Phase Shift Keying (Demodulation)

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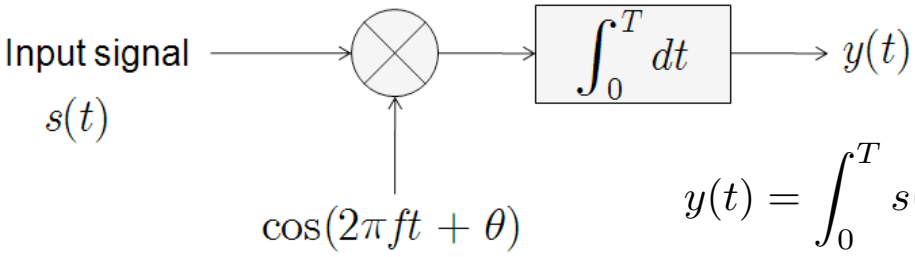
Correlator



$$y(t) = \int_0^T s(t)\cos(2\pi ft + \theta)dt$$

If $s(t) = \cos(2\pi ft),\ \theta = 0 \rightarrow y(t) > 0$

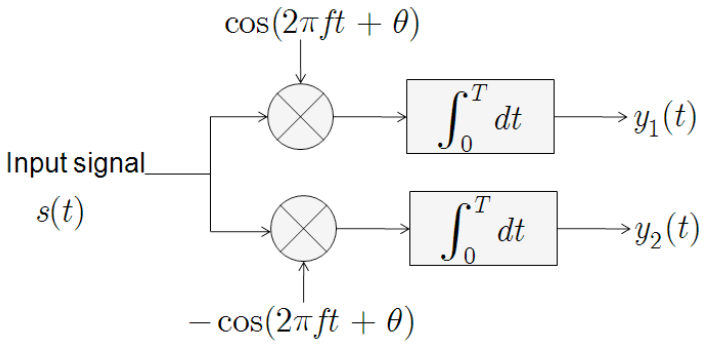
If $s(t) = \sin(2\pi ft),\ \theta = 0 \rightarrow y(t) = 0$

Q: Can you guess what are decoding rules?

BPSK Decoding

- Recall: Input Signal

$$s_0(t) = A\cos(2\pi ft + \pi) = -A\cos(2\pi ft) \qquad s_1(t) = A\cos(2\pi ft)$$

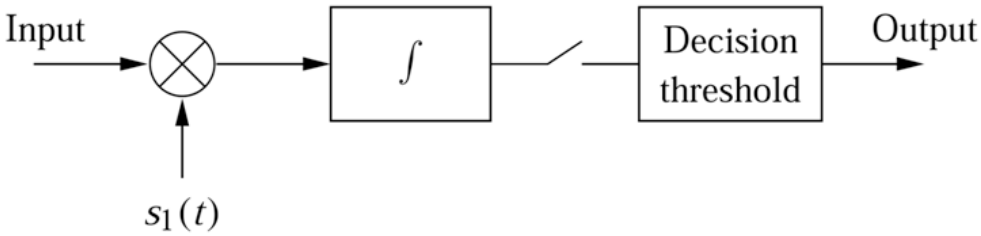


Decision Rule: $\hat{y}(t) = \max(y_1(t), y_2(t))$

Q: Can you guess what would be simpler version?

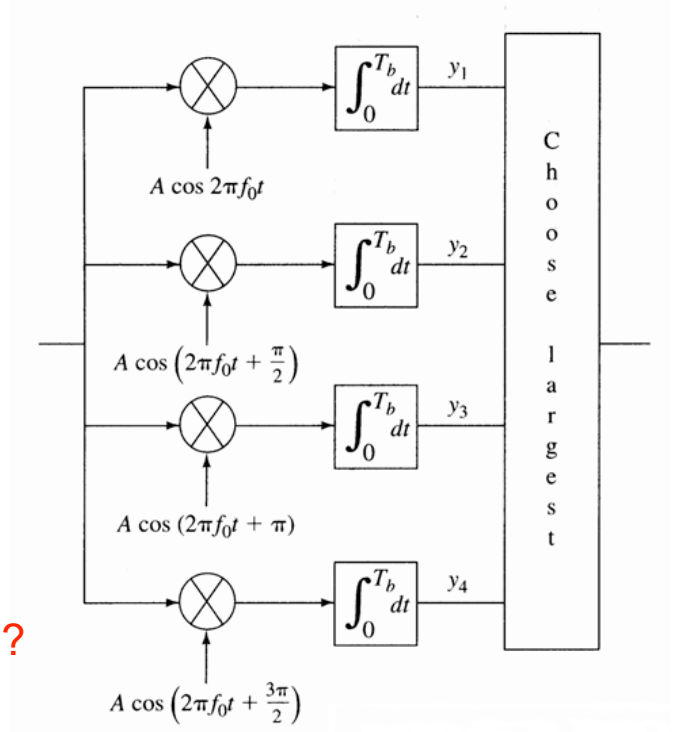
BPSK Decoding

- Simple BPSK Decoding Block Diagram



QPSK Decoding

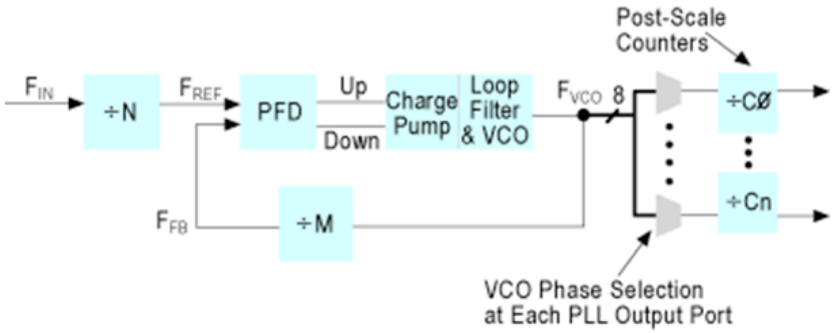
- Simple extension:



Q: Can you guess what would be one of most important things here?

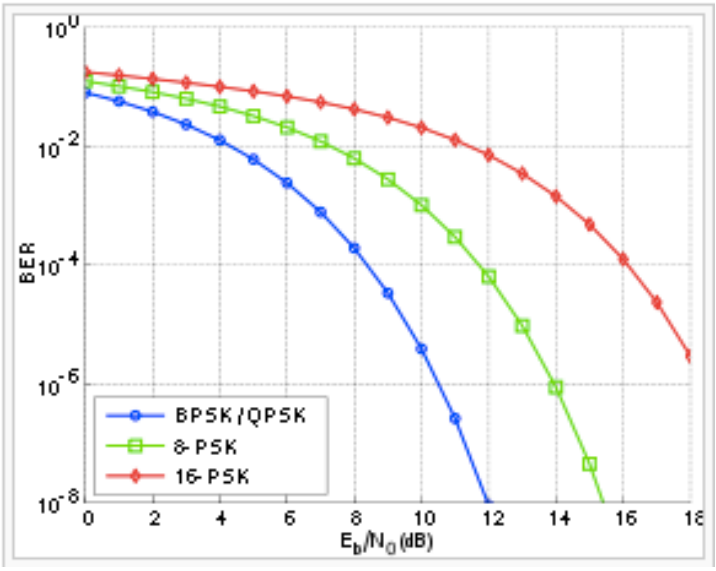
Phase Locked Loop - PLL

- Generate output signal whose phase is related to phase of the input "reference" signal.



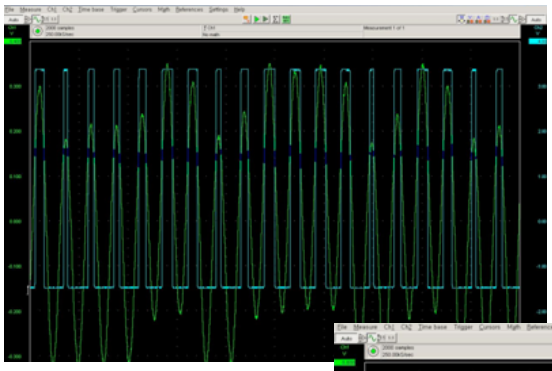
- PFD (phase frequency detector): detects difference in phase and frequency of two input signals

Theoretical Error Performance

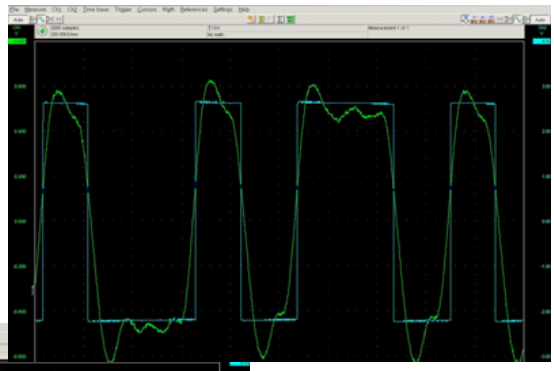


- BER (Bit Error Rate), Eb/N0 (Signal to Noise Ratio)
- BPSK/QPSK show the same BER performance!

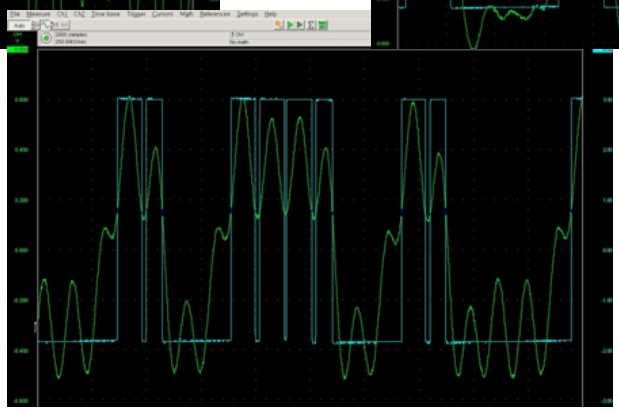
Potential Results



Not matched



Perfectly matched



Not perfectly matched