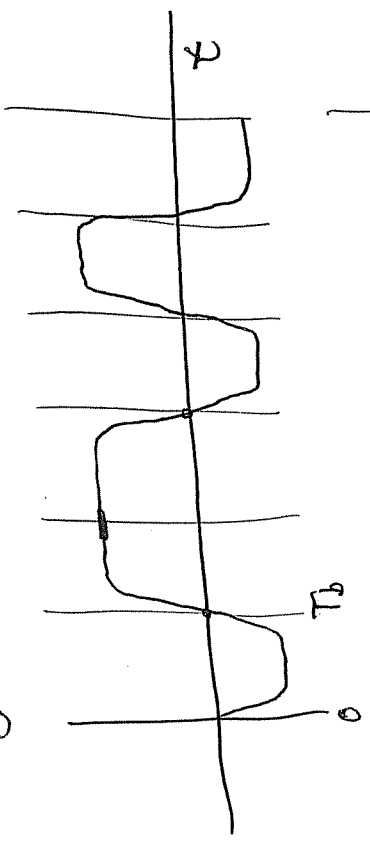


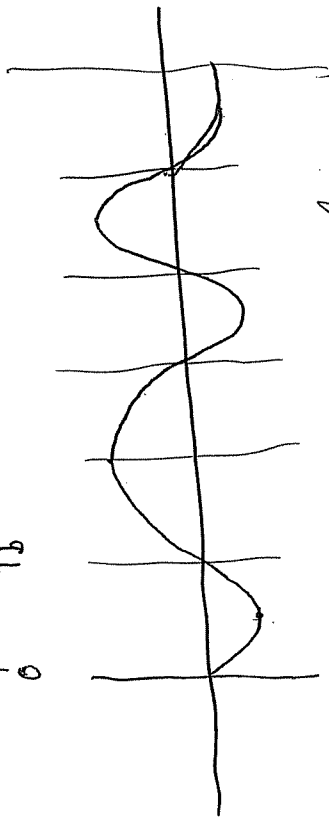
# Lecture 14 EE511

Eye diagrams: show slide

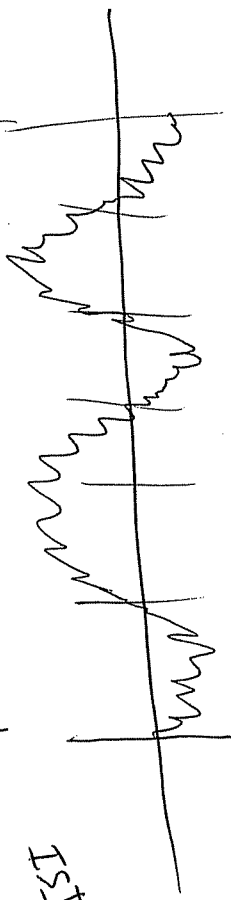
Speed Fitting



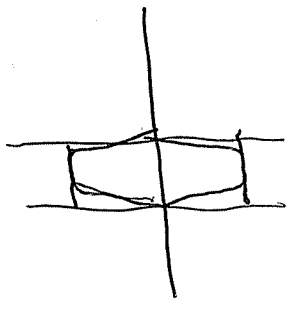
Fitting with ISI



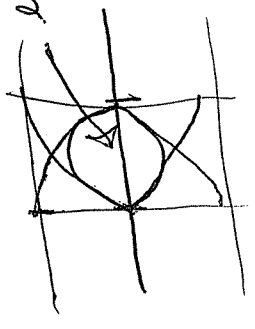
Noise + ISI



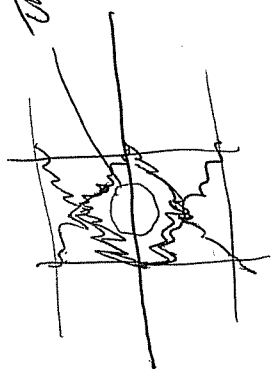
Eye pattern



eye pupil



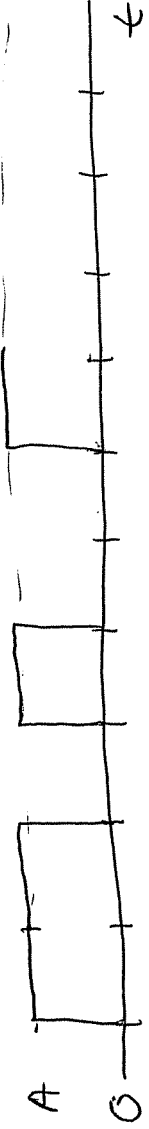
threshold region



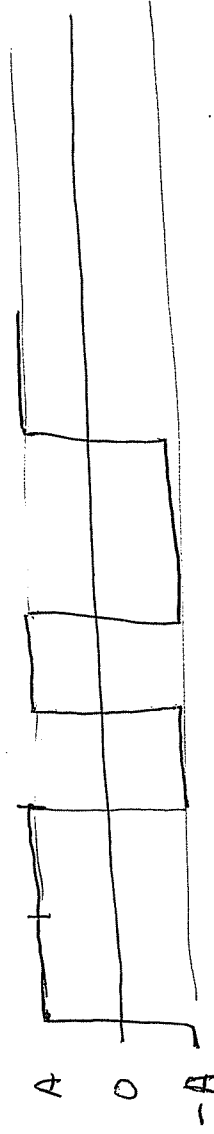
②

# Binary line Codes and Differential Coding

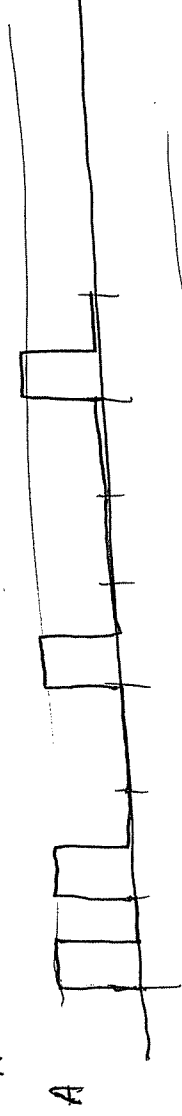
1 1 0 1 0 0 1



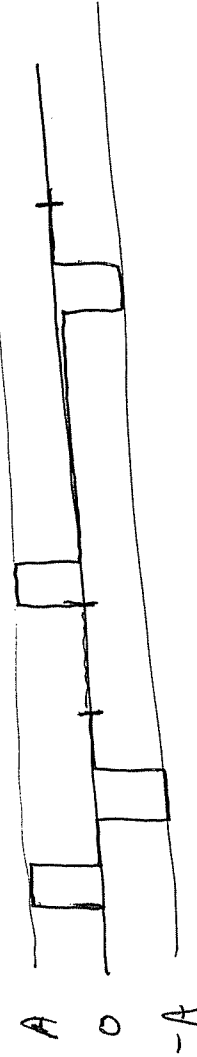
Unipolar



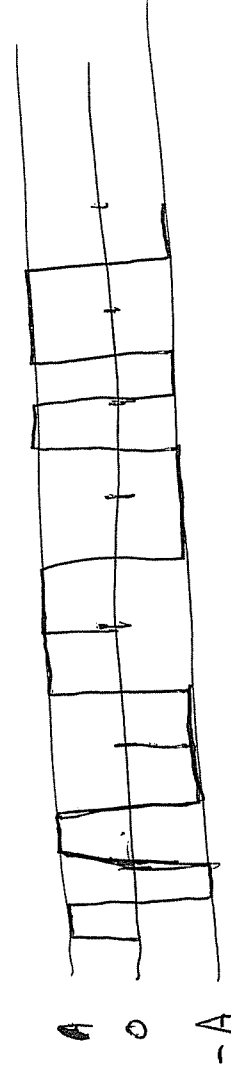
Bipolar



Unipolar  
~~NRZ~~  
RZ



Bipolar  
RZ



Manchester  
NRZ  
Aplic  
encoding

other coding  
gray coding

0 00  
1 01  
2 11  
3 10

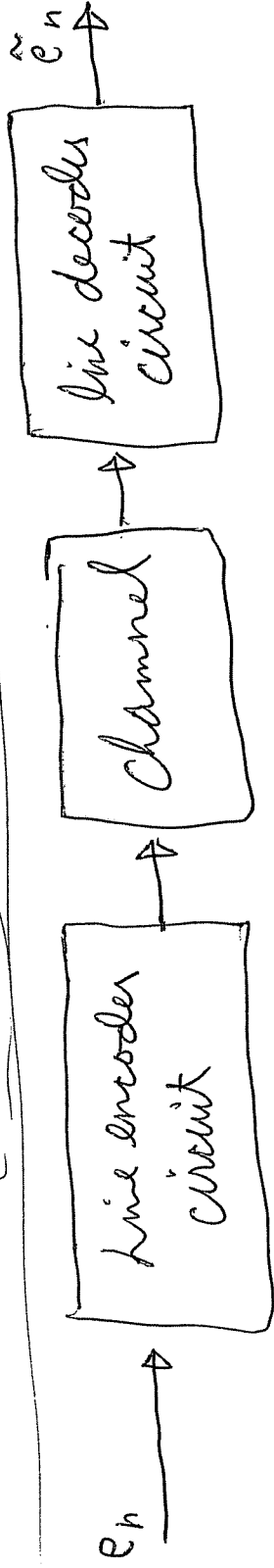
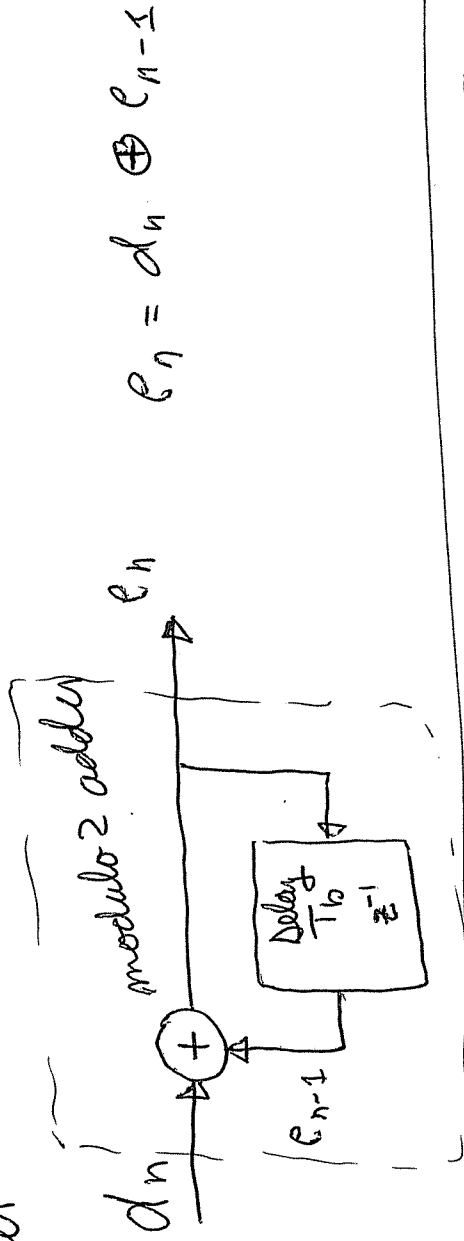
~~1001~~  
~~1001~~



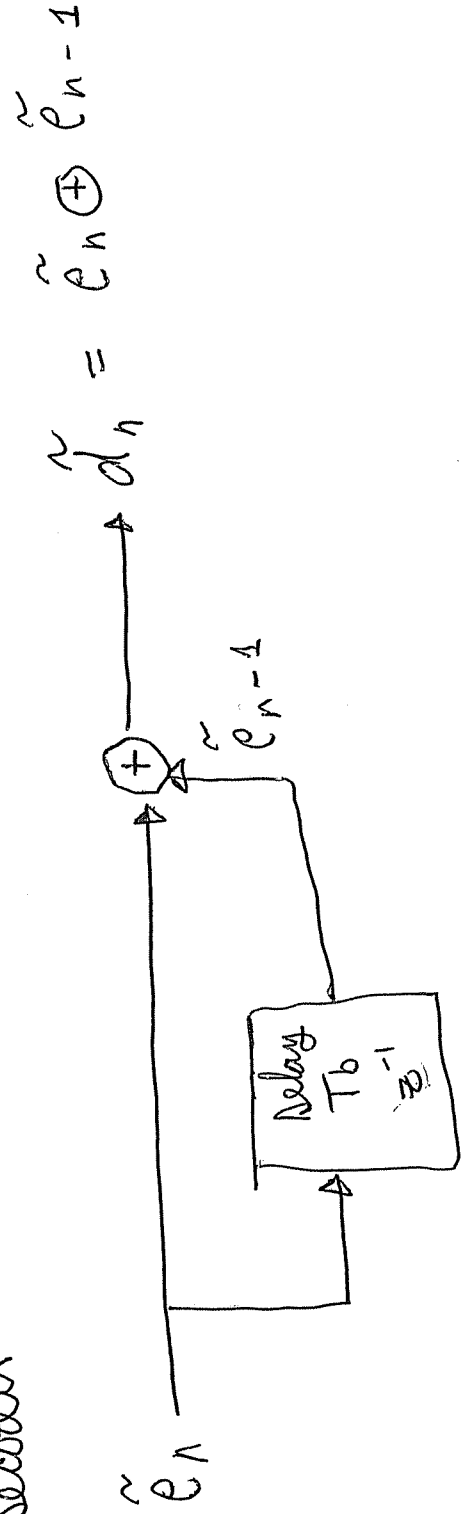
3

# Differential Coding

## Diff. Encoder



## Diff Decoder



4

Example

Encode  $e_n = d_n \oplus e_{n-1}$

$$\begin{array}{cccccccc}
 d_n & = & \underline{x} & 1 & 1 & 0 & 1 & 0 & 0 & 1 \\
 e_n & = & \underline{1} & 0 & 1 & 1 & 0 & 0 & 0 & 1 \\
 e_{n-1} & = & \text{init} & 1 & 0 & 1 & 1 & 0 & 0 & 0 & 1 \\
 \tilde{d}_n & = & & 1 & 1 & 0 & 1 & 0 & 0 & 1 & 1
 \end{array}$$

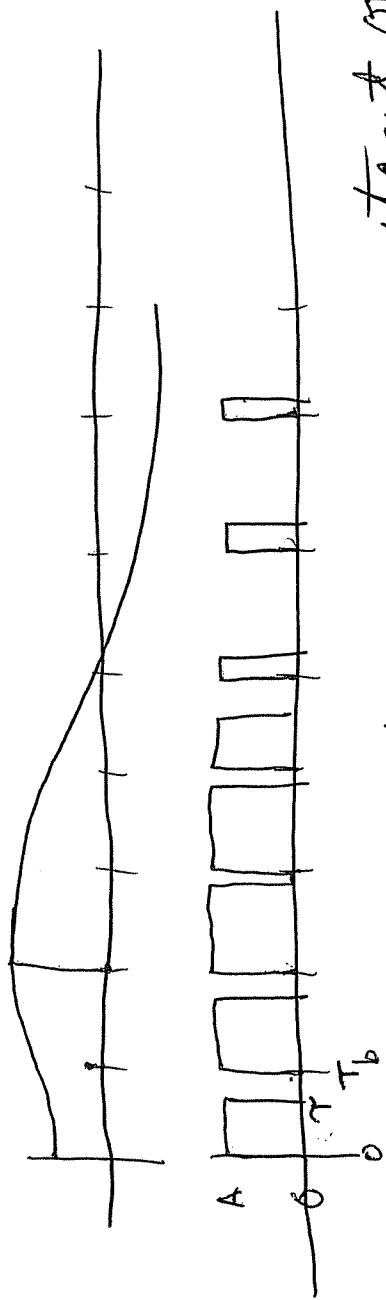
$$= \tilde{e}_n \oplus \tilde{e}_{n-1}$$

Decode negative sequence

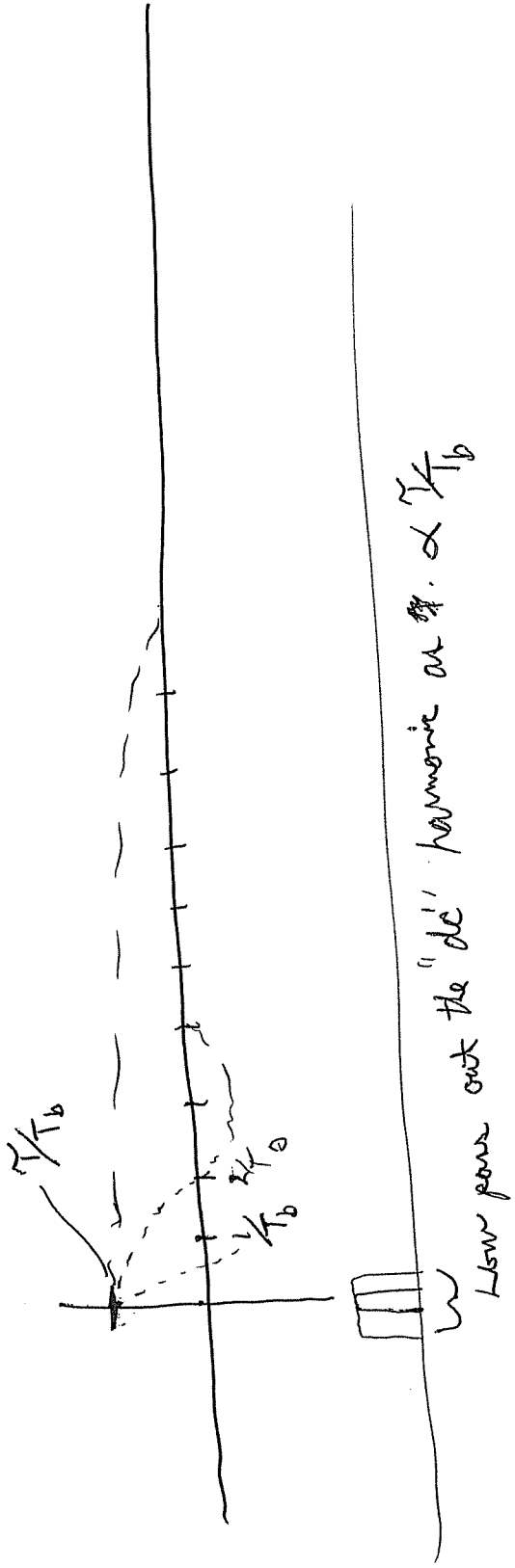
$$\begin{array}{cccccccc}
 \tilde{d}_n & & 1 & 1 & 0 & 1 & 0 & 0 & 1 \\
 \tilde{e}_n & = & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 0 \\
 \tilde{e}_{n-1} & = & x & 0 & 1 & 0 & 0 & 1 & 1 & 1 \\
 \tilde{d}_n & = & & 1 & 1 & 0 & 1 & 0 & 0 & 1
 \end{array}$$

5

PWM



consider the spectrum of a constant output

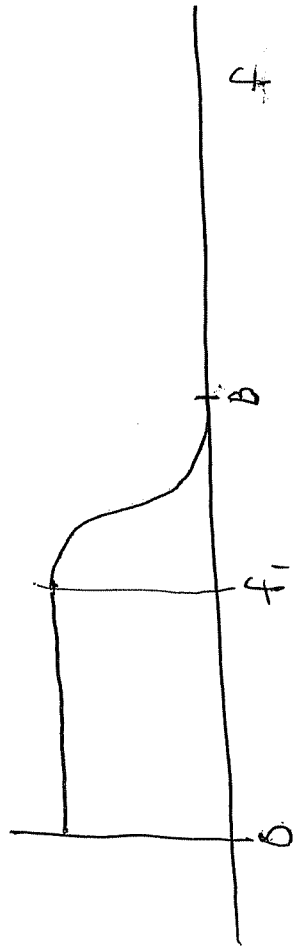


Low pass out the "dc" harmonic  $\propto T_b$

6

Cosine - Roll off Filtering

$$H_c(f) = \begin{cases} 1 & |f| < f_1 \\ \frac{1}{2} \left( 1 + \cos \left[ \frac{\pi}{2A} (|f| - f_1) \right] \right) & 0 \leq |f| < B \\ 0 & |f| > B \end{cases}$$



See text for frequency response