

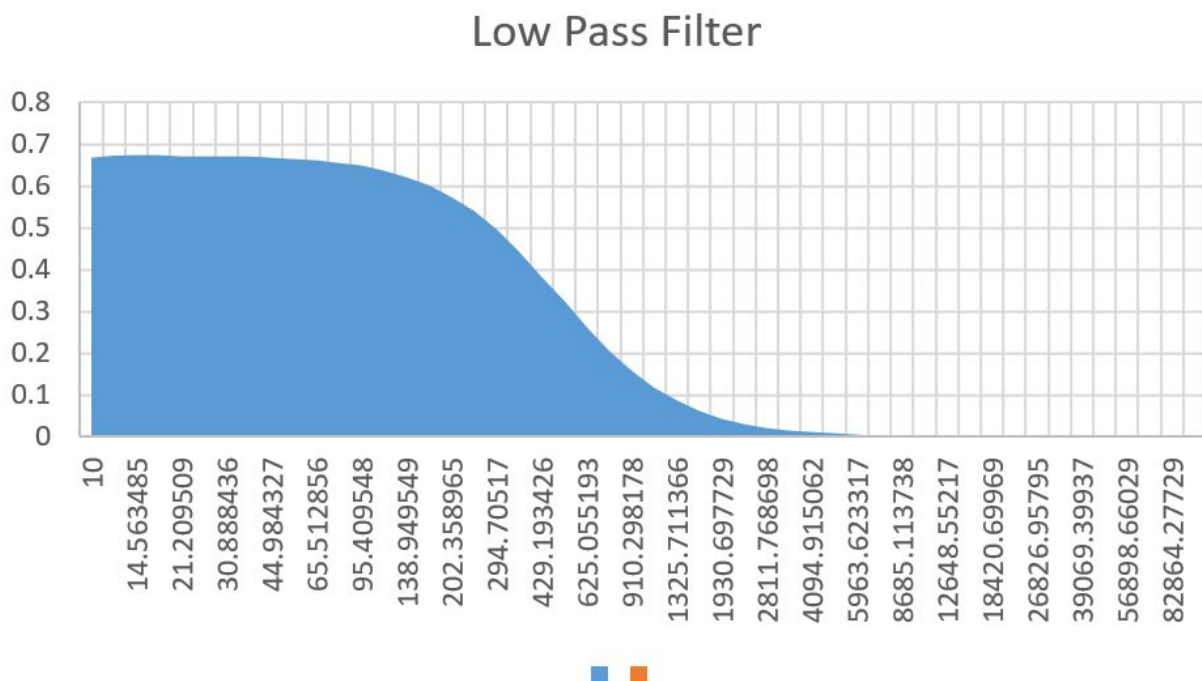
Design Lab 1

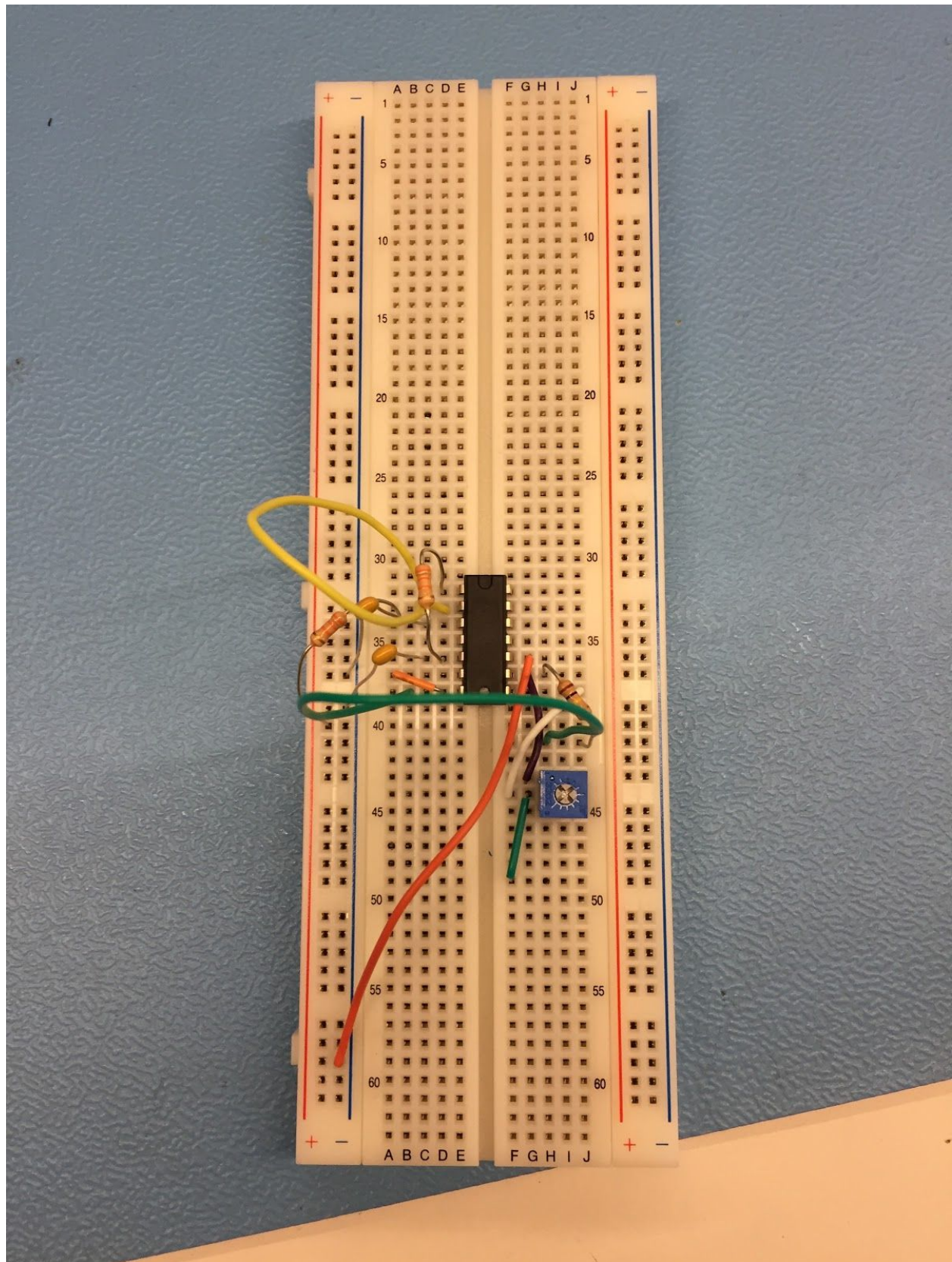
Introduction

In this lab we had to simulate an audio system that separated out components of the signal for speakers, a subwoofer and tweeters. The bass portion had to have a boost equivalent to a gain of 5. To do this we designed three filters that met certain specifications. We made a low pass filter that corresponded to the bass, a high pass filter that corresponded to the tweeters and band pass filter for the other frequencies.

Low Pass Filter

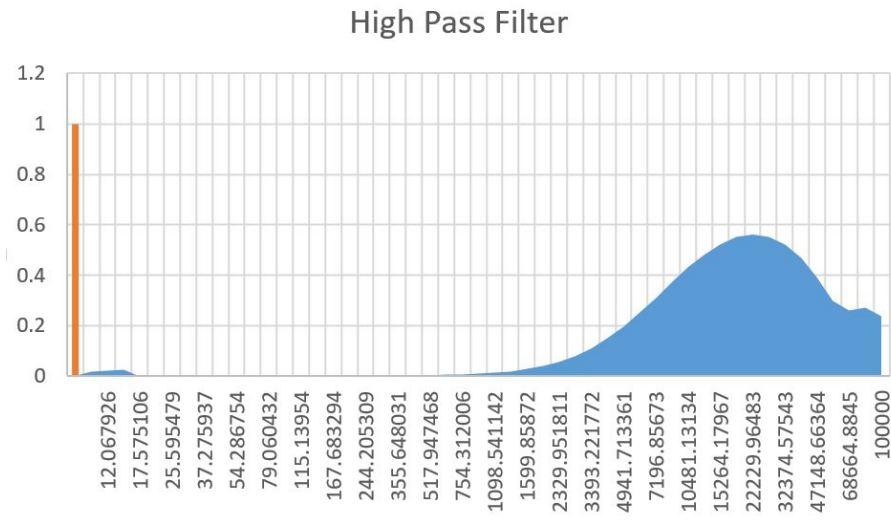
In this part of the lab we designed the low pass filter. The filter had to meet several criteria. It needed to have a varying gain of 1 to 5 and a corner frequency of 200 hz. The filter also had to be second order. To create this filter we simply cascaded two low pass filters. All of the filters were active and we used the smallest capacitance values we could to improve our results. To adjust the gain at the end we used an op amp with a potentiometer.

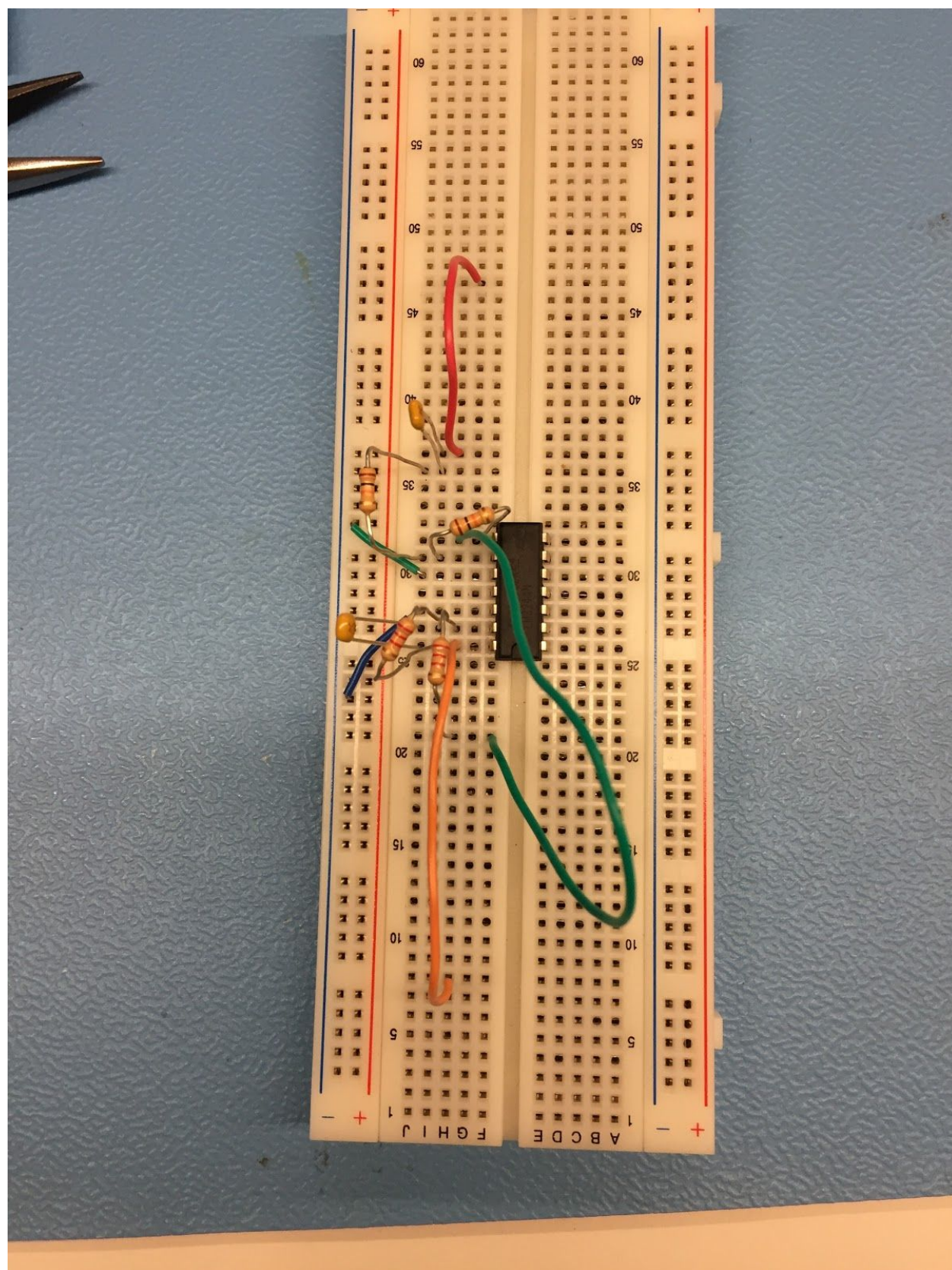




High Pass Filter

In this part of the lab we designed the high pass filter. It had a corner frequency of 6000 hz and a gain of 1. We again found it best to cascade two high pass filters to obtain the second order requirement. We used small capacitors and larger resistors when doing the calculation for corner frequency. We found that that gave us a smoother graph. We also put a op amp at the end so that our gain was less attenuated.





Band Pass Filter

For this part of the lab we were to design a band pass filter with low corner frequency of 300Hz and a high corner frequency of 5000Hz. As you can see in the graph below the low corner frequency we saw with our circuit was just about 300 and the high was about 4100. We found that with our design setup and equipment we had, this was a pretty well designed circuit with not a lot of error at all, besides the high corner frequency being a little low. The biggest thing we changed to get our current circuit was that we added an additional filter that we cascaded which had a gain of 1. In doing this we saw a cleaner graph.

