

Second Investigation into the Assertion that Apparent Resistance remains Constant with Probe Spacing

eLB001-002
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Background: Second test using scale models.

Aim:

To determine the behaviour of the apparent resistance between stainless steel putty knives as a function of spacing.

Equipment:

- DVM and stainless steel putty knives (2 off)
- Plastic rectangular wash dish (approximately 35cm by 28cm and 12cm in depth)

Method:

- Fill plastic wash dish to $\frac{3}{4}$ with ordinary tap water (suggest avoiding rain water because of lack of impurities)
- Measure resistance using ordinary DVM between putty knives at various spacings

Results:

1. When the putty knives were immersed in the water with a spacing of 2cm the resistance was found to be approximately 6Kohms. Moving the test probes around the wash dish while keeping the putty knife spacing at 2cm showed little variation (approx. ± 200 ohms).
2. Varying the test probe spacing from 2cm to 30cm showed slightly more variation (approx. ± 500), but still measured around 6Kohms.

Discussion:

Result 1. The measurement of 6Kohms in Result 1. above would likely be different to the resistance result for water of a different origin (dependent on the level of dissolved salts and other impurities).

Result 2. The small variation in resistance (± 200 ohms is approx. $\pm 3\%$ of 6K) with a large variation in probe spacing (15:1) is consistent with expected results where resistance is largely independent of probe spacing (for a homogeneous medium).

Conclusion:

The wash dish simulation of the earth showed a relatively constant value of resistance between putty knife probes for a spacing variation of 15:1. However, the surface area of the probe had a direct effect on the resistance as can be shown by the large

drop in resistance measured compared to the resistance readings (~140K ohms) obtained when just using the DVM test probes (in eLB001-001). The surface area of the putty knives I much larger than the surface area of the test probes.

Although these tests seem to confirm the assertion that apparent resistance between probes is largely independent with distance it should be remembered that these tests were done using a homogeneous medium and different results are expected where spacings cover areas where the medium is not homogeneous.

Theses results seem to confirm the results obtained in eLB001-001, namely – that the resistivity of the medium and probe effectiveness (as far as providing a good contact with the medium) are the main factors in determining the apparent resistance between probes – not probe spacing.

