

## Resistance Meter Calibration Checking

It is recommended that resistance meters, other than those that self-calibrate, such as the Miller 400D Resistance Meter, have their calibration checked by the manufacturer on an annual basis.

Periodic calibration checking by users of resistance meters is also recommended. As indicated in the ASTM Standard (ASTM G 57), a commercial resistance decade box is recommended for periodic resistance meter calibration checking. One such commercial source for resistance decade boxes is IET Labs, Inc., of Westbury, NY ([www.ietlabs.com/decaderes.html](http://www.ietlabs.com/decaderes.html)).

Another option is to use an M. C. Miller 4-electrode soil box together with a “standard” solution electrolyte having a known conductivity and, therefore, a known resistivity.

The ASTM Standard (ASTM G 57) suggests using sodium chloride solutions having resistivity values of 1,000  $\Omega$ .cm, 5,000  $\Omega$ .cm and 10,000  $\Omega$ .cm for this purpose. These resistivity values correspond to the following conductivity values, respectively: 1000  $\mu$ S/cm, 200  $\mu$ S/cm and 100  $\mu$ S/cm.

A commercial source for “solution conductivity standards” is the Fisher Scientific Company. For example, at the time of writing, a sodium chloride solution standard having a conductivity value of 200  $\mu$ S/cm (@ 25°C), which corresponds to a resistivity for the solution of 5,000  $\Omega$ .cm (@ 25°C), was available under Fisher Scientific catalog number 223816.

By properly filling an M. C. Miller soil box with the 200  $\mu$ S/cm (5,000  $\Omega$ .cm) solution, for example, the solution resistance as measured by a calibrated 4 terminal resistance meter would be 5,000  $\Omega$  (5 k $\Omega$ ), since the M. C. Miller soil box has an L/A ratio of 1 inverse cm [ $R = \rho \times (L/A)$ ].

If a resistance reading differs significantly from the expected value associated with a particular solution conductivity standard (for example, the ASTM Standard suggests a 5% error limit), the resistance meter should be re-calibrated. Having the ability to independently check the conductivity of a solution standard would also be recommended (using a calibrated solution conductivity meter), particularly if the solution temperature in the soil box was not 25 °C, since the conductivity of a sodium chloride solution will be temperature dependent.

**Note:** The above process of using an M. C. Miller soil box in conjunction with a solution conductivity standard is also a method to check the calibration of the soil box itself, assuming that a properly calibrated resistance meter is used for the reading.