

LECTURE 5

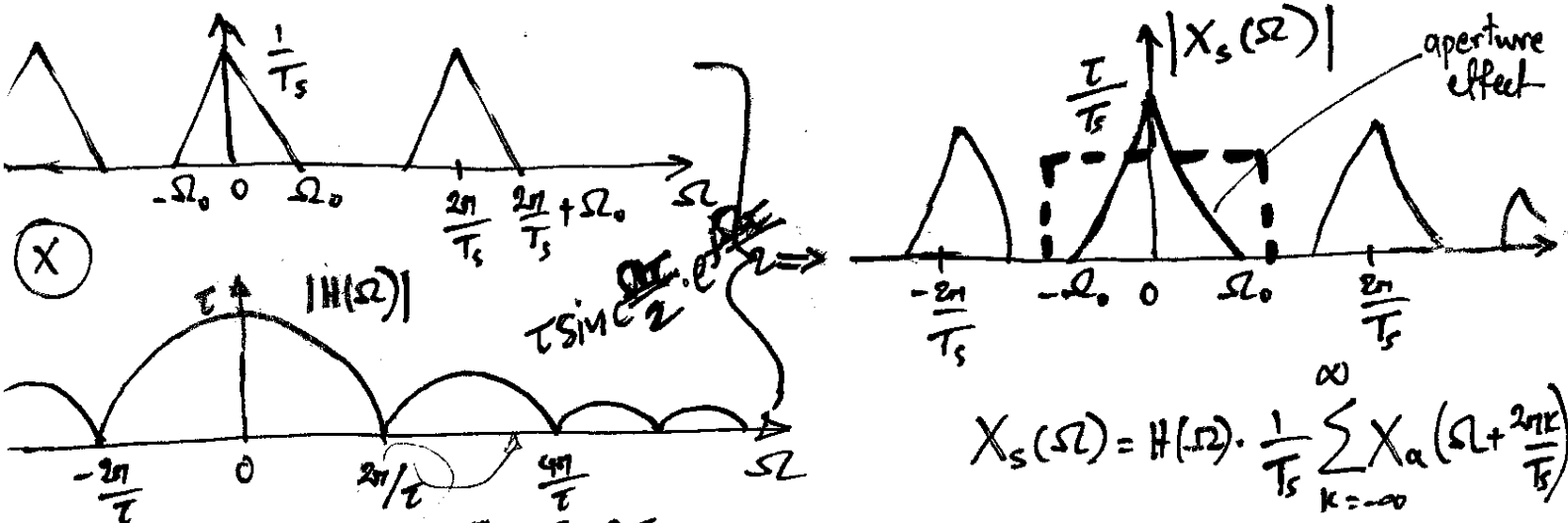
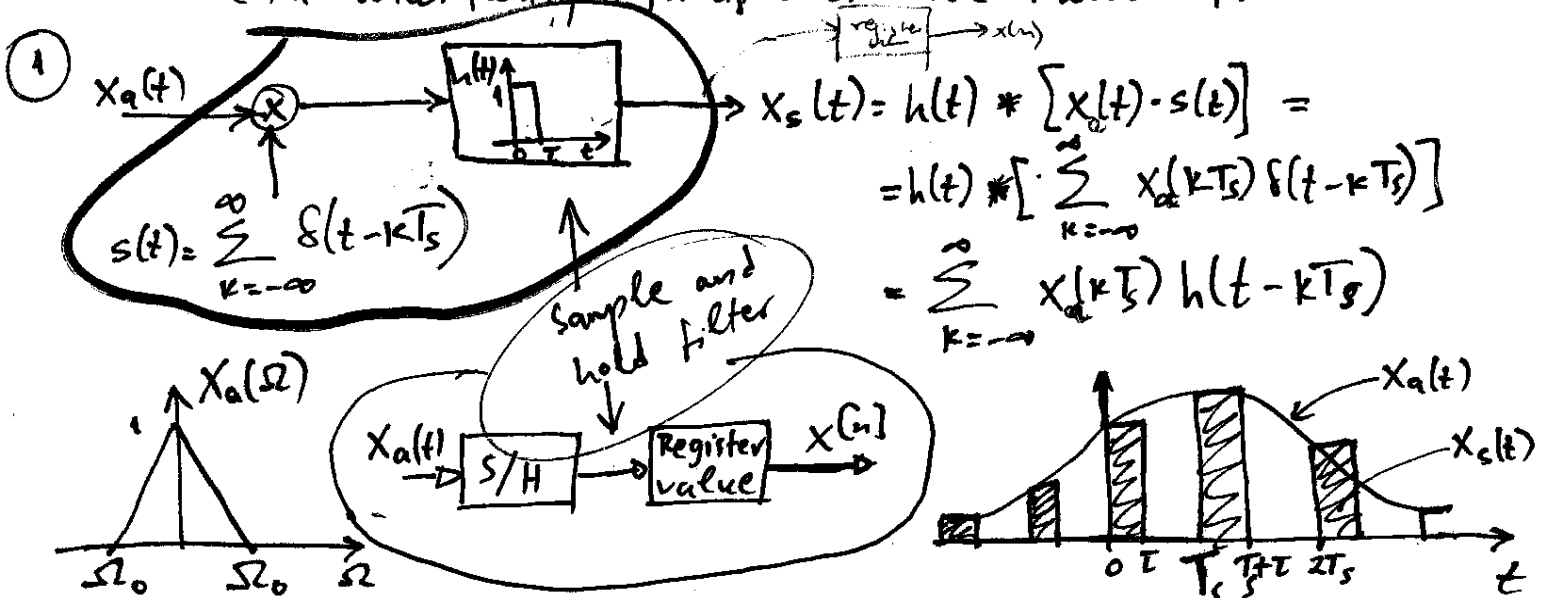
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(9)

PRACTICAL SAMPLING

Practical sampling differs from ideal in three obvious respects.

- 1) The sample (impulse) train actually consists of pulses of duration τ
- 2) Reconstruction filters are not ideal filters
- 3) Real signals are time limited therefore cannot be bandlimited (the uncertainty principle of the Fourier Transform)

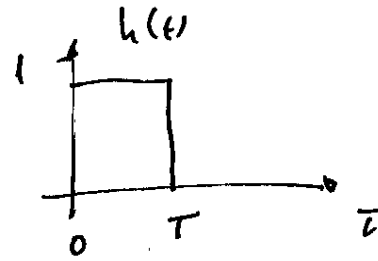
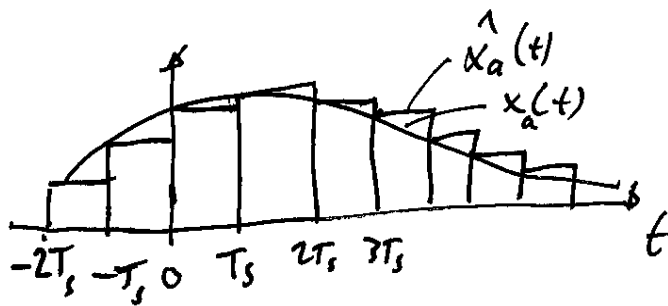


* If $\frac{2\pi}{T} \gg \Omega_0$ Then no significant distortion over signal band. (otherwise equalization can compensate distortion)

② The problem of nonideal low pass filters can be overcome by increasing $\frac{1}{T_s}$

(3) If signal has not limited frequency band $\rightarrow$ Filter prior to sampling $\rightarrow$ distortion is introduced.

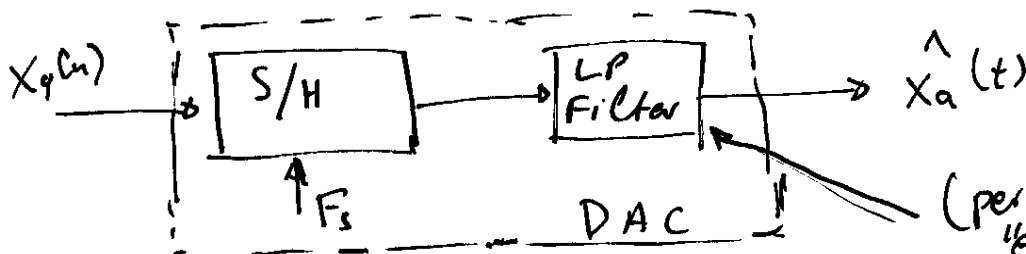
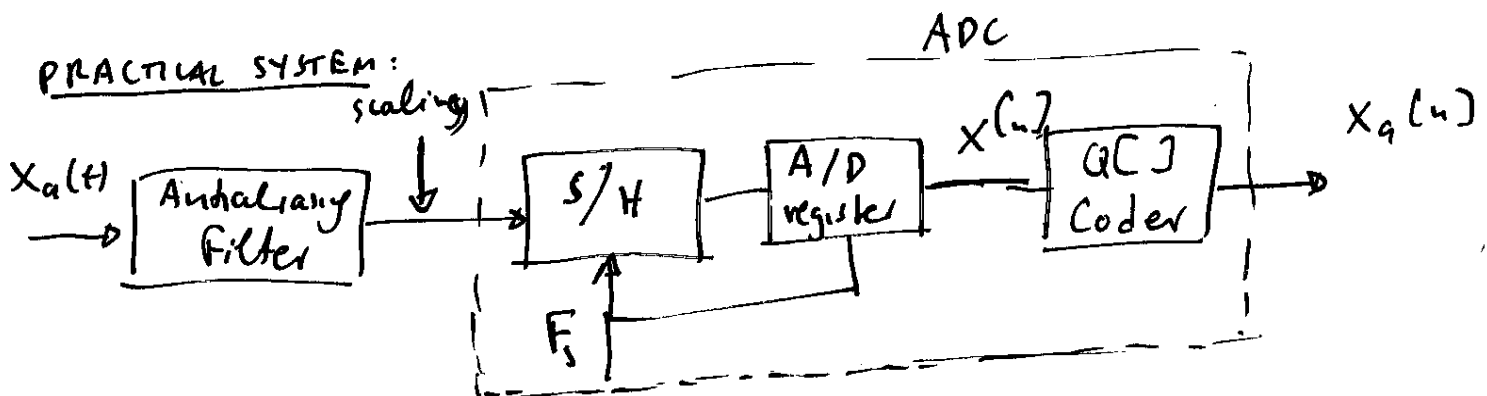
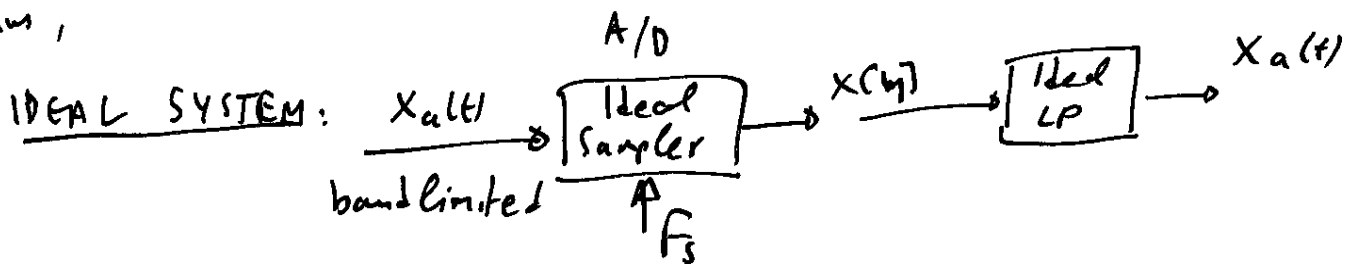
① PRACTICAL D/A conversion employing zero-order hold



From practical sampling: $\hat{x}_a(t) = h(t) * \left[\sum_{k=-\infty}^{\infty} x(kT_s) \delta(t - kT_s) \right]$

Assuming that T_s is small, then aperture effects are not very significant within the signal band and thus $\hat{x}_a(t) \approx x_a(t)$

Thus,



(performs also "equalization" of aperture effects)