LAB 1: Time & Frequency Plots

REQUIRED READINGS: **Graphs p.25-26, Resonance Curves p.81-82, Analysis of Tone p.115-118**

Equipment:

You will need at least one instrument, a computer, a sound sensor, a copper or PVC pipe, two tuning forks, a quick hand and a good ear. The instrument is NOT provided. Although there is a keyboard in the room with the computer it may not provide the pure tones you need, so be sure to bring your own. Make sure the sound sensor is plugged into the A-port on the scientific interface box and that there is nothing on the box or blocking its vents. The sensor is very sensitive to sound so be quiet when recording the desired sound.

Procedure:

Make sure the computer is in Windows before letting the TA leave. On the Desktop there is an icon for 1320 Music. Double click on this icon and then double click on the listing with Spring 2001 in the title. This should immediately open up a window with two graphs in the center. One graph is a frequency-domain graph and the other is a time-domain graph. By pressing the Start button on the top toolbar and then speaking into the sound sensor you should see the graphs of your voice. As long as the counter is running on the toolbar the graphs will continue to change according to the sound coming into the sensor. Whoever is sitting at the computer should be ready with a fast trigger finger to hit the Stop button when the desired sound is being heard. Once you stop the graph there are a couple of ways to print. In order to save paper and time the following way is preferred.

With the graphed stopped, hit the Print Scrn button on the keyboard. Go to the Start menu and find Programs. Find Office 97 and then find Word. Open a new document and left click and paste. Once

the image of the screen is in Word you can resize the image to fit one page fairly easily. Print from word. PRINT only ONE copy per group. LABEL the graph as to what instrument, note, chord, or any other relevant information. Make sure to staple all the graphs together and put everyone's name on the cover sheet so the TA can match each plot to the comments in your lab book.

Graphs:

1) Play a note on your instrument loudly.
2) Play the same note softly.
3) Play the same note in a different octave.
4) Play the same note on a different instrument (the keyboard is fine.)
5) Play different notes on your instrument. (You only need to print one graph to compare to graph 1, so pick the note with the biggest difference.)
6) Play one of the copper or PVC pipes.
7) Simultaneously play two tuning forks that are almost (but not quite) in tune.
8) Sing a ''good'' note.
9) Sing a ''bad'' note.
10) Swing a Blugle (the whirly thing from lab 3) at a resonance.
11) Swing it at a different resonance.
12) Use the keyboard to play a note from a clarinet.
13) Use the keyboard to play a note from a trumpet.

Analysis:

Remember to compare both the time-domain and the frequency domain graphs when asked for a comparison.

1) What is the difference between the graphs 1 & 2?
2) What does this tell you about the y-axis on the graphs?
3) What is the difference between the graphs 1 & 3?
4) What is the difference between the graphs 1 & 4?
5) What are the main differences between different notes according to your graphs 1 & 5?

6) By comparing the graphs of the ‘‘good’’ and ‘‘bad’’ notes, note the major difference. Could this experiment be used to distinguish a good singer from a bad one?
7) What is the main difference between the graphs of 10 & 11?
8) Did the graph of the clarinet sound come out like you expected? Explain and, if need be, draw a graph of what you expected.
9) Did the graph of the trumpet sound come out like you expected? Explain and, if need be, draw a graph of what you expected.
10) What other patterns did you notice?