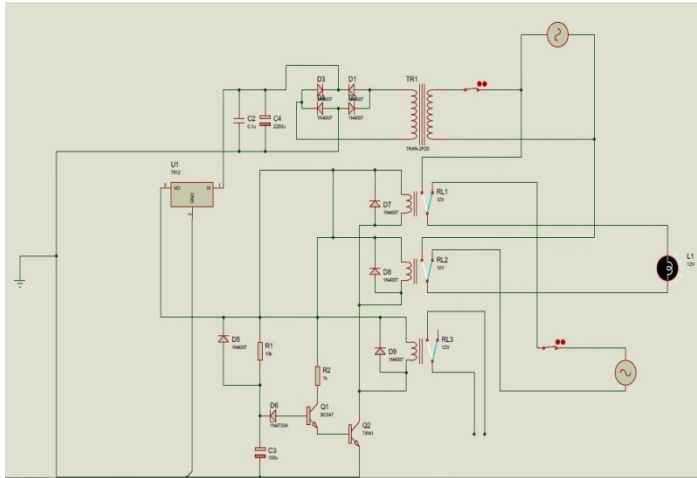


The two transistor used in the circuit is the BC547 need a small current for its biasing; the TIP11C needs larger amount of current for its biasing. The pinout is as shown above.

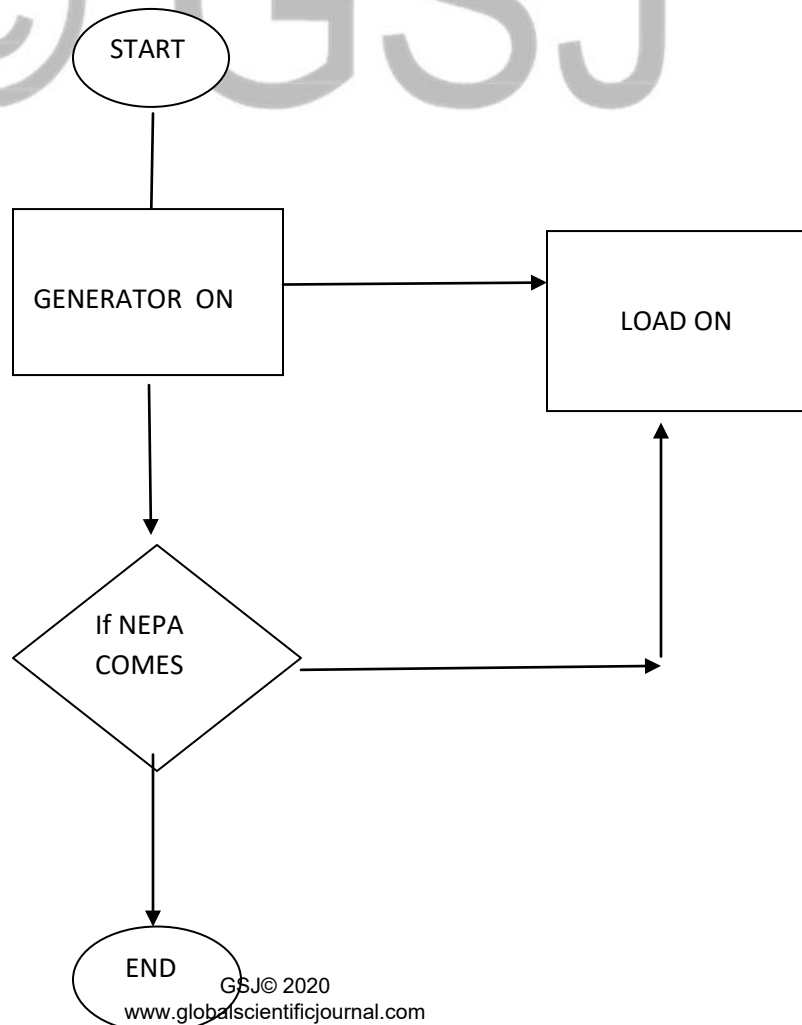
**Buzzer:**

The buzzer is used as alarm in the circuit

**Circuit diagram:**



**FLOW CHAT FOR THE AUTOMATIC CHANGEOVER SYSTEM**



### **Advantages of automatic changeover System**

- Uninterrupted load during the switching for generator to the load
- Reduces the stress of going to change over from one power source to another.
- It is reliable
- It save fuel as the generator will be switch off immediately there is a switching

### **CONCLUSION**

The major objective of this automatic changeover system is to ease the borden of changing over to the commercial power source when electricity is restored, and again switching off the generator. With this automatic changeover system, while your generator is running, when electricity is restored, the system will change over to main power automatically as well as switching off your generator.

### **ACKNOWLEDGMENT**

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