IT 327 Lab #6
Amplitude and Frequency Modulation

Objective: To analyze amplitude and frequency modulation and spectral properties of modulated sine, square, and triangle waves as produced by a function generator. Also, to create your own AM signal using TIMS.

Procedure: Be sure to take plenty of pictures and include them in your write-up with appropriate captions.

First, spend some time learning how to use the Function Generators in the lab that are capable of modulation (like the Philips PM 5139 Function Generator). These are capable of AM and FM and will allow you to select both the carrier frequency and the modulation frequency (message). Some will even allow you to set the m parameter for under or over modulation. Some will allow you to input your own signal.

You should print the display showing your signal and modulated carrier on the oscilloscope and the spectrum analyzer for the procedures below. Label each graph and explain the harmonics and the anomalies and what each peak means.

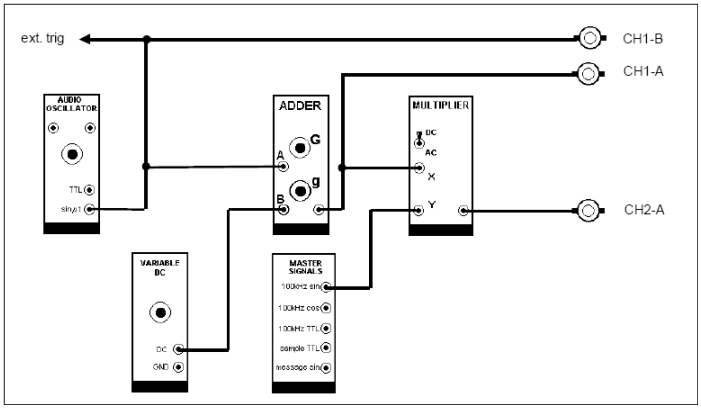
1. After you feel comfortable using the function generator, oscilloscope, and spectrum analyzer, **amplitude modulate (AM)** a 100kHz sine wave carrier at a set frequency of your choosing (the message, I suggest 20kHz). Experiment with it until analysis of waveforms is achieved with the oscilloscope and spectrum analyzer. Trigger on the signal that is modulating the carrier. (Note: the spectrum analyzer has a strong DC component at 0 Hz, don't get that confused with your signal)

2. Repeat procedure 1 with a 100kHz triangle wave carrier and a 100kHz square wave carrier.

3. Return to a sine wave carrier and now modify the m parameter to display varying percentages of modulation and explain how that affects the time domain as well as the frequency domain.

4. Repeat procedure 1, only this time use **frequency modulation (FM)**. The deviation for FM is similar to the m parameter on AM. Set the deviation to about twice that of the modulating signal.

5. Now you will do AM as in steps 1 and 2, but using the TIMS modules. For a wiring diagram, see the figure to the right (or *Book A1 pgs 47-55* in the lab). These pages also include the reason for using an adder and multiplier and how to adjust the controls to set the *m* parameter. Include a diagram, like the one on the right, on how you wired this part.



Label all diagrams, drawings, printouts, signals, etc.