

**ANALOGUE AND DIGITAL
COMMUNICATION
ET-323**

Grading Criteria

- Lab Performance** 13%
- Project 7%

Lab Performance**

Lab task	3%
Viva Voce/Quiz	10%

Equipment Used

- Communication Trainer AM 3000
- Spectrum Analyzer
- Function Generator
- DSO

Communication Trainer AM 3000

AM 3000 is a basic tool for carrying out experiments in the field of Communication.



- It has built in RF crystal oscillator, AF oscillator and regulated 12 volts and +5 volts power supplies.
- In addition there is a wide variety of plug in modules available for different types of experiments to be performed.

Features

- Input voltage 220VAC, 50Hz
- 10.24MHz crystal controlled RF signal source
- Low distortion 500Hz/1KHz AF signal source
- Clock with variable frequency 100Hz to 6KHz
- DC supply voltage +12V, -12V, 100mA and +5V at 1A
- 6 ports for module
- 1 Bread board

Special Features

- Regulated Power Supply

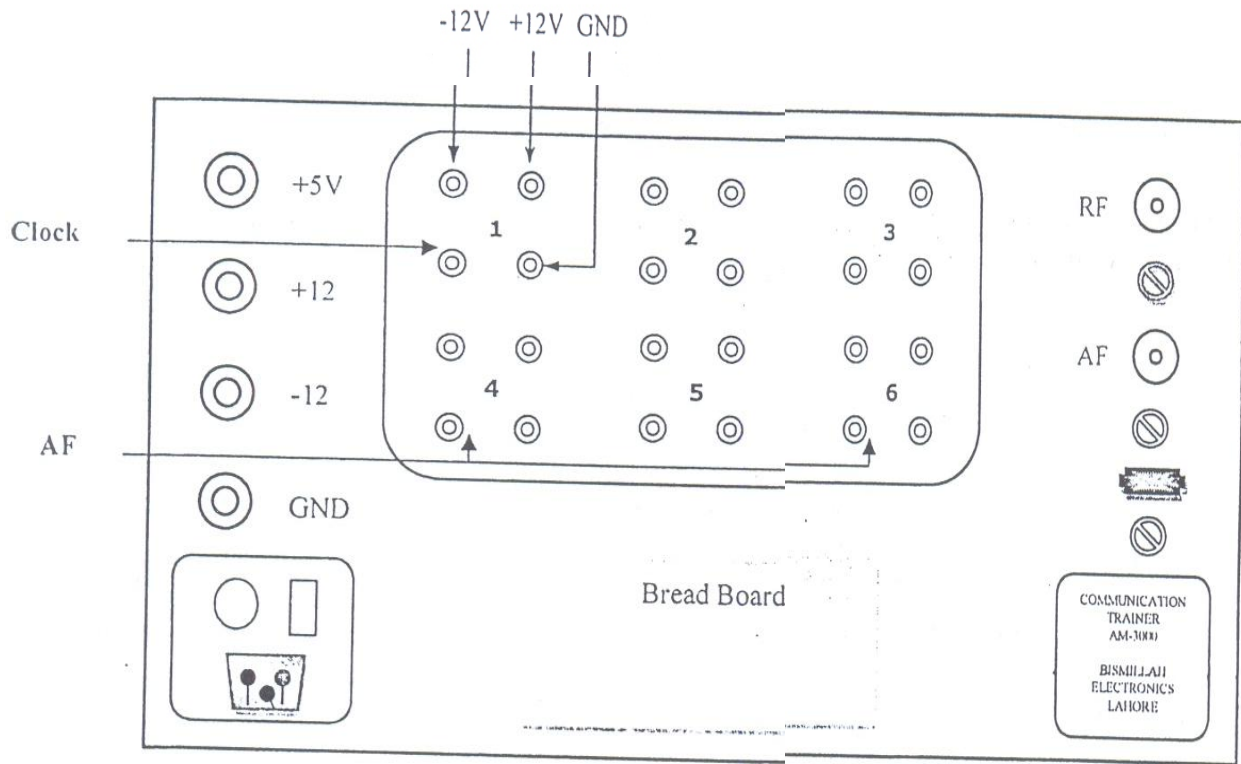
Fixed voltages of +5V, +12V, -12V with power indication.

Short circuit and AC input protection fuse.

- RF (Radio Frequency) Source

10.24 MHz signal available through a BNC connector with varying amplitude through a control knob.

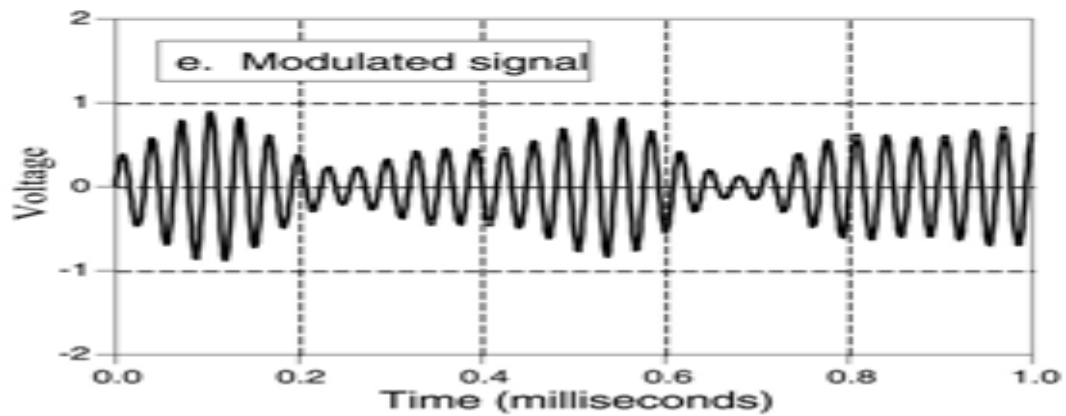
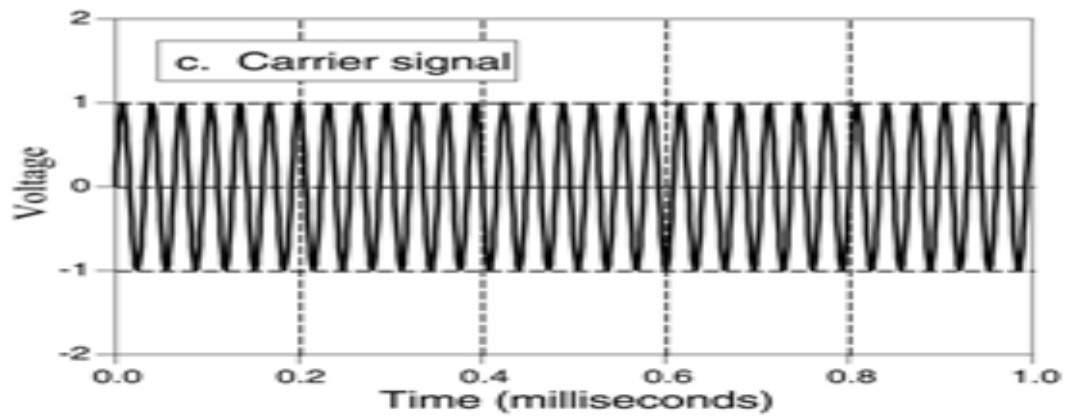
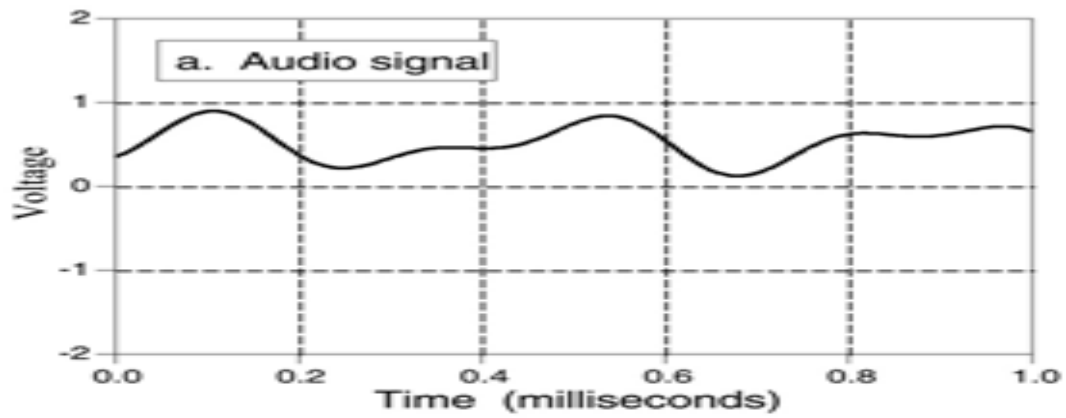
- AF (Audio Frequency) Source
0.5/1 kHz signal available through a BNC connector with varying amplitude.
Also available through sockets # 4 & 6.
- Clock Timer
A pulse source with adjustable frequency.
The output is available through sockets # 1.



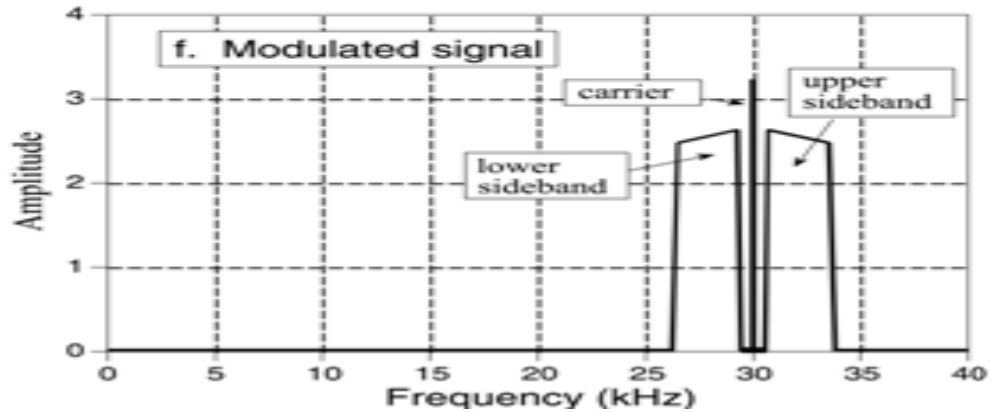
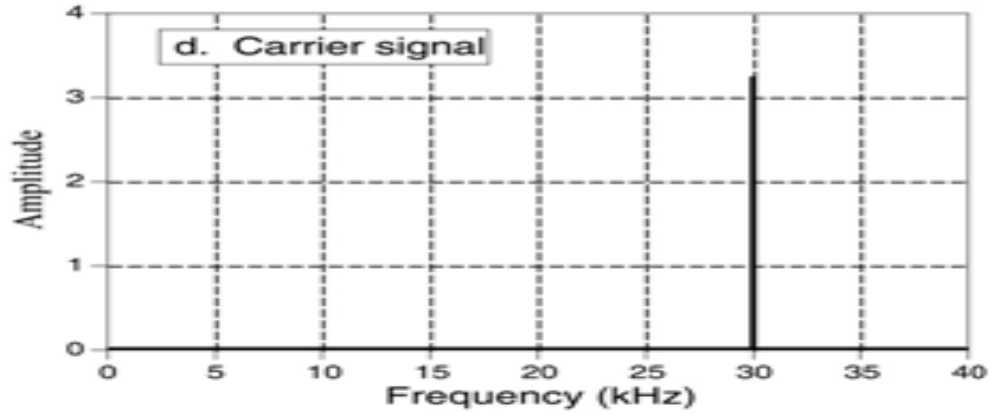
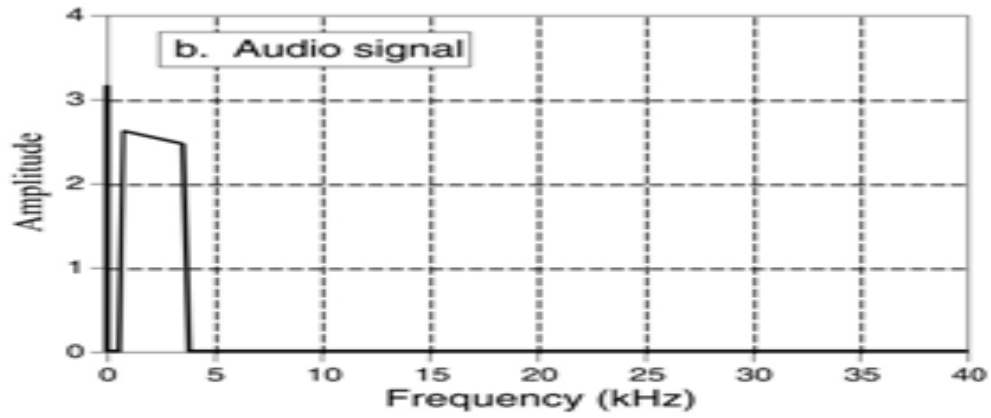
Amplitude Modulation

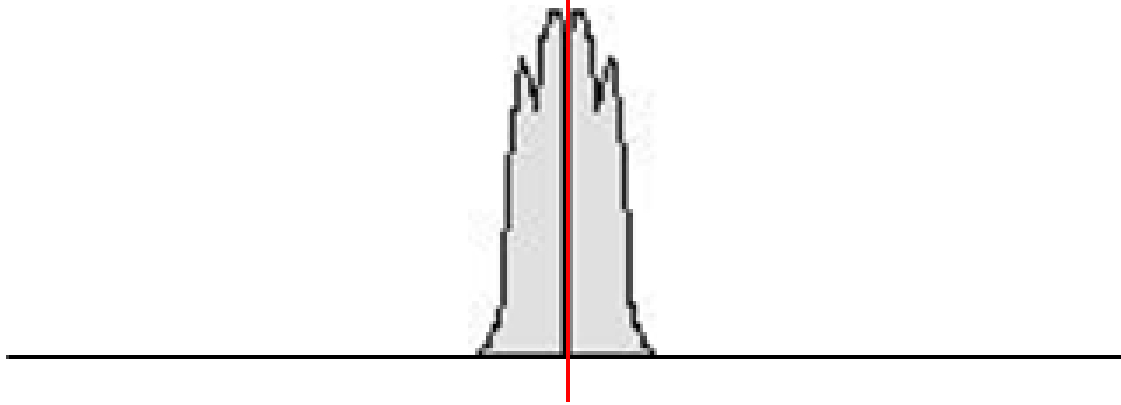
- “Modulation” is a technique of superimposing a low frequency information signal over a high frequency carrier signal for its transmission.
- As a result, one of the parameters of carrier signal is changed in accordance to the baseband signal.
- In case of amplitude modulation, the amplitude of the carrier wave is varied in accordance with the amplitude of the modulating wave.

Time Domain

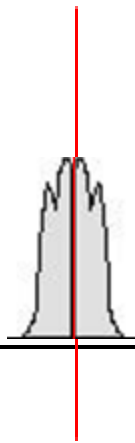


Frequency Domain

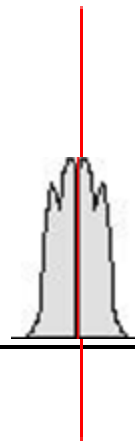




$-\omega_0$

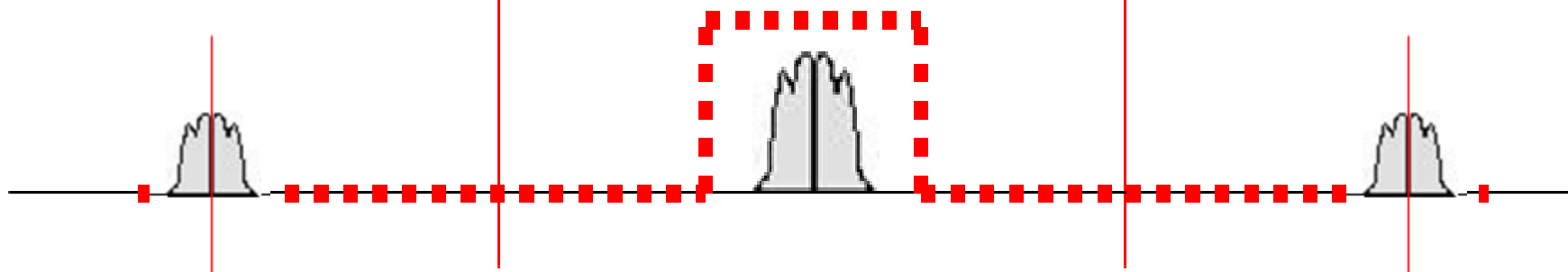
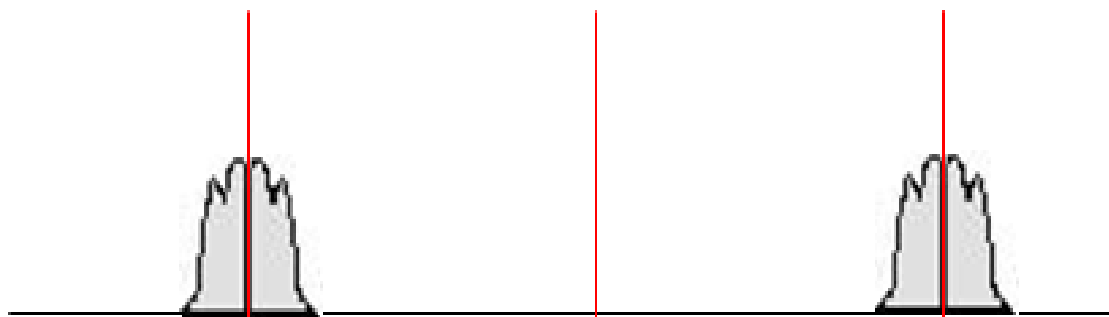
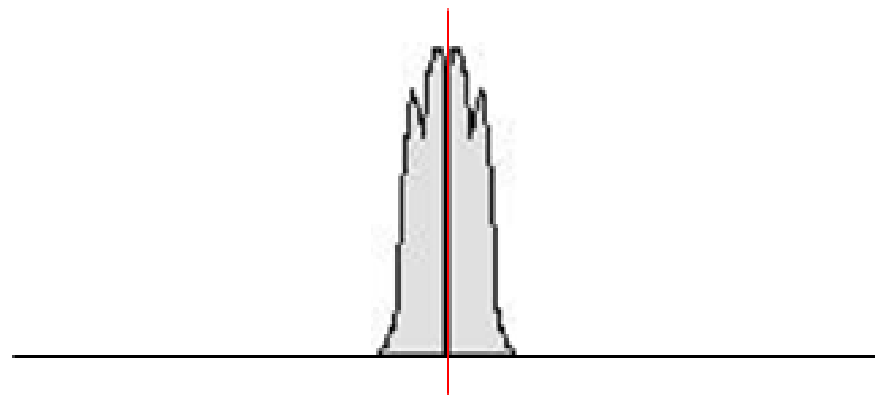


ω_0

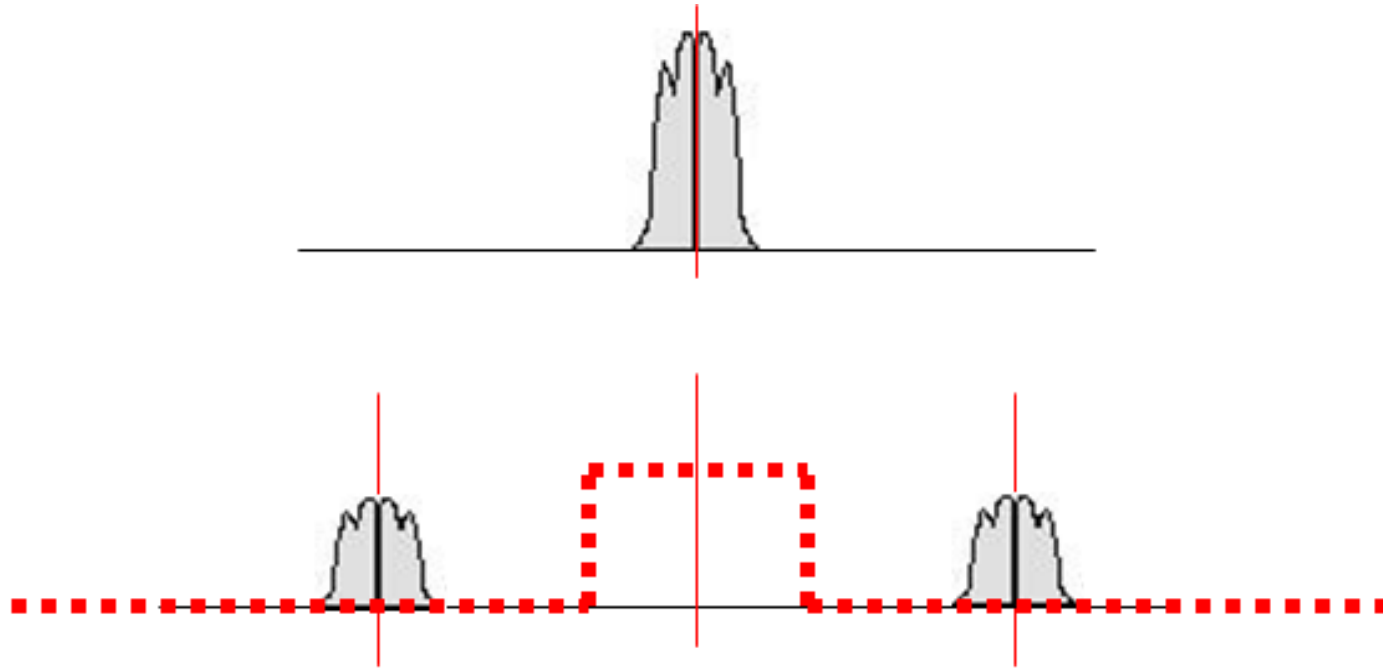


Demodulation

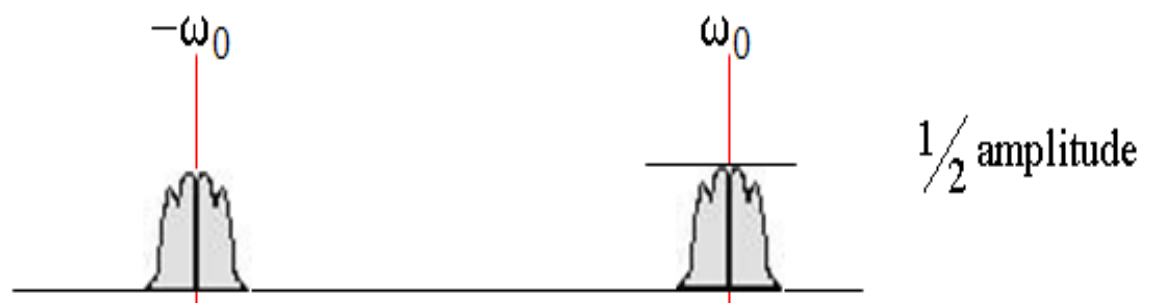
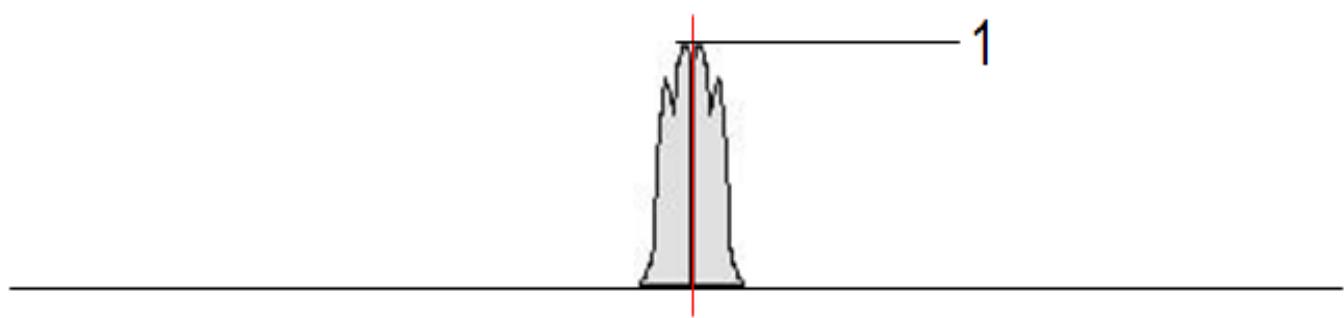
- Process of recovering the baseband signal.
- This is done on receiver side.
- Demodulation is basically the process of multiplication of “modulated signal” with “carrier” (with same phase and frequency as used in modulation).



Why can't we just low pass filter the modulated signal to get back the low frequency modulating signal?



After modulation, there is no signal in the FD inside the LP filter limits, so doing a LP filter does not result in any output.



$1/2$ amplitude

$1/4$ amplitude

$1/2$ amplitude

Modulation Index

- Indicates how much the modulation varies

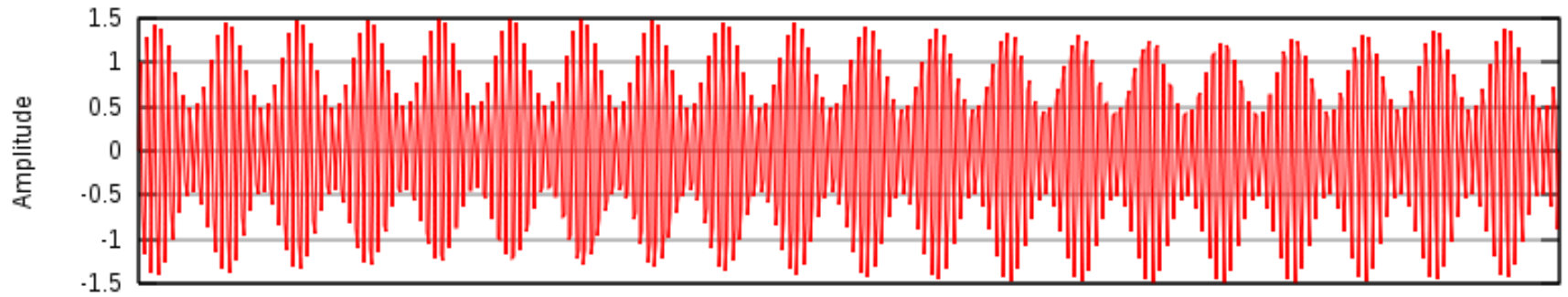
$$u = \frac{\text{peak value of } m(t)}{A}$$

where A is carrier amplitude

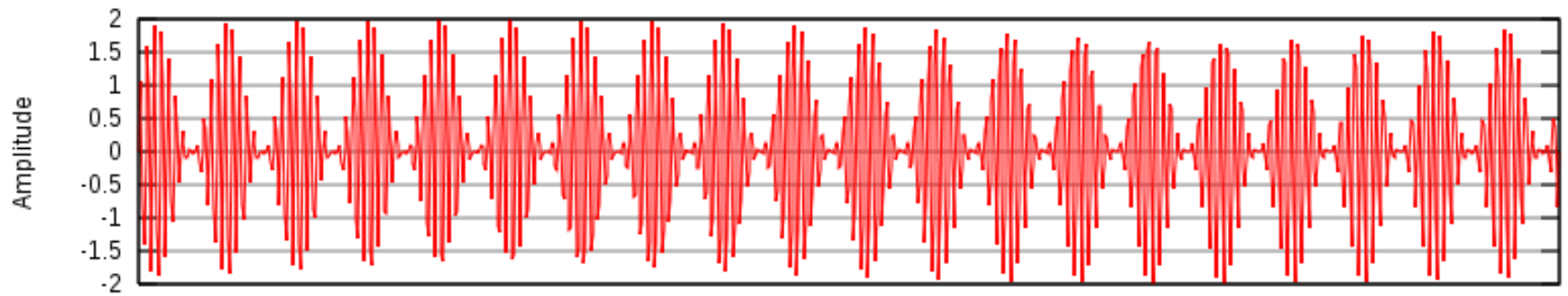
- For demodulation

$$0 \leq u \leq 1$$

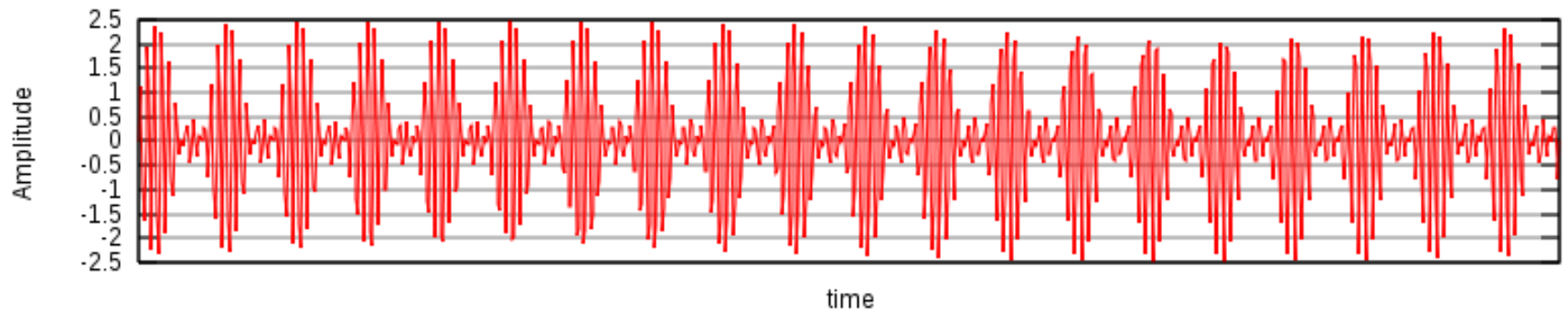
50% Modulation



100% Modulation



150% Modulation



Questions