Experiment #1
Mapping of Equipotential Lines

Materials needed:

- mapping boards
- variable DC power supply (12V)
- digital voltmeter
- probe with handle
- banana plug patch cords

Procedure:

1. Choose one of the mapping boards and connect the electrodes of the mapping board to the power supply. Measure the potential difference between the two electrodes.
2. Make a prediction of what the equipotential lines will look like for the mapping boards that you have chosen. Make a small drawing of this prediction. Set the voltmeter to read DC voltage. Connect the COM line to the voltmeter to the electrode connected to the negative terminal of the power supply.
3. Plot the family of five equipotential lines by direct reading from the board and meter onto a sheet of graphing paper (a scale reproduction of the lines on the mapping board). To get a good scale drawing, draw a straight line from one electrode to the other. Draw five equidistant points on this line. Get the potential reading of these 5 points: v1, v2, v3, v4, and v5. Map the lines corresponding to these potentials.
4. Make a geometric construction of a family of electric field lines using the plotted equipotential lines as basis. The field lines must be constructed such that they are perpendicular to the equipotential lines at their point of intersection. Furthermore, they must be constructed such that the lines form tubes the correspond to the tubes of flux.

Questions

1. Why didn't have to draw the equipotential lines just outside the conductors?

2. Does your prediction of the field lines exactly agree with your experimental observation? Could you explain any difference?

3. Can equipotential lines intersect? Give an example of a configuration where this happens.