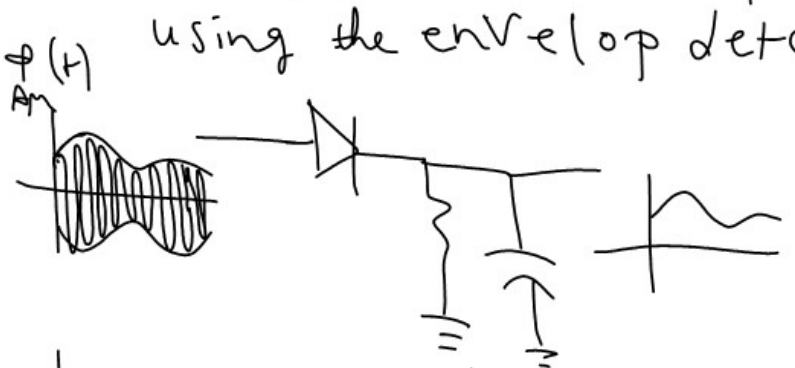
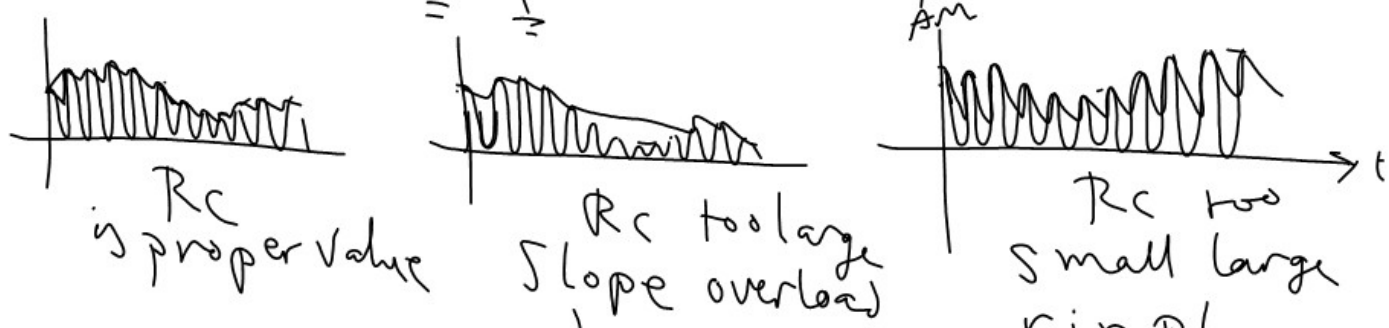
Demodulation of AM

b) envelope detector

* The information signal $f(t)$ can be recovered from $\phi_{AM}(t)$ by using the envelop detector



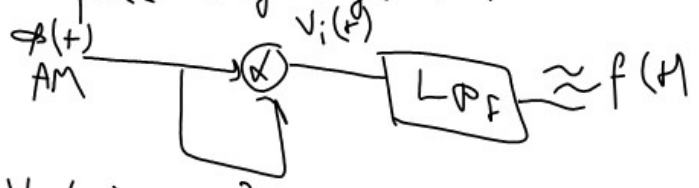


for proper recovery of $f(t)$, we can select RC according to this equation

$$\frac{10}{f_c} < RC < \frac{10}{f_m}$$

c) using square law detection

* Assume that $\phi_{AM}(t)$ is passed through the following system



$$V_i(t) = \phi^2_{AM}(t)$$

$$= \left[A(1 + m f(t)) \cos \omega_c t\right]^2$$

$$= A^2\left(1 + 2m f(t) + m^2 f^2(t)\right)\cos^2 \omega_c t$$

$$= \tfrac{1}{2} A^2\left(1 + 2m f(t) + m^2 f^2(t)\right) + \tfrac{1}{2} A^2\left(1 + 2m f(t) + m^2 f^2(t)\right)\cos 2\omega_c t$$

* If m is small enough, then the term $m^2 f^2(t) \approx 0$

$$\therefore V_0(t) \approx \tfrac{1}{2} A^2\left(1 + 2m f(t)\right)$$

* The main advantage of AM modulaion is the use of simple demodulator in the receiver
* The disadvantageous are
  1. Low efficiency
  2. The presence of the carrier term ruins the DC-Component of the message signal

5.4 Single Sideband modulation(SSB)

* We have seen that the DSB modulation schemes require bandwidth equal twice the bandwidth of the information signal
* In single side band we can transmit the modulated signal with bandwidth equal to the bandwidth of $f(t)$
* SSB means that If we have a limited bandwidth we can transmit more signals compared with DSB modulation