

**Report On:**  
**Dc Power Supply**

**Done by:**

**Mazen Khaled**

**Ali Fayyad**

**Amir Ibrahim**

**Mohamed Ayman**

**Omar Ahmad**

# Introduction:

A Variable regulated power supply is used to convert the unregulated AC to DC.

The regulated power supply accepts AC input and gives out DC

depending on the value of the current passing through the circuit (varies from 1.2v to 30v).

The basic blocks of a variable regulated power supply:

- 1) Step-Down Transformer.
- 2) AC rectifier.
- 3) Regulator.
- 4) Potentiometer.
- 5) Filter.

## selected electronic circuit:

Ac voltage - Step down transformer 220 to 24 - Bridge (rectifier)

Capacitors - Ic (lm317 T) - Led & resistance - Potentiometer

Diode (1N4007) - 2 Female bananas plug for output - Pcb - Box

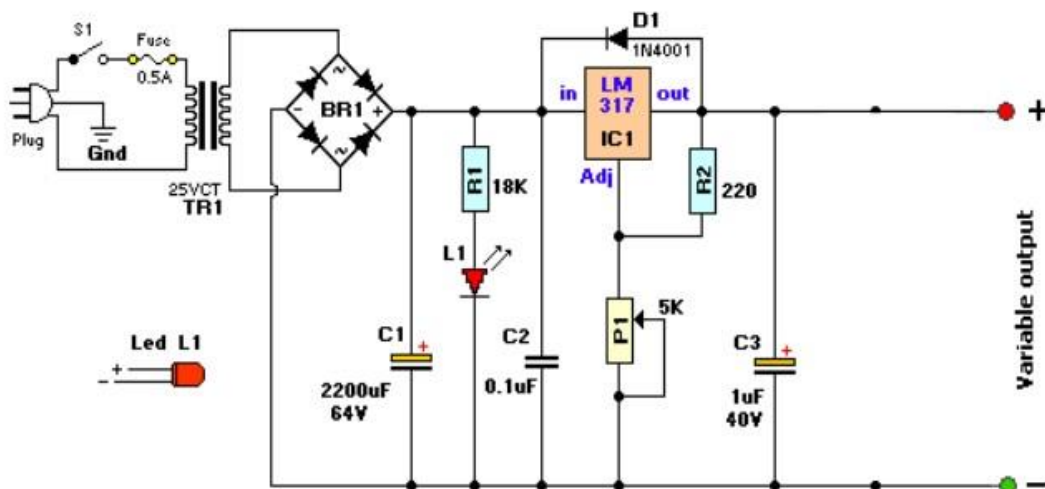


Fig (1)

# Theory of Operation and Technical Details:

A power supply takes the AC from the wall outlet, converts it to unregulated DC, and reduces the voltage using an input power transformer, typically stepping it down to the voltage required by the load.

First, we step down the voltage came from outlet by:

Transformer 220 – 24 so the voltage stepped down to 24 v.

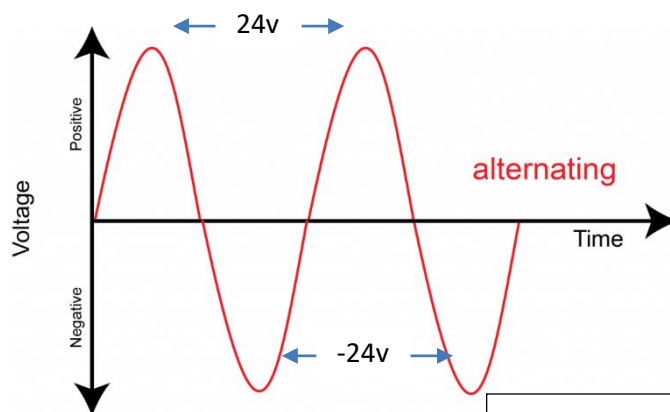


Figure 1: stepped down voltage

Second, we rectified the voltage by putting a bridge which is a set of

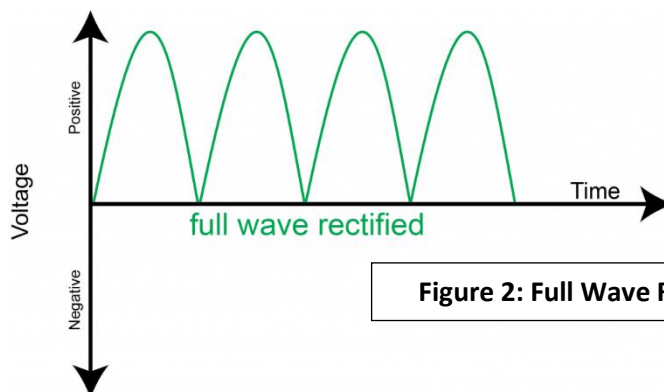
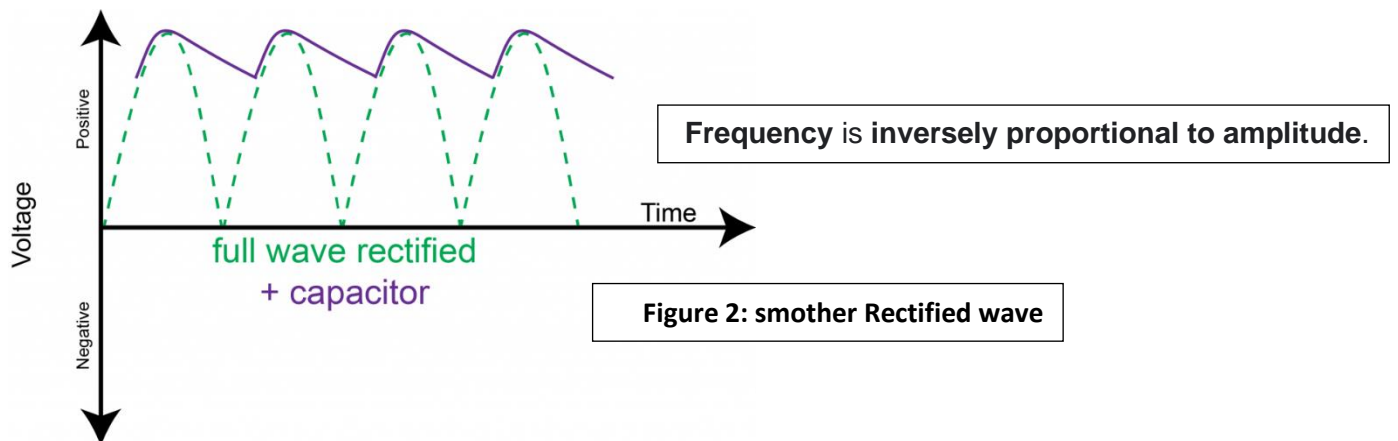


Figure 2: Full Wave Rectified

diodes the rectifier converts the sine waves of ac into a series of positive peaks.

once the voltage has been rectified there is still changeable in the waveform. The rectified AC voltage is then filtered or “smoothed” with



a big capacitor with high capacitance to pass the low frequency.

So, we use as small capacitor with low capacitance to pass the high frequency.

$$\therefore \text{capacitance} = \frac{1}{2\pi f x_c}$$

Then we use a regulator lm317T which make the voltage more smother and give a variable output voltage by change the value of potentiometer, it connected with a fixed resistance to limit the current pass through it.

Finally, for protection we connect another capacitor to lm317T and a diode as when the circuit is open and big capacitor still discharge so diode, we prevent voltage to reach to lm317.

## Circuit and Components:



**Fig (Chemical capacitor)**



**Fig (Mica capacitor)**



**Fig (IC)**



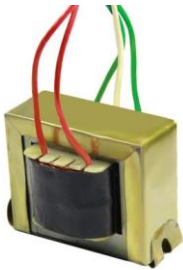
**Fig (LED)**



**Fig (Resistors)**



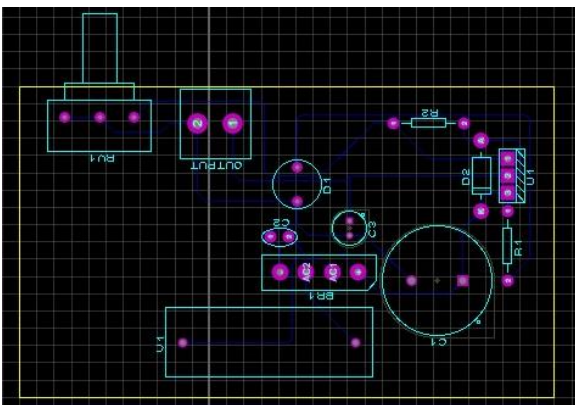
**Fig (Potentiometer)**



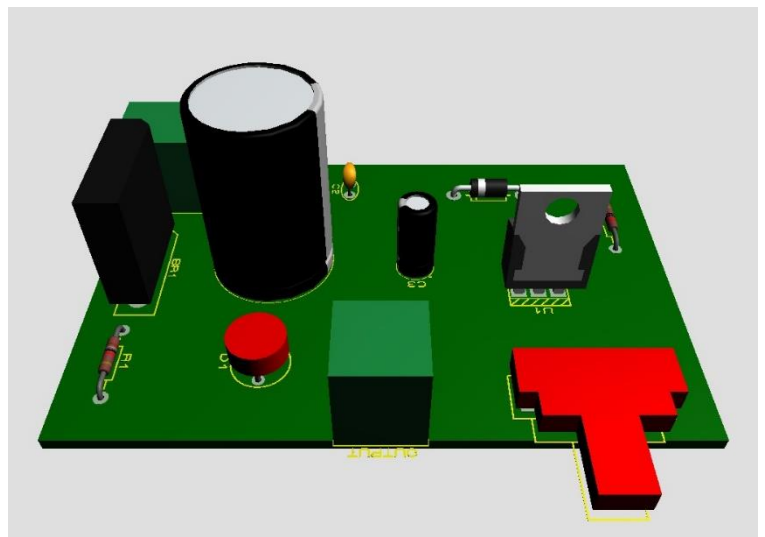
**Fig (Transformer)**



**Fig (AC rectifier)**



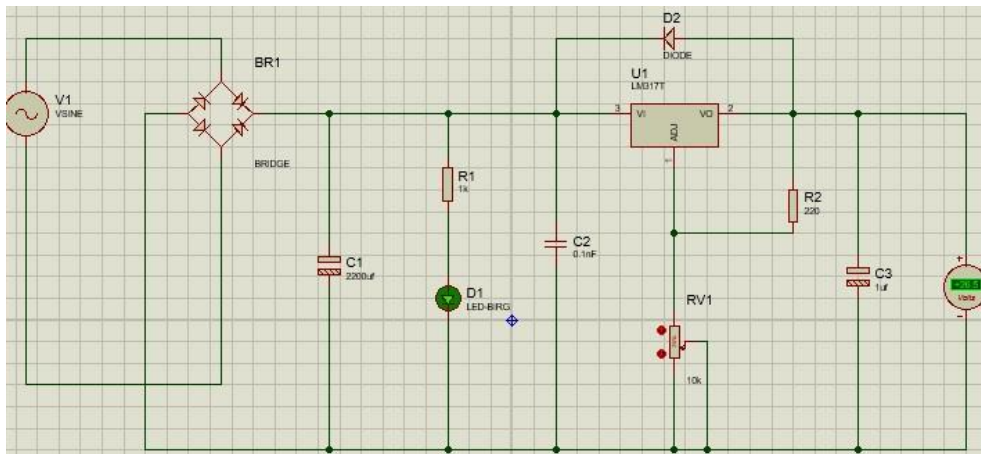
**Fig (PCB layout)**



**Fig (Circuit)**

# Results and Conclusions:

## Simulation:



Input Voltage: 30v

Output:

- When the potentiometer is set to 0% (0 ohm) - DC voltmeter reading: 26.3v
- When the potentiometer is set to 100% (10k ohm) - DC voltmeter reading: 1.26v

## Conclusion:

- The input current from the source passes through rectifier to produce a direct current, the current then passes through the capacitor of 2200uf capacitance to filter the current producing unregulated DC voltage.
- During this process, a leakage of voltage happens due to the remaining unconverted ac voltage (ripple).
- The IC (LM 317) regulates the input voltage and produces output DC voltage its magnitude is determined by the value of the potentiometer.
- The net voltage varies between 1.26v and 26.3v

**End Of The Report.**