

Assignment:

1. Turn the power switch on for one of the Grass amplifiers and connect its output to channel zero of the data acquisition system using a BNC-to-BNC cable.
2. Set the amplifier gain initially to 2000 and adjust later to get a clear view of the signal on the screen. Set the filters: low cut-off=0.03Hz, high cut-off=30Hz. 60Hz notch filter is IN. You may want to start with a low cut-off of 1Hz until you see the trace on the screen since it will take a long time for the amplifier output voltage to come down to the baseline at 0.03Hz setting. Once you see the trace then switch to 0.03Hz.
3. Identify a subject in your group and attach two disposable electrodes on the temples on each side of the subject's head and a third one on the neck as the instructor demonstrates in the class. (You may want to reduce the size of the sticky part of the electrodes by cutting it with scissors since it may hurt while detaching them later.)
4. Connect the first two electrodes on each side of the eyes to the differential inputs of the amplifier and the third one to the common terminal.
5. Download the following VI from web.njit.edu/~sahin/BME301 and run.

Cont Acq to Spreadsheet File_modified.vi

6. Chose zero for the channel number, 100 samples/sec for the scan rate, and 1 samples to be transferred each time (the number in the third box). Run the VI by clicking on the arrow button. Enter a file name when prompted to save your data into. Please save your data only on the desktop (not in any National Instrument folder) and delete them after this studio. Use the 'AutoScale Y' and 'SweepChart' options on the plot window. (bring the cursor over the plot and do a right click on the mouse.)
7. Ask the subject to fix his/her gaze at a point directly ahead. Wait a minute or so for the voltage on the screen to come back to the zero baseline.
8. Now, ask the subject to fix his/her gaze at a point far right, wait a few seconds, and then move to a point at far left. Try to do that without moving the head. Do you see a square wave on the EOG diagram? Use the stop button on the bottom right corner to stop the VI. Your data has been saved into the filename you entered earlier.
9. Change the low cut-off setting from 0.03Hz to 1Hz. Have the subject move the gaze from center to far right and keep it for 5 seconds. Does the voltage output stay constant or decrease? What is the ideal frequency range for an EOG amplifier? Prepare to explain it in your report. Save the data for your report.
10. Move the low-cut off filter setting to 0.01Hz. Have the subject read a text while holding the page about 10 inches away. How does the EOG waveform look on the screen? Linear lines or stepwise increases? Save the data.
11. Have the subject move the gaze in vertical direction stopping at certain points. Does the output signal change as much as it did with the horizontal movement of the eyes? Comment on this in your report. Save the data.
12. Now, determine the sensitivity of the system. What is the output voltage per one degree of arc for the horizontal movement of the eyes? (Hint: Have the subject move the eyes for a known degree angle, e.g. 30°, and measure the corresponding output voltage). Save the data for your report and calculations. Notice that the sensitivity of the system will change according to the gain of the amplifier. So, make sure to report the amplifier gain at which you did this measurement.
13. Detach the electrodes from the temples and this time put them on diagonally; one above the right eyebrow and the other below the left eye.
14. Test the output signal for the horizontal and vertical movements of the gaze. Do both vertical and horizontal movements generate voltage? What is different from the previous placement of the electrodes? Save the data.
15. Try moving the gaze diagonally; to the upper-right, down-right, upper-left, and down-left corner of the visual field. Which directions generate stronger voltages and why? Which directions generate positive/negative voltages and why?
16. Remember to include information on the use of EOG signals in the clinic as you prepare your report.