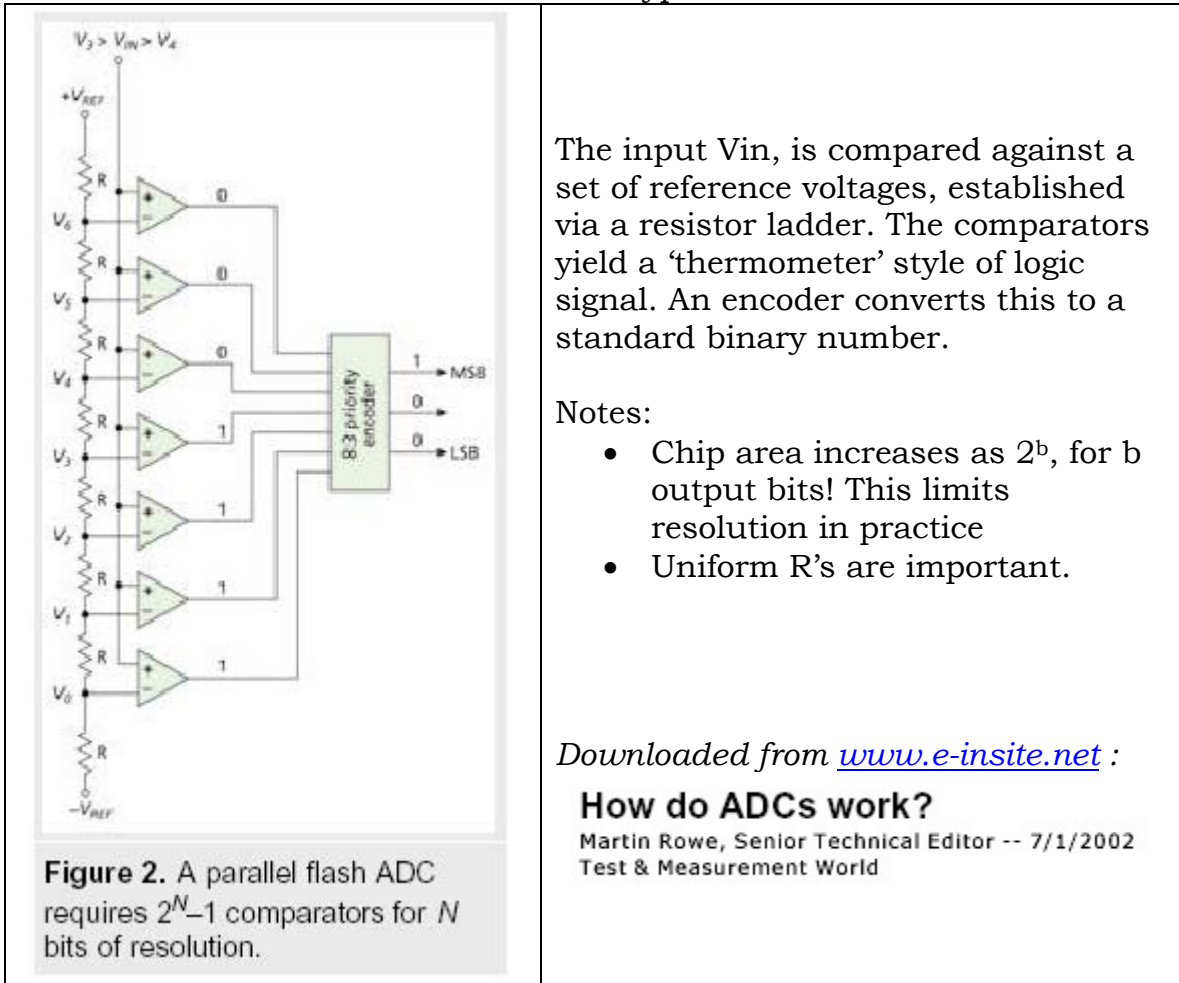


EE328 – DePiero – Practical A/D and D/A Converters

There are a number of basic types of A/D converters. The 'Flash' type shown below is the fastest of the basic types.



The input V_{in} , is compared against a set of reference voltages, established via a resistor ladder. The comparators yield a 'thermometer' style of logic signal. An encoder converts this to a standard binary number.

Notes:

- Chip area increases as 2^b , for b output bits! This limits resolution in practice
- Uniform R 's are important.

Downloaded from www.e-insite.net :

How do ADCs work?

Martin Rowe, Senior Technical Editor -- 7/1/2002
Test & Measurement World

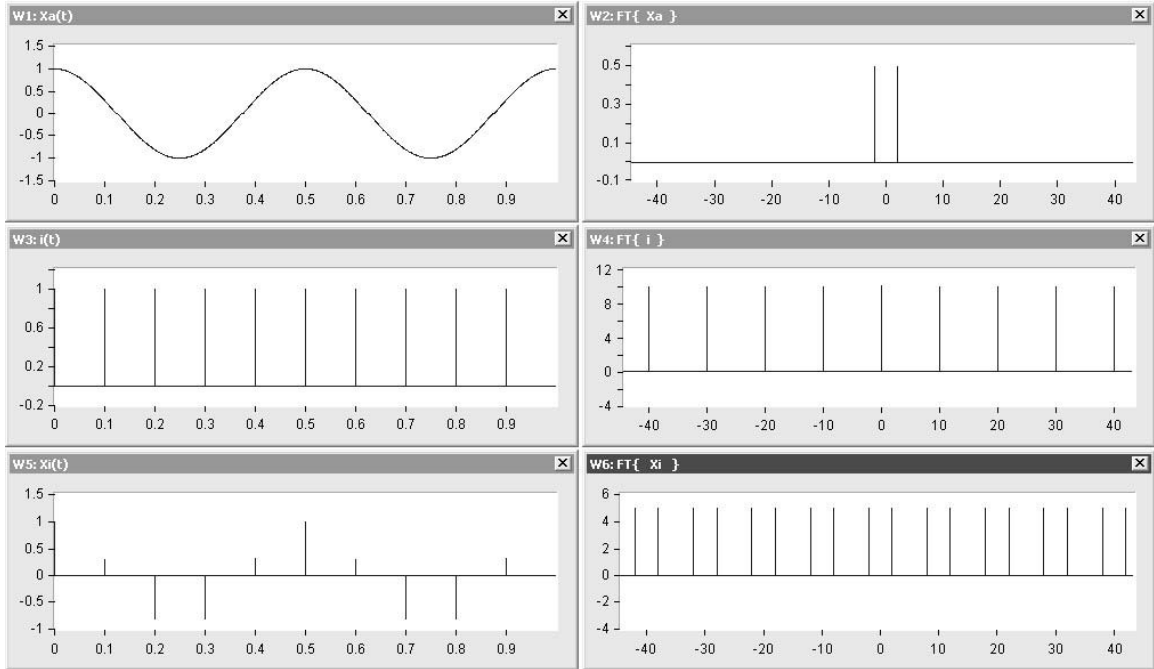
Comparing practical devices to the ideal model of sampling, note:

- There is no signal generation of an impulse train (which is impossible anyway).
- There is no multiplication inside the A/D.

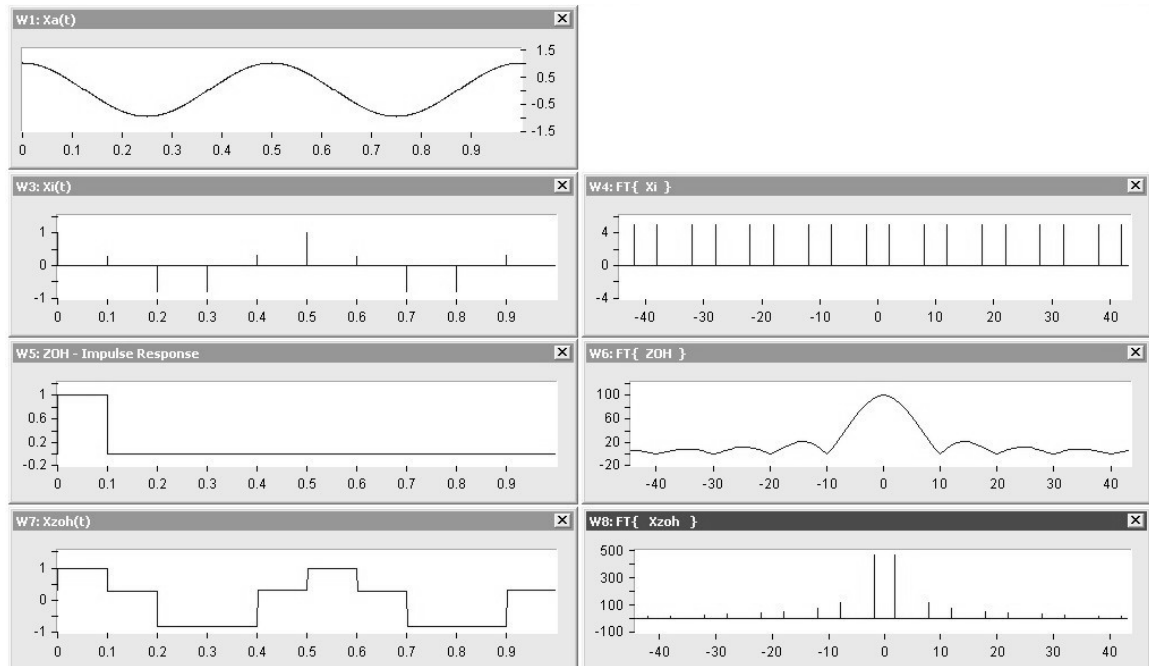
Practical D/A converters, such as the 'zero-order-hold' type trap a voltage on a capacitor for the duration of the sample period. This yields a stair-step approximation to the output voltage, which is then run through a low-pass filter to smooth the step transitions.

Comparing accuracy of the ideal model to a practical system:

- The A/D requires a finite amount of time for the comparators to respond, hence sampling is not instantaneous.
- A 'zero-order-hold' weights the spectrum of a sampled signal, reducing the intensity of high frequency spectral copies.



Signals associated with the model of ideal sampling.



Signals associated with ideal sampling and zero-order-hold reconstruction.