



ABU DHABI UNIVERSITY

ELECTRONIC DEVICES AND CIRCUITS

Project Report
AC to DC Converter

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Section 1

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Abstract

All electronic devices require a DC; In this project we are going to connect a number of diodes and capacitor to get a High DC voltages at different outputs by providing an input of a low AC voltage.

1 Introduction

Alternating current (AC) is the most efficient way to deliver electrical power. However, DC is the main operator of the electric devices. So we need to convert the AC TO DC. This operator are either a part of devices themselves or as part of their power cords.

2 Difficulty faced

We had made a mistake by mixing up the input and the output of regulator (5V) then measuring the voltage but we didnt get correct values. After we figured out our mistake we disconnect what we had connected after regulator to flip our regulator

3 List of Equipment used

- 12 Vrms, 1A Transformer.
- 1.5A Diode Bridge Rectifier.
- 4700uF Capacitor
- 10uF Capacitor.
- 100nF Capacitor.
- 12 Volt Regulator 7812.
- Copper board (Vera board).
- Soldering Iron.
- Oscilloscope.
- Probing wires.

4 Procedure

- Using copper board to put our circuit on it and soldering iron to connect our circuit
- Take 230V from power supply and connect it with transformer which is of 12Vrms and 1A.
- Connect the wave part of diode bridge rectifier with transformer and measure the voltage by Oscilloscope probes.
- From same diode connect the positive part with positive side of two capacitor in parallel 7200uf and 10uf respectively and negative with negative then measure the voltage again using Oscilloscope.

- Connect the input from regulator that have 5 voltage with the positive last capacitors and the common with the negative while connect the output of regulator with the new two capacitor in parallel with value 10uf and 100nf respectively. Take two wire form output to get the 5 voltage DC.
- Connect the input from previous regulator with the input of new regulator that have 12 v and with positive part of capacitor while the common from two regulator with negative all capacitor.
- Use the output to be connected with the positive capacitor 10uf.

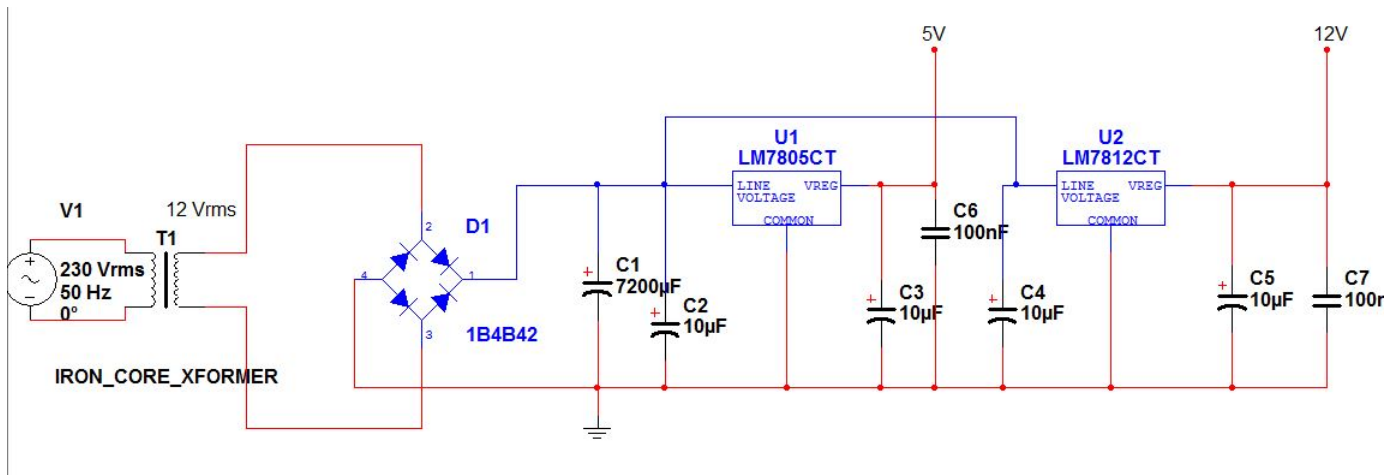


Figure 1: Circuit diagram for the AC to DC converter

5 Results and Discussions

At the end of these exercises we got the following results:-

- Oscilloscope was showing 17V AC after the probes were connected to transformer.
- Oscilloscope was showing about 16V DC voltage when connected to a bridge rectifier.
- A smooth output of 16V was obtained at the output when we connected the oscilloscope to the capacitors.
- A perfectly smooth and straight DC output was observed when the circuit was connected completely to a voltage regulator.
- Two separate output voltages were obtained as asked in the project. 12V DC and 5V DC for various uses.

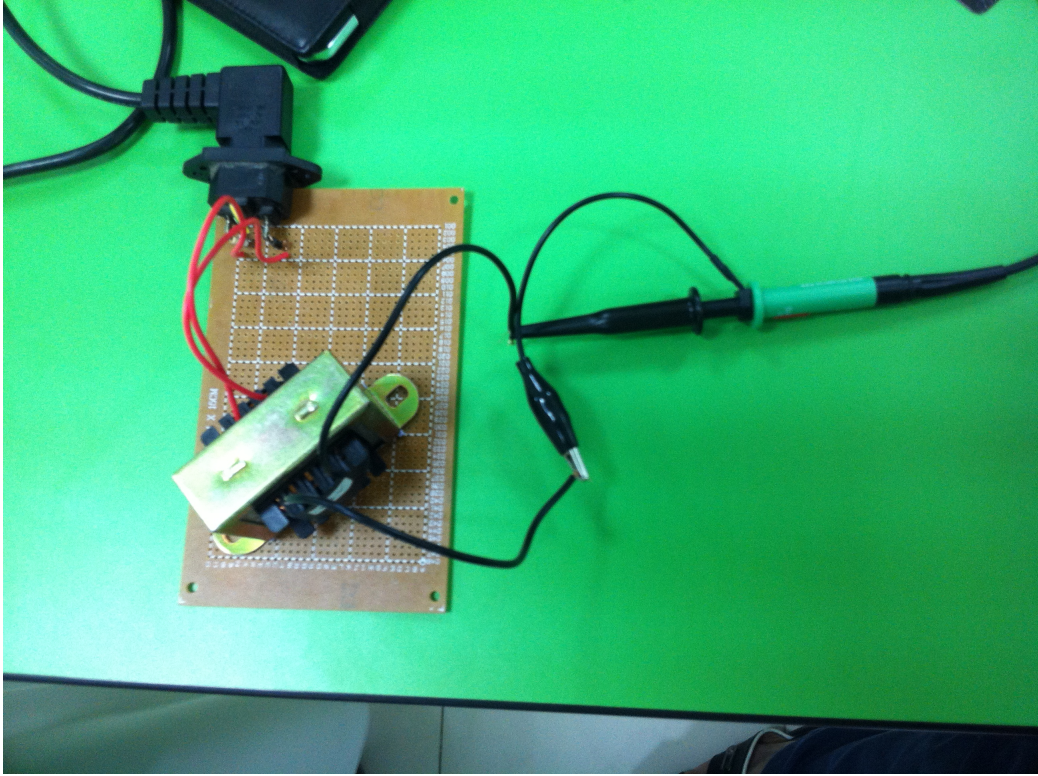


Figure 2: Probe connections to the transformer

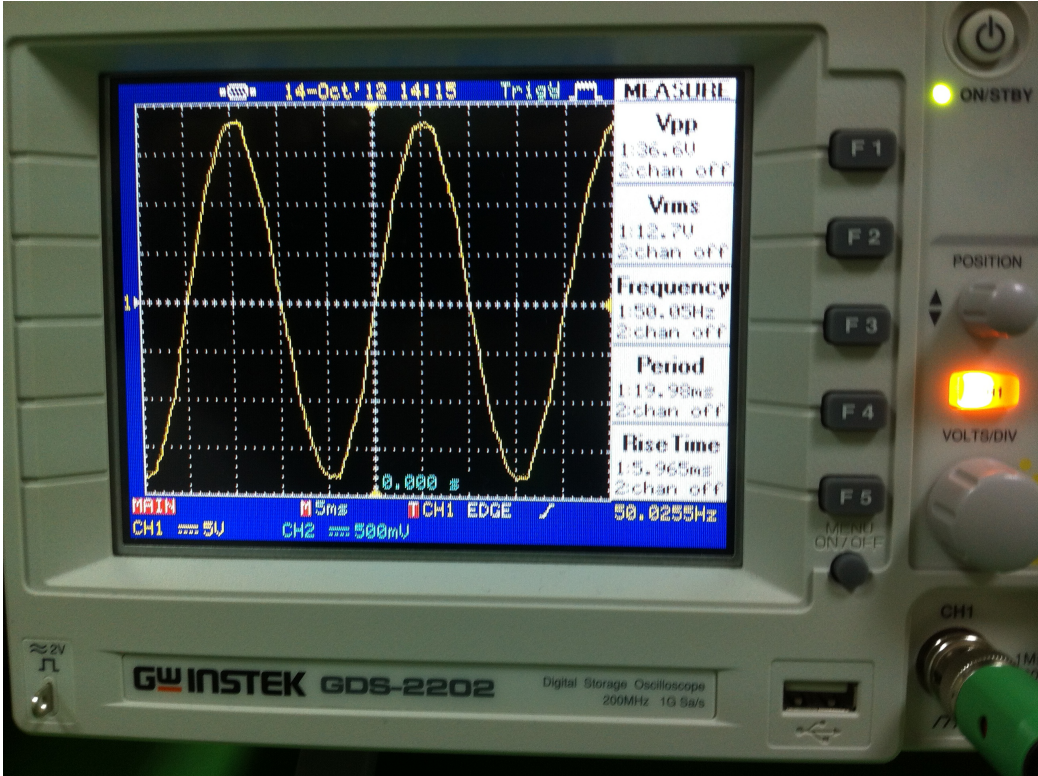


Figure 3: Untouched AC output from step down transformer

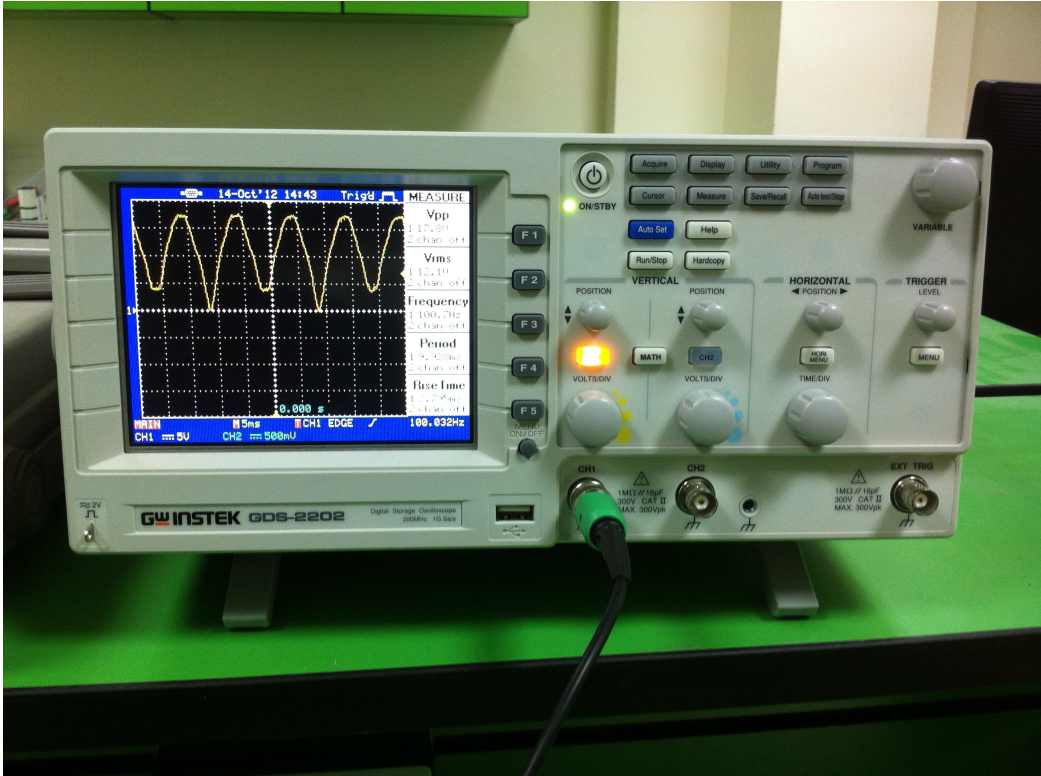


Figure 4: The raw rectified wave output from bridge rectifier

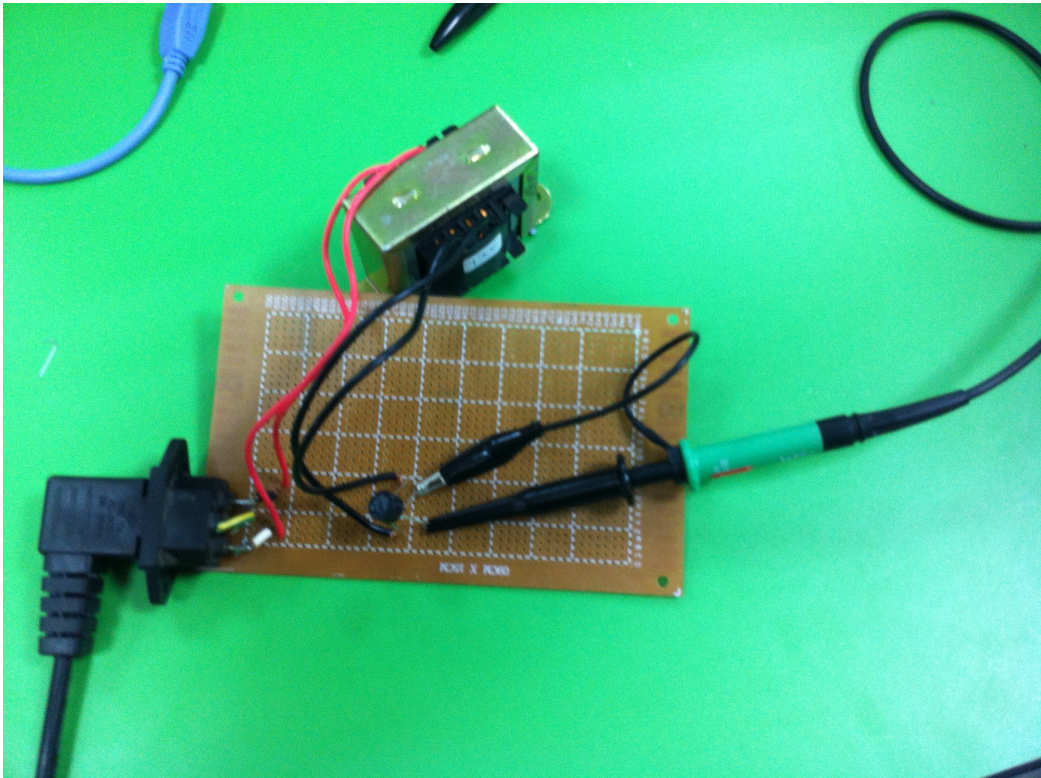


Figure 5: The overview of the circuit so far

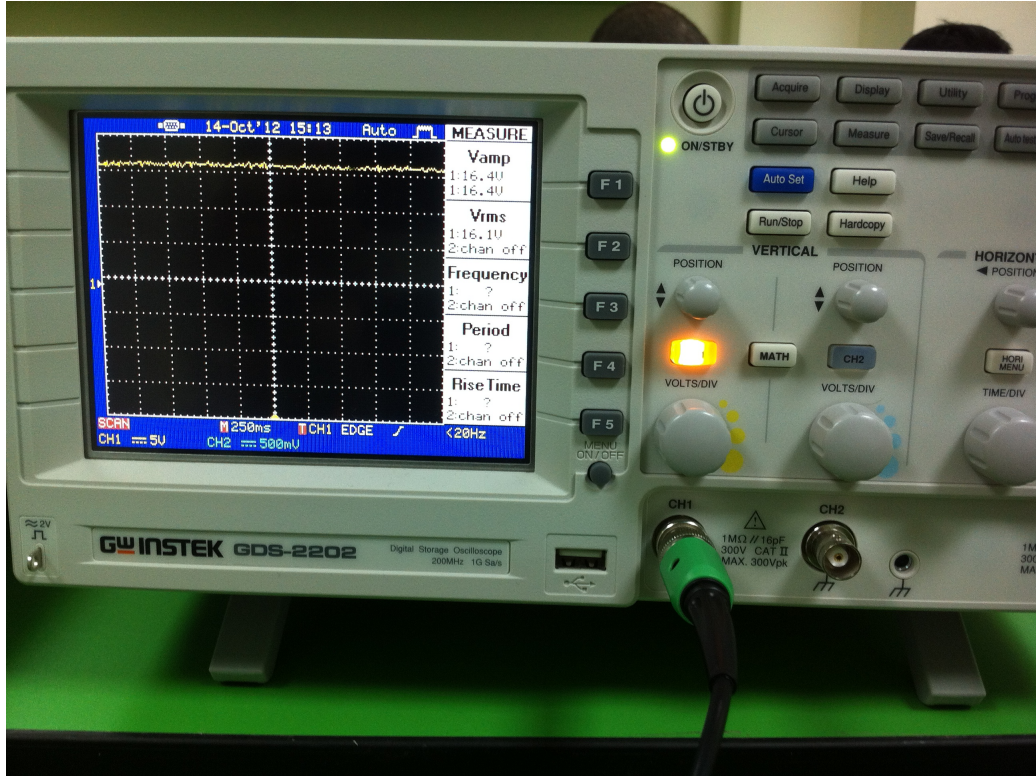


Figure 6: The oscilloscope showing somewhat 16.4 voltage from Capacitors

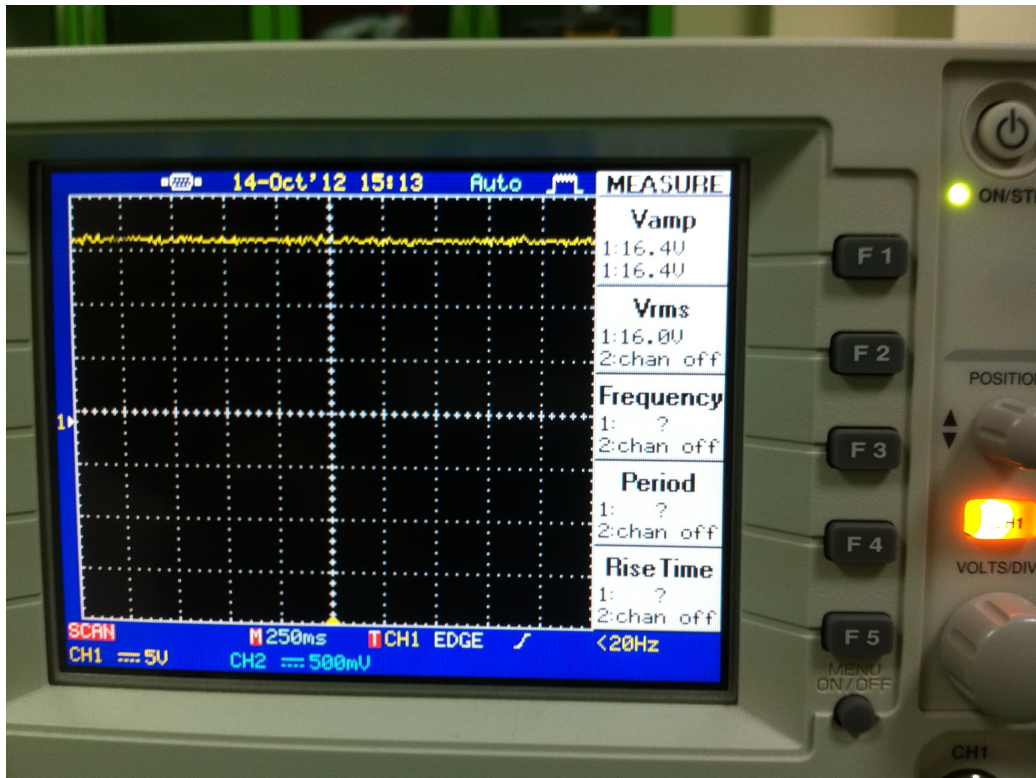


Figure 7: The output in the intermediate phase after the capacitors were soldered

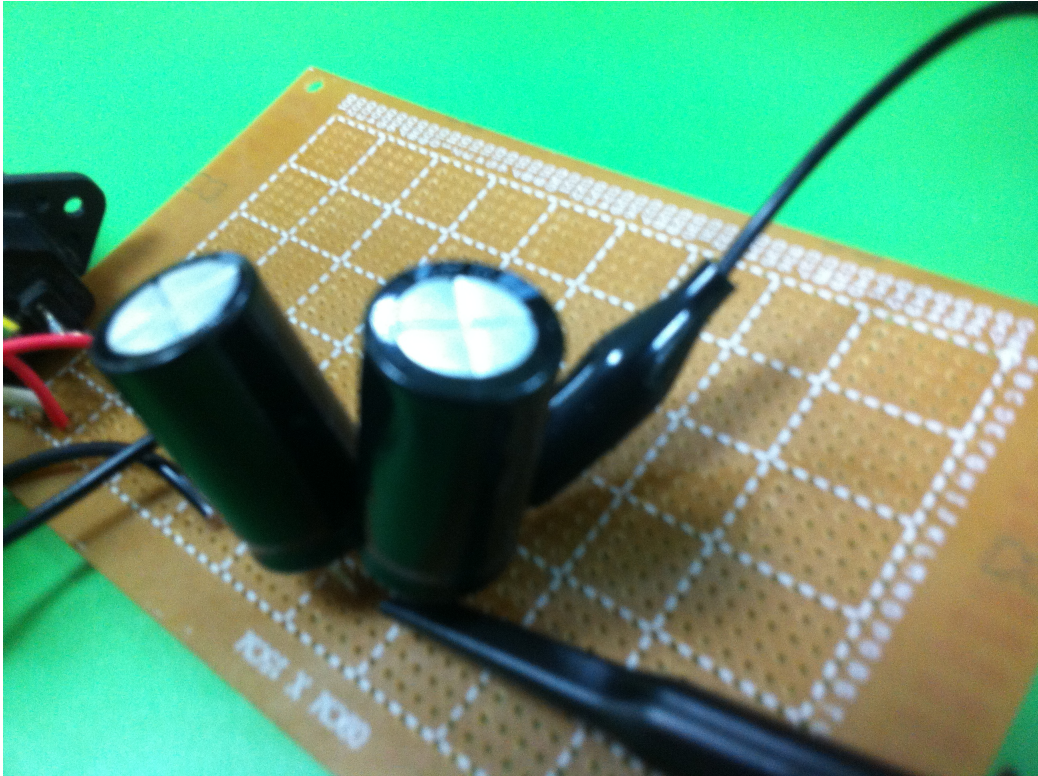


Figure 8: The intermediate testing phase after the capacitors were soldered

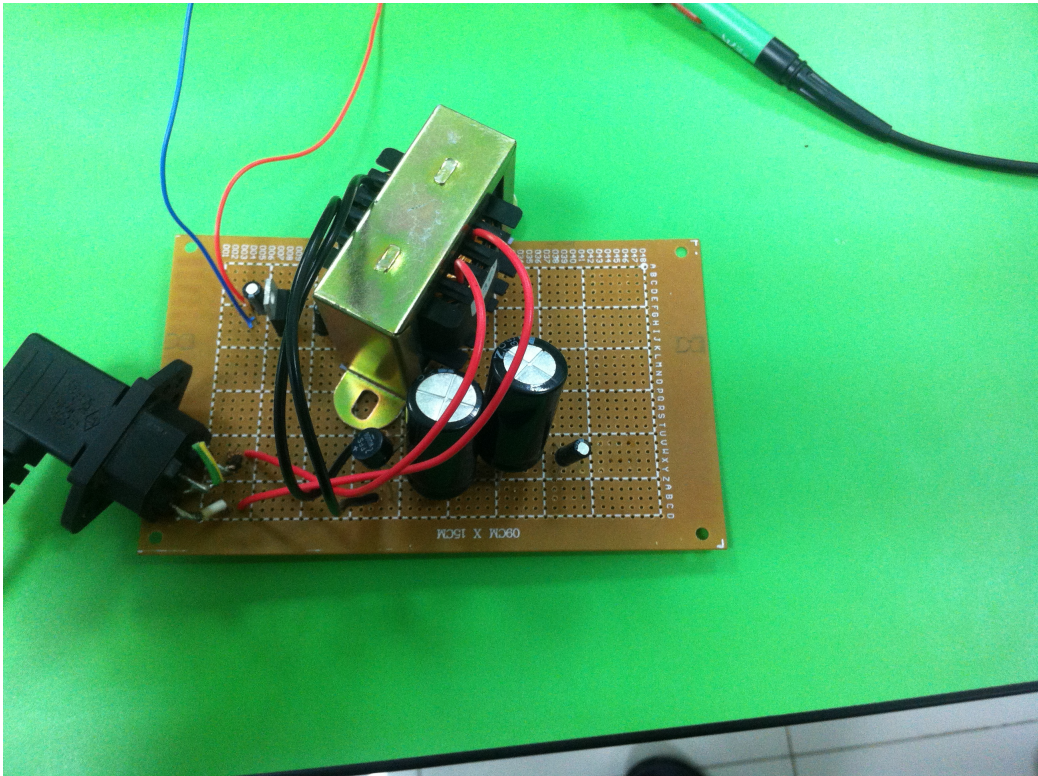


Figure 9: The circuit so far

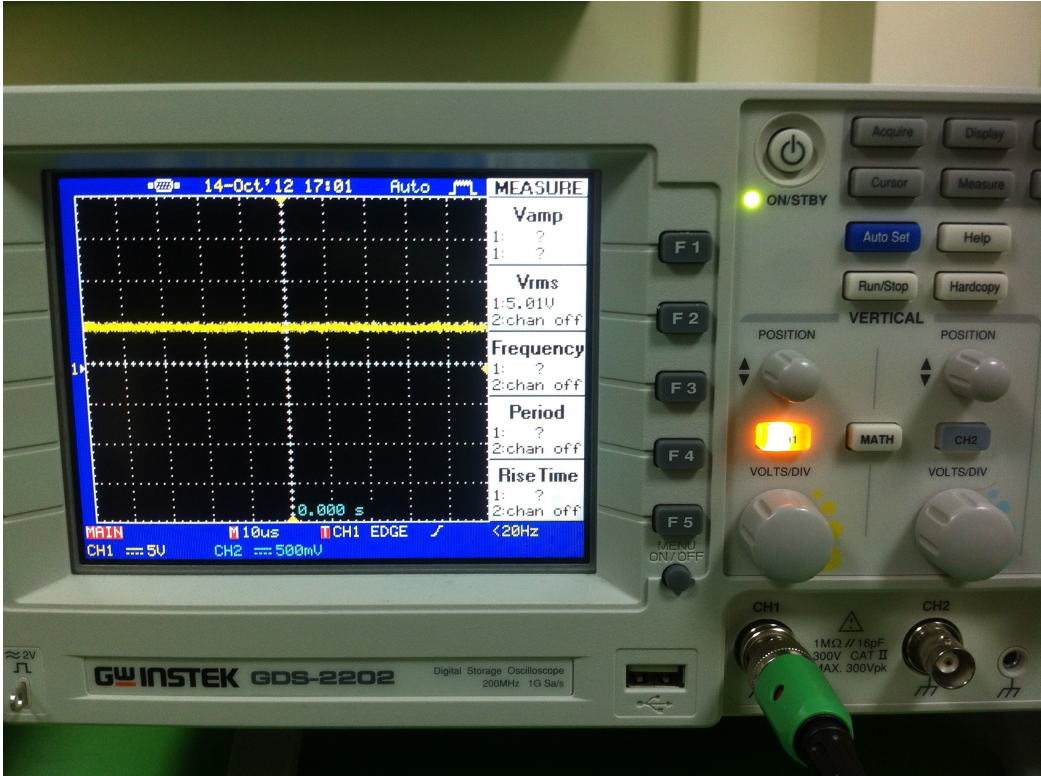


Figure 10: 5V regulator output

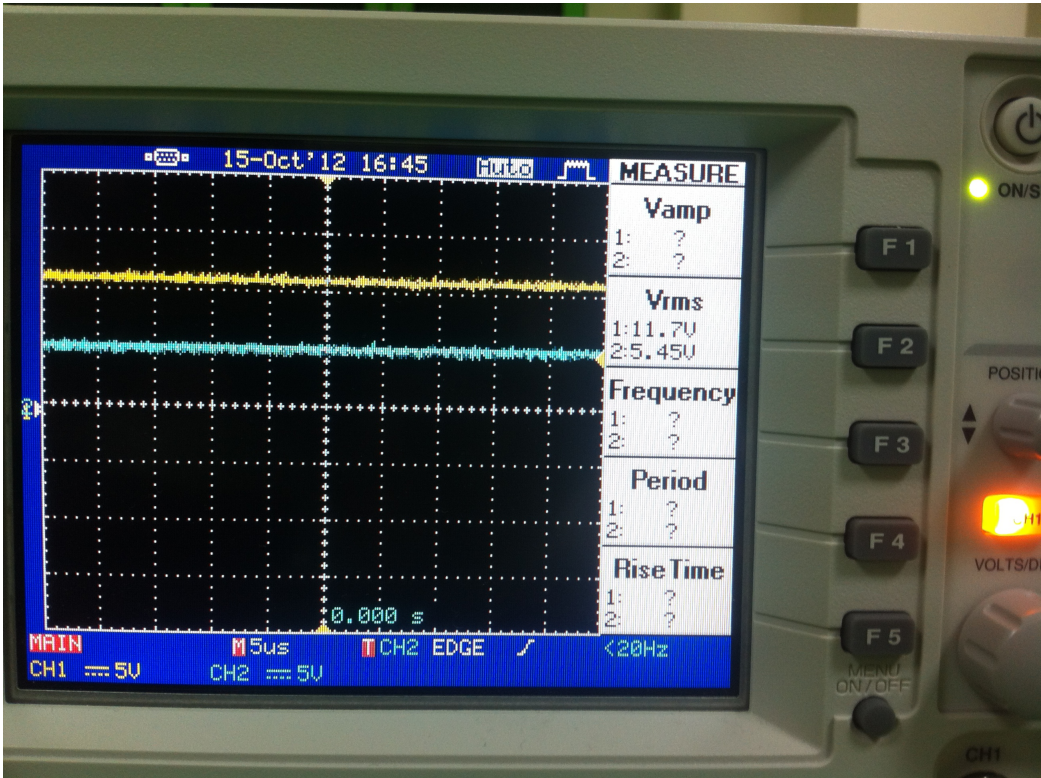


Figure 11: 12V DC and 5V DC constant output from the regulators

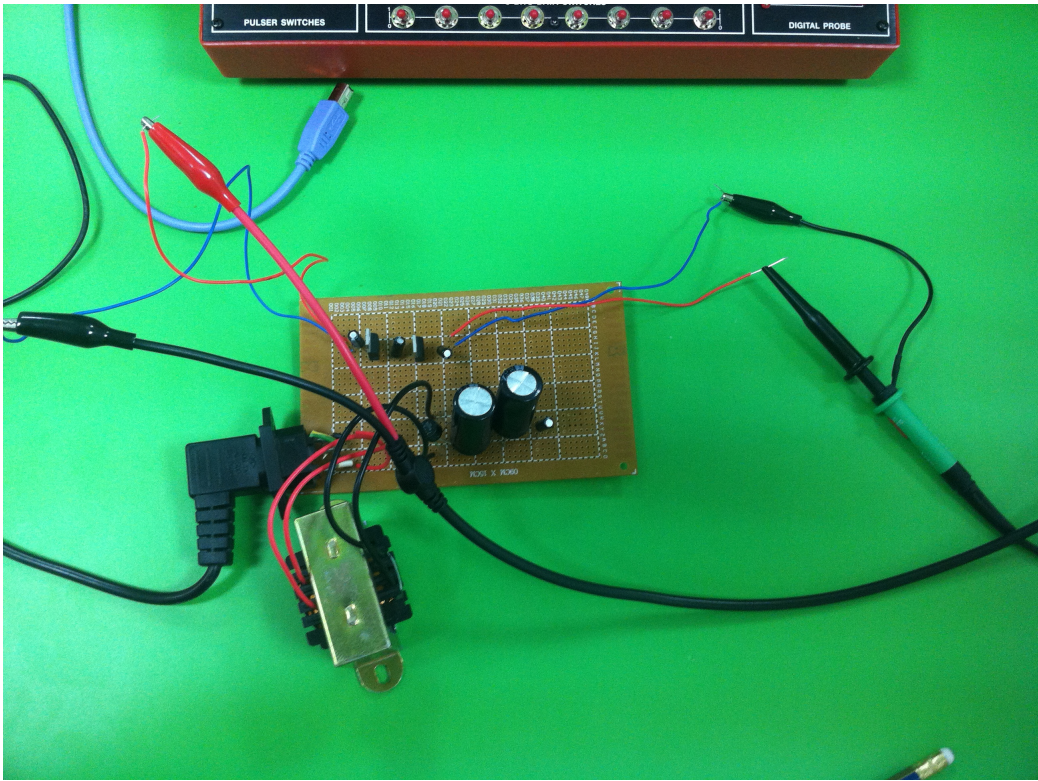


Figure 12: The finished circuit

6 Conclusion

- Transformer steps down AC voltage from 230V to 17V AC approximately and not completely smooth 12V as shown on the cover.
- Rectifier clips the negative part of the voltage but clamps it up in the positive part. Thus it is called a full wave rectifier.
- Capacitors are used for smoothing the current flow and reducing the ripples so that a constant output is produced.
- We have learned that the regulator is the important part to save the circuit from burned. Also using more capacitor is the best way to filter the voltage.