ELECTRONICS I

LAB 1 Diode I

TRADITIONAL LAB

A.   Forward-Biased Diode Characteristic

1.   Set up the circuit shown
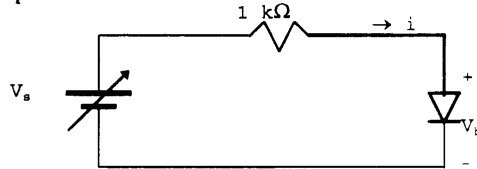

Figure 1.3   Diode Characteristics Test

2.   Vary the current I by varying V_s, and measure V_D. Use the following suggested values for each step.

Table 1.1   I-V Test Data

Current i mA	0	0.1	0.2	0.4	0.6	0.8	1.0	2.0	4.0	5.0	
Voltage V_D volts											

Current i (mA)	Diode 1, V_D volts	Diode 2, V_D volts	Diode 3, V_D volts	Diode 4, V_D volts	Diode 5, V_D volts	Diode 6, V_D vlots	Diode 7, V_D volts	Diode 8, V_D volts	Diode 9, V_D volts	Diode 10, V_D volts
0										
0.1										
0.2										
0.4										
0.6										
0.8										
1.0										
2.0										
4.0										
5.0										

Repeat the above test for ten similar diodes.
(Note: You need, 1 K-ohm resistor, diodes (get 1 0), dc power supply low range, a multimeter or dc ammeter and a voltmeter).

B. Analysis (**See your Lab manual**)

MOBILE STUDIO IMPLEMENTATION

1. Variable Voltage Supply

Since power supply in the *IOBard* is fixed with +5V, +3.3V, +2.5V, and -2.5V, we need a small circuit to supply variable voltage to the diode circuit.   Here we use a variable resistor. Variable resistors come in many different shapes but they all share the common feature of having 3 pins as illustrated left.
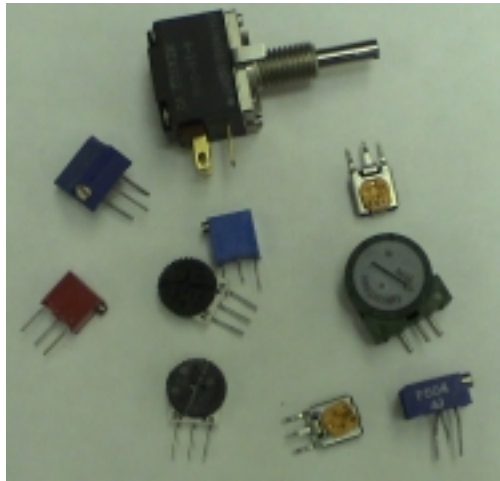

The resistance between two end pins are fixed with a value like 1K, 10K, etc. The center pin is connected to the wiper which we turn to a desired position for a desired value.

The main idea of using a variable resistor for variable voltage supply is that, when we apply +5V at the two end pins, then the voltage between the center pin and one of the end pins are determined by the wiper position. So by changing, moving around the wiper, we can effectively decide and thus provide variable voltage between the center pin and an end pin.   The variable voltage, therefore, is between 0 and +5V.
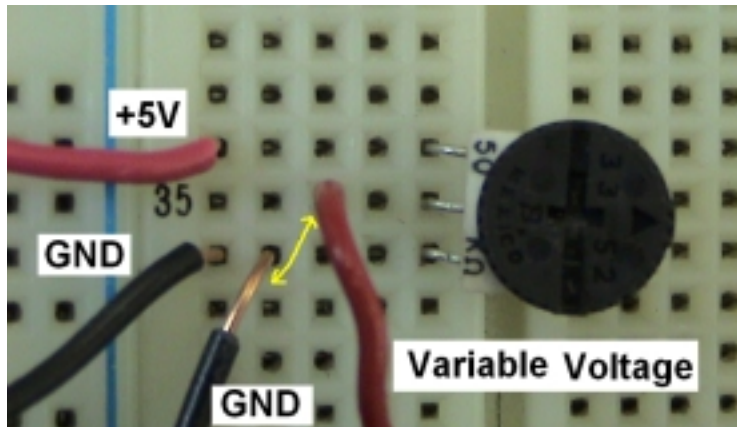
The variable voltage supply circuit using a variable resistor of 50K is illustrated next.
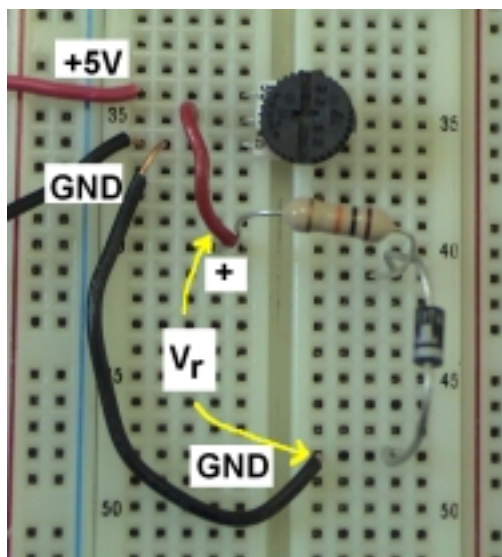
Once we have the variable voltage supply, the circuit implementation with 1K resistor and a diode is simple as illustrated left. Now the variable voltage from the variable resistor is applied to the resistor-diode circuit.

2. Current Measurement

Since there is no Ammeter in *IOBoard*, we also have to devise a way to **indirectly** measure the current through the resistor (and diode). It's easy. Since we already know the resistance of the resistor (which is 1K), the voltage across the resistor divided by the resistance will give is the current through the resistor (by Ohm's Law). Simply, if the voltage across the resistor is 1V, then the current is $1/1000 = 0.001A$ or 1mA. So to have a condition for 0.1mA, we adjust the variable resistor so that the voltage across the resistor is 0.1V.

For this voltage measurement across the resistor, we use a scope channel. In the suggested configuration, the channel 1 probes are assigned to measure the voltage (and thus the current).
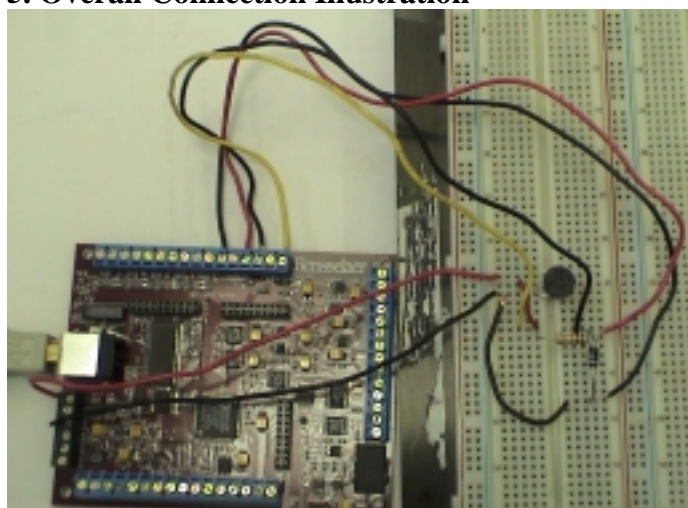
3. Diode Voltage Measurement

In the suggested configuration, the diode voltage is measure by the probes of channel 2 of the scope.

4. Suggested Configuration for the Lab (Illustration)
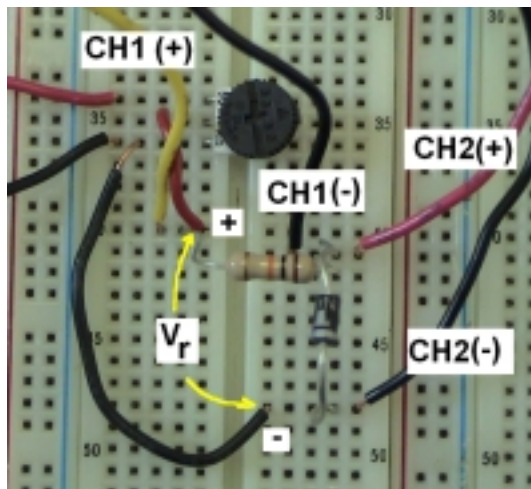
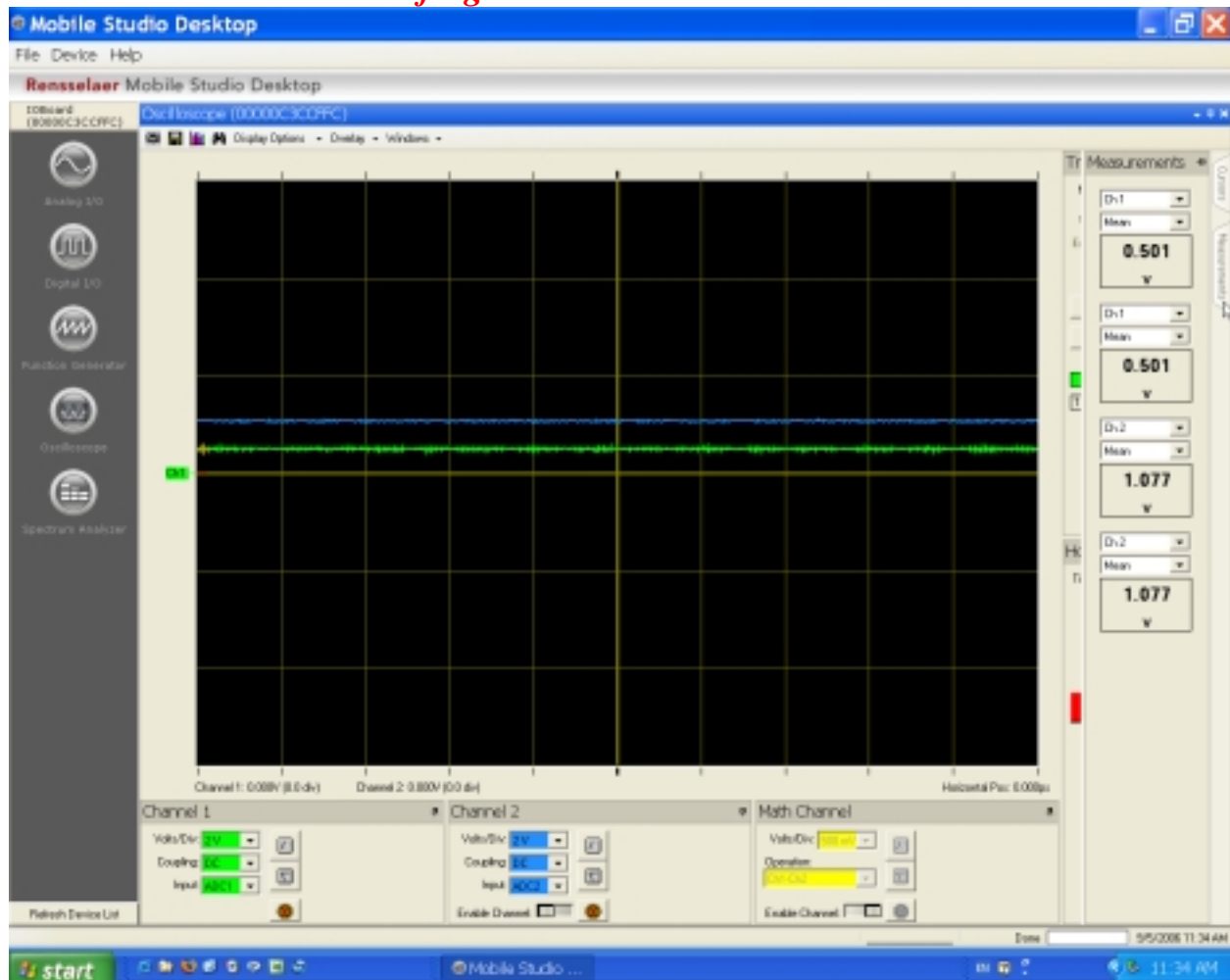## 5. Overall Connection Illustration

6. Connection of IBOARD to PC
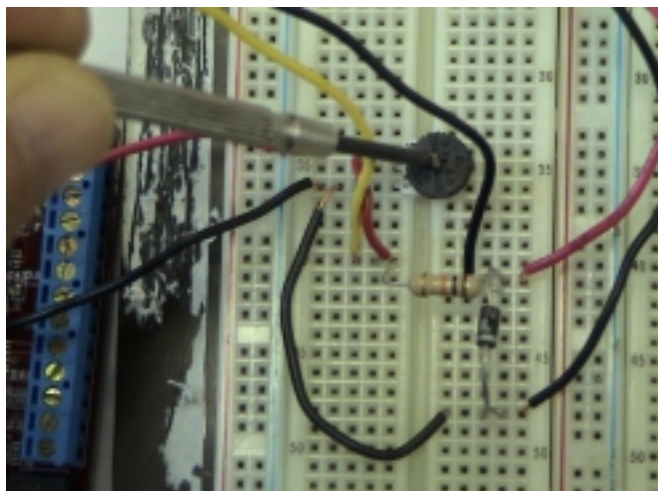
       Connect IOBARD to PC and run the *Mobile Studio Desktop*

7. Run Oscilloscope Function from the *Mobile Studio Desktop*
       Don't forget to click the "Start" button

8. Voltage Variation and Reading the Diode Voltage and Current.

Change the voltage supply so that you see the change in voltage at channel 1 (which indirectly reads the current), and measure the voltage at channel 2 for the diode voltage. And do this process for other 9 diodes to have some statistics.