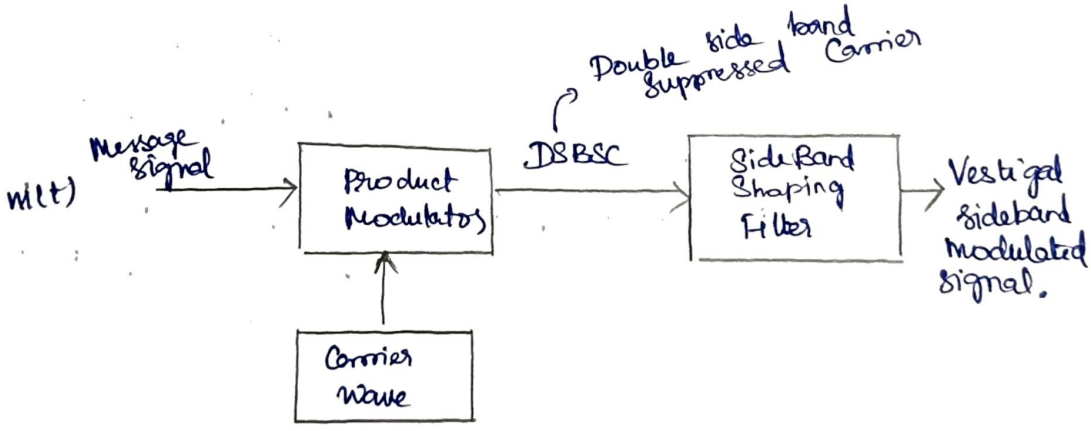
VESTIGAL SIDEBAND MODULATION: (VSB)

Why use VSB ?

* SSB modulation is not an appropriate way of modulation.
* Upper Side Band (USB) & Lower Side Band (LSB) meet at carrier frequency f_c. So it is very difficult to isolate "One side band".
* Getting Single Side Band signal (SSB) is challenging.
* To overcome this → We use VSB modulation.

VSB ⇒ Consist of one complete side band & trace of other side band or vestige.

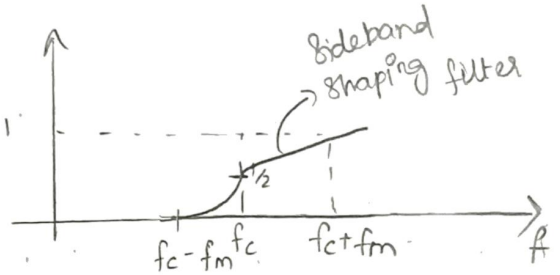
VSB generator:



$$s(t) = \frac{A_m A_c}{2}\left[\cos 2\pi (f_c + f_m) t\right] \Rightarrow \text{USB}$$

$$s(t) = \frac{A_m A_c}{2}\left[\cos(2\pi (f_c - f_m) t\right] \Rightarrow \text{LSB}.$$

SIDEBAND SHAPING FILTER:



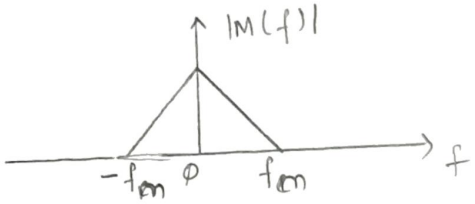
* Filter response is designed so that the original message spectrum is reproduced on demodulation as a result of the superposition of 2 spectra.

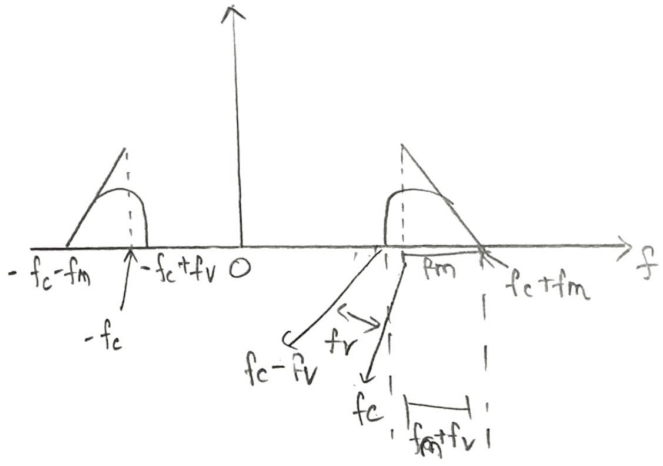
ON DEMODULATION OF VSB:

* Positive frequency part ⇒ shifted downward in frequency by f_c.

* Negative frequency part ⇒ shifted upward in frequency by f_c.

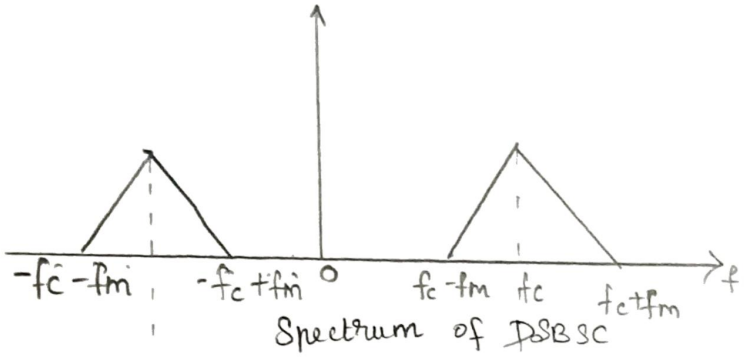
SPECTRUM OF MESSAGE SIGNAL:



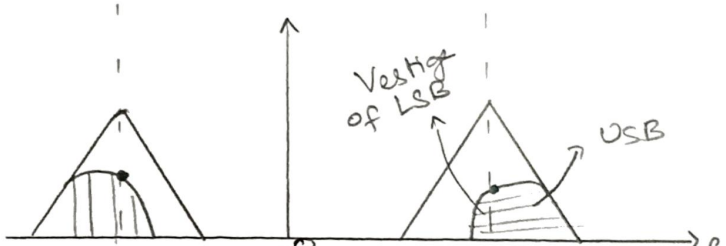


f_c ⇒ Carrier frequency

f_{vc} ⇒ Vestige frequency.



Spectrum of DSBSC



Spectrum of VSB

Demodulated o/p spectrum