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Fall of Potential Method using the Syscal R1+
The method follows the IEEE Standard 81 – 2012 [1]

Connect the system

1. Connect the first cable reel to the female terminal labeled B on the front panel of the meter (Figure 1)

   A) Connect the other end of the cable reel to the current electrode (CE) (Figure 2)

2. Connect the second cable reel to the female terminal labeled M on the front panel of the meter (Figure 1)

   A) Connect the other end of the cable reel to the potential electrode (PE) (Figure 2)

3. Connect the third cable reel to the female terminal labeled A on the front panel of the meter (Figure 1)

   A) Connect the other end of the cable reel to the ground (G) / electrode under test(Figure 2)

4. Connect the fourth cable reel to the female terminal labeled N on the front panel of the meter (Figure 1)

   A) Connect the other end of the cable reel to the ground (G) / electrode under test(Figure 2)

5. After all connections are made, switch the power meter to the ‘ON’ positions and begin measurements according to the instruction in the resistivity meter manual.

Brief explanation

The terminals labeled A & B on the R1+ are the current electrodes (injecting current into the ground), and M & N are the potential (measuring the potential difference). According to the Fall of Potential method ([1]) the ground / electrode under test is both a current and potential electrode, thus both A and N are attached to it.

Description of the method[1]

Typically, the distance D (G to CE) (Figure 2) is at least five times the largest dimension of the ground electrode under test (e.g. five times the diameter for circular system area, and five times the diagonal for rectangular system area).

The potential probe (PE) is typically placed in the same direction as the current probe, but it can be placed in the opposite direction (Figure 2). In practice, the distance "X" for the potential probe is often chosen to be 62% of the distance of the current probe when current and potential probes are in the same direction (62% rule).

Three to fine constant resistance readings can be assumed to represent the true resistance value (flat slope method) (Figure 2)

Detailed information can be found in [1].

1 modified from[1]

Summary of Operation

After all cables/wires are connected (see Connect the system):

1. check batteries – Press Battery (8) (Figure 1)
2. If connected to external battery for Tx flip switch to Ext (otherwise to Int) (Figure 1)
3. Select Set Up:
    a) Mode – select Standard
    b) stack number – typical Min:2 Max:4
    c) Qmax: 5%
    d) Tx parameters: select Rho
    e) Time: typical 1 or 2s
    f) Choose between Vp and V_{AB}
        i. $V_p$requested –select 800mV (or Max) and then select 600V
        ii. VAB -select 12/25V and increase as needed based on the conditions
4. El array: select Schlumberger for soundings (or Wenner) (it does not matter for the FoP method)
5. Perform the measurement
    a) check connections – press Rs check – 6) (Figure 1)
    b) Press start
        i. you can input dummy values; used to calculate resistivity, while you are interested in resistance
    c) hit OK
        i. record V and I (used to calculate R)
    d) store data to memory (write down block number used in order to recall it if needed)
    e) Move potential electrode (PE) (Figure 2) and repeat (from step 5)

List of figures

Figure 1: Syscal R1+ front panel showing the proper connections. Inset shows the keyboard panel .

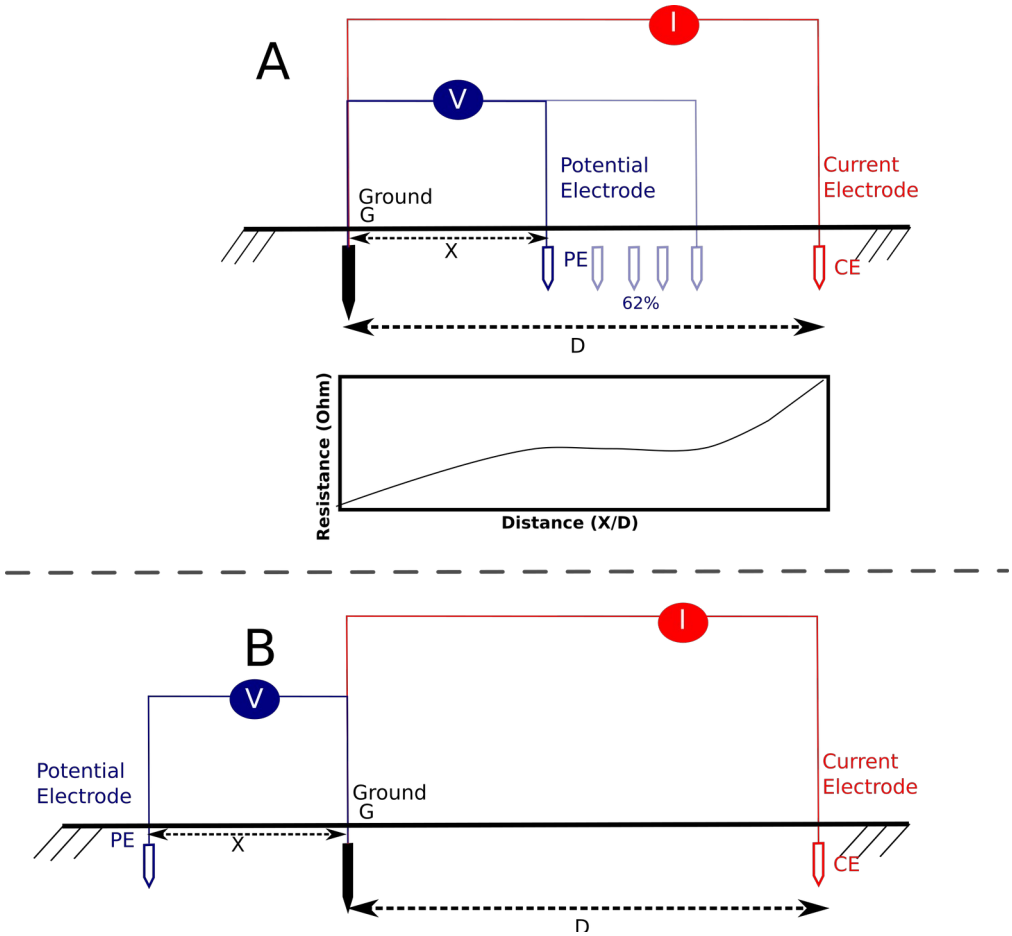

Figure 2: Fall of Potential Method (IEEE standard 2012). Placement of electrodes for the Fall of Potential method. [A] typical configuration and a typical curve for Resistance/distance (distance is x/D) ; [B] alternative configuration.

References

[1] "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System," *IEEE Std 81-2012 Revis. IEEE Std 81-1983*, pp. 1–86, Dec. 2012, doi: 10.1109/IEEESTD.2012.6392181.