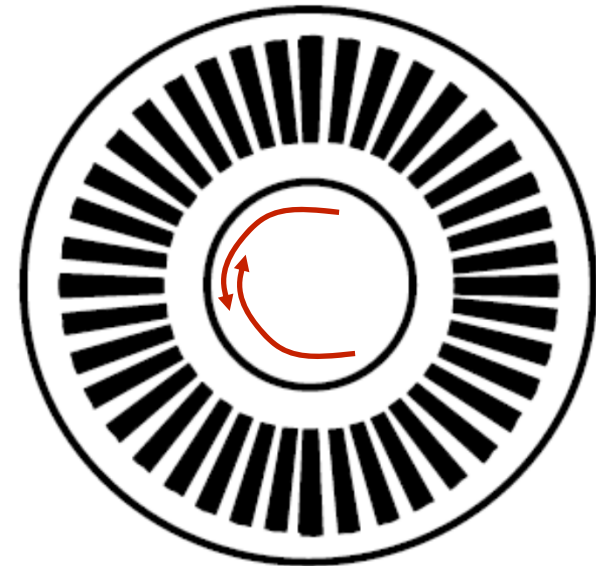
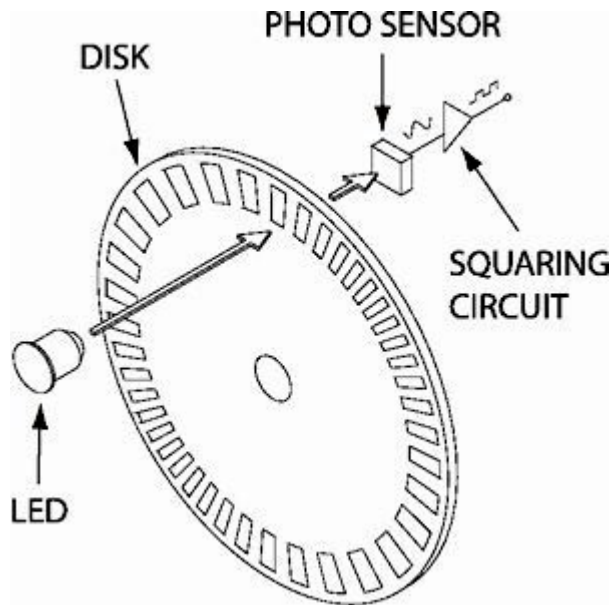


# Encoders

## Optical Encoders for Position

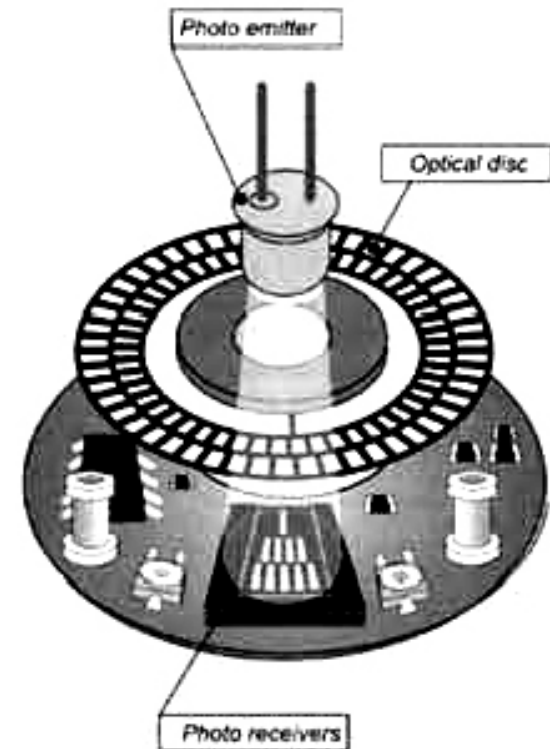
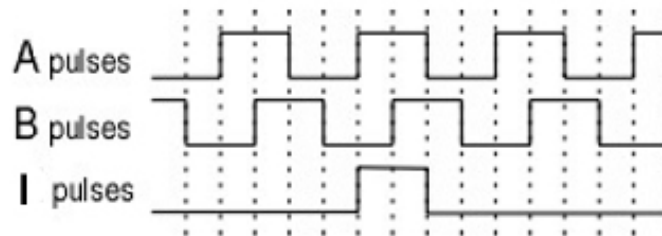
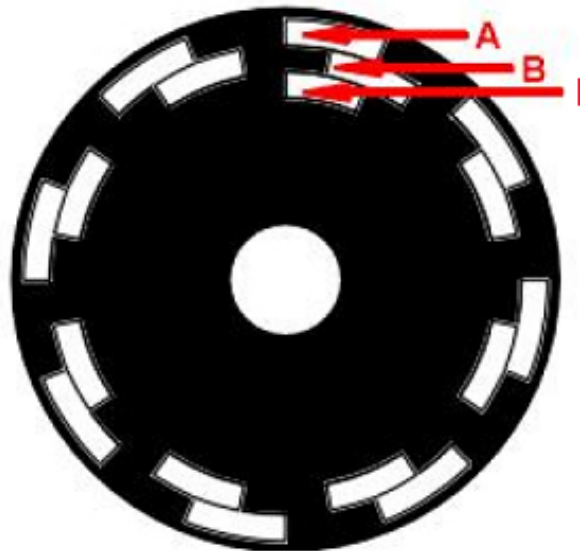
- Combines a transmissive optical sensor with a rotating mask



## Optical Encoders for Position

- Quadrature incremental encoder

INCREMENTAL ENCODER DISK



# Encoders

## Optical Encoders for Position

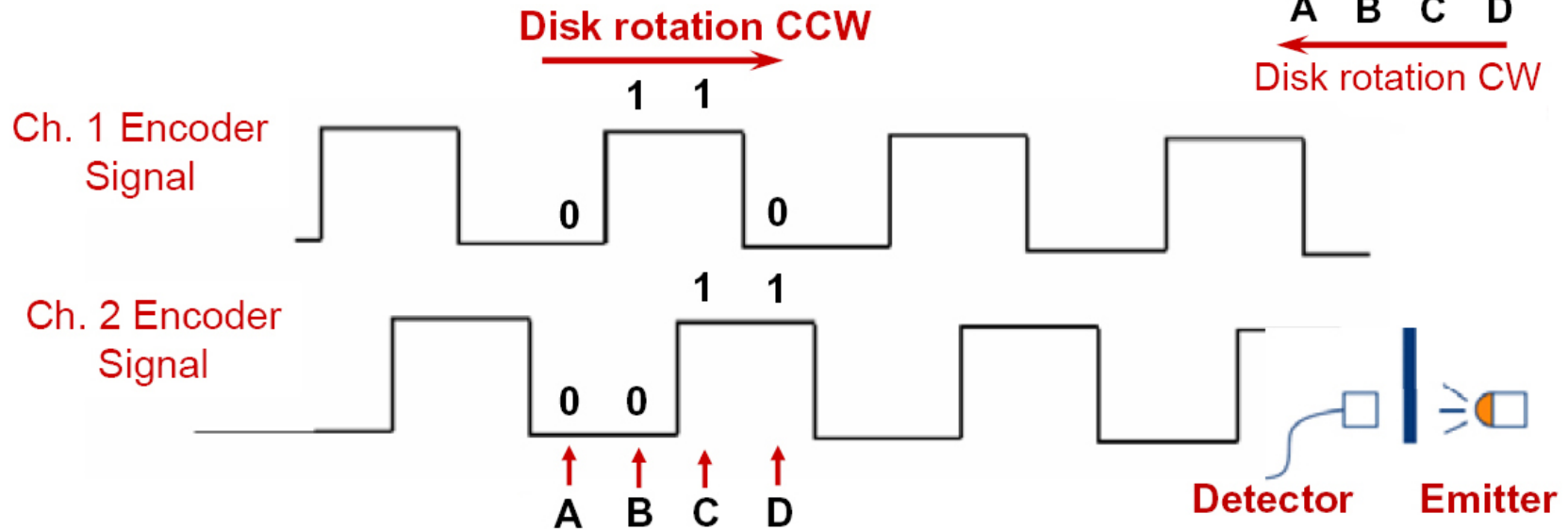
- Quadrature Encoder States

### Encoder States

Disk rotation CCW  
→

	A	B	C	D
Ch. 1	0	1	1	0
Ch. 2	0	0	1	1

←  
Disk rotation CW

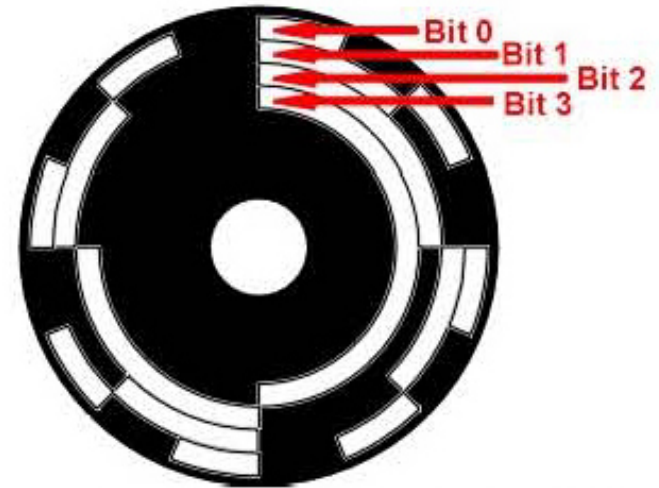


# Encoders

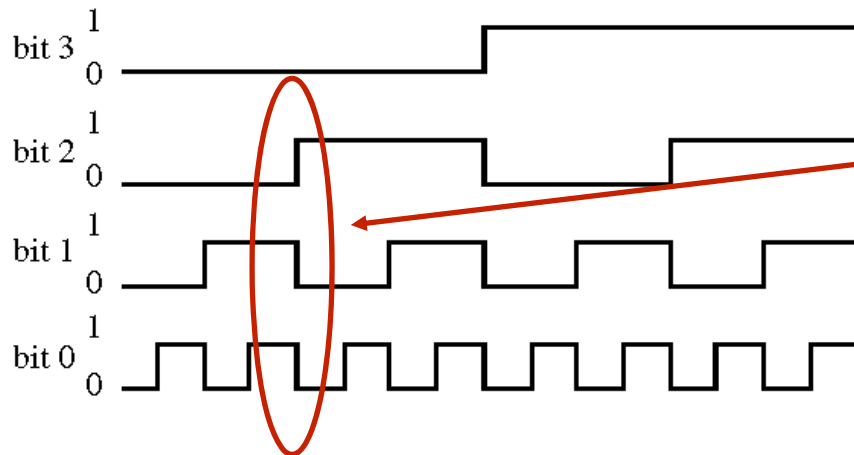
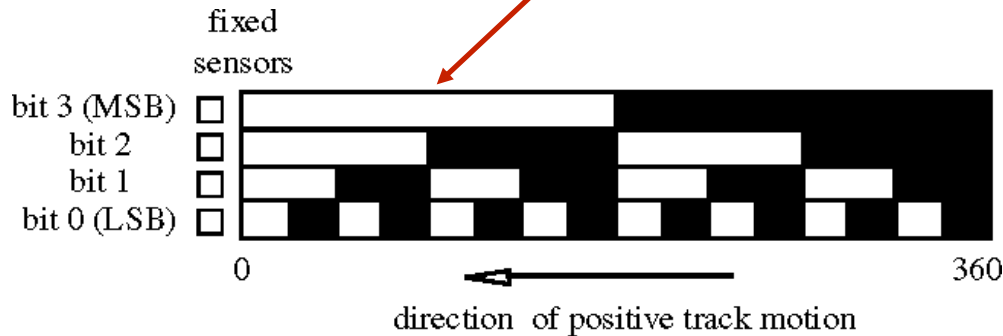
## Optical Encoders for Position

- Absolute encoder

ABSOLUTE ENCODER DISK



natural binary encoding



Multiple bit transitions

# Encoders

## Optical Encoders for Position

- Absolute encoder

