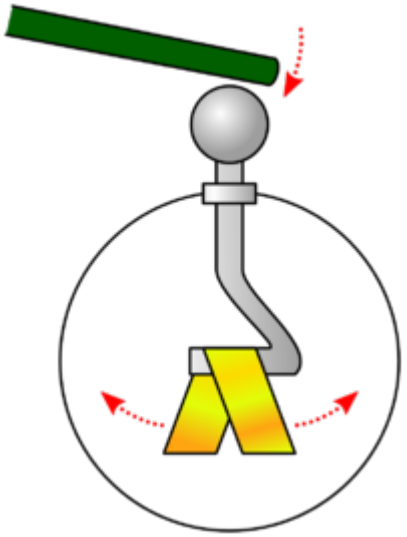


Electro(scope)meter

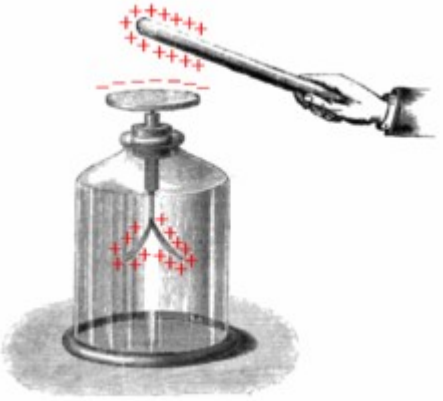
Vishal

Electroscope

- An *electroscope* is used to detect the presence and magnitude (qualitative) of electric charge on a body. It was the first electrical measuring instrument.
- The first electroscope, a pivoted needle called the versorium, was invented by British physician William Gilbert around 1600.
- The pith-ball electroscope and the gold-leaf electroscope are two classical types of electroscope that are still used in physics education to demonstrate the principles of electrostatics.

Gilbert's versorium.

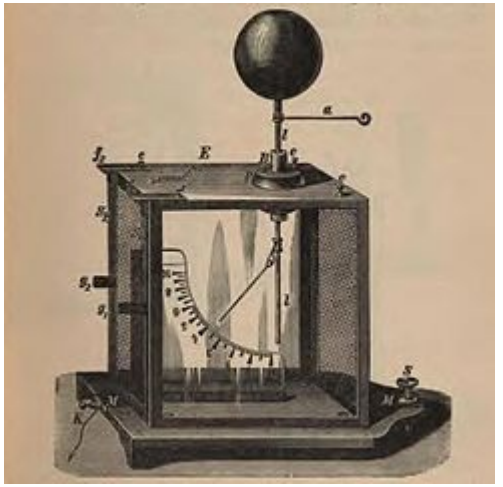
Pith ball electroscope from the 1870s, showing attraction to charged object



Gold leaf electroscope

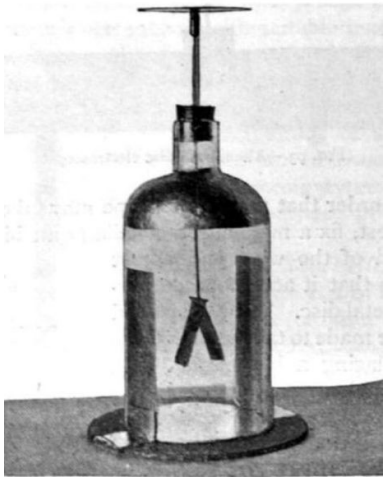
Electroscope

"Condensing" electroscope, Rome University physics dept.



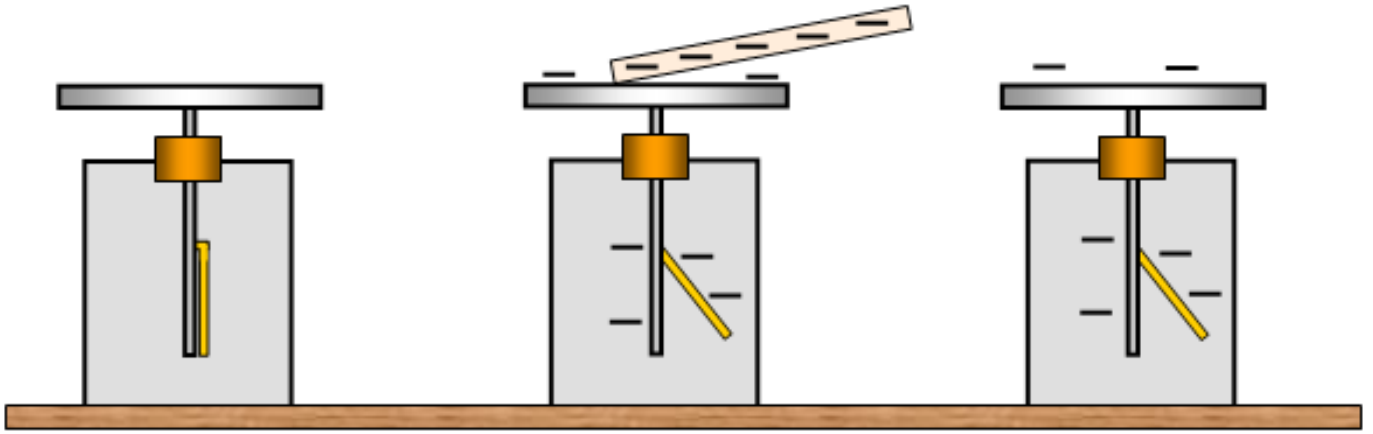
Kolbe electrometer

Quadrant electrometer, 1903, Cambridge Scientific Instrument Company, s/n 16979

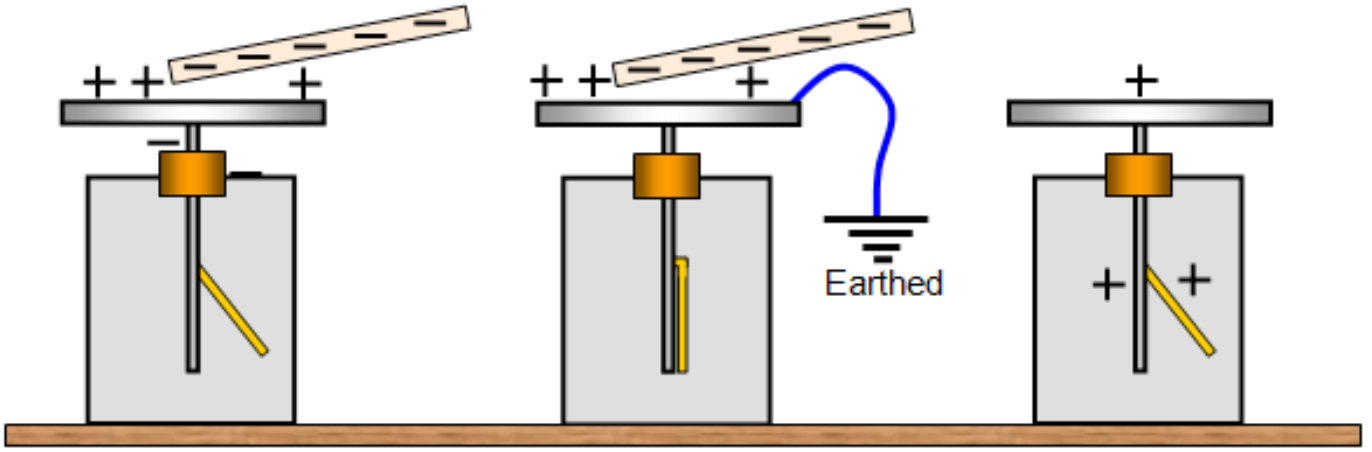


Homemade electroscope, 1900

Charging Methods

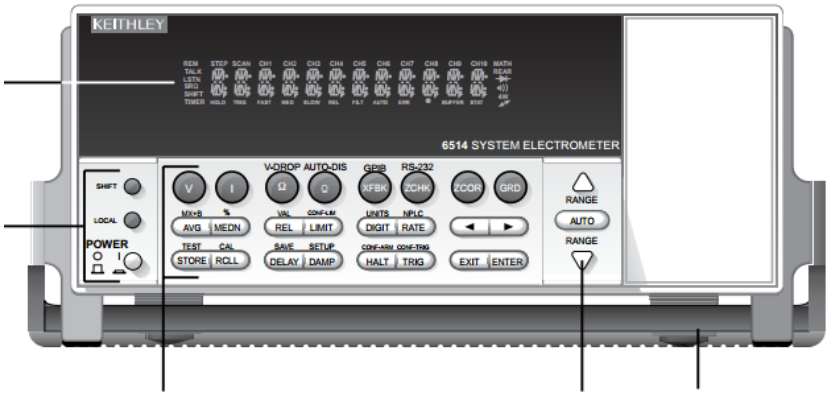


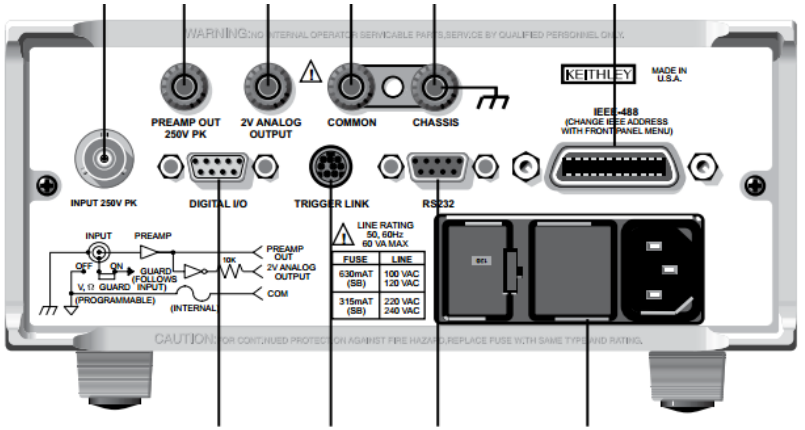
Charging by contact



Charging by induction

Measurement Range





Keithley 6514 Electrometer

Parameter	Range
Charge	10fC to 2.1μC
Current	100aA to 21mA
Resistance	10mΩ to 210GΩ
Voltage	10μV to 210V

Charge Measurement

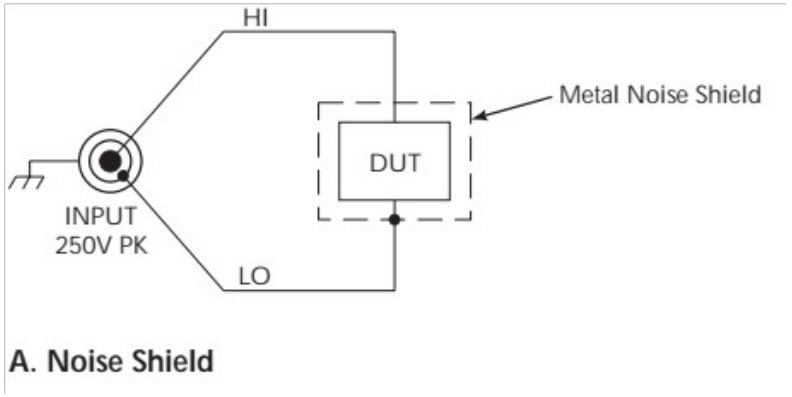
An accurately known capacitor is placed in the feedback loop of the amplifier so that the voltage developed is proportional to the integral of the input current in accordance with the following formula:

$$V = \frac{1}{C}\int i\,dt = \frac{Q}{C}$$

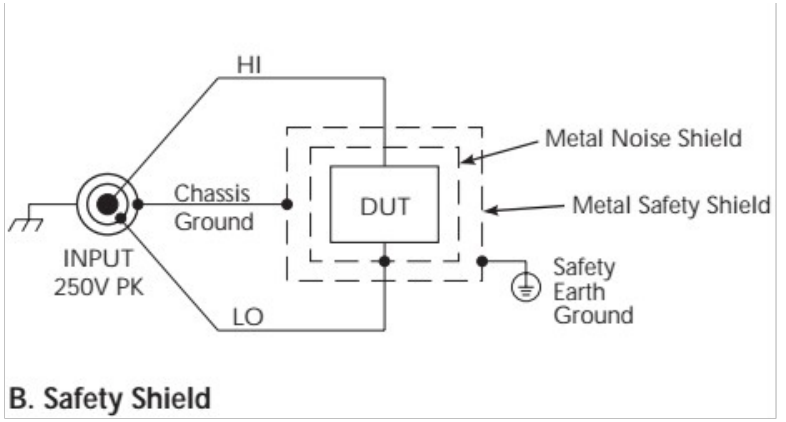
Where; V is the voltage
C is the known capacitance
Q is the charge

The voltage is scaled and displayed as charge.

Measurement Technique



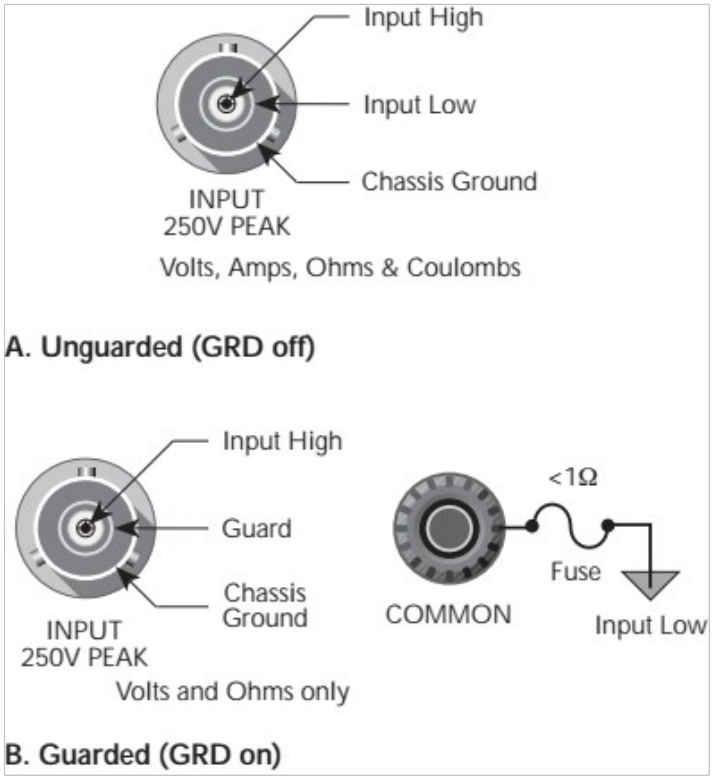
A. Noise Shield

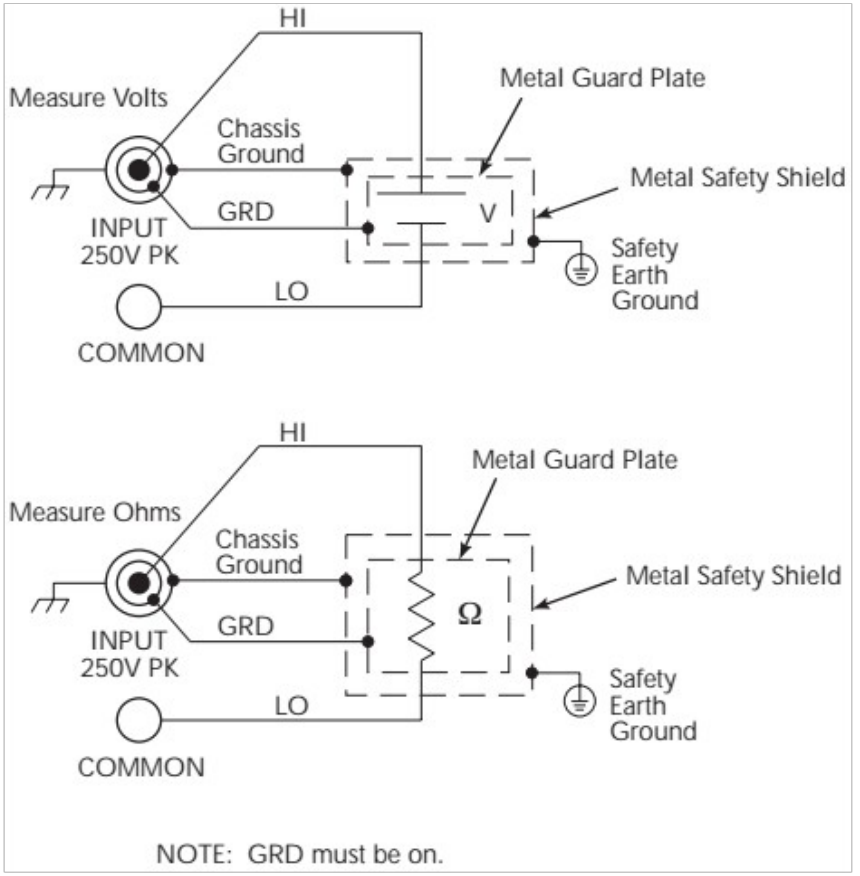


B. Safety Shield

A noise shield is used to prevent unwanted signals from being induced on the electrometer input.

Guarded Connection





The driven guard is used to eliminate leakage current and capacitance in high impedance circuits which could corrupt the volts or ohms measurement.

The Nobel Prize in Physics 1936

Victor F. Hess, Carl D. Anderson

During the years that followed the discovery of radioactive rays a search was made throughout nature for radioactive substances: in the crust of the earth, in the seas, and in the atmosphere; and the instrument just mentioned - the electroscope - was applied. Radioactive rays were found everywhere, whether

Thank You