

Corso di Elettronica II – Anno 2005/2006

Esercitazione di Laboratorio no. 1 Strumentazione

STRUMENTI DI MISURA

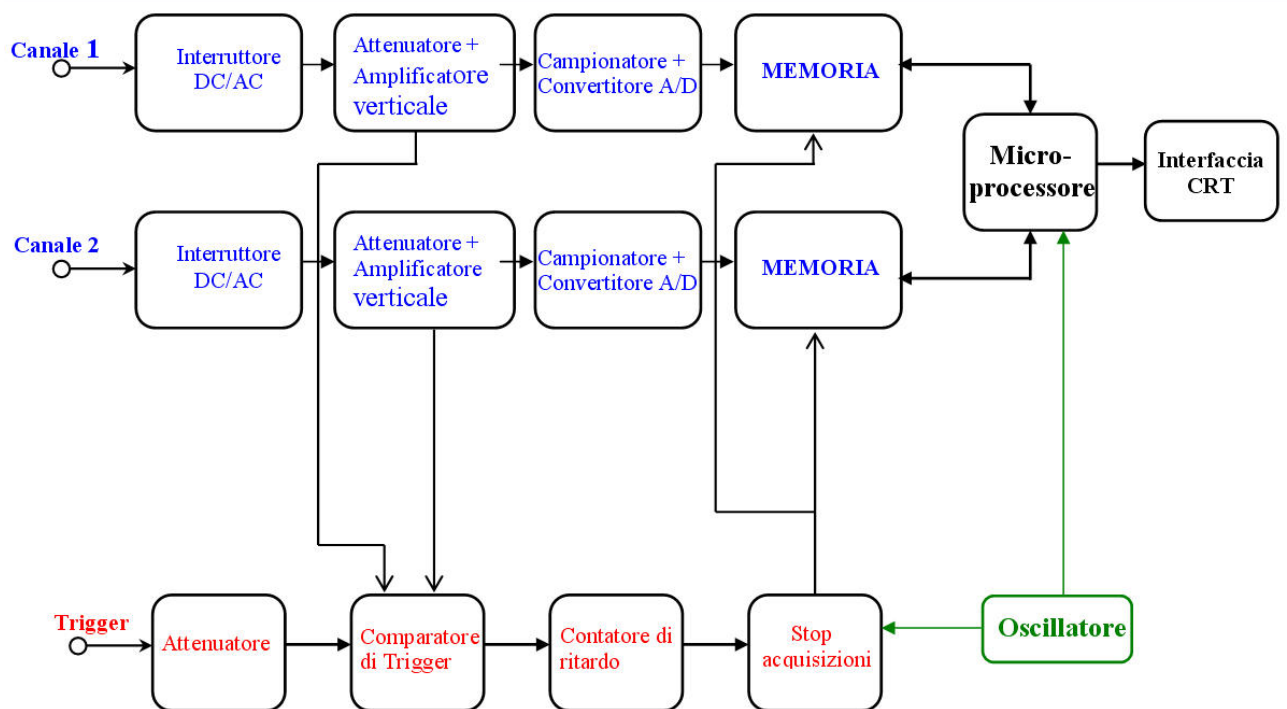
- Oscilloscopio Digitale
- Generatore di forme d'onda
- Alimentatore da banco

ACCESSORI

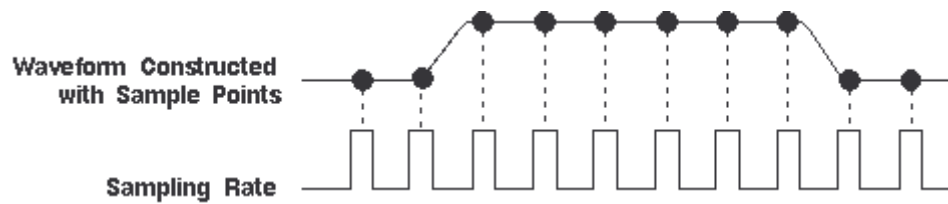
- Sonda compensata 10x
- Cavo coassiale

Oscilloscopio Digitale

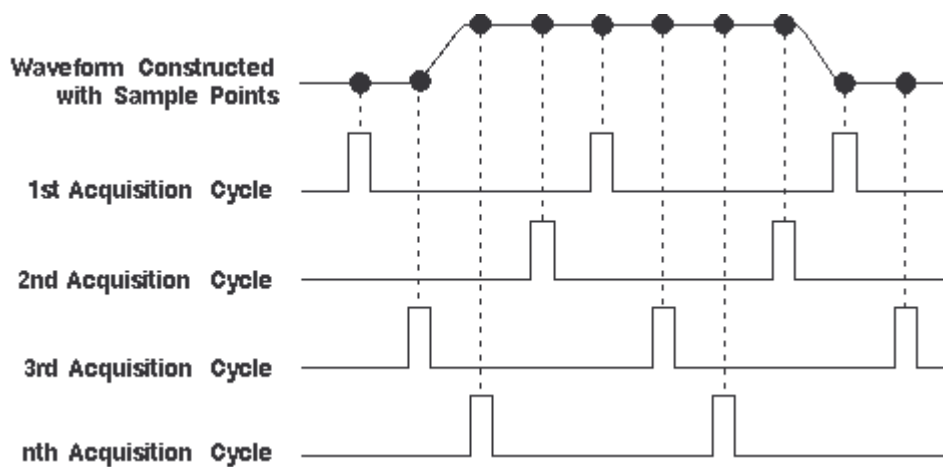
SCHEMA A BLOCCHI DI UN OSCILLOSCOPIO DIGITALE



Campionamento in tempo reale

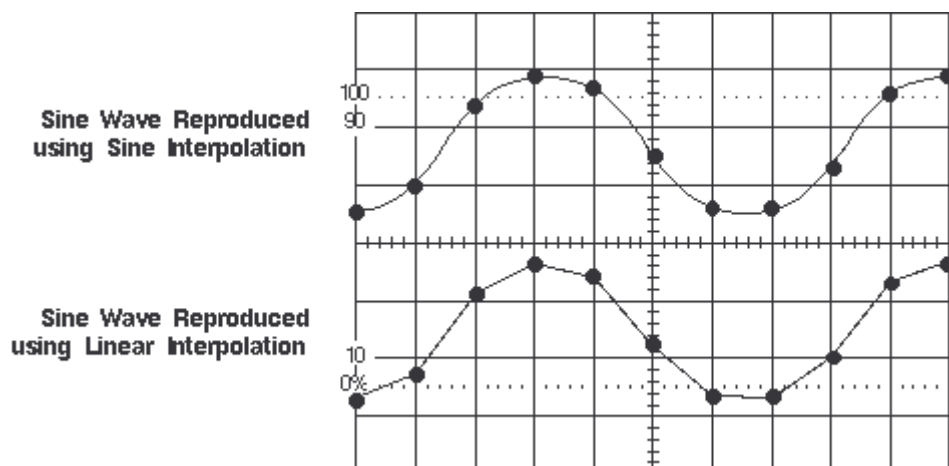


Campionamento in tempo equivalente

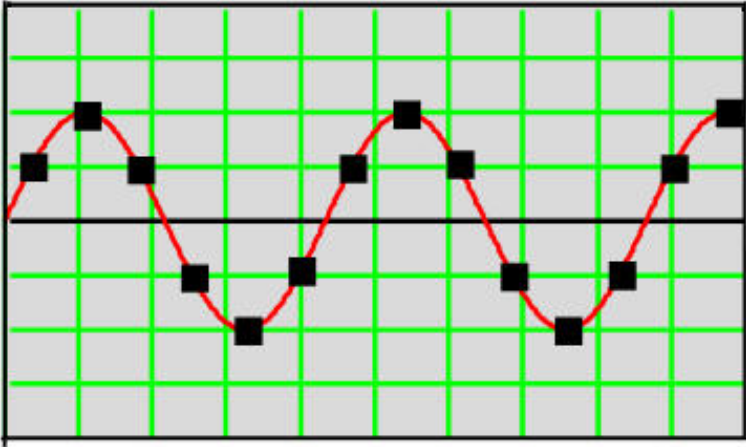


Visualizzazione con interpolazione

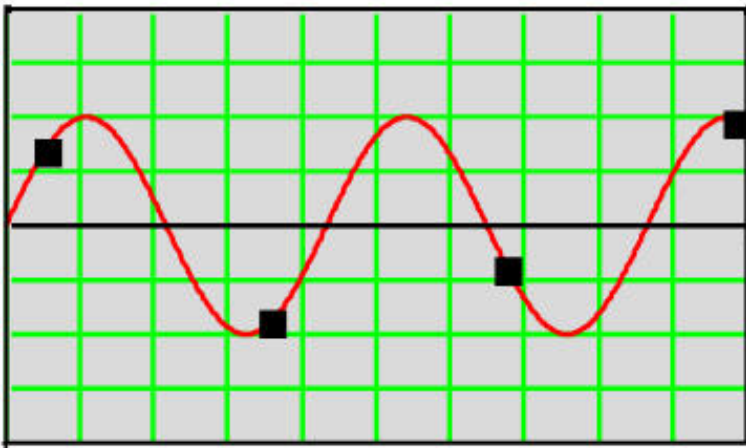
Interpolazione sinusoidale ($\frac{\sin x}{x}$) e lineare



Aliasing (ATTENZIONE!!!!!!)

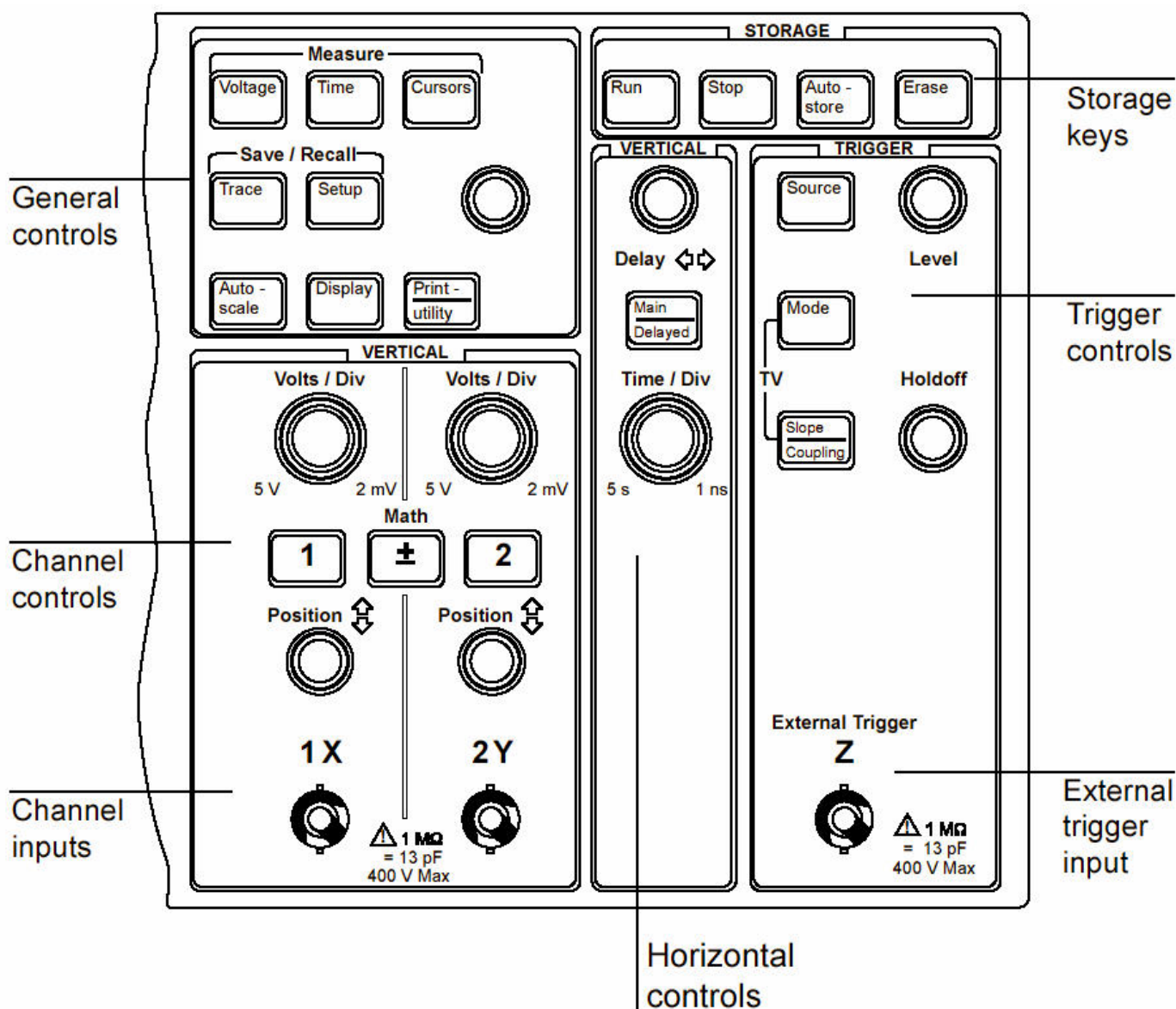


No Aliasing
 $f_{\text{sampling}} > 2 f_{\text{signal}}$

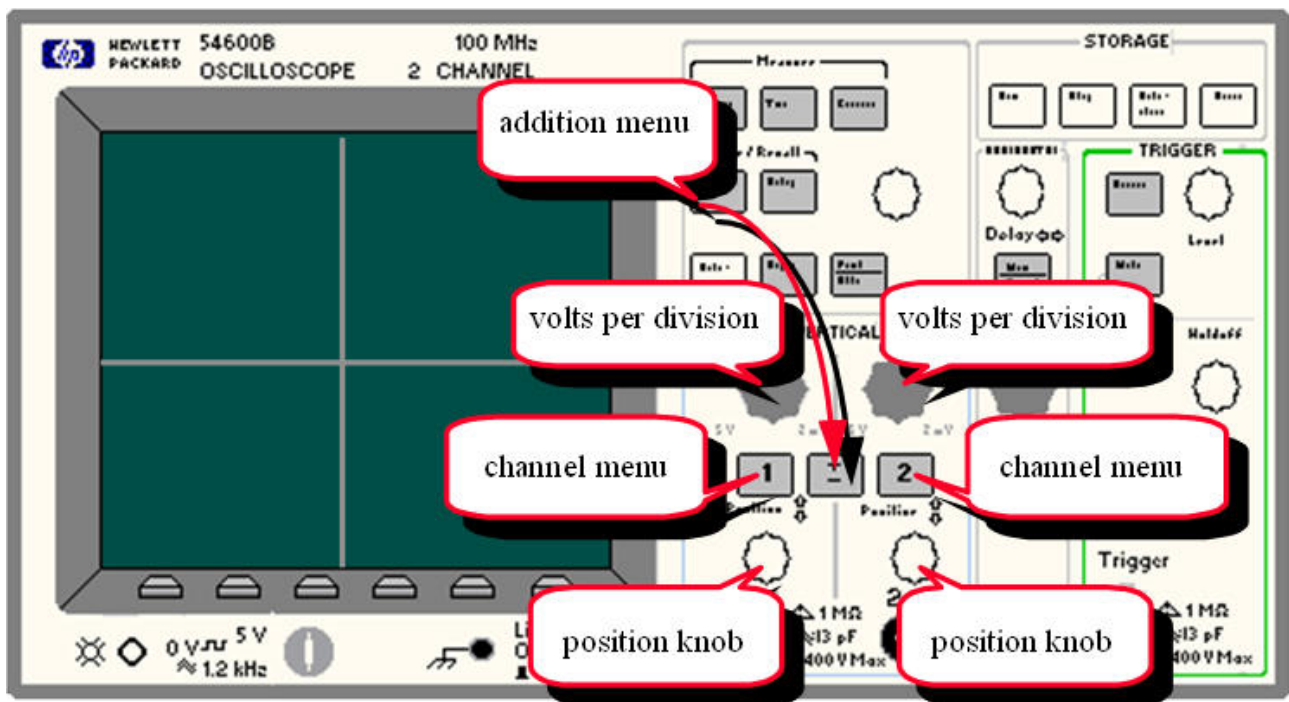


Aliasing
 $f_{\text{sampling}} < 2 f_{\text{signal}}$

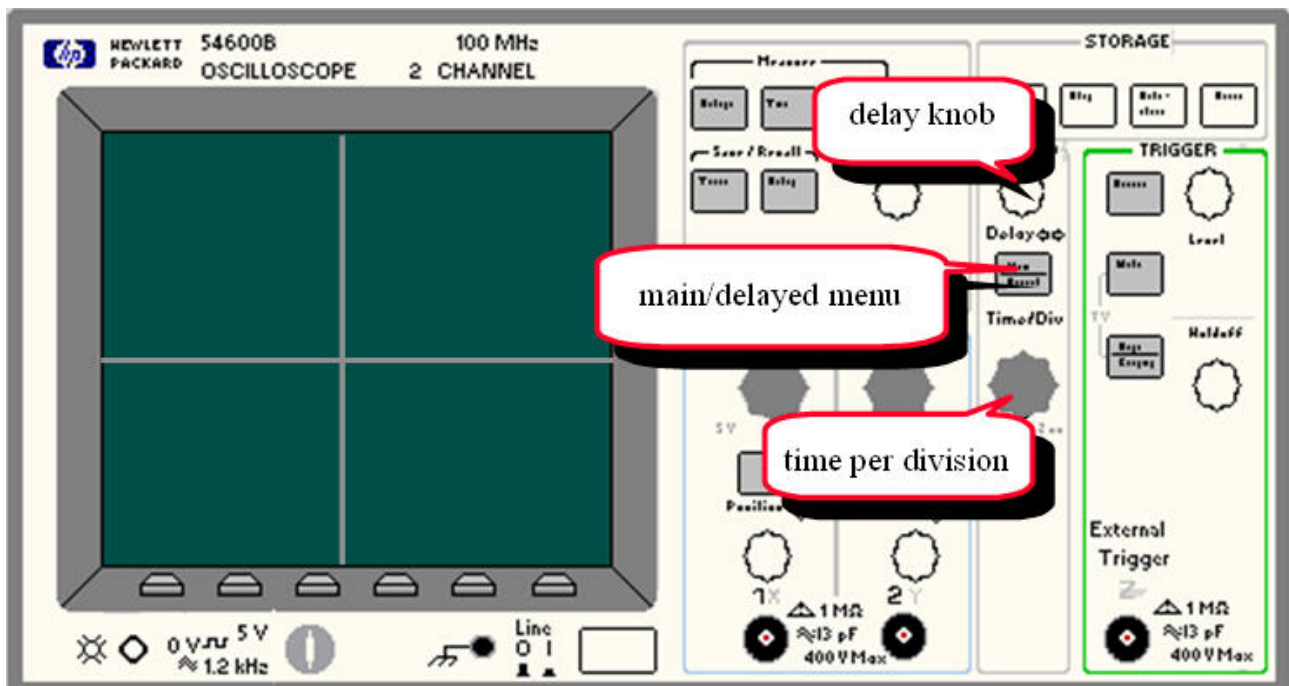
Pannello frontale dell'oscilloscopio digitale HP54600B



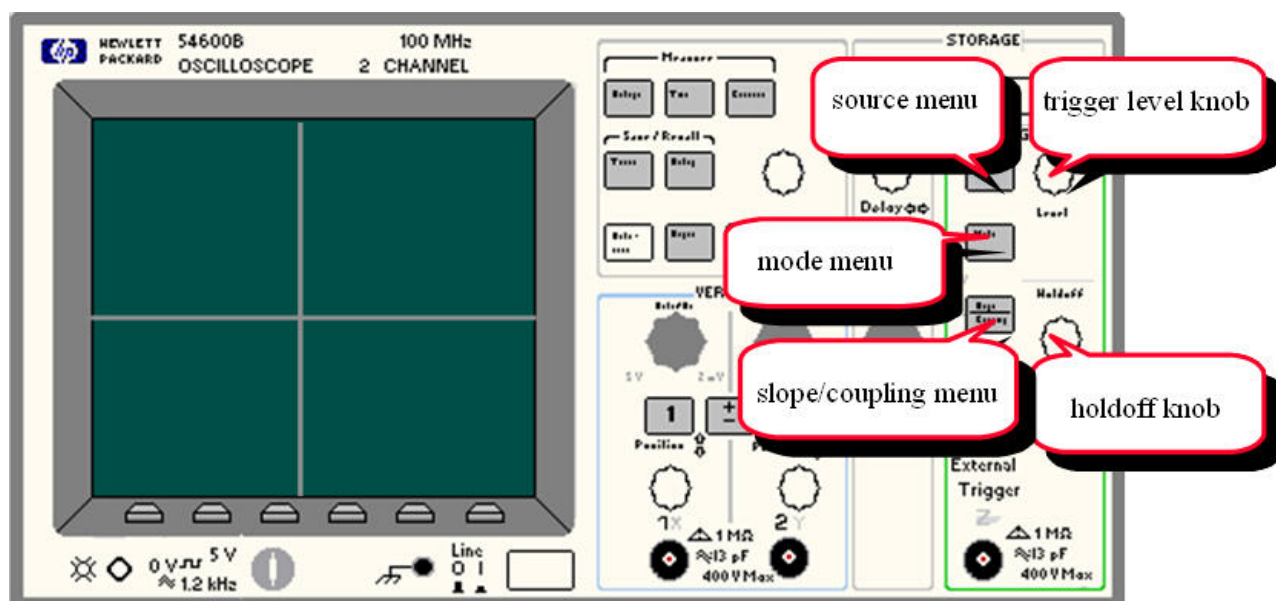
Menù Verticale



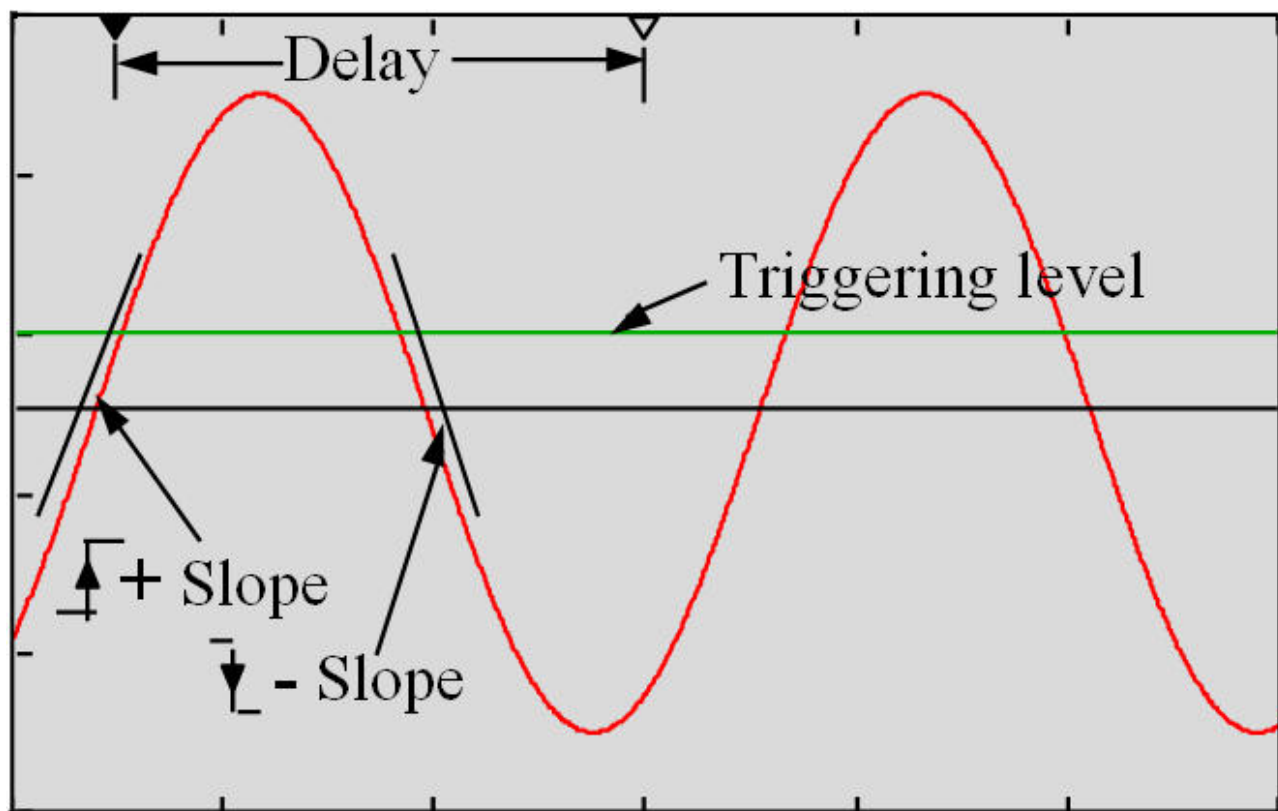
Menù Orizzontale



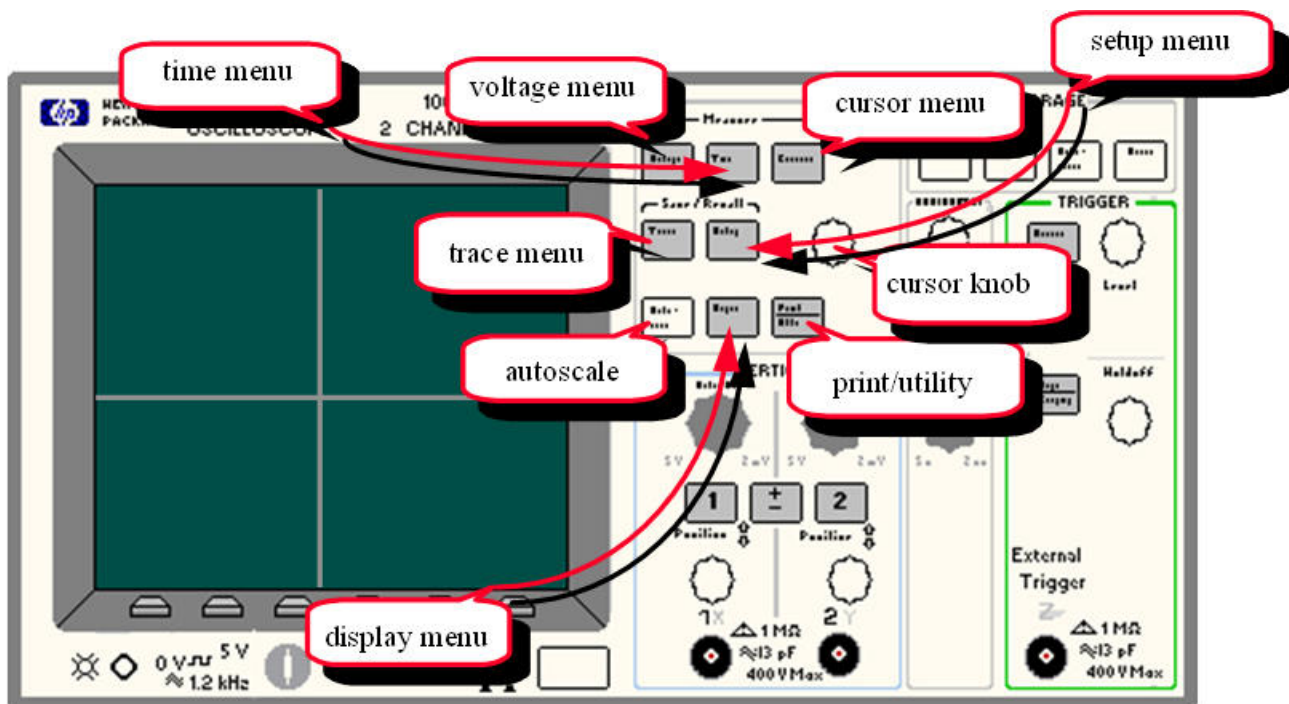
Menù di Trigger



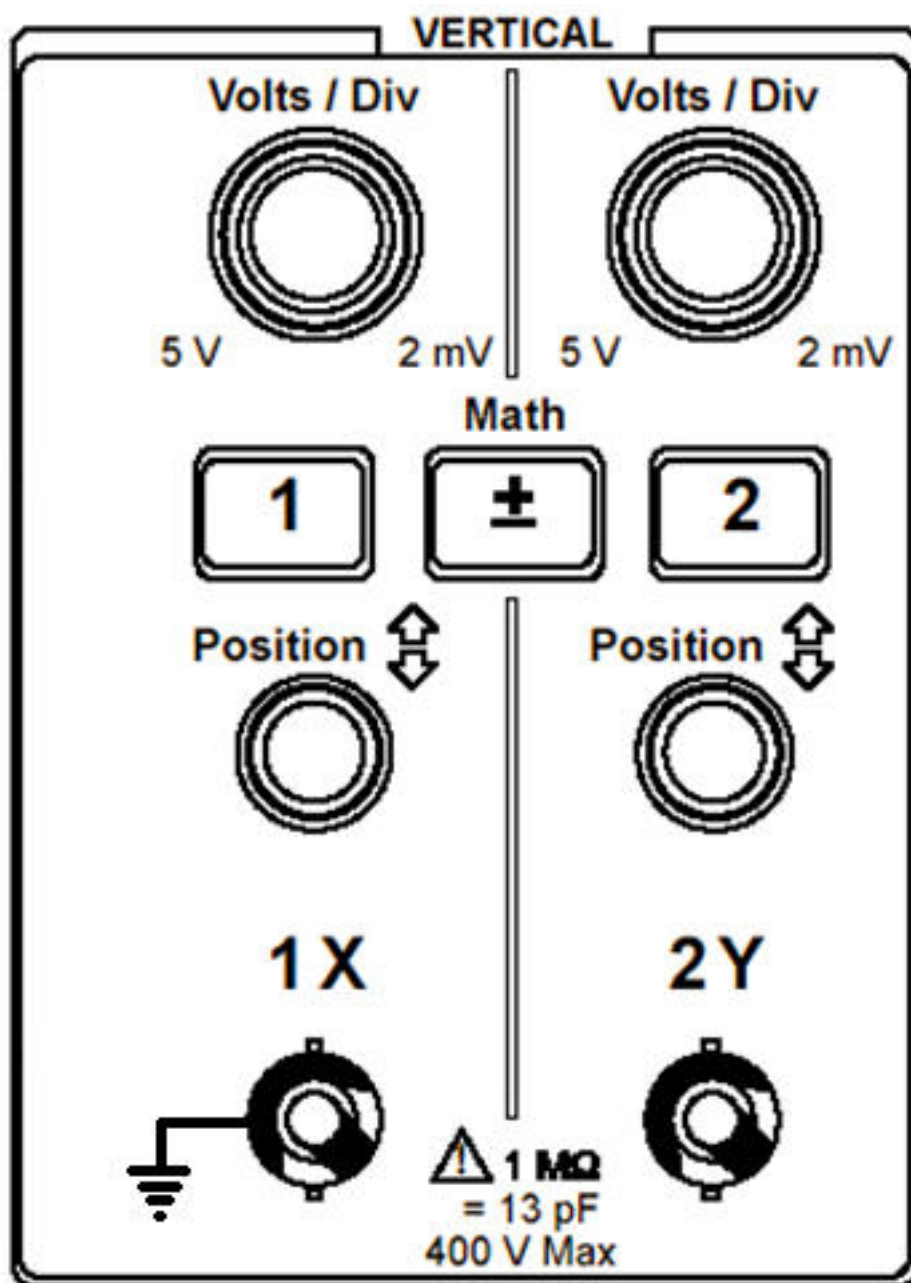
Triggering



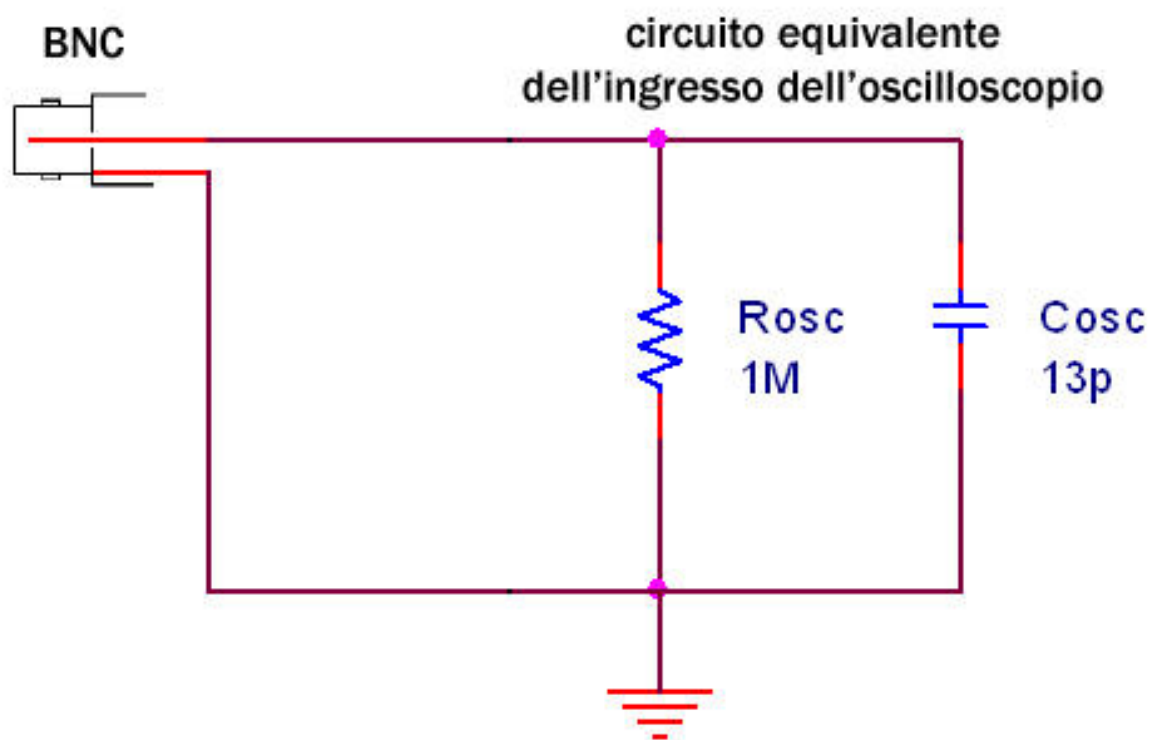
Misure automatiche e traccia



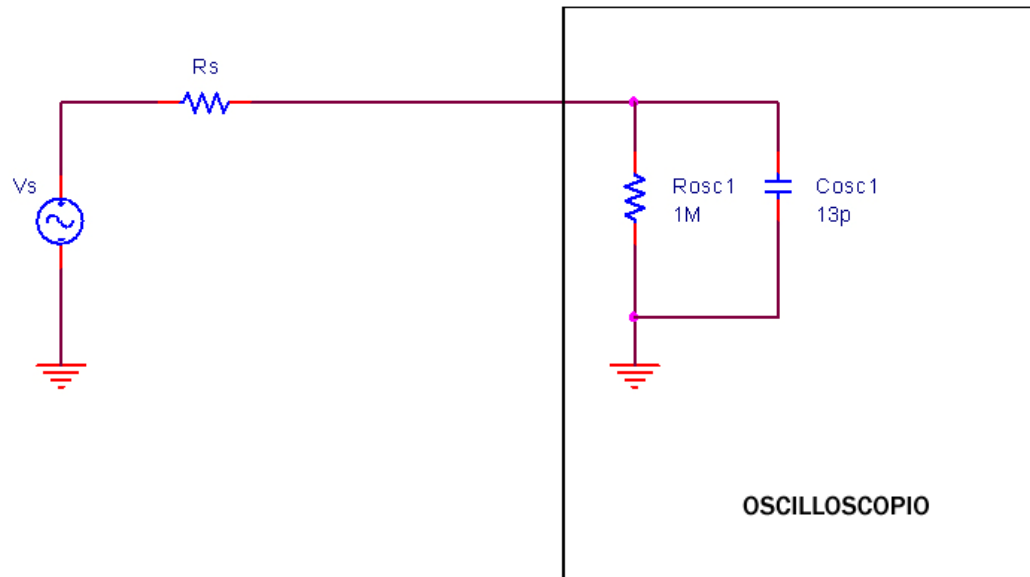
Canali d'ingresso



Canali di ingresso

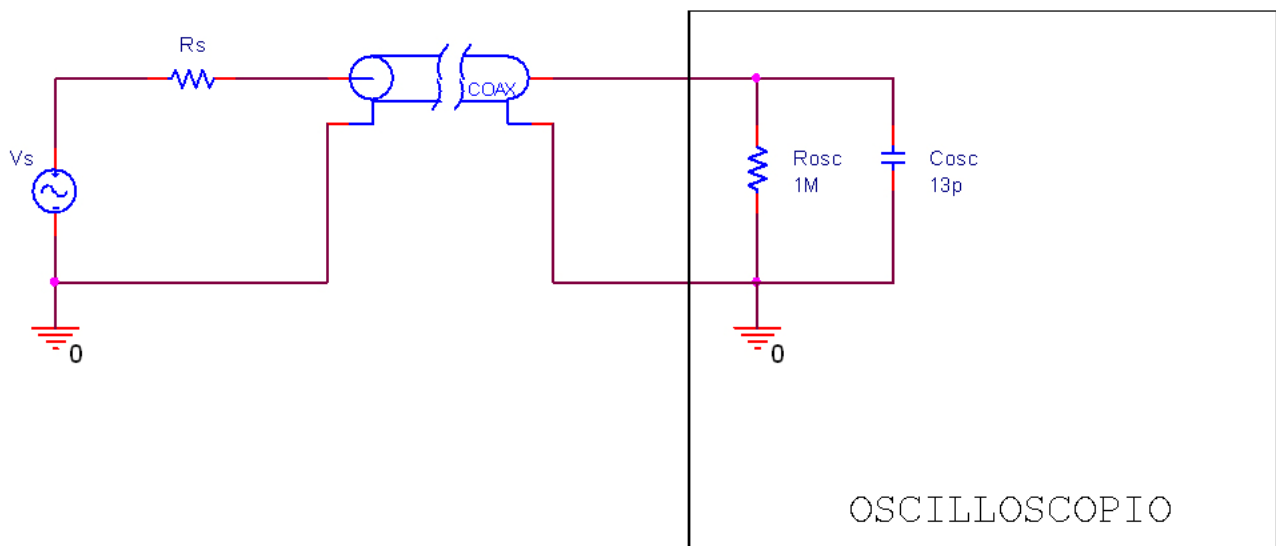


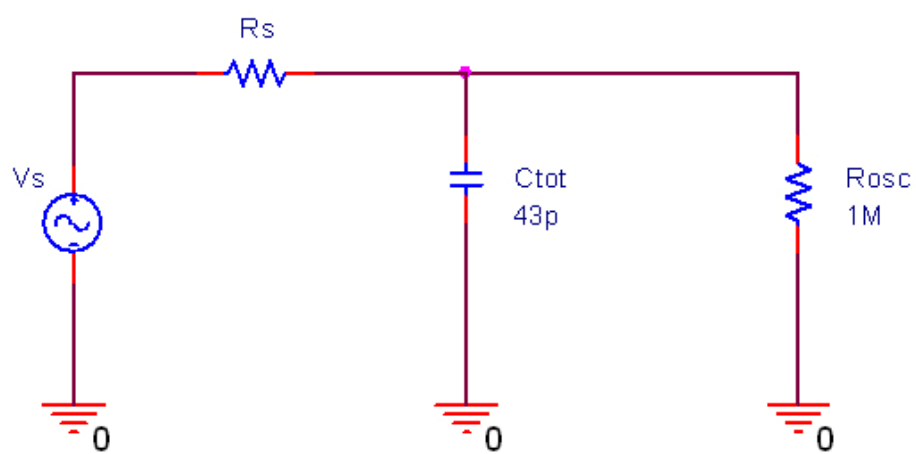
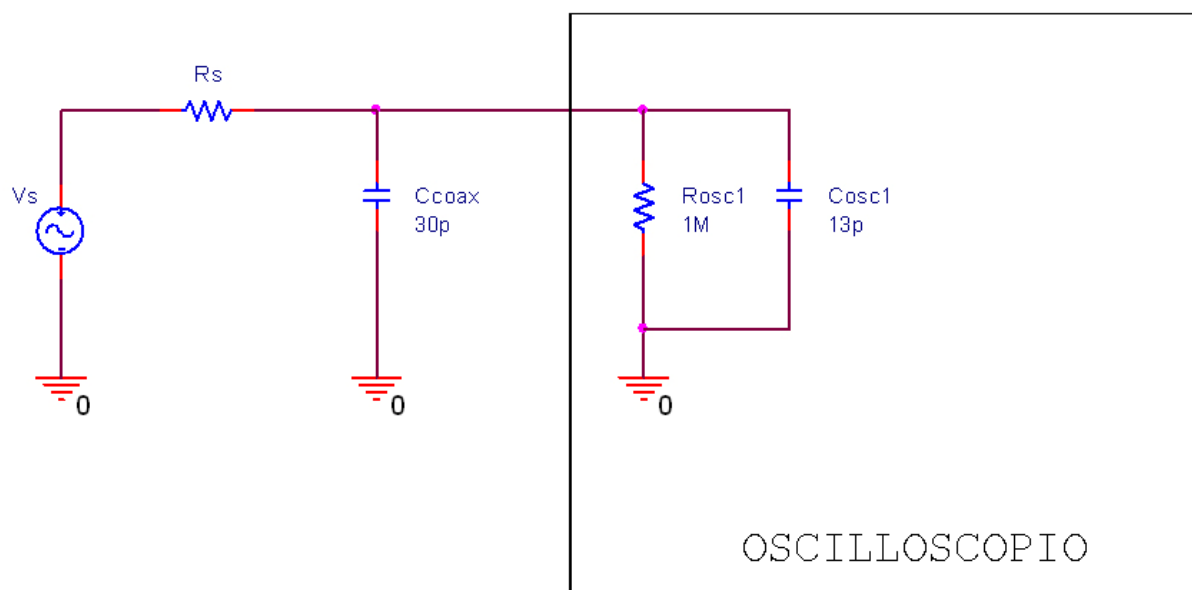
Banda dell'oscilloscopio \leftrightarrow Rise Time



$$R_s \ll 1 \text{ M}\Omega \rightarrow f_T = \frac{1}{2\pi R_s C_{osc1}}$$

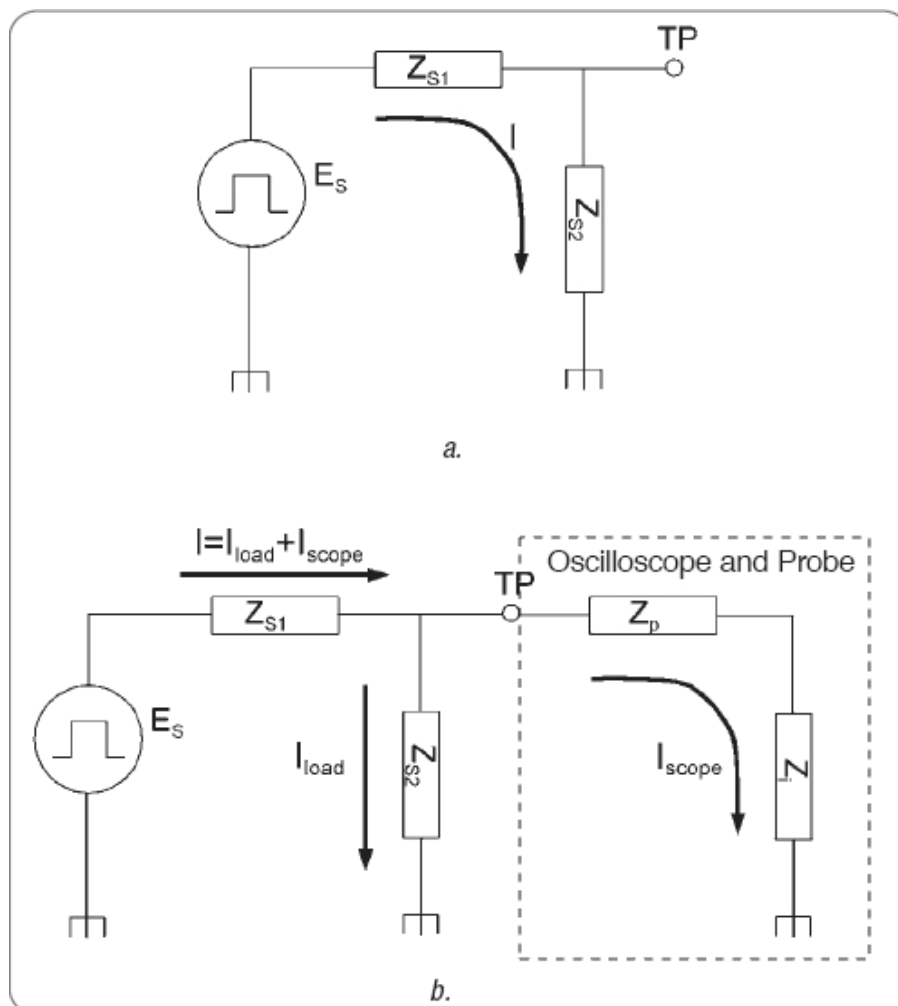
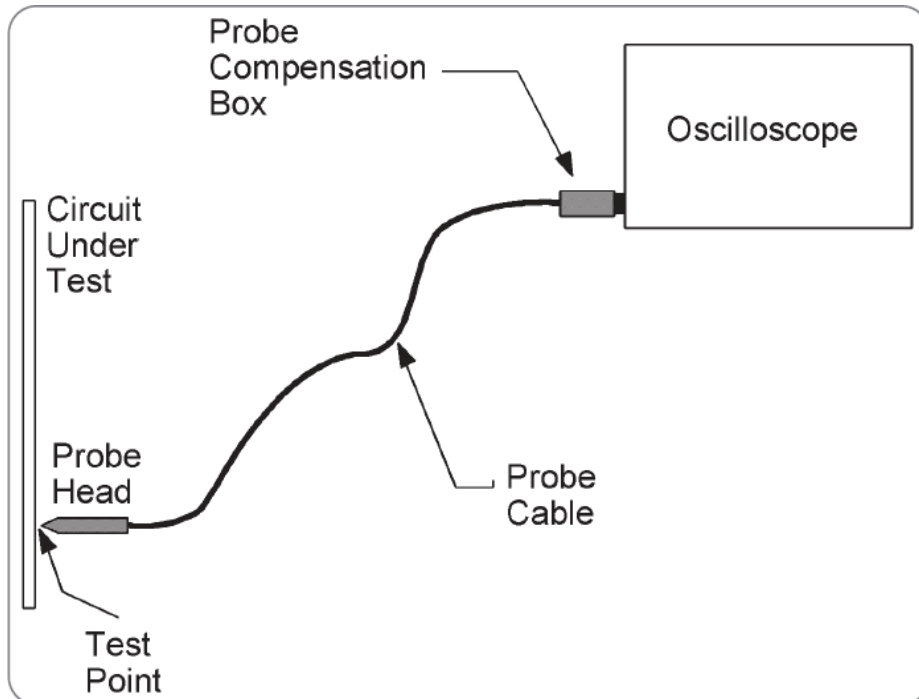
...con cavo coassiale



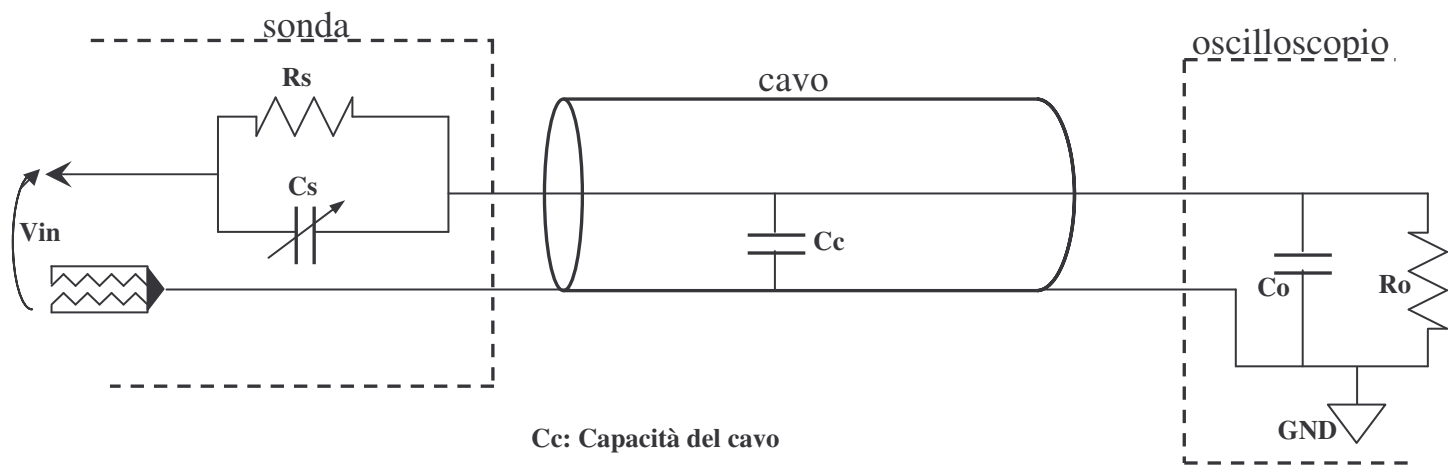


$$C_{tot} = C_{osc} + C_{coax}$$

Sonda Compensata



Sonda Compensata



C_c : Capacità del cavo

R_s : Resistenza della sonda

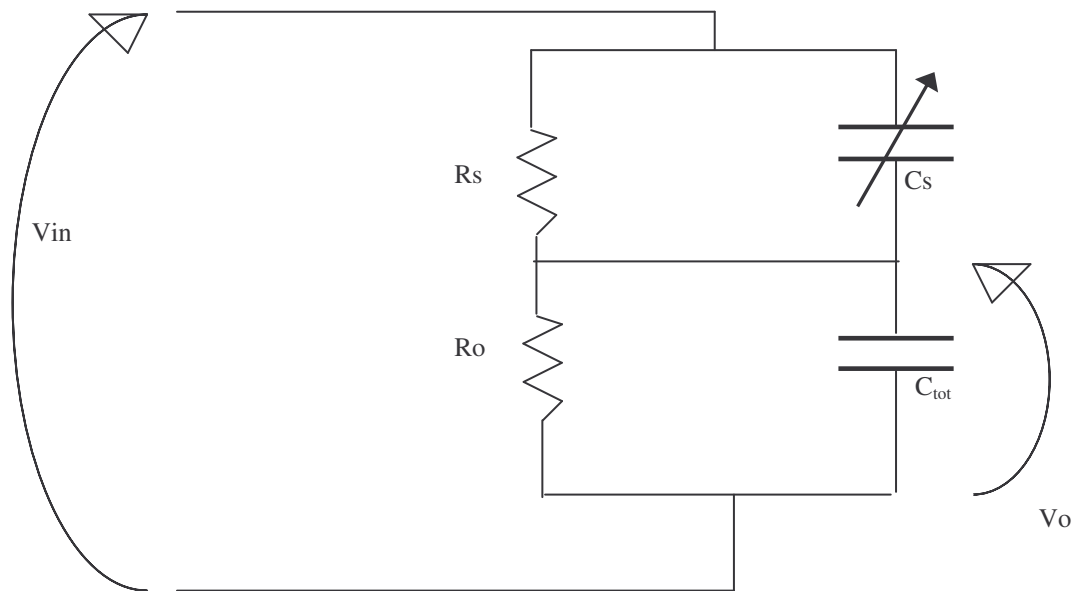
C_s : Capacità di compensazione della sonda

C_o : Capacità di ingresso dell'oscilloscopio

R_o : Resistenza di ingresso dell'oscilloscopio

CALCOLO DEL PARTITORE COMPENSATO

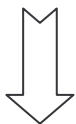
$$C_{tot} = C_C + C_O$$



$$V_o = V_{in} \frac{\frac{R_o}{1 + j\omega R_o C_{tot}}}{\frac{R_o}{1 + j\omega R_o C_{tot}} + \frac{R_s}{1 + j\omega R_s C_s}}$$

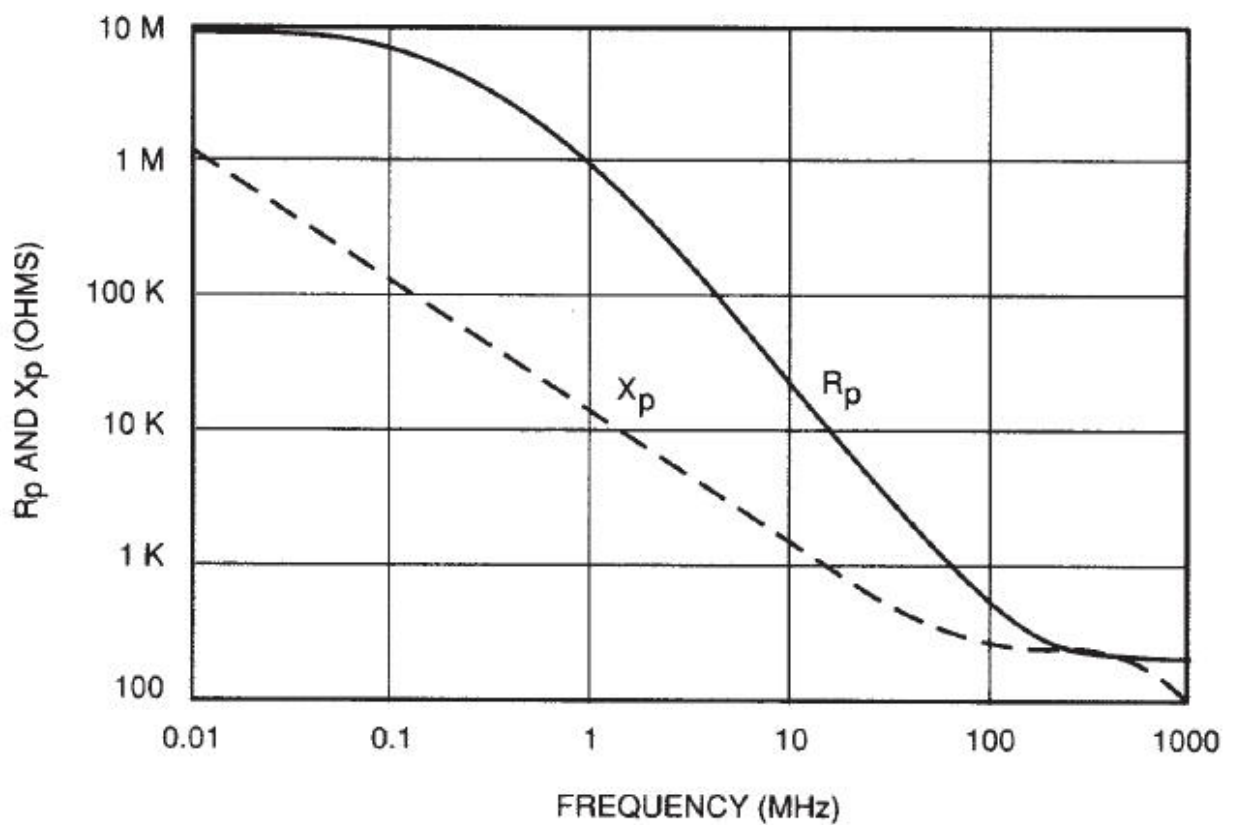


$$\frac{V_o}{V_{in}} = \frac{R_o}{R_o + R_s \left(\frac{1 + j\omega R_o C_{tot}}{1 + j\omega R_s C_s} \right)}$$



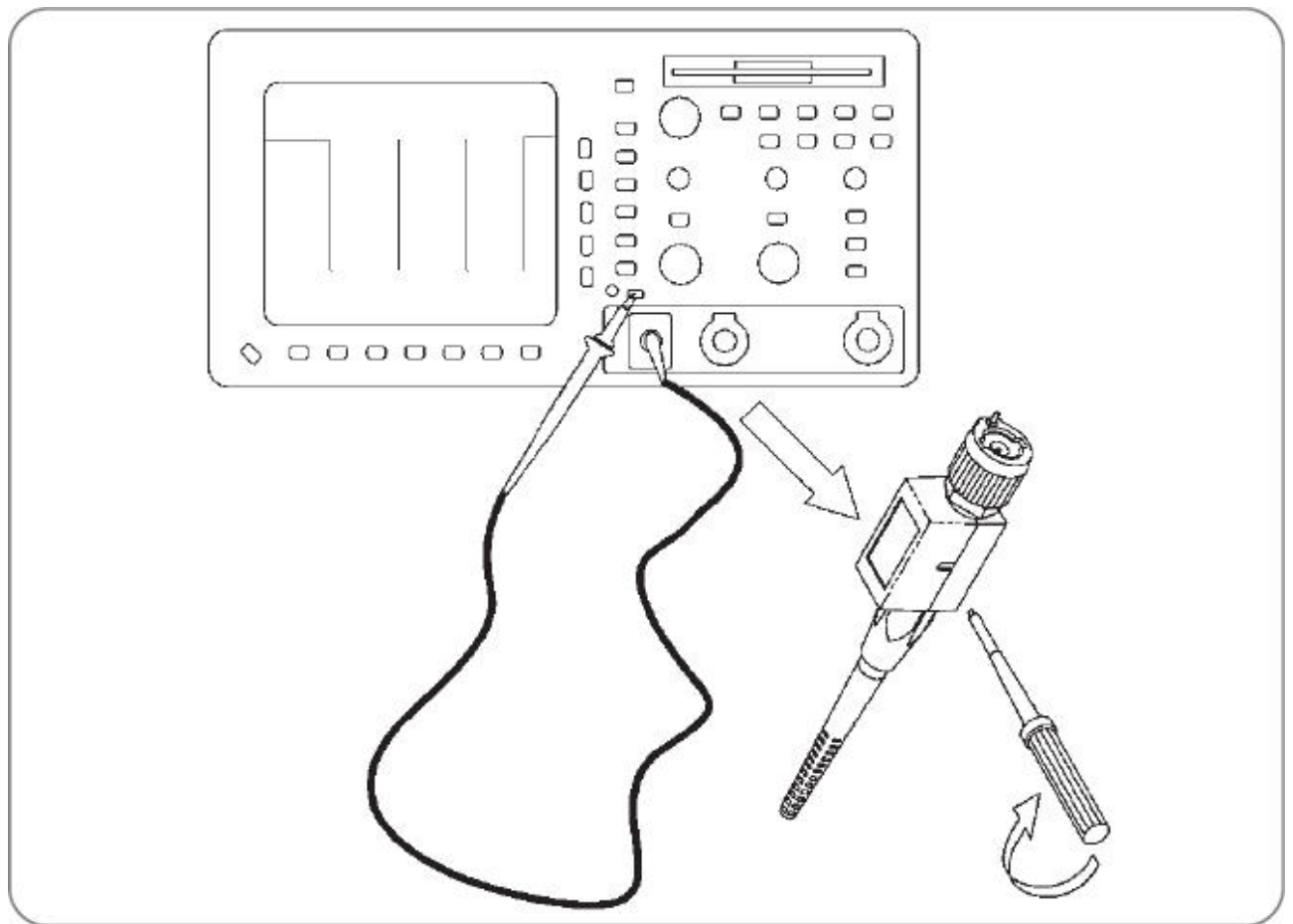
se $R_s C_s = R_o C_{tot}$ $\frac{V_o}{V_{in}} = \frac{R_o}{R_s + R_o} \quad \forall \omega (?!?)$

Impedenza reale di sonda + oscilloscopio

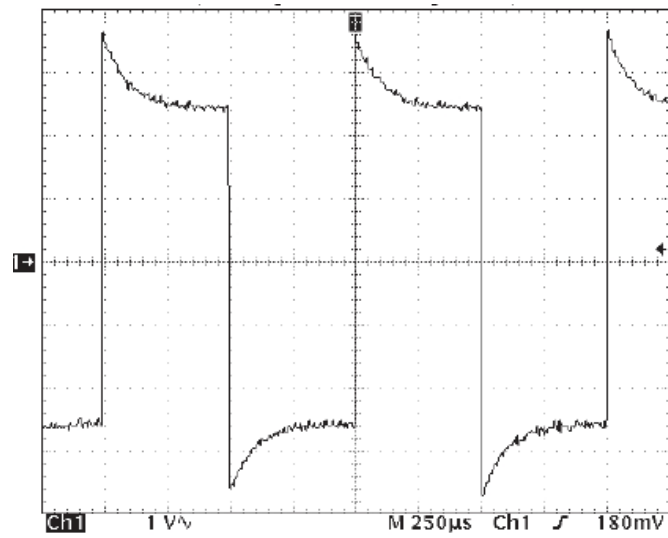


X_p and R_p versus frequency for a typical 10 M Ω passive probe.

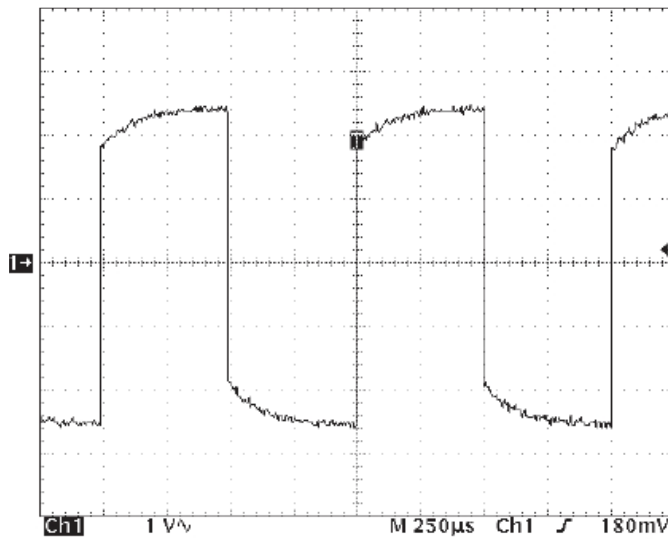
Compensazione della sonda



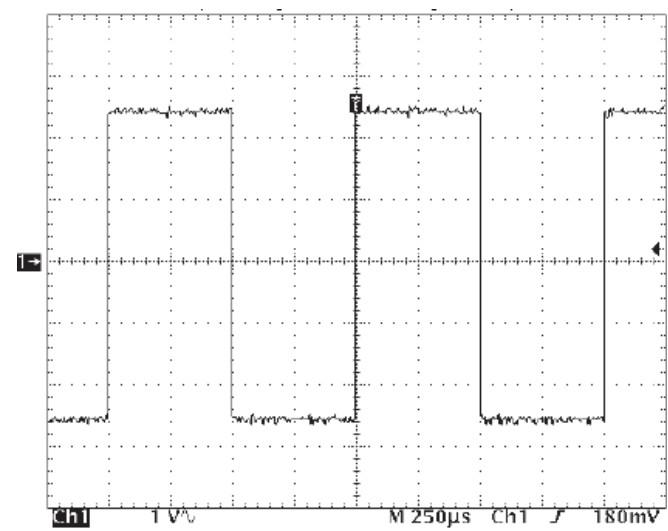
Probe compensation adjustments are done either at the probe head or at a compensation box where the box attaches to the oscilloscope input.



a. Overcompensated.



b. Under compensated.



c. Properly compensated.

Generatore di forme d'onda

Genera forme d'onda:

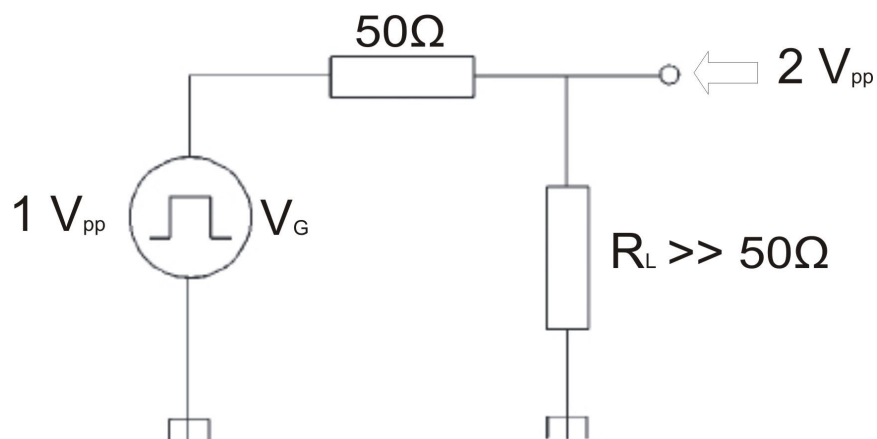
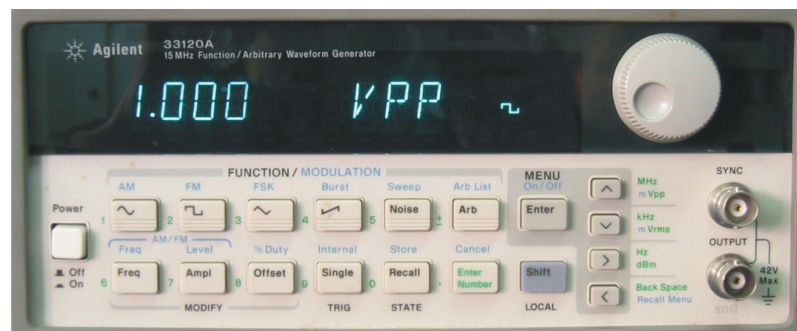
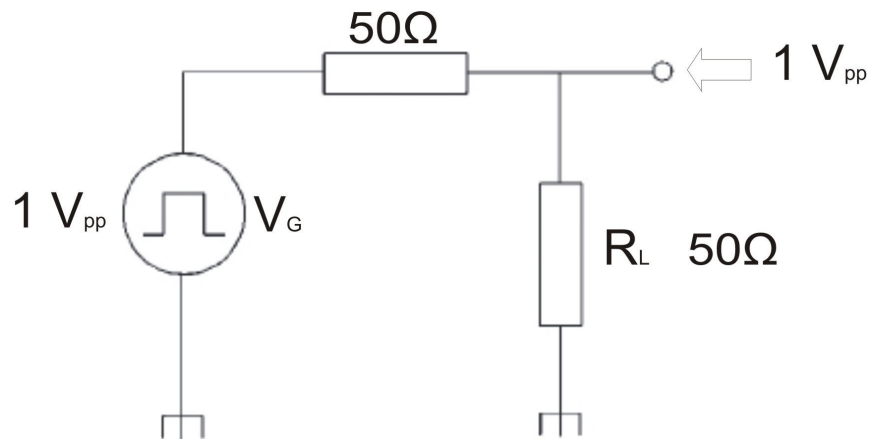
- Sinusoidali
- Quadre
- Triangolari
- Dente di sega
- Arbitrarie

Permette la regolazione di:

- Frequenza
- Ampiezza
- Offset
-

Generatore di forme d'onda

Impedenza di uscita



Alimentatore da banco

- 1 uscita singola
- 1 uscita duale

ATTENZIONE

Il morsetto di riferimento (massa) è quello indicato dalla scritta “COM”.

Il morsetto con il simbolo di terra è connesso al case metallico.

ATTENZIONE

La spia luminosa indicata con la scritta “OVL” (Overload) si accende in caso di cortocircuito dell'alimentazione: spegnere immediatamente l'alimentatore.

RACCOMANDAZIONI

- Non usare la sonda compensata per connettere il generatore di forme d'onda al circuito in prova: per fare questo ci sono i cavi coassiali terminati con due coccodrilli.
- Connettere sempre tutti i riferimenti di massa assieme.

Appunti su ...

www.echommunity.com/uscnd

poi cliccare su “courses” a sinistra