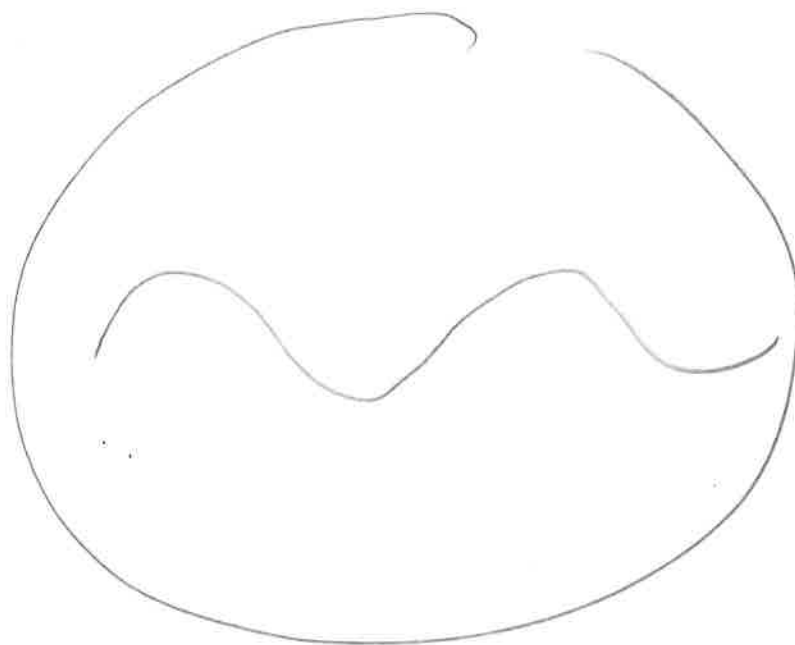


○ scillo score 5

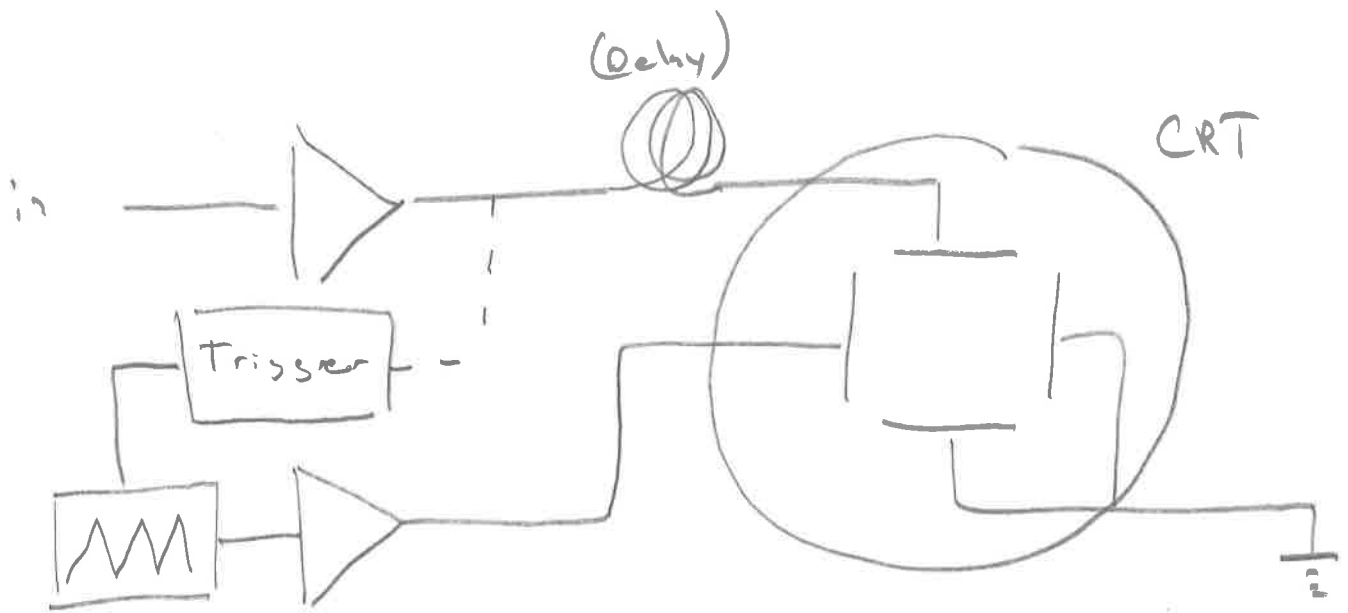
---

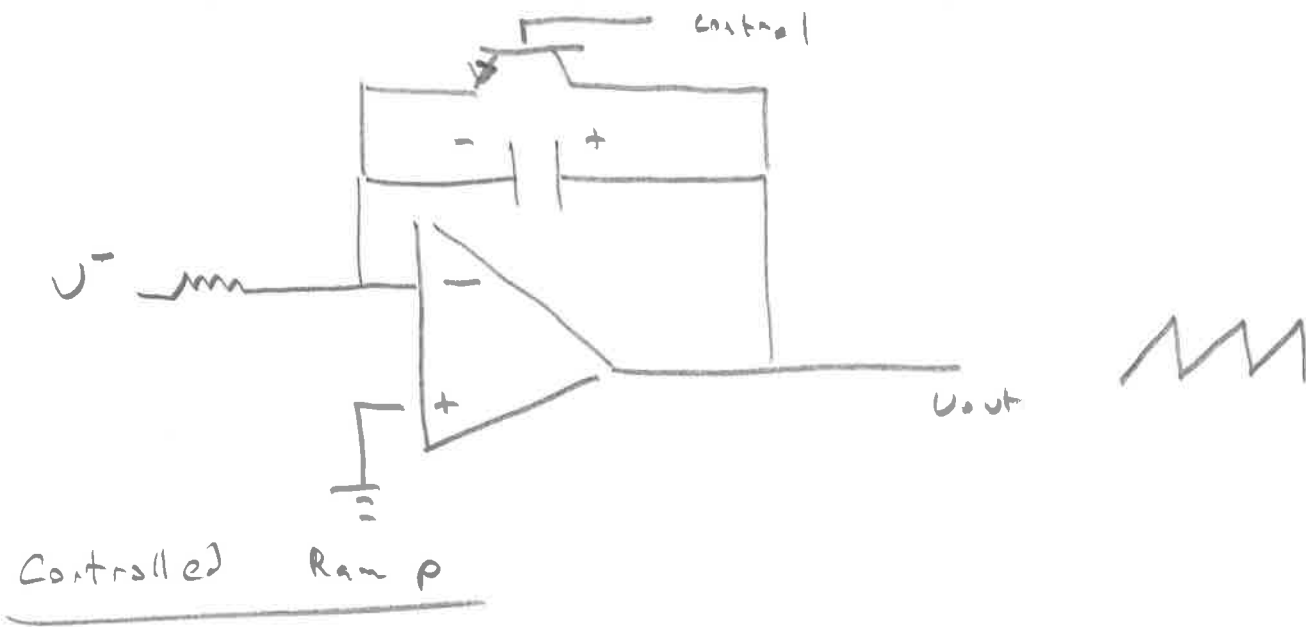


$$\begin{array}{r} \frac{1}{9} + 1 \\ \hline 1 \end{array}$$

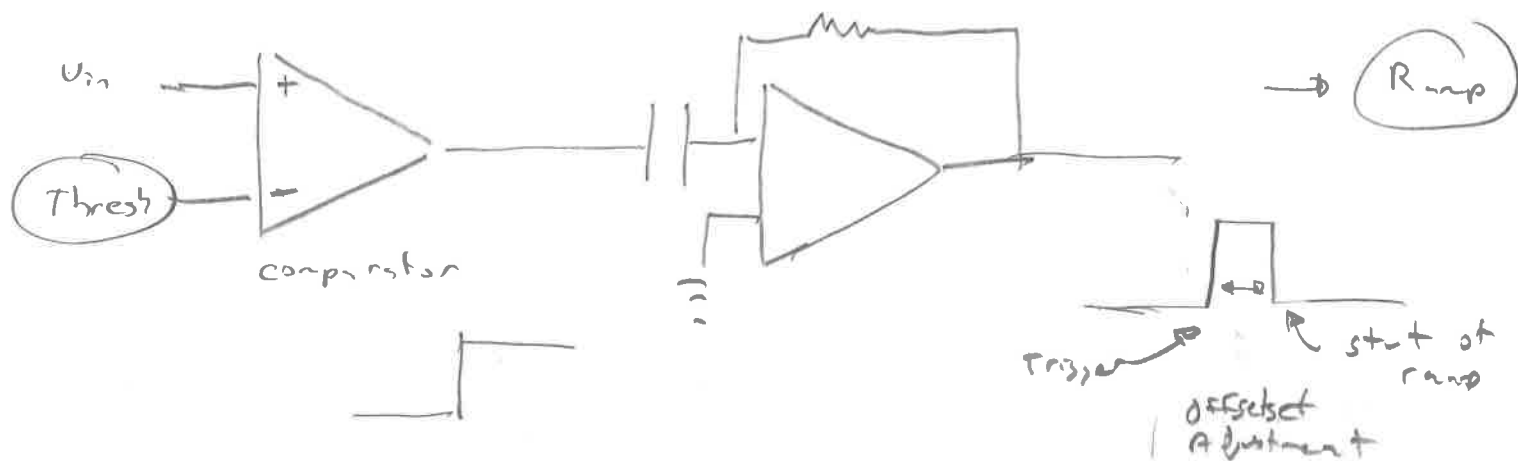
$$\begin{array}{r} \frac{1}{1} \\ \hline 1 - 1 \end{array}$$

# Analogue Oscilloscope



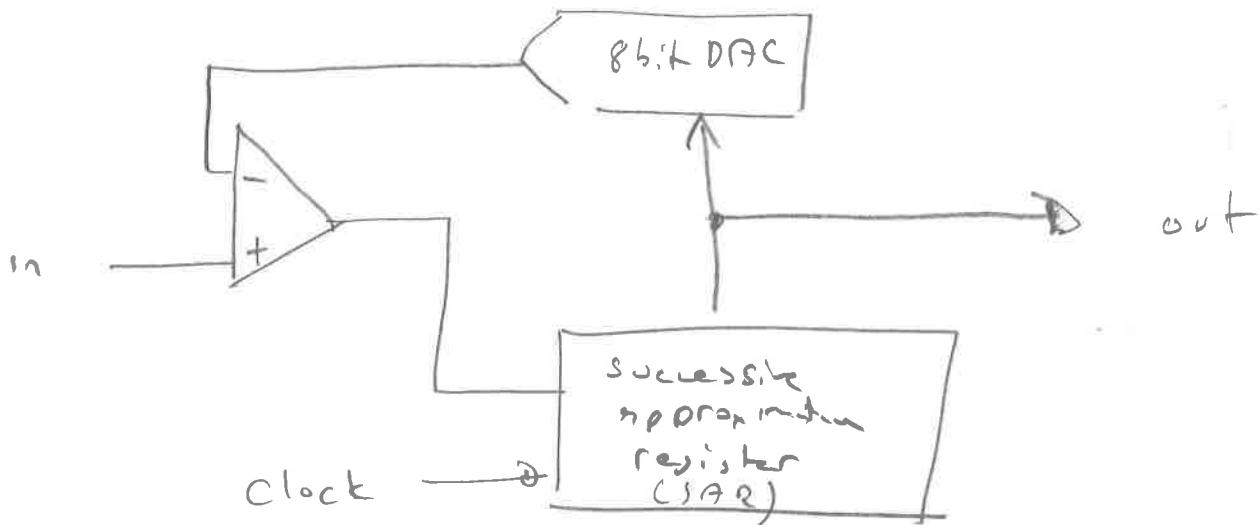


## Trigger Logic (Example)



# A/D C

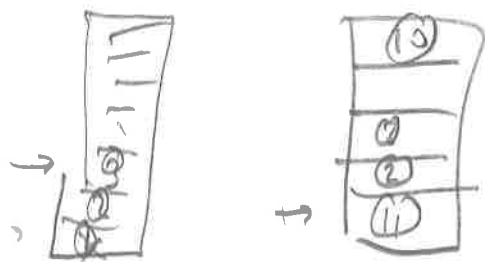
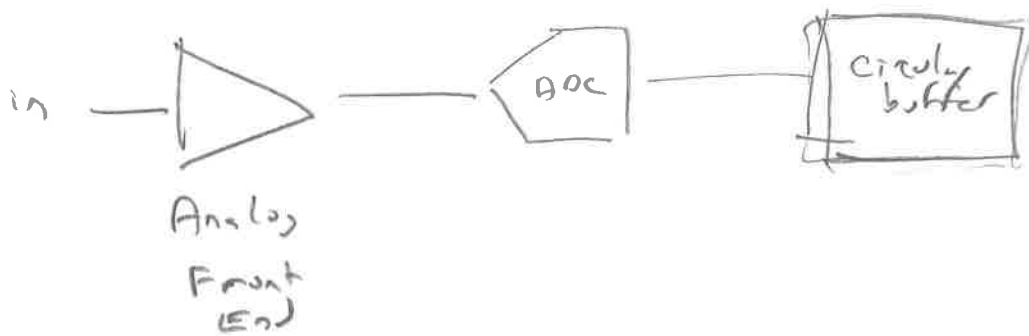
## Successive Approximation



	SAR	IN PUT
0	1000	0110
1	0100	0110
2	0110	0110
3	0111	0110
4	0110	0110

← out put  
latched

# Digital Scope



circular buffer

Normal → Display buffer contents  
whenever trigger condition  
met.

Single → Once

Auto → Trigger + Fixed Rate

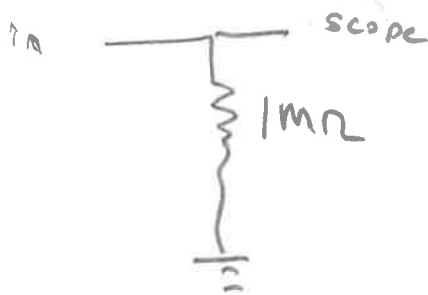
Expense? → Analog Front-End ⇒ match  
wide range of inputs to ADC.

→ Fast / Accurate ADC.

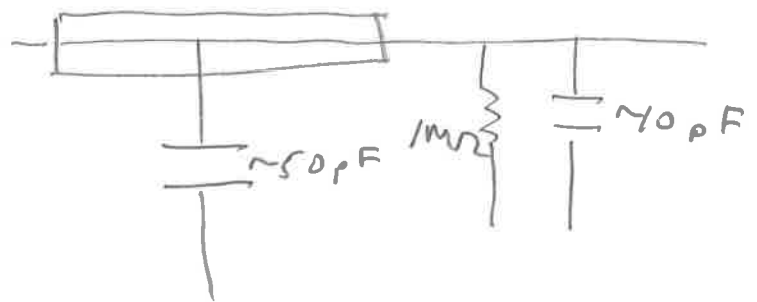
→ Trigger / Disposed Logic  
⇒ (Pico Scope!)

# Probes:

Intent:

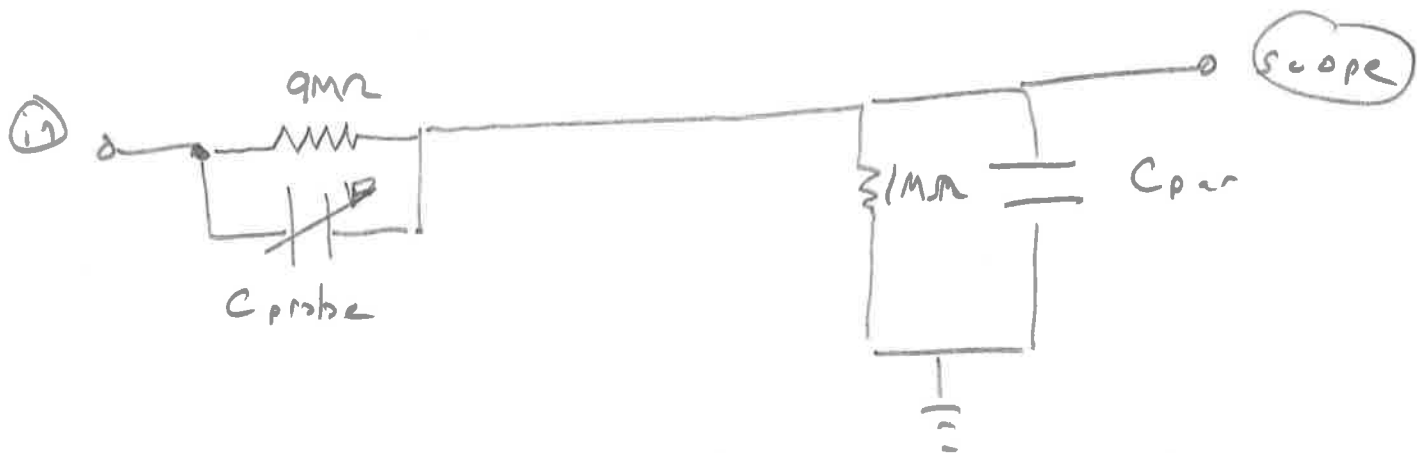


Reality



1:1 probe, circuit sees  $1M\Omega$  load  $C \sim 60pF$

10:1 probe



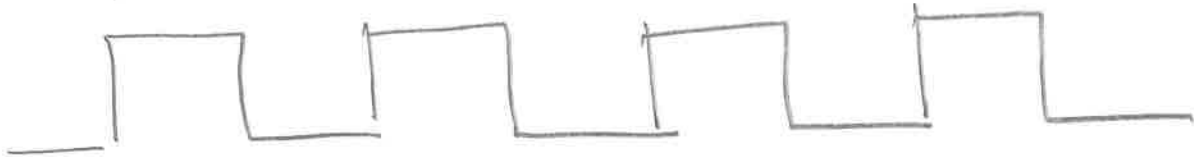
LF: 
$$V_{scope} = \frac{1M\Omega}{9M\Omega + 1M\Omega} V_{in} = \frac{1}{10} V_{in}$$

Tune 
$$C_{probe} = \frac{1}{9} C_{par}$$

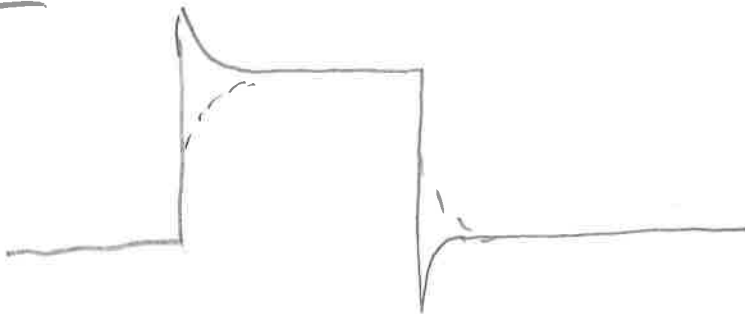
HF: 
$$V_{scope} = \frac{1}{10} V_{in} \text{ as well.}$$

## Tuning probe:

HF input



See:



$$C_{\text{probe}} < \frac{1}{9} C_{\text{par}} \Rightarrow \text{overshoot}$$

$$C_{\text{probe}} > \frac{1}{9} C_{\text{par}} \Rightarrow \text{undershoot}$$