Data Memo for: Team 4, TI Oscilloscope
From: Ray Montgomery
Eric Taylor
To: Professor Yoder
Date: 1/26/2015

Context:

This experiment was conducted on Wednesday February 4, 2015 by Raymond Montgomery and Eric Taylor in B200 on the second to west-most lab bench on the southern wall of the room (closest to the doorway).

Procedure:

Each differential amplifier is designated for a channel of the oscilloscope BoosterPack. Each differential amplifier receives an input signal and has a grounded input. The configuration pins were arranged with appropriate high/low voltages that set the Programmable Gain Amplifier (PGA) to the lowest gain. The input signals into the differential amplifiers varied in shape, amplitude, and frequency.

Presentation of Data/Description of Data and How to Use It:

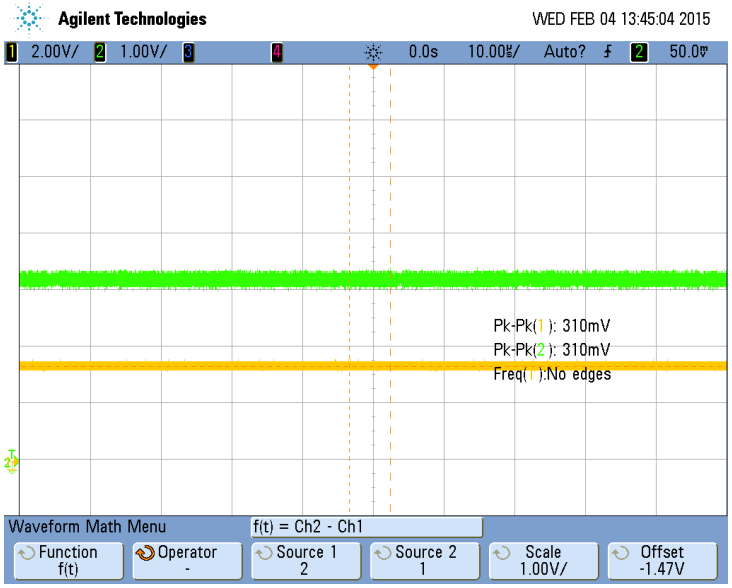

Figure 1: Show DC voltage output for a DC voltage input

A DC voltage signal input into the differential amplifiers generates a DC voltage output for the PGA. The figure shows that the desired gain is used and the output of the PGA has the correct signal shape. The DC voltage input signal is created using only the common mode voltages of the system.

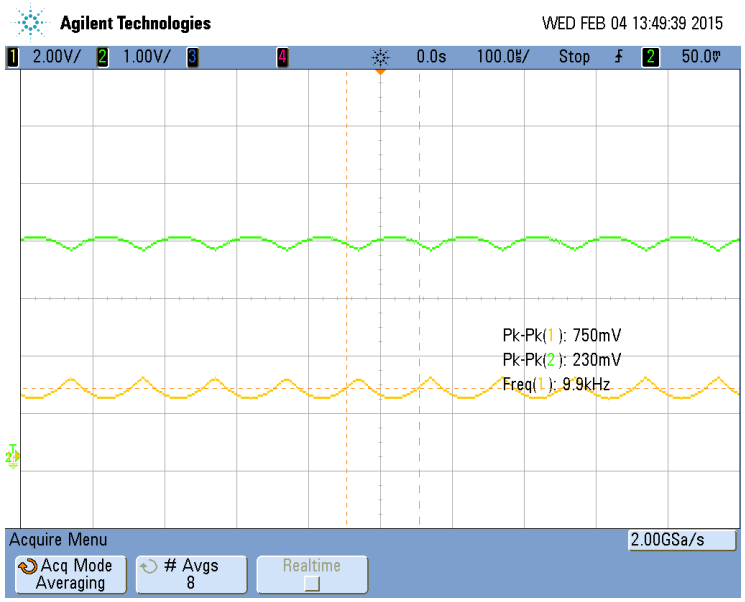

Figure 2: The input and output are shown that they can change

A sine wave input into the differential amplifier generates an output for the PGA that is the difference of the inputs the differential amplifiers. The figure shows that the desired gain is used and the output of the PGA has the correct signal shape.

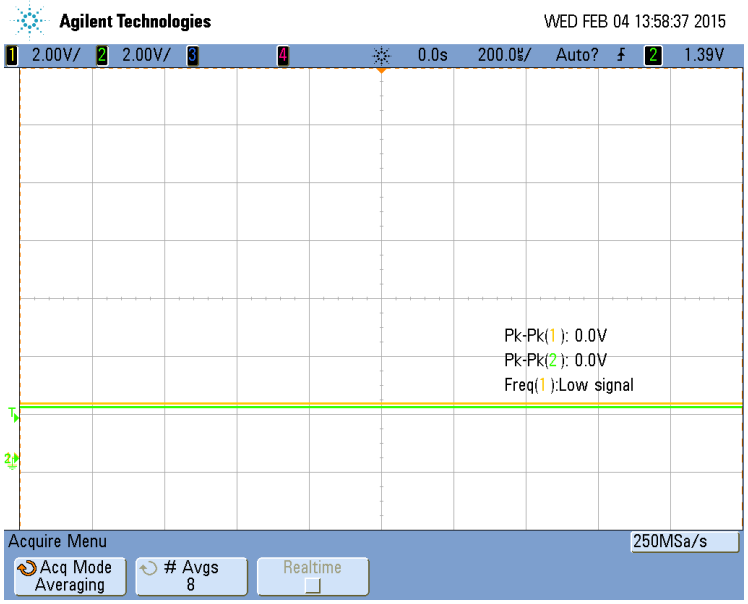

Figure 3: A DC voltage output of the differential amplifier

A DC voltage signal input into the differential amplifiers generates a DC voltage output for the differential amplifiers. The figure shows that the desired gain is used and the output of the differential amplifiers has the correct signal shape.

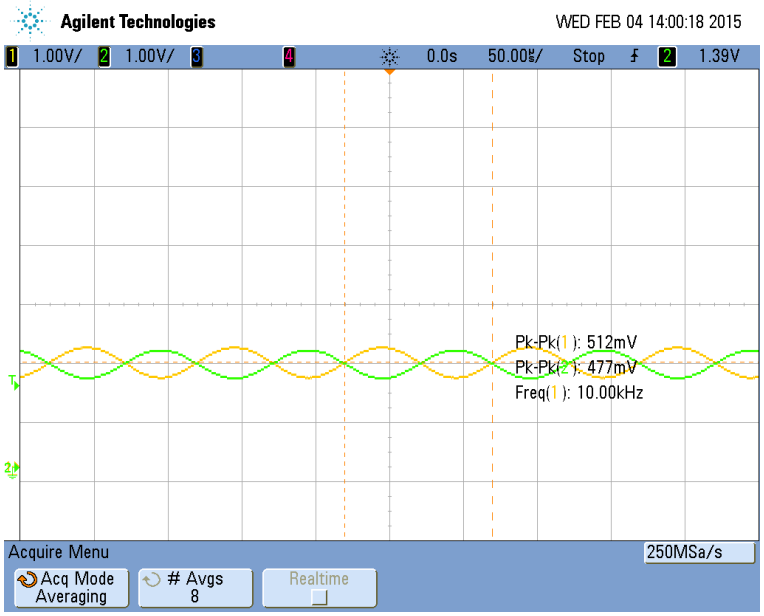

Figure 4: A sine wave input through the differential amplifier

A sine wave input into the differential amplifiers generates a sine wave output for the differential amplifiers. The figure shows that the desired gain is used and the output of the differential amplifiers has the correct signal shape.

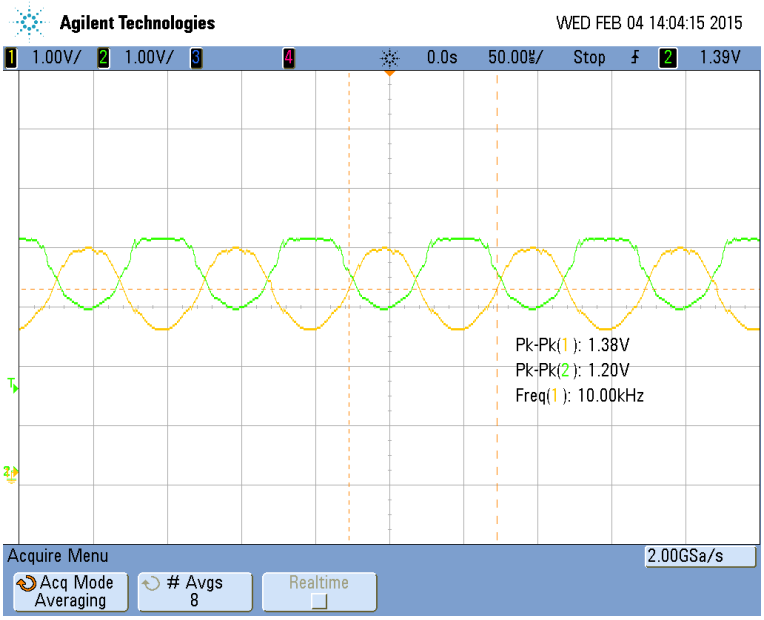

Figure 5: Sinusoid input through the gain amplifier

A sinusoid input into the differential amplifiers generates a sinusoid output for the PGA. The figure shows that the desired gain is used and the output of the differential amplifiers has a somewhat correct signal shape. The clipping of the signal is due an inappropriate common mode voltage.

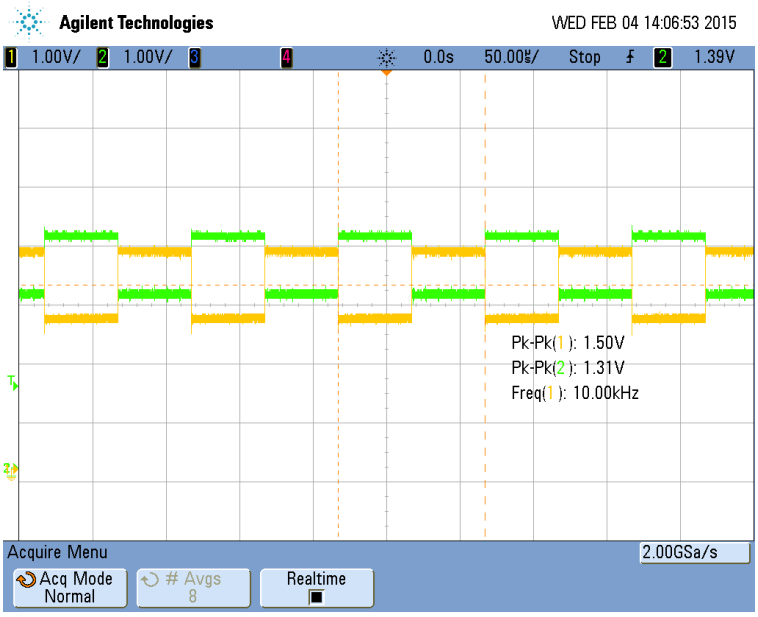

Figure 6: Square wave input through the gain amplifier

A square wave input into the differential amplifiers generates a square wave output for the PGA. The figure shows that the desired gain is used and the output of the differential amplifiers has the correct signal shape.

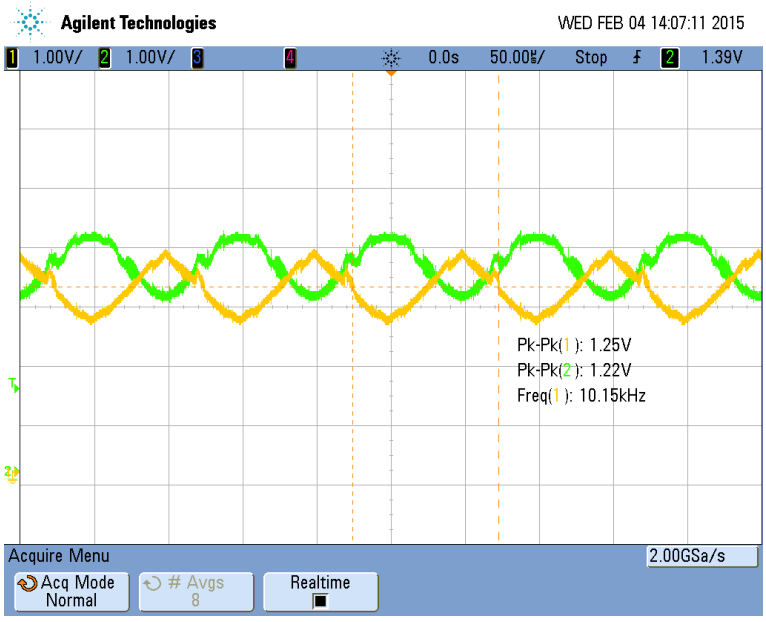

Figure 7: Triangle wave input through the gain amplifier

A triangle wave input into the differential amplifiers generates a triangle wave output for the PGA. The figure shows that the desired gain is used and the output of the differential amplifiers has a somewhat correct signal shape. The distortion of the signal is due an inappropriate common mode voltage.

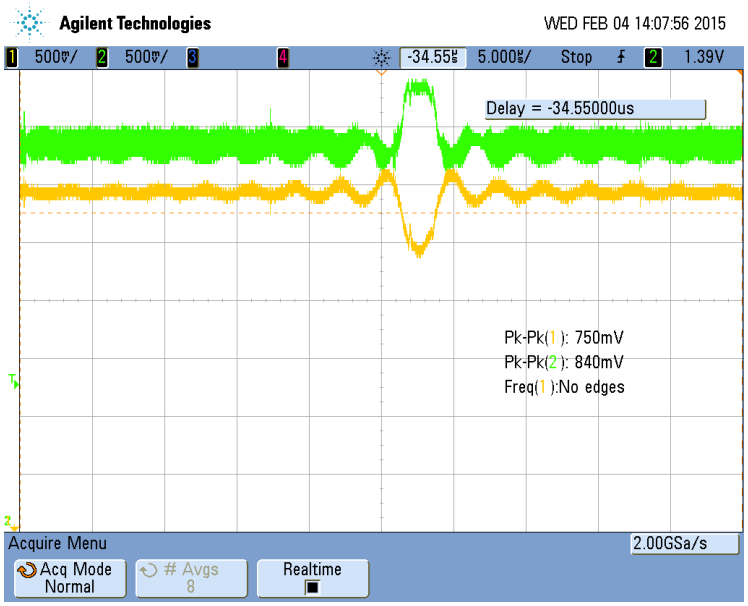

Figure 8: Sinc wave input through the gain amplifier

A sinc wave input into the differential amplifiers generates a sinc wave output for the PGA. The figure shows that the desired gain is used and the output of the differential amplifiers has a somewhat correct signal shape. The clipping of the signal is due an inappropriate common mode voltage.

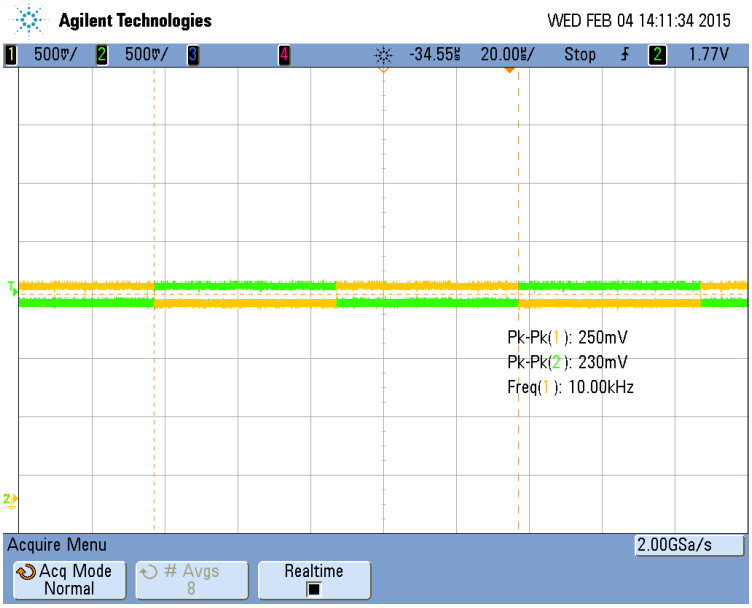

Figure 9: Square wave input through the differential amplifier

A square wave input into the differential amplifiers generates a triangle wave output for the differential amplifiers. The figure shows that the desired gain is used and the output of the differential amplifiers has the correct signal shape.

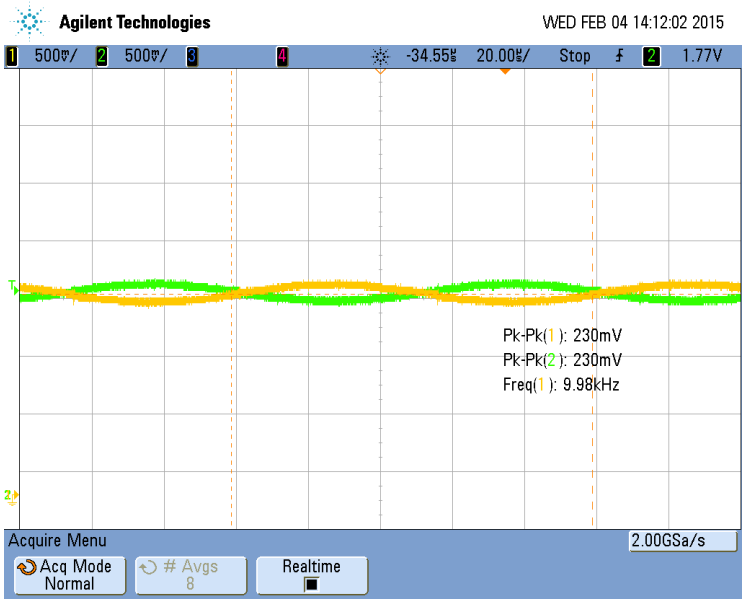

Figure 10: Sine wave input through the differential amplifier

A sine wave input into the differential amplifiers generates a sine wave output for the differential amplifiers. The figure shows that the desired gain is used and the output of the differential amplifiers has the correct signal shape.

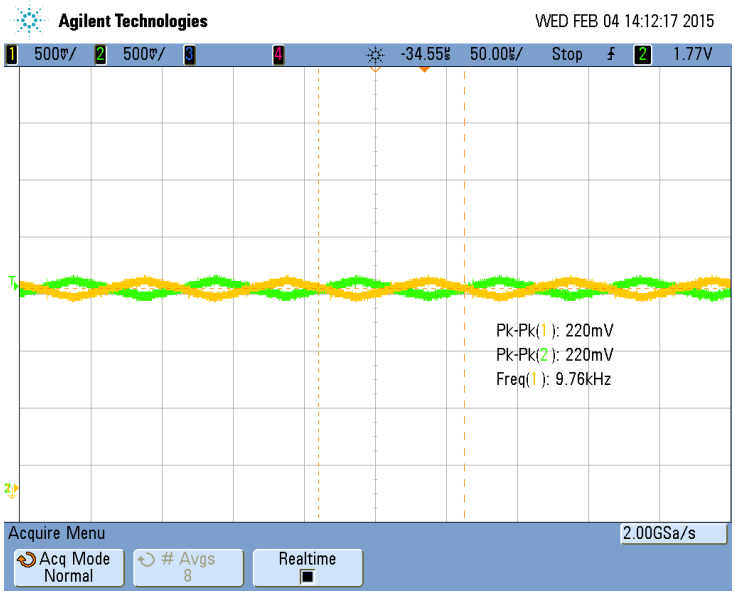

Figure 11: Triangle wave input through the differential amplifier

A triangle wave input into the differential amplifiers generates a triangle wave output for the differential amplifiers. The figure shows that the desired gain is used and the output of the differential amplifiers has the correct signal shape.

Conclusions:

We need the appropriate common mode voltages so the signals do not saturate and the integrated circuits can operate under appropriate conditions. Supply voltages started to oscillate due to the wiring set-up of the test. The PGA heats up due to lack of connection to the ground plane on the PCB. Output signals of the differential amplifiers became out of phase at high(er) frequencies.