**Lab 3: ES50 Section 007, Lombardo Thursday 6:30 pm – 9:30 pm**

**Name: Nabib Ahmed, Sharanya Pulapura, Andrew Jiang**

**2: Pre-lab questions:**

1. We all read the lab.
2. We all read the data sheet.
3. Schematic on a separate sheet of paper.
4. The load would hook to V0.
5. 3.57 K ohms to 5.88 K ohms. Math done on a separate sheet of paper.

**3. Theoretical Overview**

Nothing to answer.

**4. Comparator – An Op Amp Without Feedback**

1. The input and output signals have the same shape but different amplitudes. The output signal amplitude is higher.
2. Changing the input signal from sine to saw tooth changes the output signal from sine to saw tooth. The reason is that op-amps allows control over the amplitude however it doesn’t distort the shape.

**5. Voltage Divider (With R1=R2=1 kΩ, and V = 5V)**

1. Without the load resistor RL, the voltage across AB = 2.5 V. With RL closer to R2 (RL = R2 = 1 kΩ), the voltage across AB = 1.67 V. With RL closer to zero, the voltage across AB = 0 V. With RL farther from R2 (RL = 5 kΩ), the voltage across AB = 2.20 V.

|  |  |  |
| --- | --- | --- |
| **Load Resistor RL­** | **Actual Measurements** | **Expected Value** |
| None | 2.5 V | 2.5 V |
| 1 kΩ | 1.67 V | 1.67 V |
| 0 Ω | 0 V | 0 V |
| 5 kΩ | 2.20 V | 2.27 V |

There are no substantial differences between actual and expected values.

The only cases where the voltage divider acts like an ideal source are when the load resistance is 0 kΩ or has infinite resistance.

1. When we twist the potentiometer knob, the voltage increases from 0V to 10V. Using a higher resistance potentiometer will allow the results to be more precise, since there is a greater range of values that R1 can be by shifting the knob. This also allows it to be more power-resistant so it is less likely to overheat or pop. The range from 0V to 10V will remain the same.
2. When we turn the power on, the voltage almost immediately increases to 5V. Once we turn off the power supply, the voltage exponentially decreases as it discharges until it reaches 0V.