minimum circuit complexity.

Coherent Binary Modulation Techniques

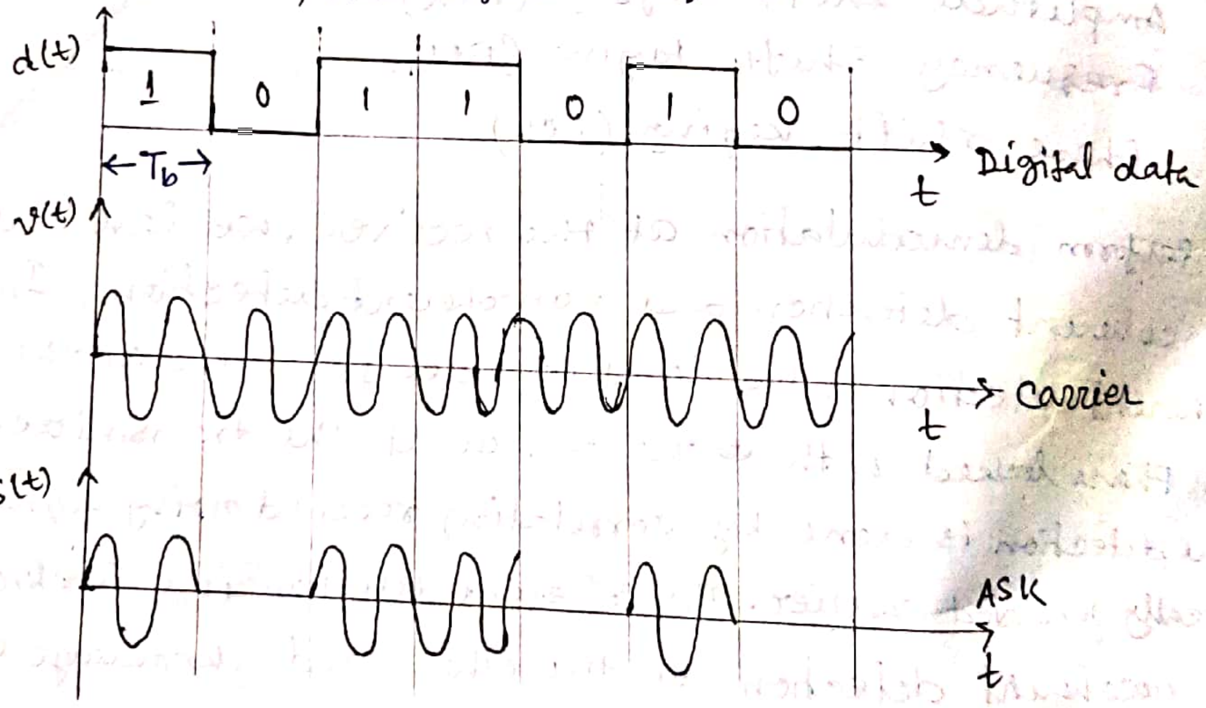
Here we describe different coherent binary modulation techniques:

Binary Amplitude shift keying or On-off keying (ASK or OOK)

It this method, there is only one unit energy carrier and it is switched on or off depending upon the input binary sequence. The ASK waveform may be ~~res~~ represented as

$$s(t) = \sqrt{2P_s}\cos(2\pi f_c t) \quad (\text{To transmit } 1), \text{ — eq } 1$$

To transmit '0', the signal $s(t) = 0$.



Signal space Diagram of ASK

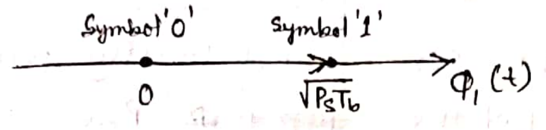
A constellation diagram has two axis, help us define the amplitude and phase of a signal element. The horizontal x axis is related to the ~~ing~~ in phase carrier, the vertical y axis is related to the quadrature carrier.

The ASK waveform of equation ① for symbol 1 can be represented as

$$s(t) = \sqrt{P_s T_b}\,\sqrt{2/T_b}\,\cos(2\pi f_c t) \quad \text{Carrier}$$

$$= \sqrt{P_s T_b}\,\phi_1(t) \quad [\phi_1(t) \text{ orthonormal signal}]$$

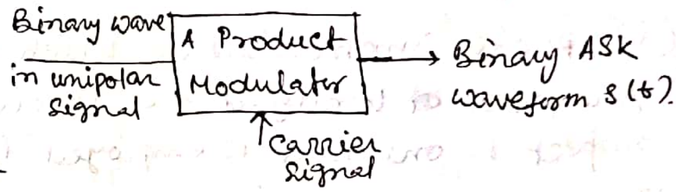
This means there is only one carrier function $\phi_1(t)$. The signal space have two points on $\phi_1(t)$. One will be at zero and other will be at $\sqrt{P_s T_b}$.



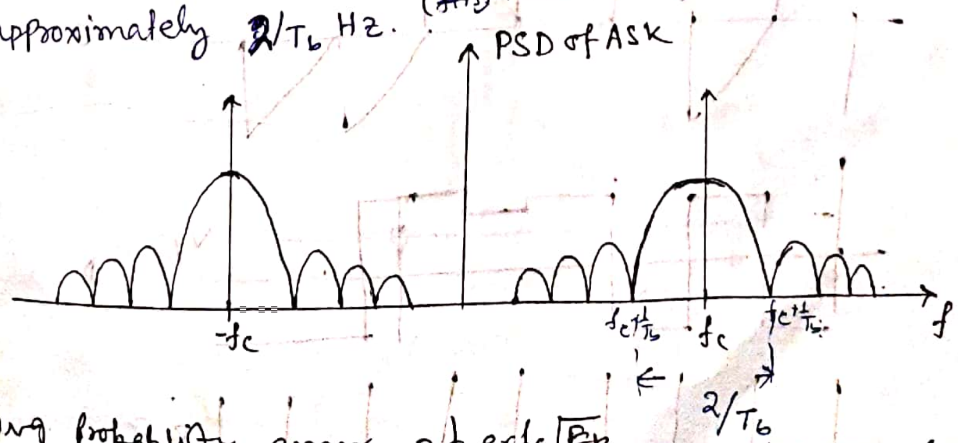
Thus the distance between ~~two~~ the two signal point is, ~~d~~

$$d = \sqrt{P_s T_b} = \sqrt{E_b} \quad \text{where } E_b = P_s T_b \text{ is the energy contained in a bit duration.}$$

Generation of ASK signal



ASK signal may be generated by applying the incoming binary data and the sinusoidal carrier to the two inputs of a product modulator. Modulation causes a shift of the baseband signal spectrum. The PSD of ASK signal same as that of the baseband on-off signal but shifted in the frequency domain by $\pm f_c$. The spectrum of the ASK signal shows that is, has an infinite bandwidth. But practically ~~of an~~ bandwidth of an ideal bandpass filtered at f_c whose output contains about 95% of the total average power. From this point bandwidth of the ASK signal (~~first~~ null-to null) is approximately $2/T_b$ Hz.

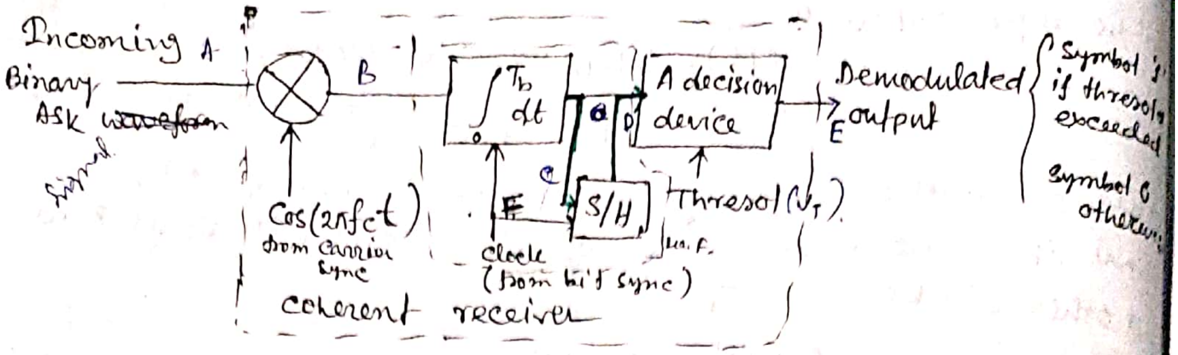


avg probability error $= \frac{1}{2}\,\mathrm{erfc}\sqrt{\frac{E_b}{4N_0}}$

E_b is bit signal energy, N_0 = noise power spectral density with zero mean

Demodulation of Binary ASK

NOTE: 5.9

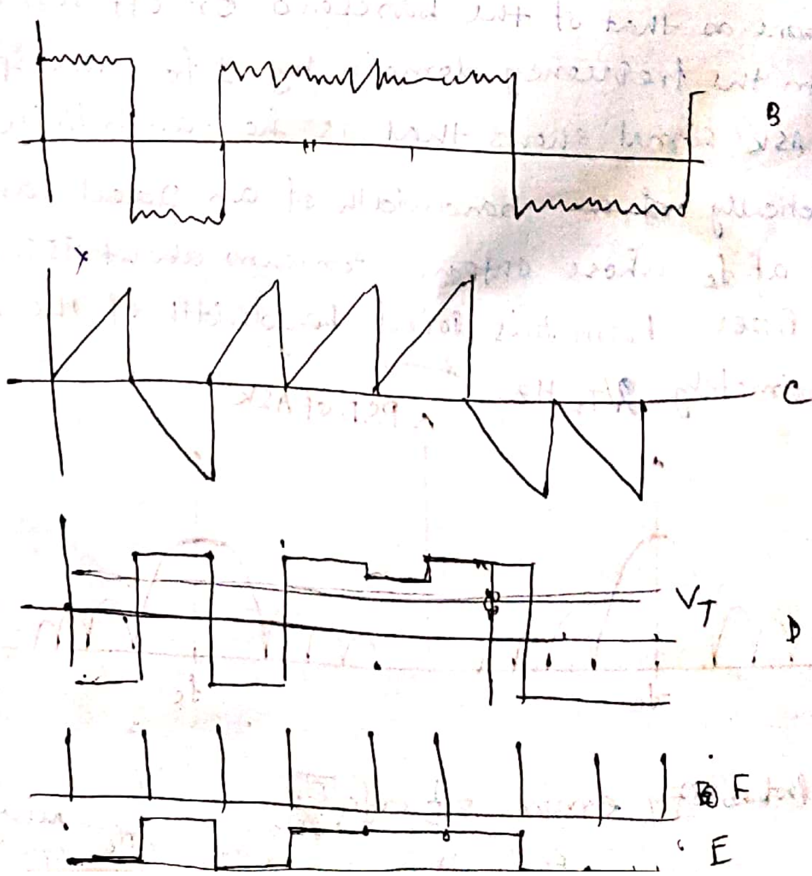


The incoming ASK signal and locally generated a sinusoidal carrier. The output of the ~~integrator~~ Product modulator goes to input of the integrator. The integrator integrates it for successive bit interval and passing through sample and hold circuit. Then take a decision on sample value.

The following two forms of synchronisation are required for the operation of coherent detection

(i) Phase synchronisation which ensures that carrier wave generated ~~at~~ locally at the receiver is locked in phase with respect to one that is employed in the ~~receiver~~. transmitter

(ii) Clocking synchronisation which enable proper timing of decision making operation in the receiver ~~rest~~ with respect to switching instant in the original binary data.



P-379. Fig 5-21