

## INVESTIGATION 3

### PURPOSE

In this experiment you will simulate the operation of a Scanning Probe Microscope to determine the surface “structure” of a material.

### INTRODUCTION

You will be given a metal plate onto which a piece of masking tape cut into a simple pattern has been placed. The plate has been covered with needlepoint fabric to provide you with some reference points as you “raster” the surface with the probe from the multimeter. Regions of low resistance indicate that you are probing the plate and those of high resistance are regions where the tape has been placed.

### PROCEDURE

- a. Obtain a metal plate from your instructor. **Do not** remove the needlepoint fabric that masks the shape hidden beneath.
- b. Obtain a multimeter and leads. Connect the leads to the meter so as to read the resistance in a circuit. Set the meter to read ohms and turn the power switch to the “on” position.
- c. Touch the leads to a metal surface and observe that the resistance reading diminishes significantly since metals are far better electrical conductors than air. Touch the leads to a piece of masking tape to determine its electrical conductivity. Which is more electrically conductive?
- d. Attach the alligator clip from the black lead to one of the corners of the plate. Be careful not to detach the fabric from the plate
- e. Now, in a systematic way begin to move the red probe back and forth across the fabric. The probe is sharp and must be carefully pushed through the fabric in order to make contact with the plate below.
- f. Using the axes and scale provided on the fabric, record the points on the paper where high resistance was measured.

### FOLLOW-UP QUESTIONS

1. From your data, describe or draw the shape that is hidden below the paper.
2. a. In what ways has this been a useful analogy to SPM? In what ways does it fail ?



