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Conclusion: To study the modulation and demodulation of a message signal a circuit was designed for amplitude modulation and demodulation. Signal was modulated and was taken under modulation to be 0.5 i.e the case of under modulation then the modulation index was set as 1.0 case of over modulation and then at over modulation. Separate waveforms are done only in case of under modulation and over modulation.

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CalculationFor 1.010 MHz T_{avg}

$$m = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}} = \frac{2.14 - 1.8}{2.14 + 1.8} = 0.17 \text{ (under modulation)}$$

$$m = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}} = \frac{1.94 - 0}{1.94 + 0} = 1 \text{ (exact Modulation)}$$

$$m = \frac{A_m}{A_c} = \frac{32}{24} = \frac{4}{3} = 1.33 \text{ (over modulation)}$$

Power in case of undermodulation

$$P = P_c \left(1 + \frac{m^2}{2}\right)$$

$$\therefore P_c = \frac{V^2}{2R} = \frac{(1.22)^2}{2 \times 50} = 0.01488 \text{ W}$$

$$P = 0.01488 \left(1 + \frac{0.17^2}{2}\right)$$

$$= 0.015025 \text{ W.}$$

Power in case of exact Modulation:

$$P = 0.01488 \left(1 + \frac{1^2}{2}\right)$$

$$= \frac{3}{2} \times 0.01488$$

$$= 0.02232 \text{ W.}$$

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more efficiently than DSB AM. On the other hand Single side band (SSB) modulation not only conserve energy it will also reduce bandwidth. It may be noted that one of the two needs to be transmitted

The SSB-SC signal is passed through a synchronous detector followed by a low pass filter to recover the modulating signal.

Observation:

Types of signal	P-P Amplitude	Frequency
Modulating signal	200mV	8KHz
Carrier signal	2.0V	33KHz
DSB-SC signal	740mV	32.0195KHz
SSB-SC signal		30.91KHz
<u>After Demodulation</u>		
DSB-SC signal	540mV	2.11KHz
SSB-SC signal	1.25V	2.13KHz

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Calculation

for DSB-SC

$$\text{Bandwidth} = 2f_m = (2 \times 2000) \text{ kHz} \\ = 4000 \text{ kHz}$$

for SSB-SC

$$\text{Bandwidth} = f_m = 2000 \text{ kHz} \\ = 2000 \text{ kHz}$$

Conclusion :

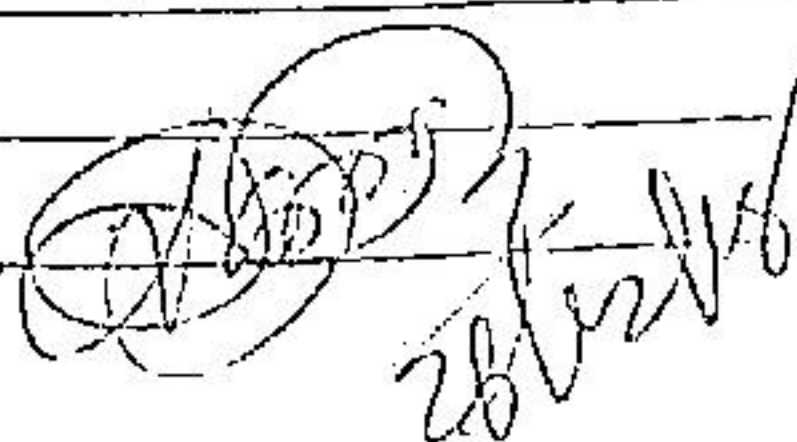
From the experiment we learn the different parameters associated with the DSB-SC and SSB-SC and also the process of modulation and demodulation of message signal using AM (DSB-SC & SSB-SC). We find the bandwidth of DSB-SC and SSB-SC i.e. 4 kHz and 2 kHz respectively which shows the DSB-SC bandwidth double than SSB-SC. Also we conclude that practically the amplitude of modulated signal is different at different point due to presence of upper side band and the power at upper side band is less as compare to lower side band which can be further seen using high percentage of filter.

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