SFWR ENG 4J03

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Table of Contents

[Abbreviations 1](#_Toc442304923)

[Angle Modulation 1](#_Toc442304924)

[Frequency Modulation 1](#_Toc442304925)

[Phase Modulation 1](#_Toc442304926)

[Amplitude Modulation 1](#_Toc442304927)

[Generating SSB-SC 1](#_Toc442304928)

[Frequency Discrimination Method 1](#_Toc442304929)

[Phase Discrimination Method 1](#_Toc442304930)

[Information Theory 1](#_Toc442304931)

[Shannon-Fano 1](#_Toc442304932)

# Abbreviations

(O/P): Output

# Angle Modulation



## Frequency Modulation

**Quantizer**:

**Quantization**: truncates, rounds

**Modulation**:

**Angular Frequency** [ωm]: 2πfm

**Angle Modulation**: frequency or phase modulation

**Frequency Modulation (FM)**:

**Phase modulation (PM)**:

**Demodulation**:

**Inductance** [L]:

**Capacitance** [C]:

**Modulated Frequency** [fm]:

**Carrier Frequency** [fc]: 

**Message Signal** [m(t)]:

**Carrier Signal** [c(t)]:

**Oscillator**: device that

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

**Balanced Modulator**: frequency translations

**Bandwidth (BW)**:

**FM Bandwidth** [BT]: 

**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)

**Peak Frequency Deviation** [Δfc]: kfAm

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

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

**Frequency Modulation index** [β]: max frequency deviation / fm

**Power**:

**Carrier Signal Power** [Pc]:

**Total Power** [Ptotal]: 

**Message Power** [Pm]: PUSB + PLSB

[PUSB]: m2/4

[PLSB]: m2/4

**Harmonics**: when waves build up…

**Audible frequency range**:

**Audio modulating frequency range**:



## Phase Modulation

hi

# Amplitude Modulation

**Amplitude Modulation (AM)**:

modulated signal contains two side bands and an unmodulated career signal

**Maximum Amplitude** [Am]:

**DSB-AM**: a.k.a. conventional AM



**Amplitude Modulation Index** [m]: 

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

## 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)**: one side band along with a pilot carrier  
  
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.

# Current

[IC]:

[IT]:

# 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. Sometimes it may be more efficient to put a smaller group on top because it is more probable and will require less bits.
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.