ELECTRODE CONFIGURATIONS

The value of the apparent resistivity depends on the geometry of the electrode array used (K factor)

1- Wenner Arrangement

Named after wenner (1916) .

The four electrodes A , M , N , B are equally spaced along a straight line. The distance between adjacent electrode is called “a” spacing . So AM=MN=NB= ⅓ AB = a.

$$P_{a=}\ 2\pi\ a\quad V\ /\ I$$

The wenner array is widely used in the western Hemisphere. This array is sensitive to horizontal variations.

2- Lee- Partitioning Array .

This array is the same as the wenner array, except that an additional potential electrode O is placed at the center of the array between the Potential electrodes M and N. Measurements of the potential difference are made between O and M and between O and N .

$$P_{a=}\ 4\pi\ a\quad V\ /\ I$$

This array has been used extensively in the past .

3) Schlumberger Arrangement .

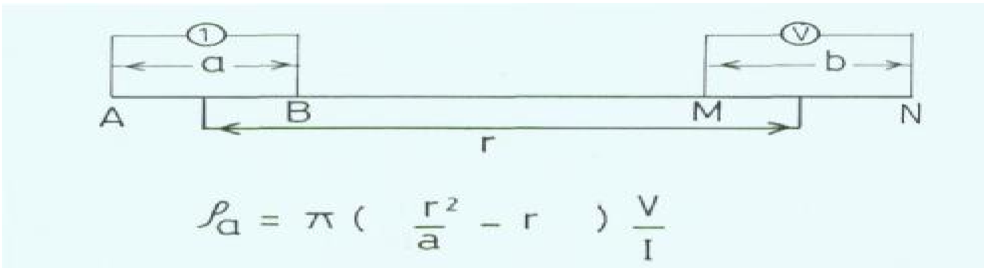
This array is the most widely used in the electrical prospecting . Four electrodes are placed along a straight line in the same order AMNB , but with AB ≥ 5 MN

$$ra = p \times \frac{V}{I} \times \left[\frac{\left(\frac{AB}{2}\right)^2 - \left(\frac{MN}{2}\right)^2}{MN} \right]$$

This array is less sensitive to lateral variations and faster to use as only the current electrodes are moved.

1. **Dipole – Dipole Array .**

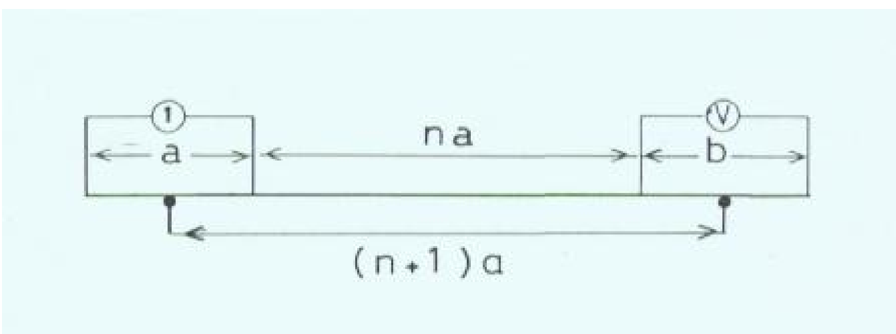
The use of the dipole-dipole arrays has become common since the 1950's , Particularly in Russia. In a dipole-dipole, the distance between the current electrode A and B (current dipole) and the distance between the potential electrodes M and N (measuring dipole) are significantly smaller than the distance r , between the centers of the two dipoles.



$$\rho_a = \pi [(r^2 / a) - r] \; v/i$$

Or . if the separations a and b are equal and the distance between the centers is **(n+1) a** then

$$\rho_a = n(n+1)(n+2) \,.\, \pi \; a . v/i$$



This array is used for deep penetration ≈ 1 km.

Four basic dipole- dipole arrays .

1) **Azimuthal**
2) **Radial**
3) **Parallel**
4) **Perpendicular**

When the azimuth angle **(ϴ)** formed by the line r and the current dipole **AB = π /2** , The Azimuthal array and parallel array reduce to the equatorial Array.

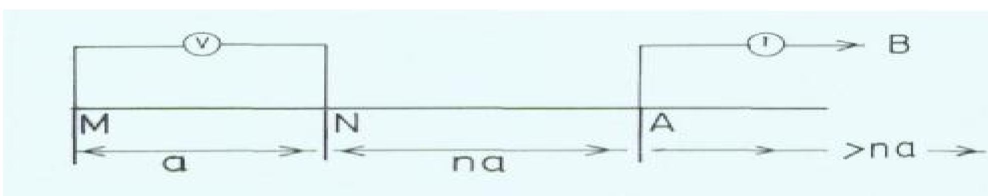
When **ϴ = O** , the parallel and radial arrays reduce to the polar or axial array .

If MN only is small is small with respect to R in the equatorial array, the system is called Bipole-Dipole (**AB** is the bipole and **MN** is the dipole), where **AB** is large and MN is small.

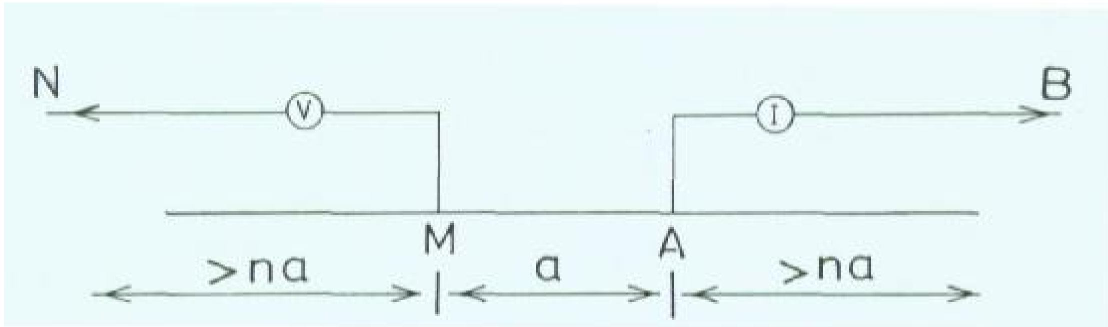
If AB and MN are both small with respect to R , the system is dipole- dipole

5) **Pole-Dipole Array .**
   The second current electrode is assumed to be a great distance from the measurement location (infinite electrode)

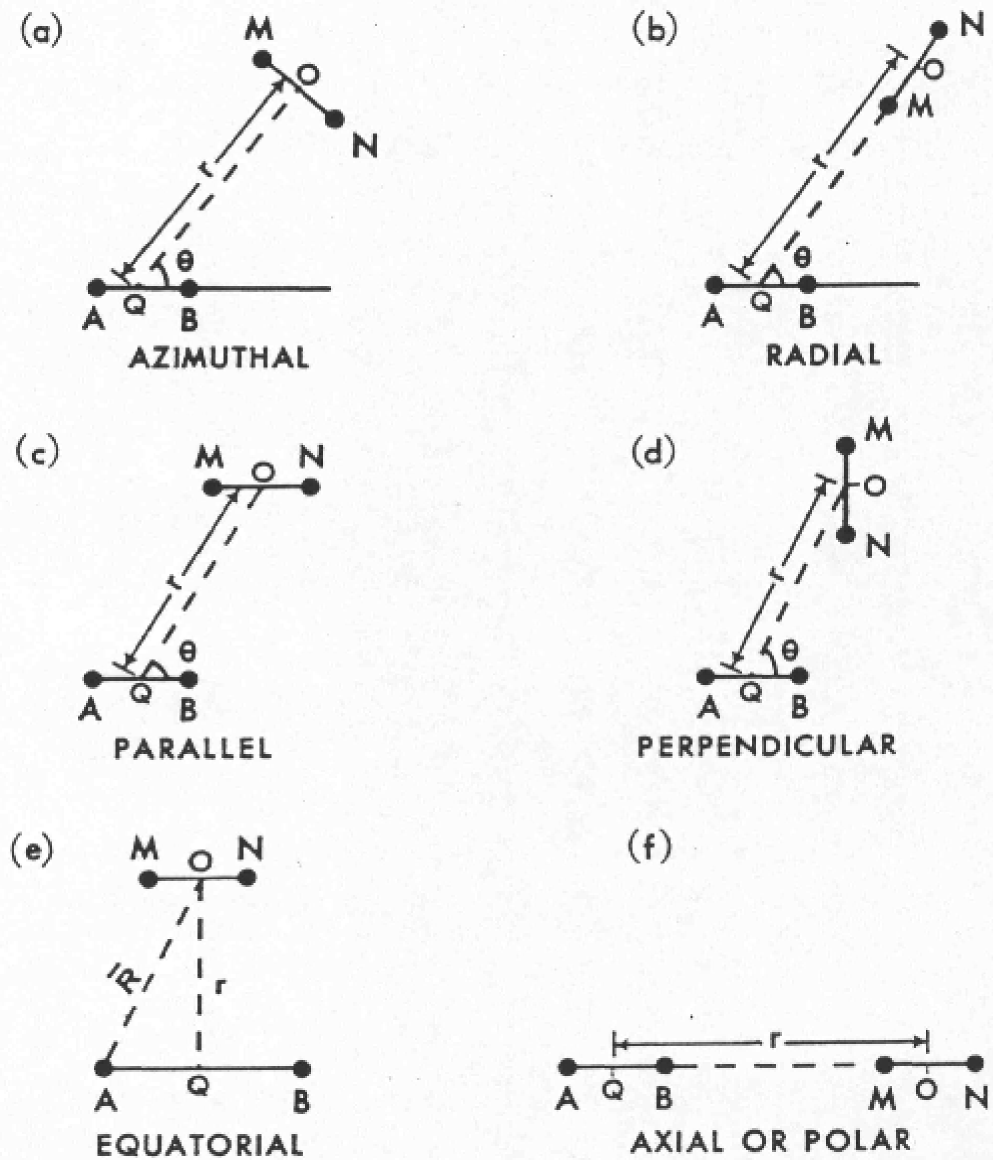
$$\rho_a = 2 \pi a n (n+1) v/i$$



6) **Pole – Pole.**
If one of the potential electrodes , N is also at a great distance.



$$P_{a=}\ 2\pi\ a\quad V\ /\ I$$



Dipole-dipole arrays. The equatorial is a bipole-dipole array because AB is large.