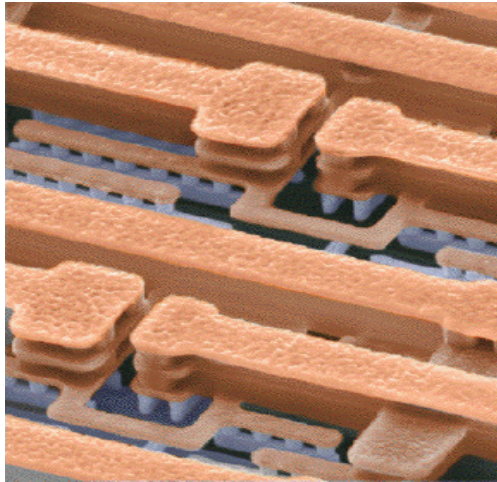


6.02 Lecture 2 - Wires and Models

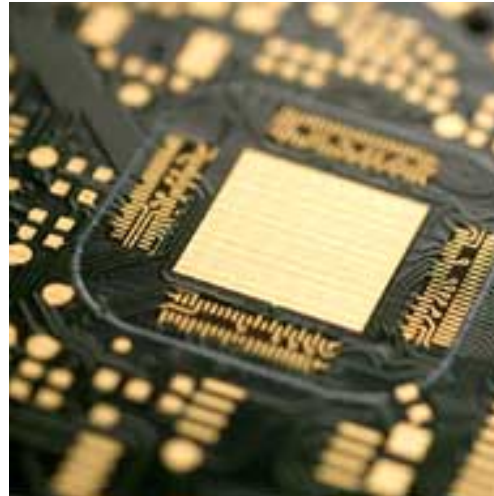
- **Non-Ideal Transmission**
 - Example wires and signal impact
 - Intersymbol Interference
 - Eye Diagrams
- **Modeling Wires**
 - Causality
 - Time-invariance
 - Linearity
- **SUPERPOSITION**
 - Demonstrating why it is so super

Types of Real "Wires"

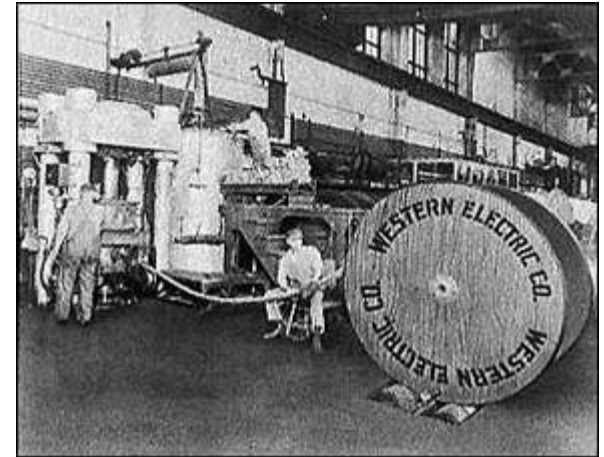
IC Interconnect



Printed Circuit Board



Transatlantic Cable

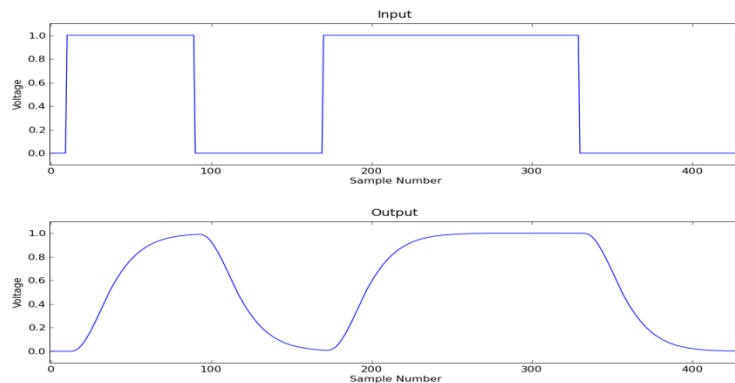


<http://materials.usask.ca/images/photos/SEMof3LevelCuInterconP98.GIF>

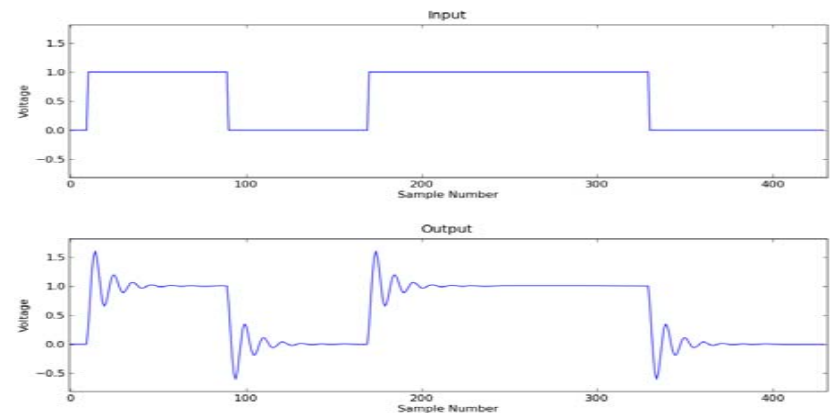
http://www.gpv-pcb.com/Files/Billeder/fabrikker/chemitalic/Chem_pcb_hdi.jpg

<http://www.satamerica.com/imagens/4a27897r1.jpg>

Slow Response



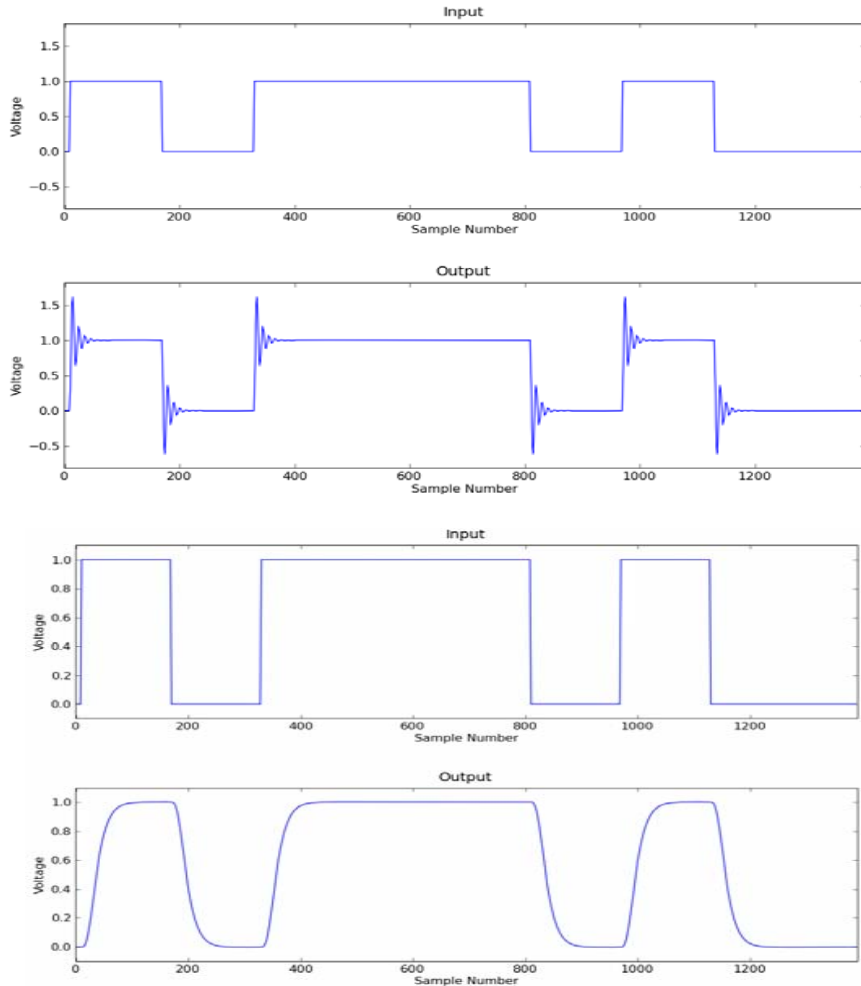
Ring



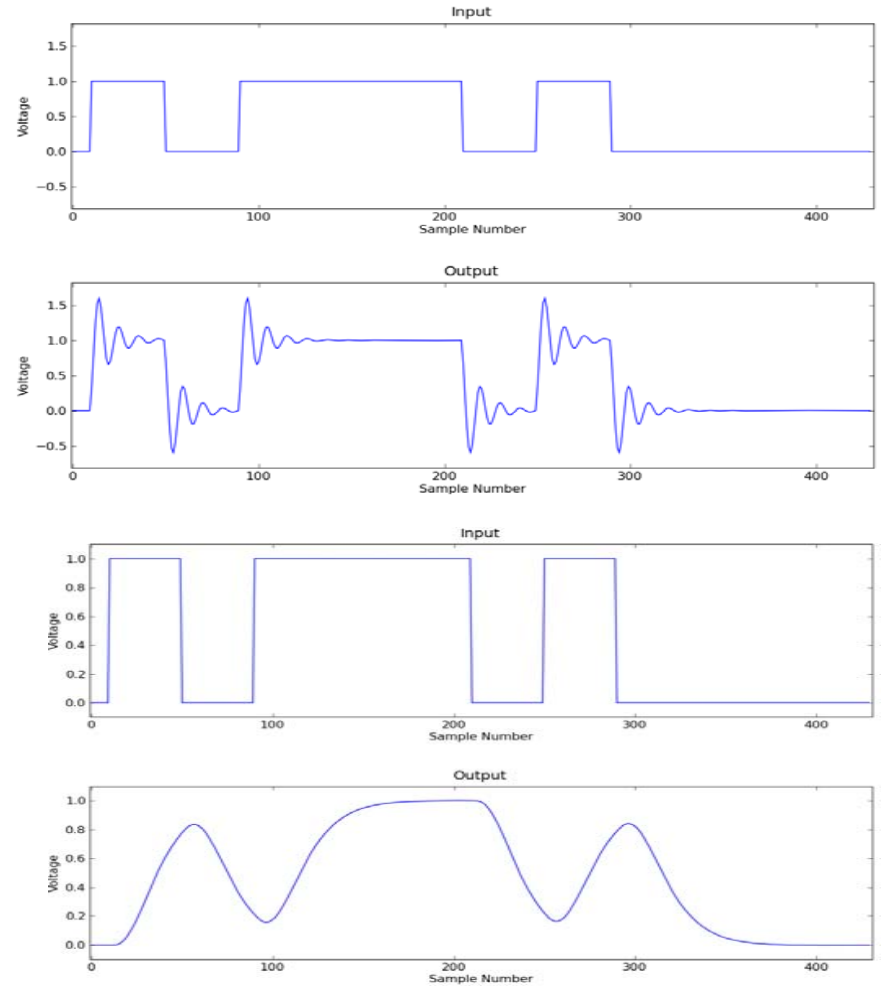
May also have long delays (Receiver does NOT know)

Intersymbol Interference

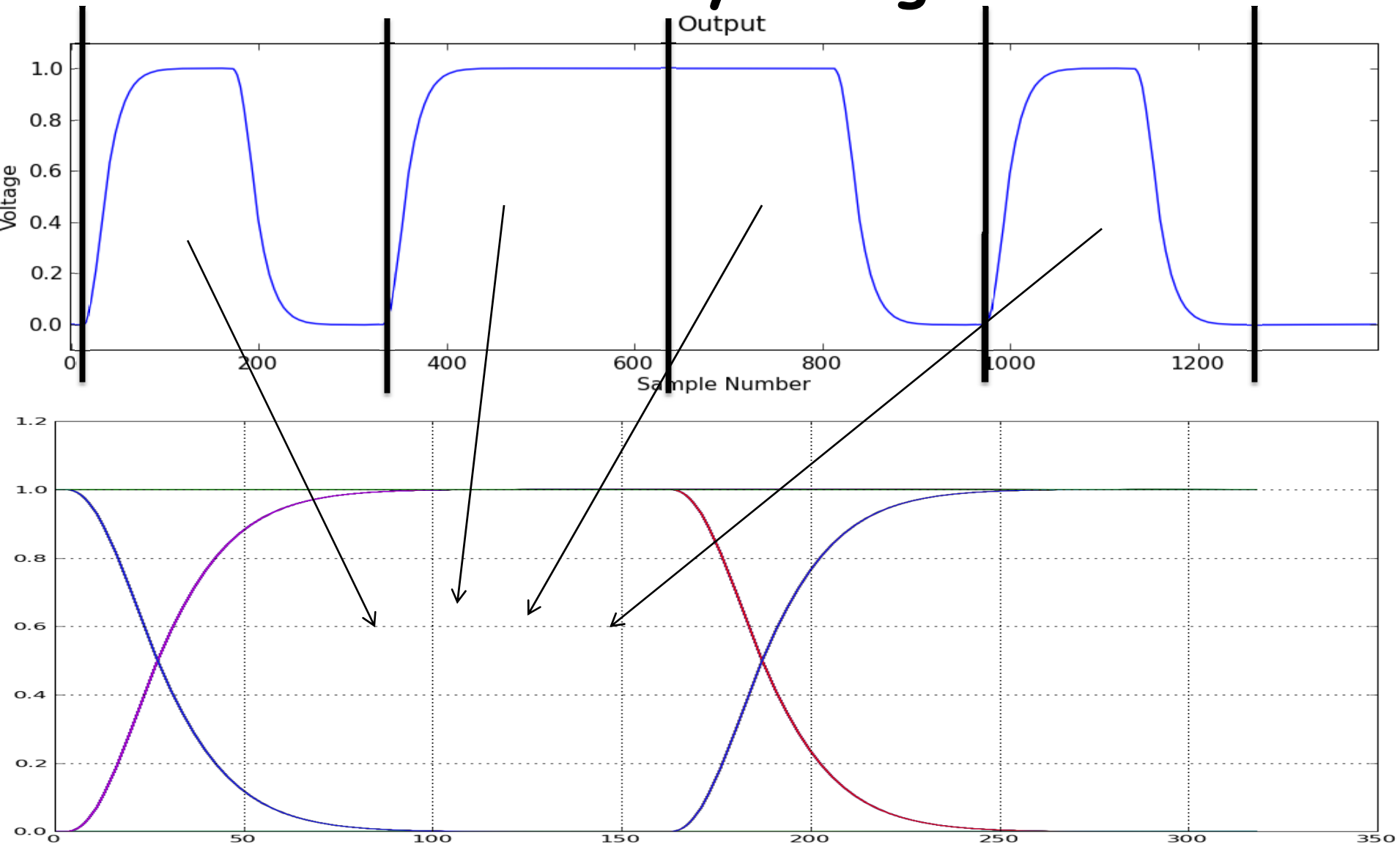
Long Bit Period (slow rate)



Short Bit Period (Fast Rate)

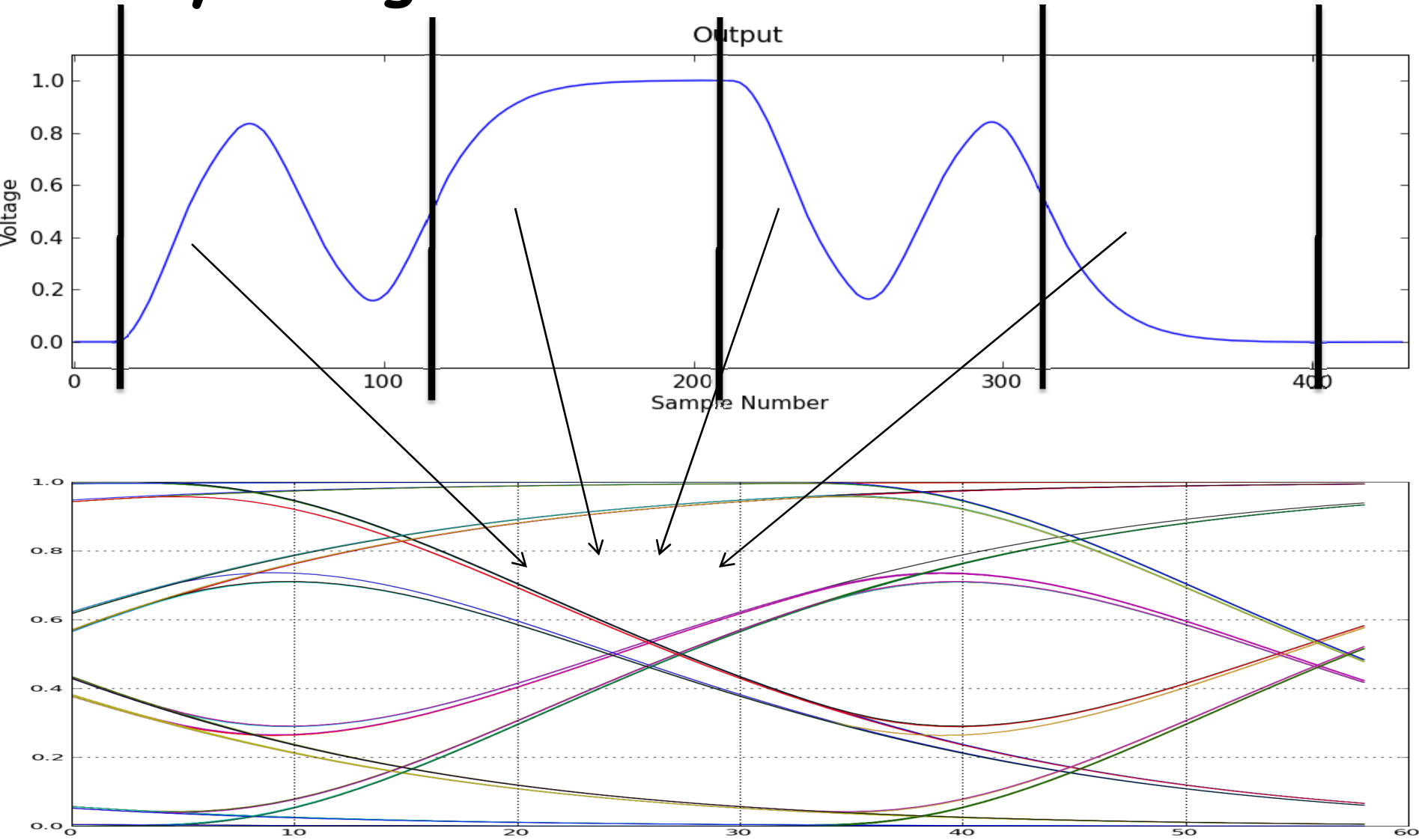


Generate Eye Diagram



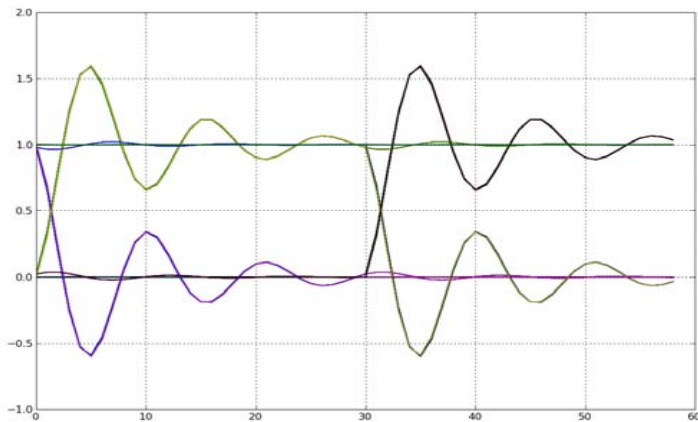
Eye Diagram Generated with 200 bits

Eye Diagram for Shorter Bit Periods



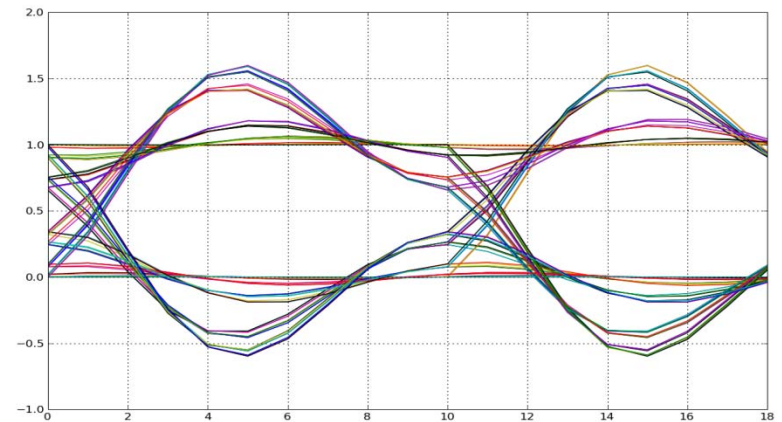
Eyes for Ringing versus Slow System

Medium Bit Period

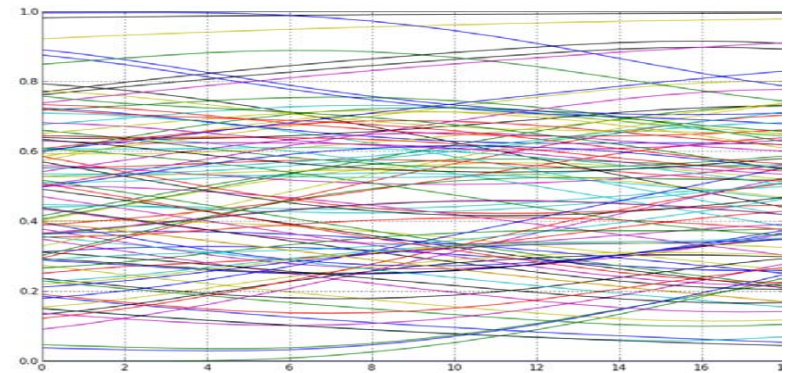
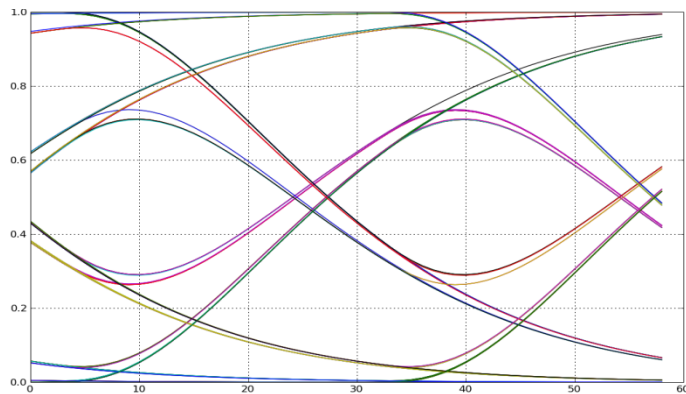


R
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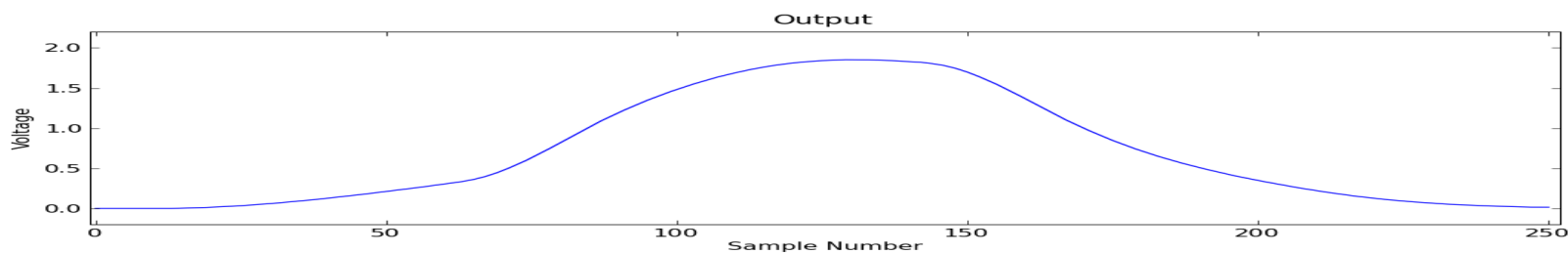
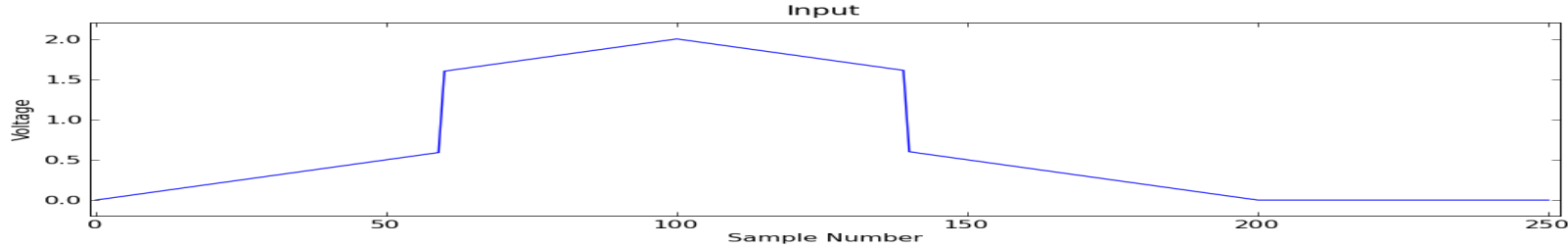
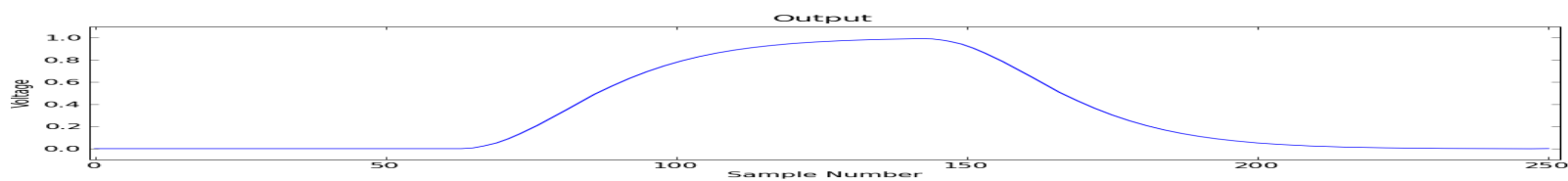
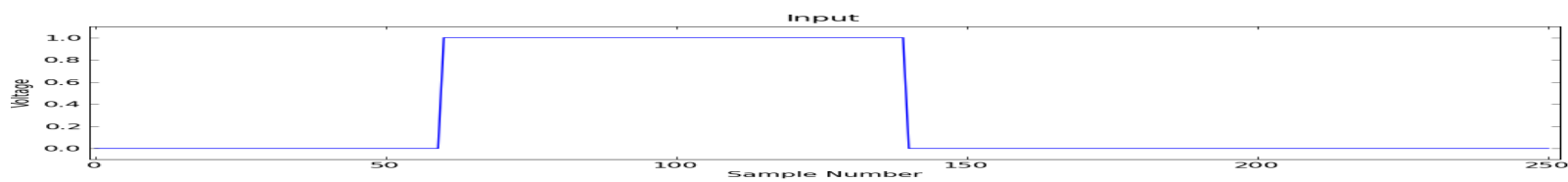
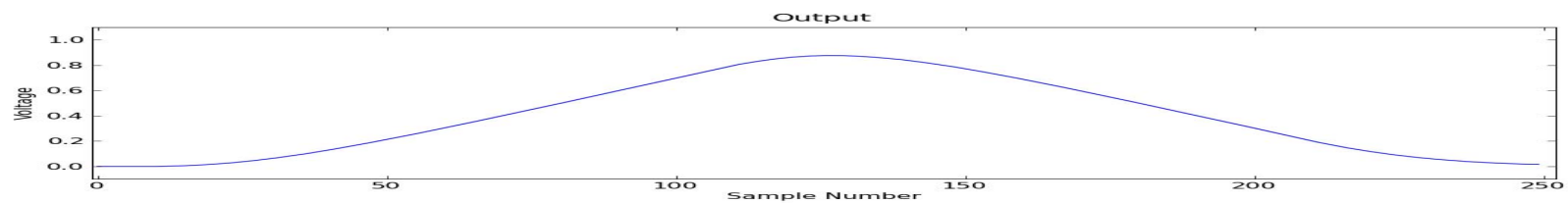
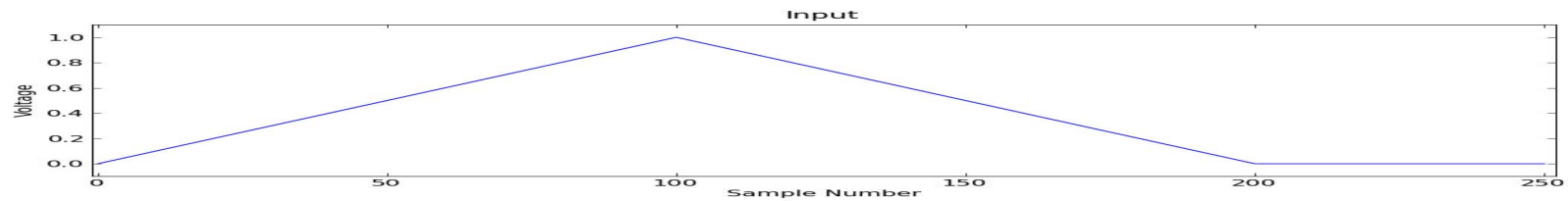
Short Bit Period



S
l
o
w



Superposition



Superposition

