$$Pe = \frac{1}{2} \operatorname{erfc} \sqrt{\frac{Eb}{No}}$$

$$1 \times 10^{-7} = \frac{1}{2} \operatorname{erfc} \sqrt{\frac{Pr\, Tb}{No}}$$

$$= \frac{1}{2} \operatorname{erfc} \sqrt{\frac{Pr \frac{1}{1.75 \times 10^{6}}}{1.26 \times 10^{-20}}}$$

from this equation we computer.

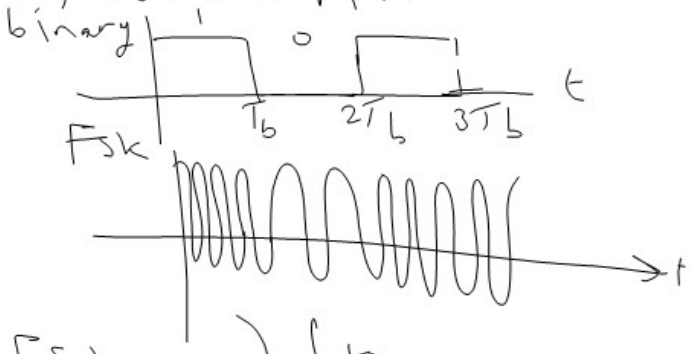
* The transmitted power can be found from the path loss equation

$$-144 = 10 \log \frac{Pr}{PT}$$

by solving this equation $PT = 75$ Watt

Frequency shift keying FSK

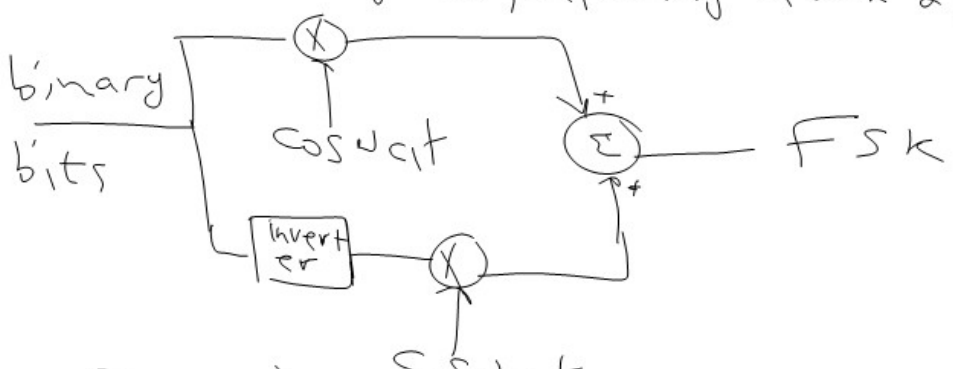
* FSK is simply is an FM modulation scheme, where the binary bits resulting from PCM for example are used to modulate the frequency of the carrier



FSK modulator

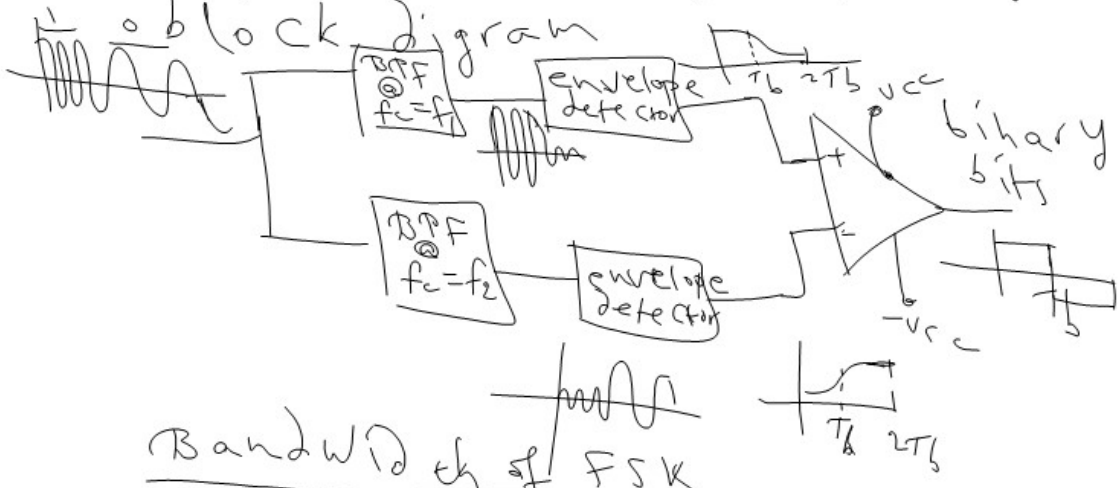
* we can generate an FSK signal by using VCO, as we have seen in FM modulation
* The FSK modulator can be presented by the following block diagram

* an alternate FSK modulator can be shown by the following block diagram



FSK demodulator

* The FSK modulation can be implemented by using the following block diagram



Bandwidth of FSK

* The bandwidth of FSK signal can be estimated by Carson's rule

$$B.W = 2f_m(1+\beta)$$
$$= 2f_m + 2\Delta f$$

* Usually in binary bit stream, were have an alteranating ones and zeros

$$f_m = R_b$$

$$\therefore BW = 2R_b + 2\Delta f$$

$$\Delta f = \frac{f_1 - f_2}{2}$$