Name	
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LAB NO 02

SSB AND DSB MODULATION

Objective: The purpose of this lab is to learn about **Amplitude Modulation** in **Simulink** and single side band and double side band simulations in Simulink.

Amplitude Modulation:

Amplitude modulation (AM) is a one of the conventional technique used to transmit message signals using a carrier wave. The amplitude or strength of the high frequency carrier wave is modified in accordance with amplitude of the message signal.

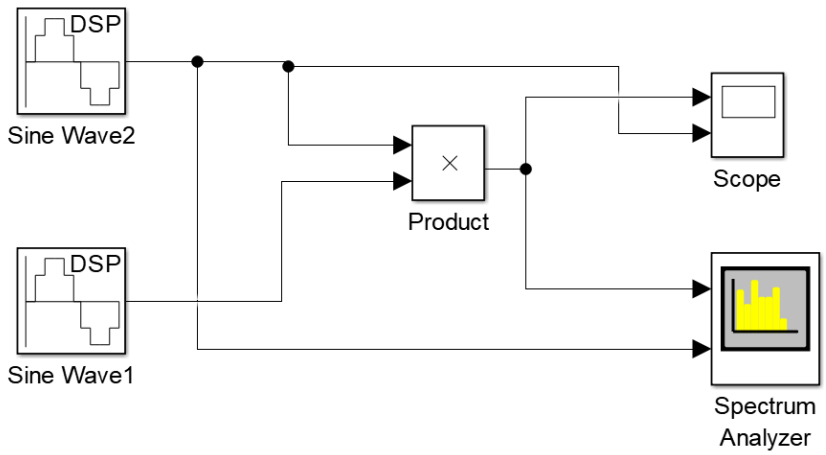
First of all lets get into the basics..

- Carrier signal (S_c) = $A_c \sin(2\pi f_c t)$
- Message signal (S_m) = $A_m \sin(2\pi f_m t)$ # fm must be smaller than fc

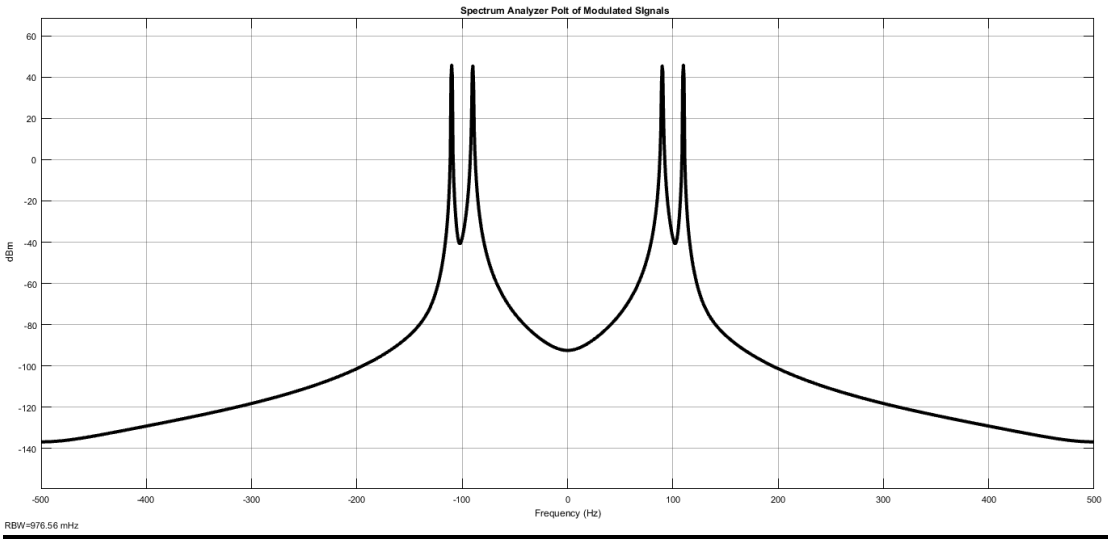
When carrier amplitude is altered with respect to message signal,

- Modulated Signal = $(A_c + A_m \sin(2\pi f_m t)) * \sin(2\pi f_c t)$

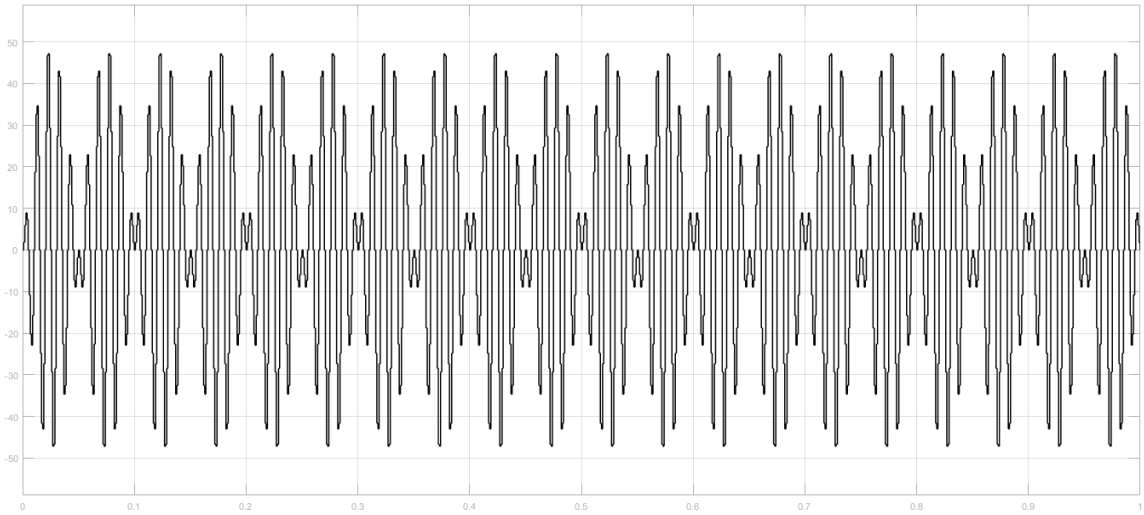
Block Diagram



Output:

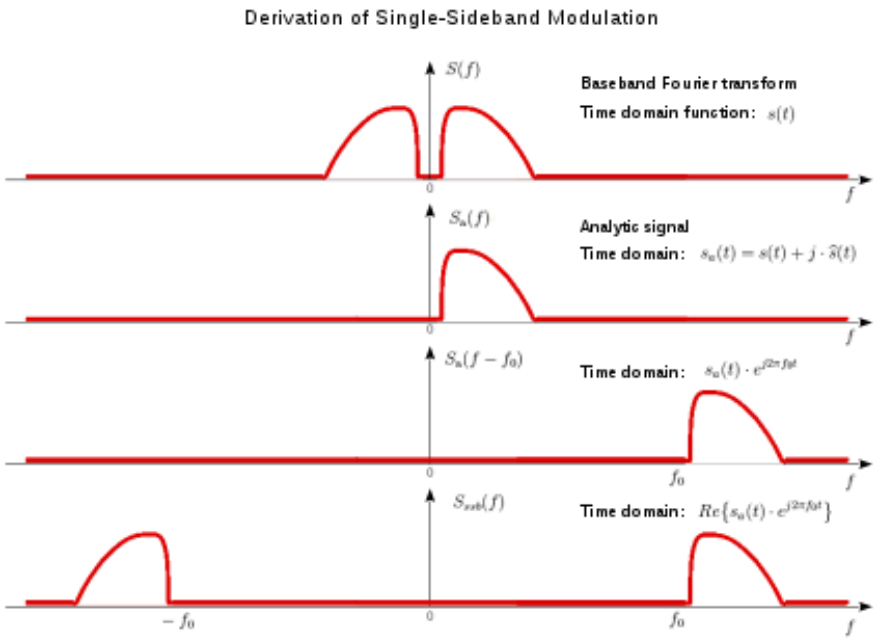


Simulation of Modulation

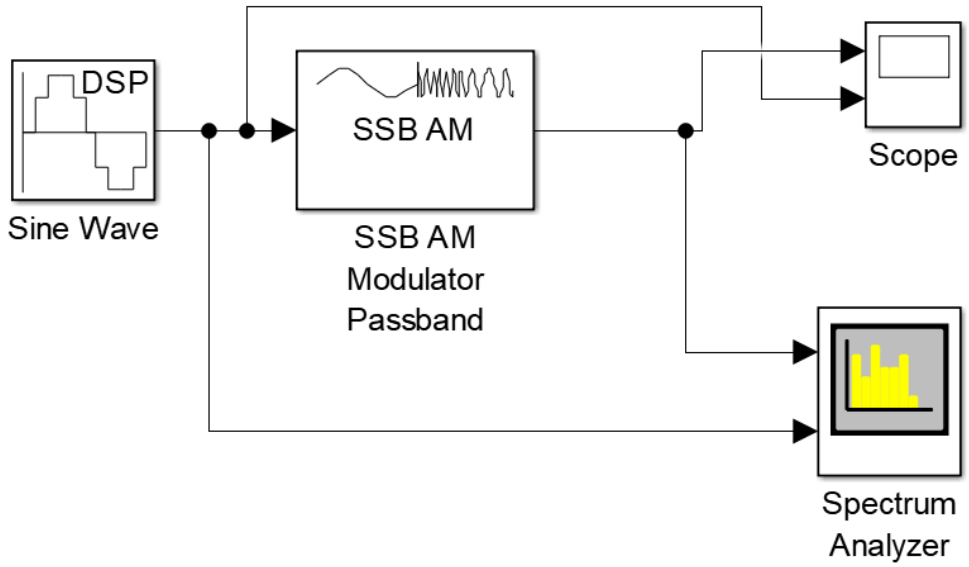


Single side band

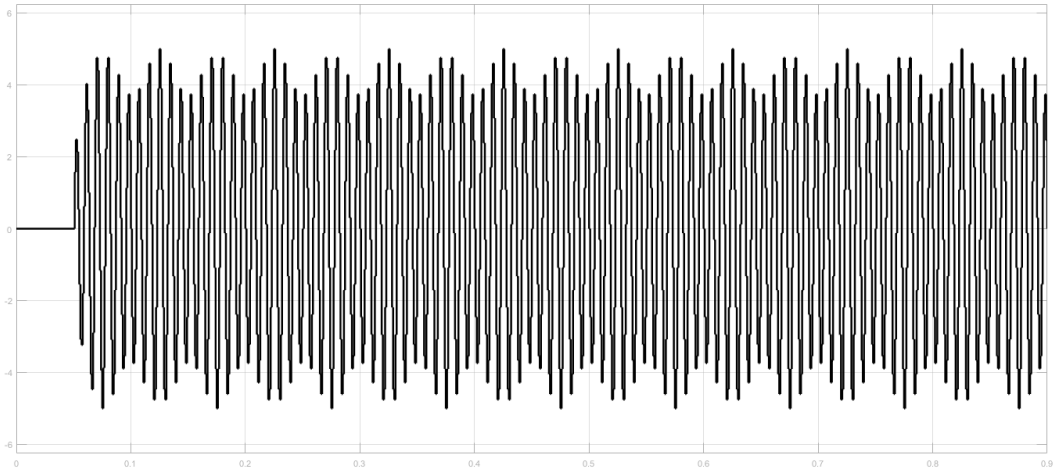
In radio communications, **single-sideband modulation** (**SSB**) or **single-sideband suppressed-carrier modulation** (**SSB-SC**) is a type of modulation used to transmit information, such as an audio signal, by radio waves. A refinement of amplitude modulation, it uses transmitter power and bandwidth more efficiently. Amplitude modulation produces an output signal the bandwidth of which is twice the maximum frequency of the original baseband signal. Single-sideband modulation avoids this bandwidth increase, and the power wasted on a carrier, at the cost of increased device complexity and more difficult tuning at the receiver.



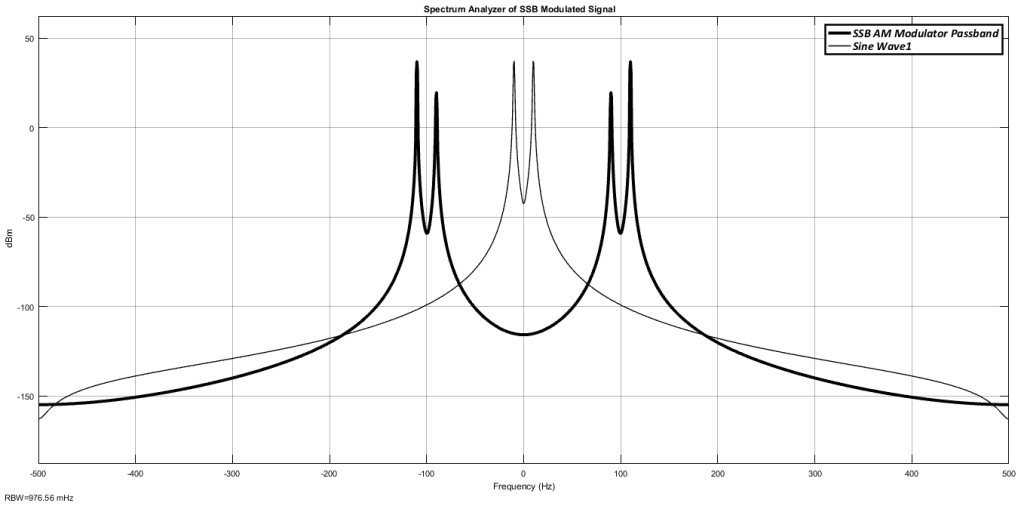
Block Diagram:



Output:



Spectrum Analyzer of SSB



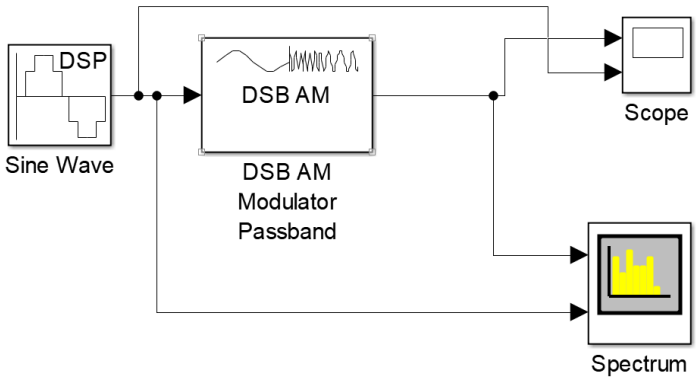
Double sideband Modulation(DSB):

Double-sideband suppressed-carrier transmission (**DSB-SC**) is transmission in which frequencies produced by amplitude modulation (AM) are symmetrically spaced above and below the carrier frequency and the carrier level is reduced to the lowest practical level, ideally being completely suppressed.[1]

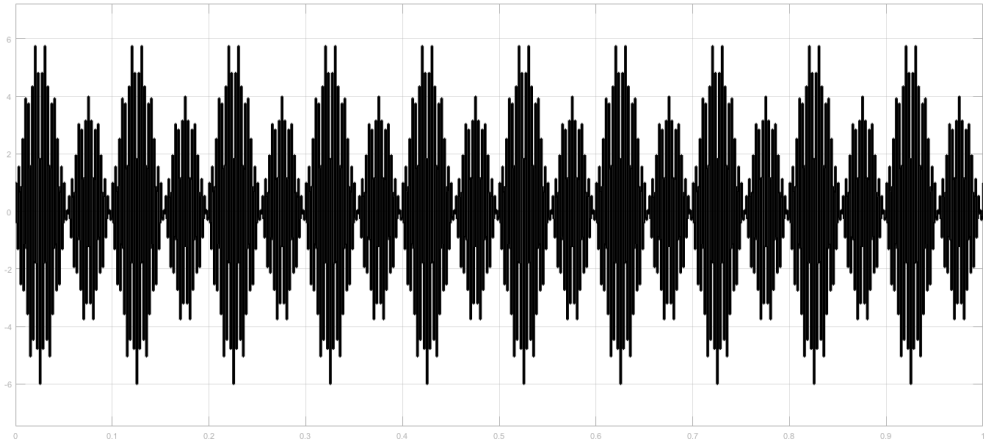
In the DSB-SC modulation, unlike in AM, the wave carrier is not transmitted; thus, much of the power is distributed between the side bands, which implies an increase of the cover in DSB-SC, compared to AM, for the same power use.

DSB-SC transmission is a special case of double-sideband reduced carrier transmission. It is used for radio data systems. This mode is frequently used in Amateur radio voice communications, especially on High-Frequency bands.

Block Diagram:



Output:



Spectrum Analyzer of DSB