EE 230 Lab Design Project 1

Project: **Stereo Amplifiers**

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Lab Section: E

Graded by _____

Score _____

EE 230 Lab Design Project 1

Introduction -
This design project centered around the creation of a stereo amplifier, similar to any that operates inside stereos or other devices. This will be built with the supplied circuitry kit.

Design Requirements -
This circuit is required to have a constant gain of 20, and a band-pass filter with an upper corner frequency of 15000 Hz and a lower corner frequency of 100 Hz. There will be two seperate channels, made to be mirror images of each other.

Components -
This circuit will be made from a passive band-pass filter and a non-inverting op-amp.
BandPass Filter:

- High Pass Filter:
- R = 15916 Ω = 15000 Ω + 680 Ω + 220 Ω + 15 Ω
- C = .1 uF

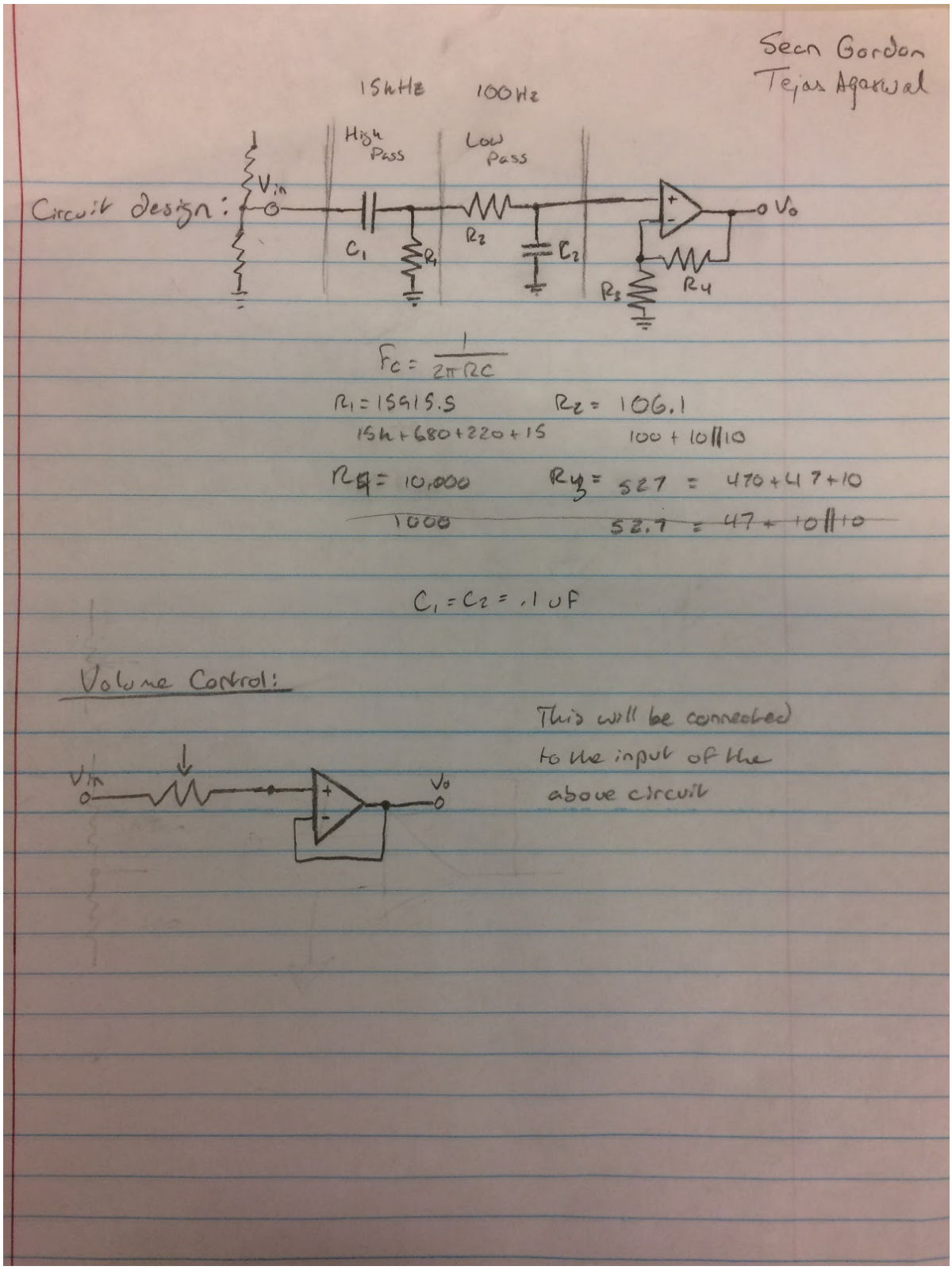
- Low Pass filter:
- R = 106 Ω = 100 Ω + 10 Ω || 10 Ω
- C = .1 uF

Op-Amp

- LM324/LM324A Op-Amp
- R2 = 527 Ω = 470 Ω + 47 Ω + 10 Ω
- Rf = 10000 Ω

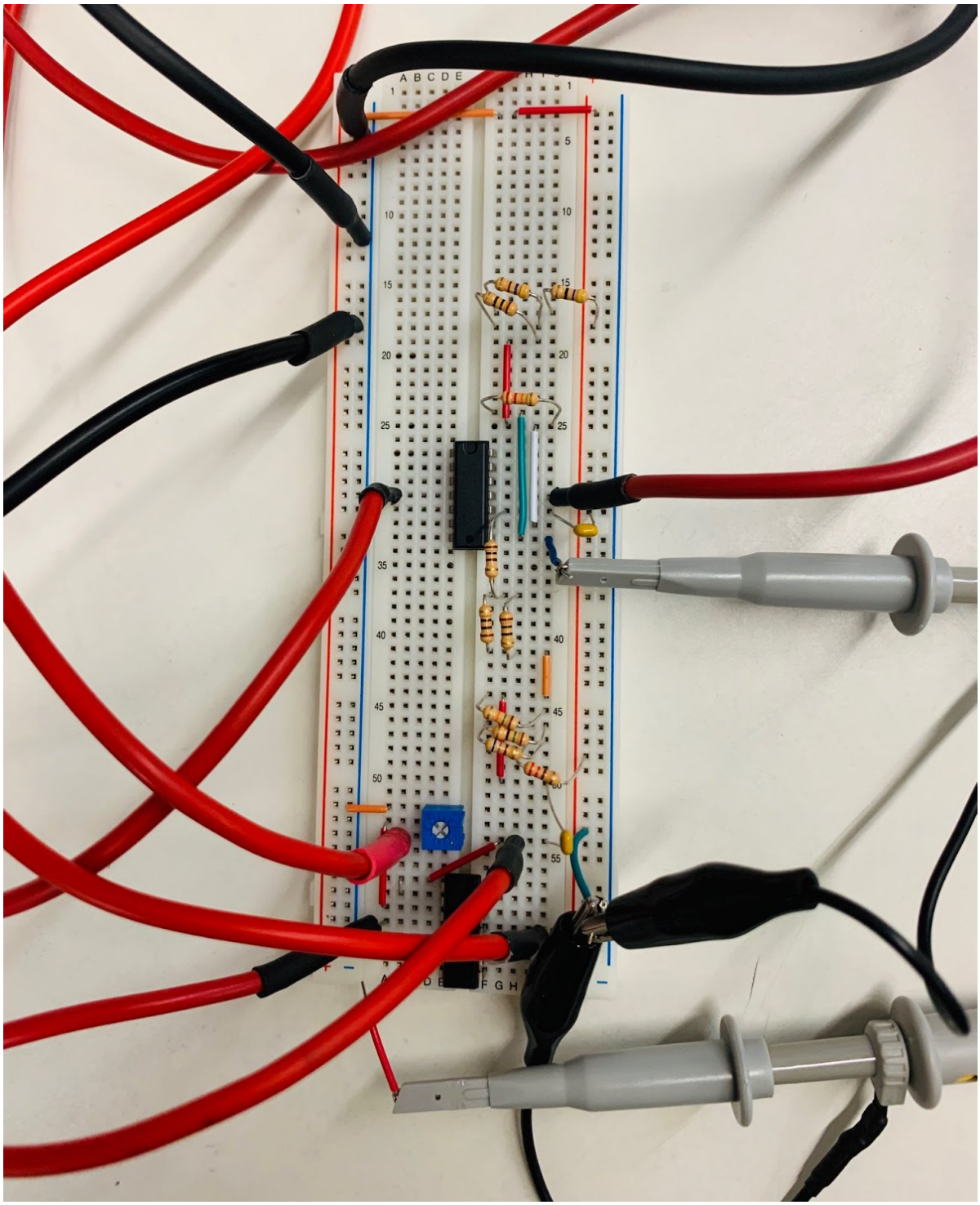
Setup -
The circuit called for a High-pass and a Low-pass circuit in series, followed by a non-inverted op-amp with a constant gain of 20. Using the equation $f_c = 1/(2\pi RC)$ we decided the values of the resistors using a capacitance of .1 uF and the required corner frequencies of 100 Hz and 15000 Hz. The op amp was powered with ±15 V power supplies, and an input with an amplitude of .25 vrms was used. The 'volume' of the circuit will be adjusted with a potentiometer at the input, hooked up to a unity gain op-amp to avoid voltage divider effects.

Notes and Written Diagram -



Circuit Implementation -

Here is shown one of the two amplifier circuits hooked up to power supplies:



Testing -

To test the circuit we connected a .25 vrms to each input independently. Placing a probe at the output of the circuit and dividing it by the input after the potentiometer yielded us our gain. The range of frequencies was also tested, with several frequencies inside of the range and a few outside tested for alignment to proposed functionality.

Conclusion -

This lab was an interesting foray into applied circuitry for the course, taking what we have learned thus far and creating a working circuit commonly found in electronics today. After an initially failed first attempt with a Deniyallis-Friend circuit, we moved to a passive band-pass circuit with an amplifier. Later on, when creating the high-pass circuit, the lower corner frequency proved to be too low, and R1 needed to be adjusted to 7200 Ω in order to meet the requisite frequency.