

Oscilloscope probes

- In high frequency and pulse applications, the input capacitance of the oscilloscope begins to load the circuit.
- The effect of probe is to increase the input resistance of the oscilloscope.

Types of probes

1) Passive Probes

- It is simplest of all the probes.
- Uses shielded co-axial cable.
- Avoids stray pick-ups which may create problems when low level signals are being measured.
- Usually used for low frequency or low impedance circuits.

Types of probes

- Using the shielded probe, the shunt capacitance of the probe and cable is added to the input impedance and capacity of the scope and acts to lower the response of the oscilloscope to high impedance and high frequency circuits.
- External high impedance probes are used to increase the input resistance and reduce the effective input capacitance of an oscilloscope.

Types of probes

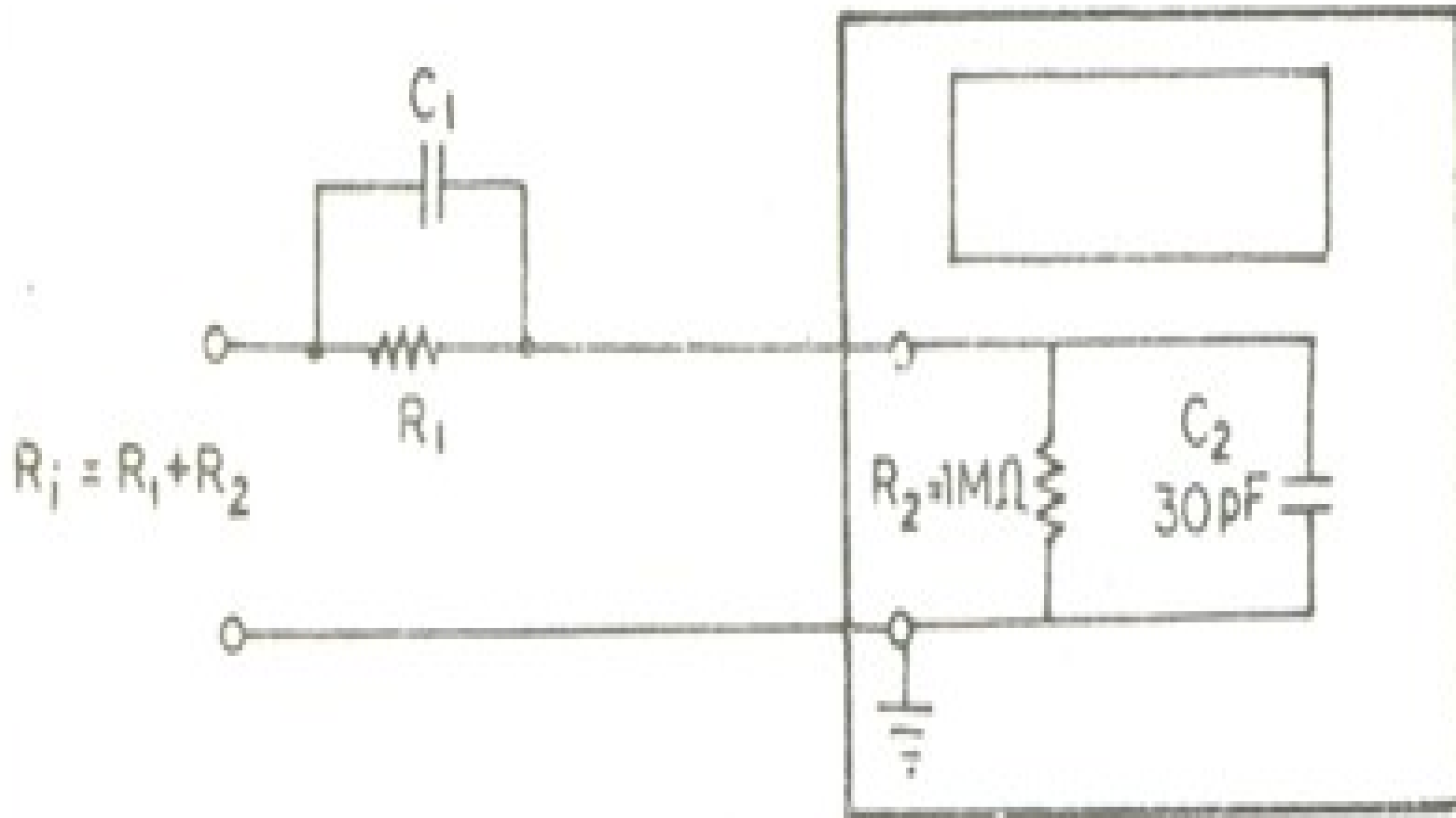
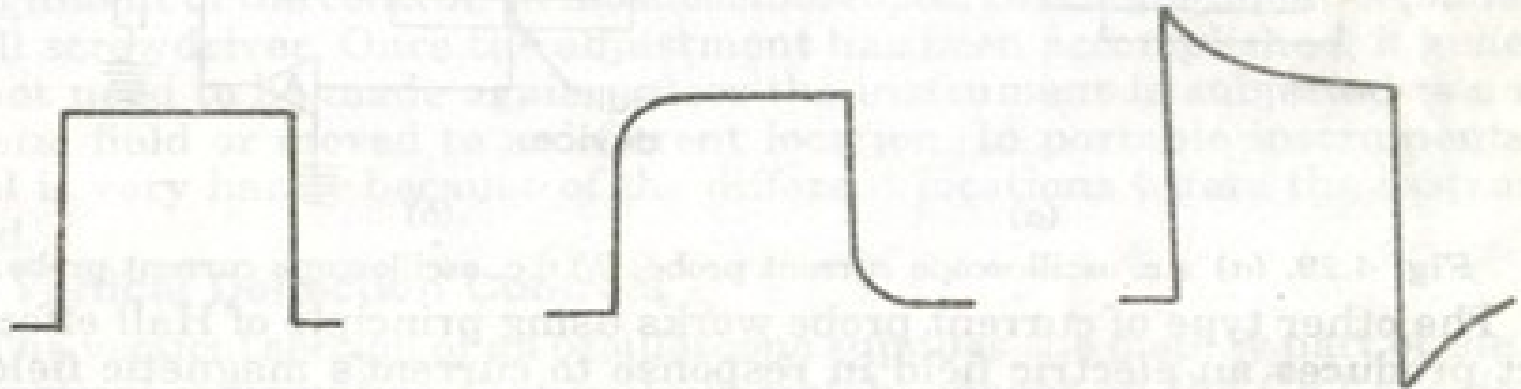


Fig. External High Impedance Probe.

Types of probes

- A resistor and capacitor combination can be added to an oscilloscope.
- $R_1 = R_2(k-1) = (1 \times 10^6)(10-1) = 9 \text{ M}\Omega$
- $C_1 = C_2 / (k-1) = 30 \times 10^{-12} / (10-1) = 3.33 \text{ pF}$
- New input impedance R1 is the total resistance,
- $R_i = R_1 + R_2 = 10 \text{ M}\Omega$
- $C_i = C_1 C_2 / (C_1 + C_2) = 3 \text{ pF}$

Types of probes



(a) Correct compensation.

(b) Value of C_1 too small.

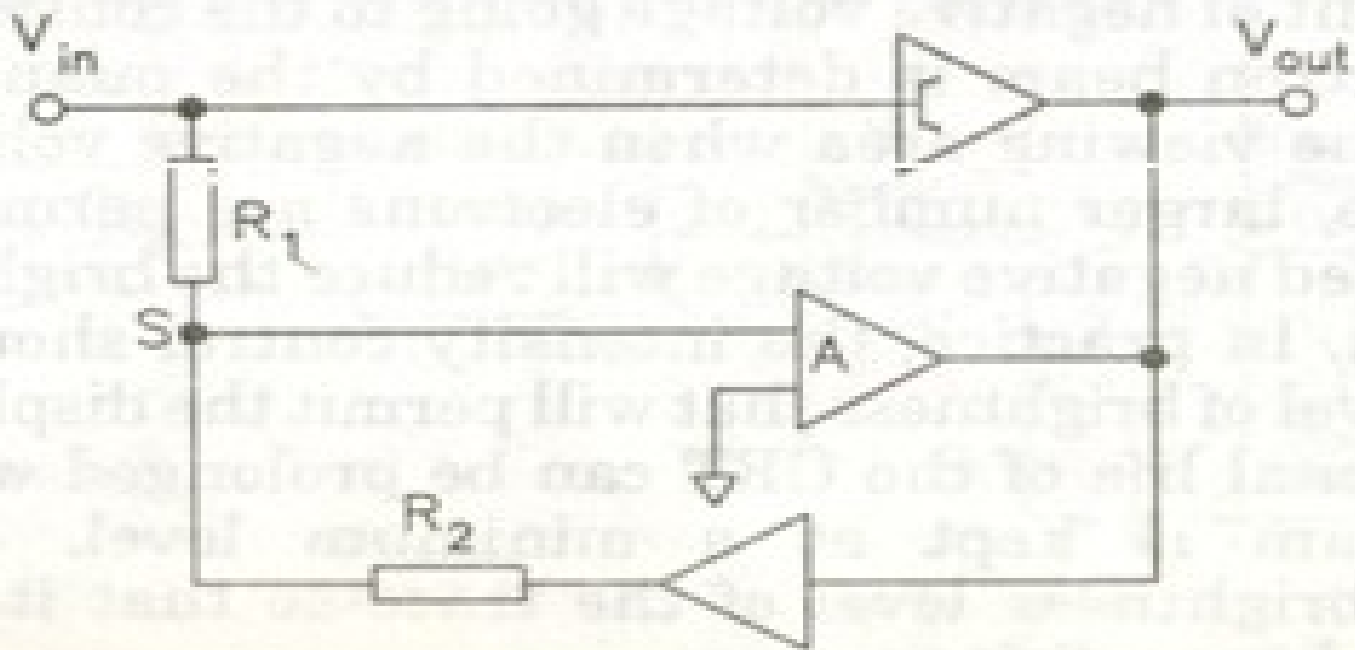
(c) Value of C_1 too large.

Effect of probe capacitance compensation on display of square waveform.

Types of probes

2)Active Probes:-

Block diagram of FET probe



Types of probes

- Passive probe is mostly used voltage probe.
- It is apparent that low capacitive loading can be obtained at the expense of considerable attenuation.
- These problems can be overcome by using active(FET) probe.

TYPES of probes

3)CURRENT PROBES-

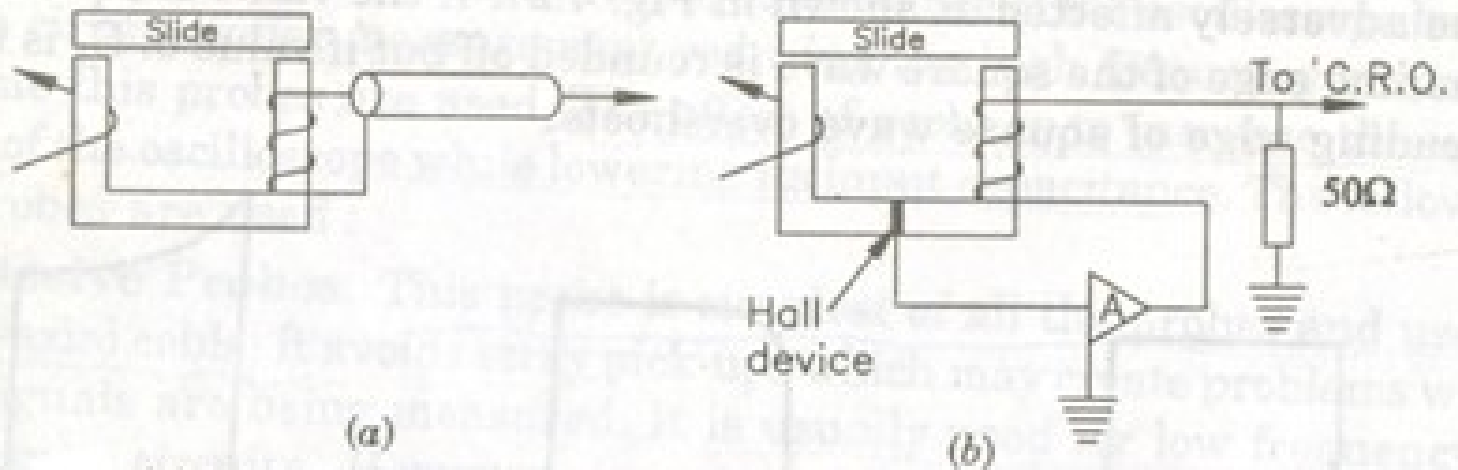


Fig.

(a) a.c. oscilloscope current probe, (b) d.c. oscilloscope current probe.

TYPES OF PROBES

- The arrangement of figure which have a core that may be slid open to allow the current carrying conductor to be inserted.
- This works on principle of transformer, with one winding of the transformer being the measured wire.
- The probes using this principle are used for a.c. measurements only.

TYPES of probes

- Oscilloscopes are designed for voltage, but can be used to measure current using current probe.
- The current probe has set of jaws which encloses the wire that the measured current is flowing through.
- No connection is required.