SFWR ENG 4J03

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# Abbreviations

(O/P): Output

# Frequency Modulation

**Quantizer**:

**Quantization**: truncates, rounds

**Modulation**:

**Frequency Modulation**: a.k.a. **angle modulation**

**Demodulation**:

**Modulated Frequency** [fm]:

**Carrier Frequency** [fc]:

**Oscillator**: device that

**Difference Signal**: oscillator frequency – input signal

**Balanced Modulator**: frequency translations

**Bandwidth (BW)**: max – min = (fc + fm) – (fc – fm) = 2∙fm

**SideBand (SB)**:   
  
**Suppressed Carrier (SC)**:   
  
**Double SB-SC (DSB-SC)**: don't transmit carrier signal, so less power, but complicated filter

**Suppressed SB-SC (SSB-SC)**: transmit only one sideband frequency   
  
**Lower SB (LSB)**: (fc – fm)  
  
**Upper SB (USB)**: (fc + fm)

**Narrow Band Frequency Modulation (NBFM)**:

**Wide Band Frequency Modulation (WBFM)**:

**Modulation index** [m]:

**Power**:

**Total Power** [Ptotal]: 

**Carrier Signal Power** [Pc]:

[PUSB]: m2/4

[PLSB]: m2/4

**Harmonics**: when waves build up…

**Audible frequency range**:

**Audio modulating frequency range**:

sinc(t) rectangle function

# Amplitude Modulation

## Generating SSB-SC

1. Frequency discrimination method
2. Phase discrimination method

### Frequency Discrimination Method

### Phase Discrimination Method

π/4 phase shift → product modulator → S1(x) → Sum → SSB-SC S(k)

**Vestigeal Sideband Transmission (VSB)**:  
  
Filters, such as BPF, tend to remove a little bit of the message. You can avoid this by extending the length of the transmission and including a trace of the opposite SB.

# Information Theory

**binits**: binary bits

## Shannon-Fano

**Shannon-Fano code**: finds efficiency of code, listed with probabilities in decreasing order

**Ensemble**: source of the messages

1. Split into 2 groups as similar in size as possible without first rearranging
2. Allocate 1s to one group and 0s to the other. Either put 0s on all the top groups or 1s in all the top groups
3. Split your groups into smaller groups
4. Continue partitioning until you only have groups of size one.