About Meter "Interpolation"

I first encountered the term meter "interpolation" after asking a question of an instructor in a GM training class in Hinsdale, Illinois in l989. I wanted to know why two different ohmmeters we were using to measure the exact same component read slightly different values. The instructor said it was due to "meter interpolation". I think I finally have a handle on what he meant and I will share it with you.

Meters use very precise and sophisticated solid state electronic components. These materials are very similar in metallurgical and chemical make-up; but, they are never *exactly* the same. The slight differences in their material make-up account for slight variations in how each meter interprets what it is measuring, be that ohms, volts, or amps.

Understanding meter interpolation begins with looking at the range of voltage required to turn on or forward bias a diode. If the diode is made from germanium, the value of voltage required to turn it on is given as a range from 300mV (.300V) to 500mV (.500V). If the diode is made from silicon, this value is given as a range from 500mV (.500V) to 700mV (.700V). In actual testing, I have seen germanium diodes turn on at a voltage as low 247mV (.247V) and some silicon diodes at as low as 452mV (.452V). The range of mV required to turn on a diode is listed based on observed, measured, and recorded reactions in live circuits

As you can see, the voltage required to turn on a diode is determined first of all by what material it is made from, and also, by how that material will react to the presence and pressure value of the potential difference (voltage) across the diode when that voltage is in the "turn on" or "forward bias" position.

I use a diode (see page 237+ "About Diodes") as my solid state device to get you to understand meter interpolation because it is the P/N junction or "forbidden gap" of the diode, or other solid state devices, that influence the values of voltage required to turn on or forward bias this junction. The development of the diode eventually led to the development of the transistor and from there to where we are with today's electronics.

The P/N junction of a diode, or any other solid state device, is constantly active with some minute measure of "bleed current" even when they are in the off or reverse bias position. How much current bleeds across this junction varies dependent upon the chemical make-up of each solid state device. The more or less bleed current when in the off or reverse bias state influences whether or not the junction will turn on or forward bias at 500mV (.500V), or 700mV (.700V). This is as close a range that the chemistry in each P/N junction will allow. This range is present in all solid state materials that make up the sophisticated circuitry in our meters. This is what causes one meter to read out a different value than another meter measuring the exact same component whether you are reading ohms, volts, or amps.

The meter manufacturer lists these slight variations as a meter's accuracy, for instance, plus or minus .1% +2. The +2 means that the meter has the overall accuracy listed and due to meter interpolation, the last digit displayed could vary by as much as 2 digits on a 10 digit scale.

Meter interpolation: The meter interprets the value of the measurement as precisely as it can subject to the value of bleed current across any and all P/N junctions that make up the circuitry used when measuring whatever value is measured, be that ohms, volts, or amps.