LAB NOTE

Subject: Electronic Design Principles

Topic: Voltage Controlled Oscillator

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1. Objectives

- Build a Relaxation Oscillator with a Voltage Control Oscillator.
- Show your design in using Multisim in your pre-lab.
- Prepare a table for measurement in advance to prove that your circuit works by comparing your calculated values with the actual values.

2. Theory and Calculation

2.1 Theory

Relaxation oscillators are characterized by an RC timing circuit and a device that periodically changes state.

2.2 Design and Calculation

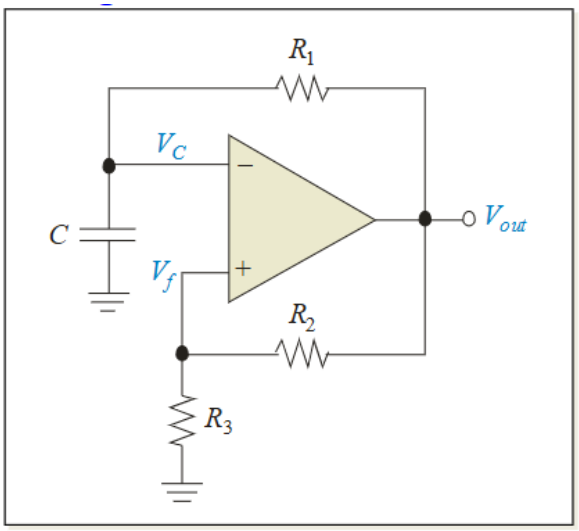


Figure 2-1: Relaxation Oscillator's design

For this design the following equipment are use:

- 7 Resistors 10k
- IC LM348N
- Function Generator
- Power Supply

Formula to calculate V_{out}:

$$V_{UTP} = +V_{max}\left(\frac{R_3}{R_2 + R_3}\right)$$

$$V_{LTP} = -V_{max}\left(\frac{R_3}{R_2 + R_3}\right)$$

Figure 2-2: Formula to calculate V_{out}

Formula to calculate the Period:

The period of the waveform is given by:

$$T = 2R_1 C \ln\left(1 + \frac{2R_3}{R_2}\right)$$

Figure 2-3: Formula to calculate Period

- **Power supply:**

recommended operating conditions

	MIN	MAX	UNIT
Supply voltage, V_{CC+}	4	18	V
Supply voltage, V_{CC-}	–4	–18	V

Figure 2-4: LM348N's datasheet

From the datasheet, it said that it recommended that the power supply of V_{cc+} should be in range from 4V to 18V, and for V_{cc-} should be from -4 to -18.

3. Design and Result

For this assignment, 6 cases will be tested, 3 will be with DC power and 3 will be from AC power.

3.1 Multisim's design.

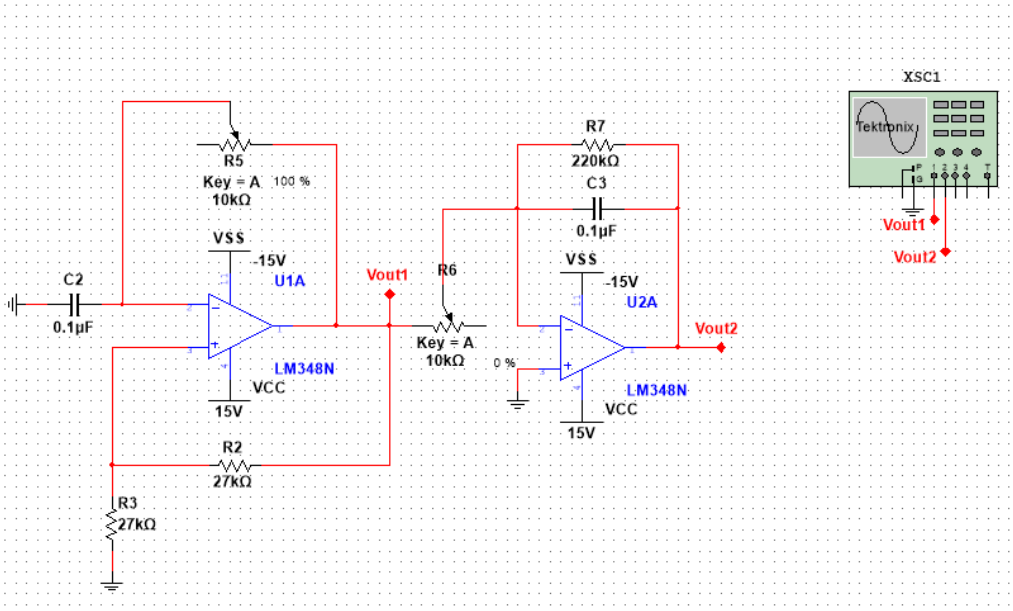


Figure 3-1: Multisim's design

3.2 Breadboard's design

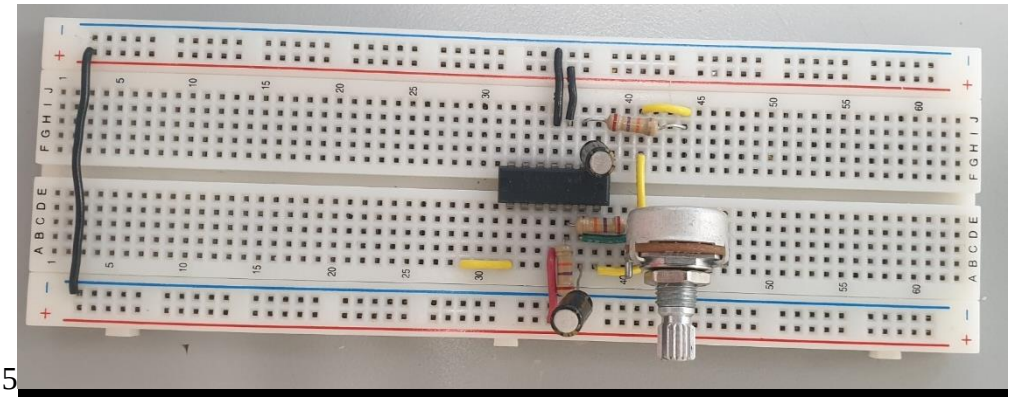


Figure 3-2: Breadboard's design

3.3 Result

Theory	Multisim	BreadBoard
455Hz	439Hz	431Hz

Table 3-1: Output for Oscillator

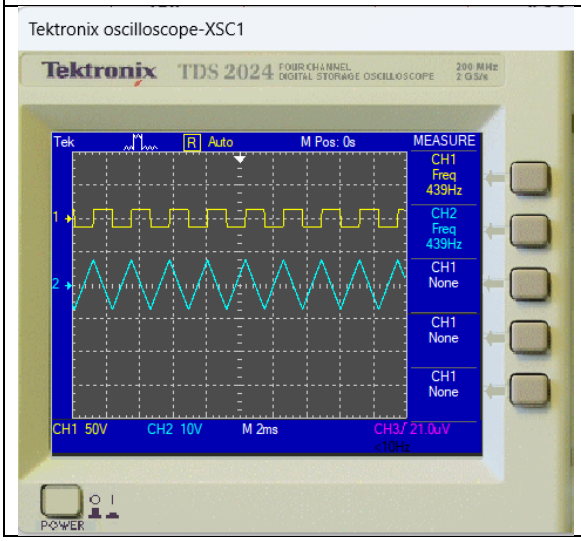
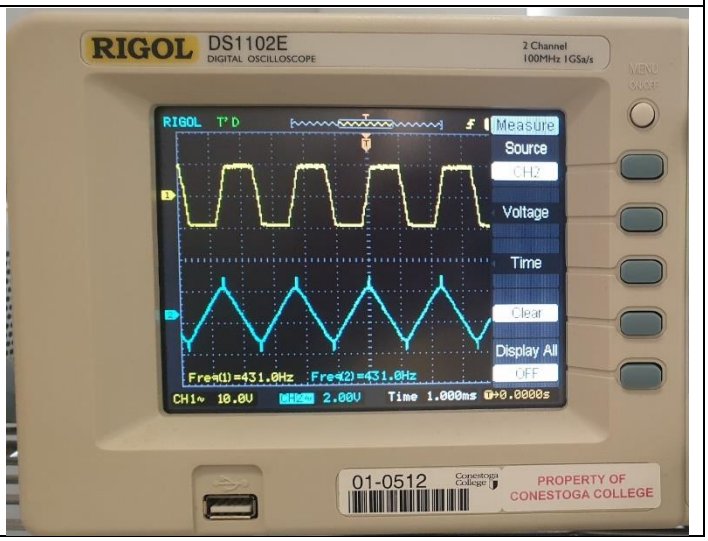
Multisim	BreadBoard
	

Table 3-2: Multisim's and BreadBoard's result

4. CONCLUSION

From the result of all cases:

- All cases have Theory's result, Multisim's result and Breadboard's result nearly the same.

REFERENCES