**Lab 2：Amplitude Modulation System**

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| **Introduction**  In Lab 2, we continue to do amplitude modulation by using LabView. However, we replace baseband signal by music signal in Lab2. We set the sampling rate of carrier signal and noise signal to 1M Hz and set number of samples of carrier signal and noise signal to 1M. First, we need to create a path to read the music signal on our computer, M(t). Then, we set the duration and resample rate of M(t) and create a modulator to obtain the signal, Sm(t). Then, Sm(t) is through AWGN Channel. However, it is all known that AWGN Channel has noise interference in the transmission process. So, we use Sm(t) to generate white noise, which simulate the noise in the transmission process and be received by the demodulator with Sm(t). Last, the signal after demodulating is played through Play Waveform.  **Lab results & Analysis**：  The following figure is the program chart.    The following figure is the result.    In theory, we can know that the case whose SNR is 30dB and modulation index is 1 is the most suitable case. Next, we will analyze system performance from four aspects, including the value of SNR, the value of modulation index and the cutoff frequency.  First, we change nothing except the value of SNR. When SNR is less than or equal to -10dB, the signal we can hear is noise and the signal received is carrier signal and noise. When SNR is greater than -10dB and less than 30dB, the music signal received become more and more clear and the noise received is fading away with the value of SNR increasing. After SNR is greater than or equal to 30dB, the noise received almost disappear.    Then, we change nothing except the value of modulation index. When modulation index is greater than 0 and less than or equal than 1.4(1.4 is an estimate), the envelope lies in the non-negative region of the Y-axis. After modulation index is greater than 1.4, part of envelope lies in the negative region of the Y-axis, which is called over modulation.    Next, we change nothing except the cutoff frequency. When cutoff frequency is less than 110Hz ((110 is an estimate)), the music signal transferred is almost cut off. When cutoff frequency is greater than 14000Hz (14000 is an estimate), the noise played become more and more obvious. | |
| **Experience**  What should be noticed is that we should choose single waveform in the process of the conversion of a music signal to a baseband signal. What’s more, we can analyze system performance from the order of LPF, the type of LPF and so on. | |
| **Score** |  |