

# Problem: Noisy Readings in High Resistance Measurements

Noisy readings prevent accurate measurement, and reduce the effective resolution.

## Probable Cause: Electrostatic Coupling

Electrostatic coupling is the most common reason readings may be noisy when making high resistance measurements. Electrostatic interference occurs when an electrically charged object is brought near an uncharged object. At low impedance levels, the effects of the interference are not noticeable because the charge dissipates rapidly. However, high resistance materials do not allow the charge to decay quickly, which may result in unstable measurements. Shielding

and guarding are both important with high resistance measurements.

## Remedies

A. *Shielding* usually is the use of a metallic enclosure to prevent electrostatic interference from affecting a high impedance circuit. A shield can be built to enclose the circuit being measured. With this shield in place, the noise current generated by the electrostatic voltage source and the coupling capacitance flows through the shield to ground rather than through the signal conductors. The easiest shield to make is a simple metal box or mesh screen that encloses the test circuit and is

connected to the low impedance point on the measurement instrument. If this point is floating above ground, then observe special safety precautions to prevent any shock hazard. It is also important to shield the cabling.

B. *Guarding* is the use of an added low impedance conductor, maintained at the same potential as the high impedance circuit, which will intercept any interfering voltage or current. The guard can be connected to the instrument's guard terminal, if available, or fed from an external buffer amplifier. A guard does not necessarily provide electrostatic shielding. 

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