Review & BS2 Safety

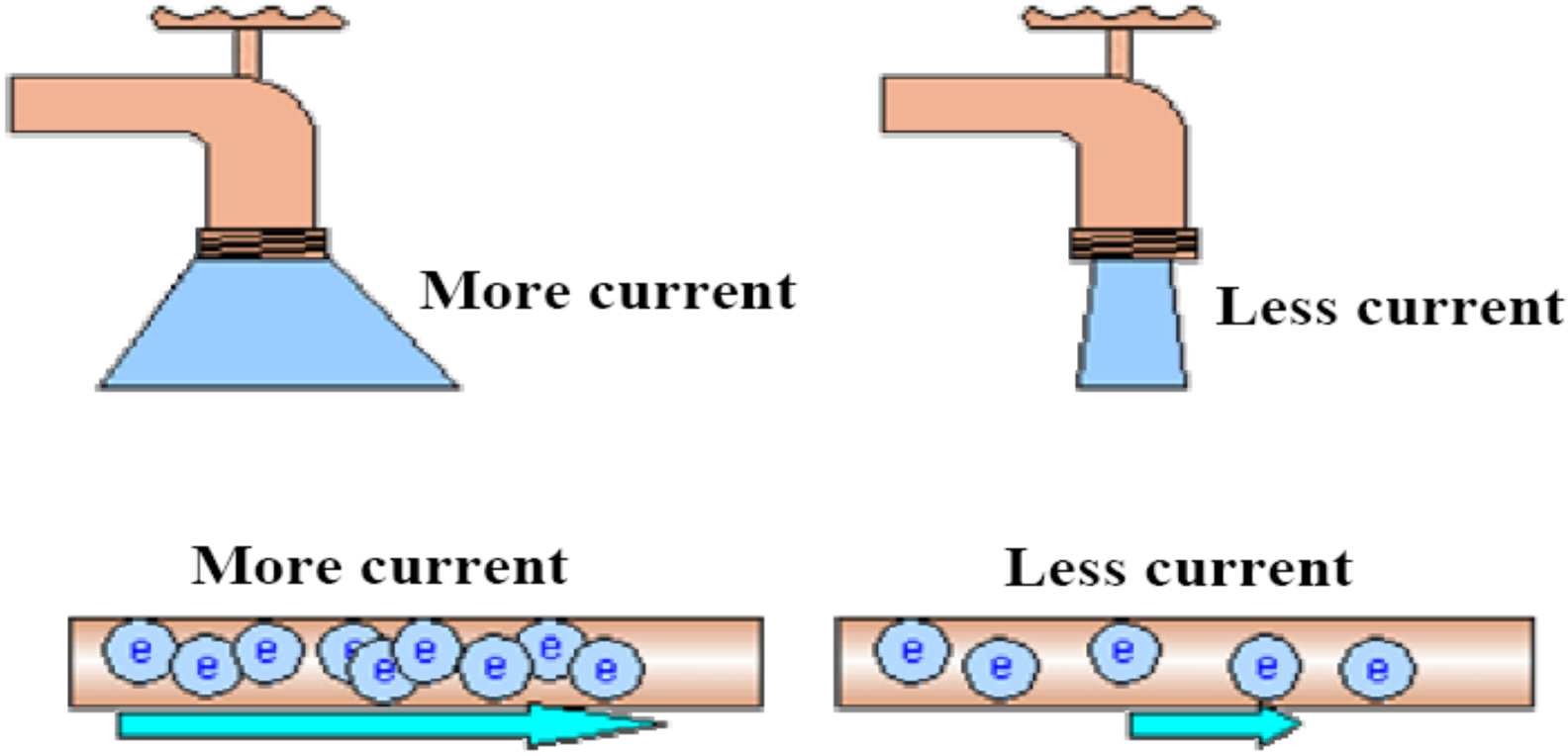
By Ilya Zarankin

What is Current?

- A flow of electrically charged particles

  Carried by small negatively-charged particles, called **electrons**
- Represented by the symbol ***I***, and is measured in **amperes**, or '**amps**', **A**
- Most often measured in **milliamps**, **mA**
- Like water flow

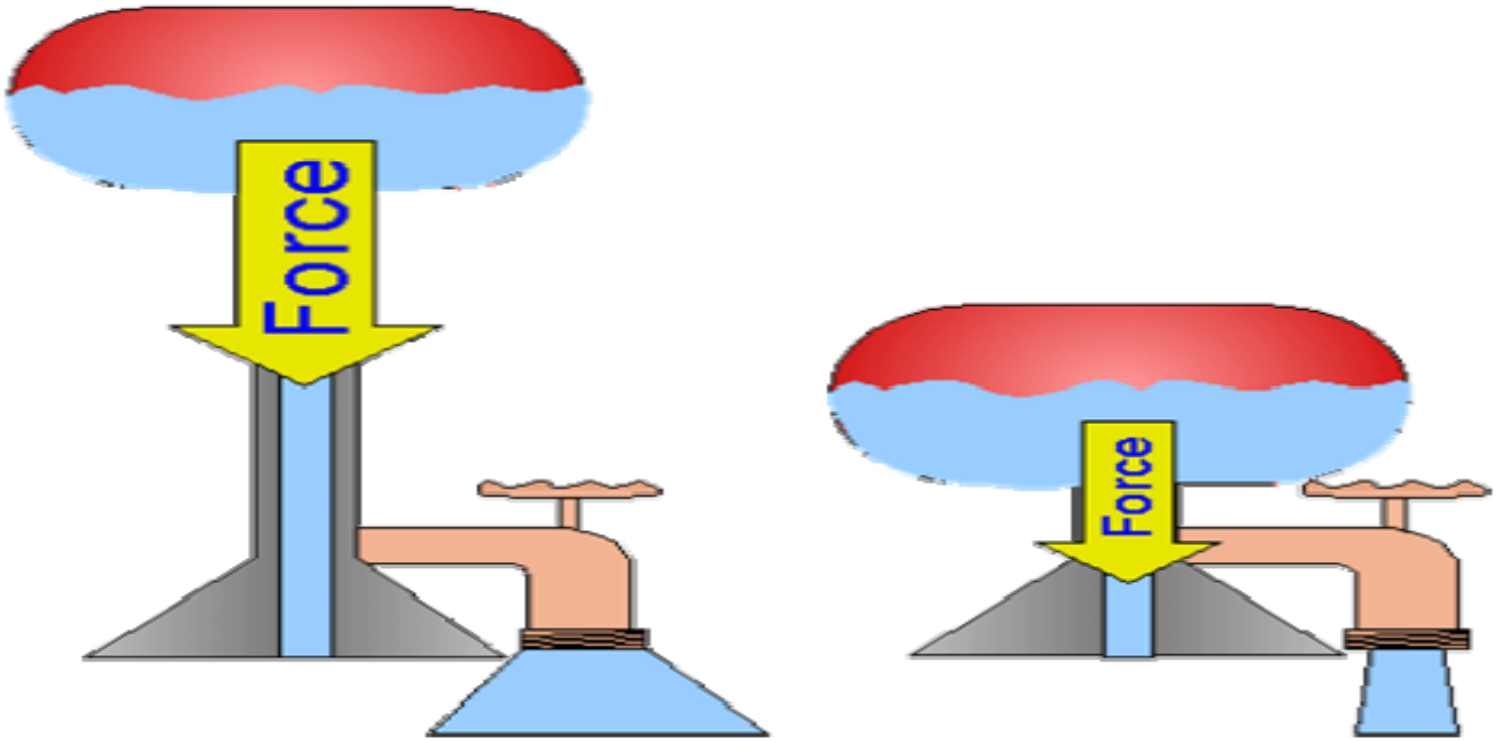
Water Analogy



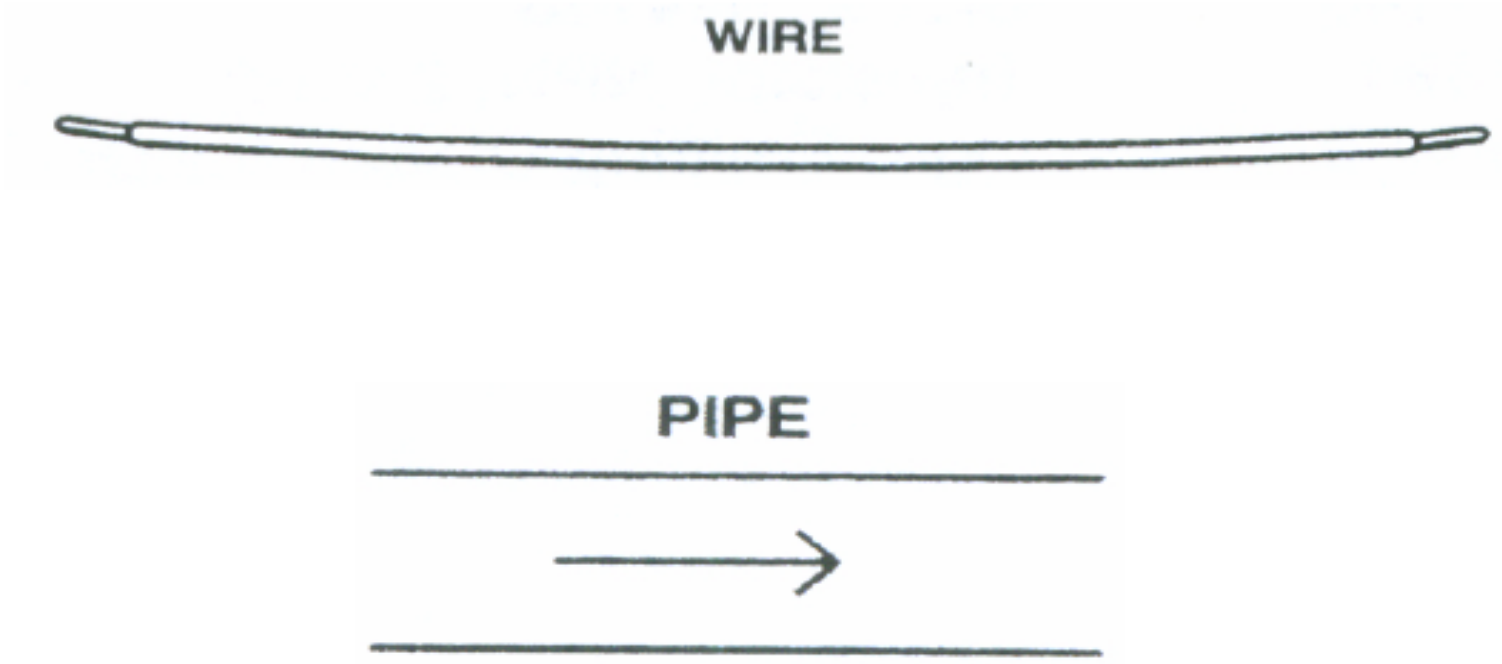
What is Voltage?

- **Potential difference**
- Represented by the symbol **V**, and is measured in **volts**, **V**
- Like potential energy at water fall

Water Analogy

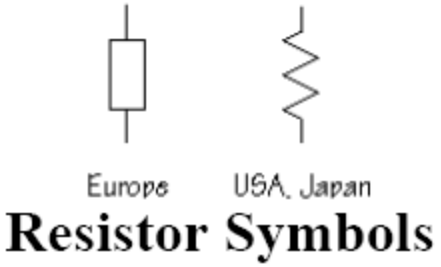


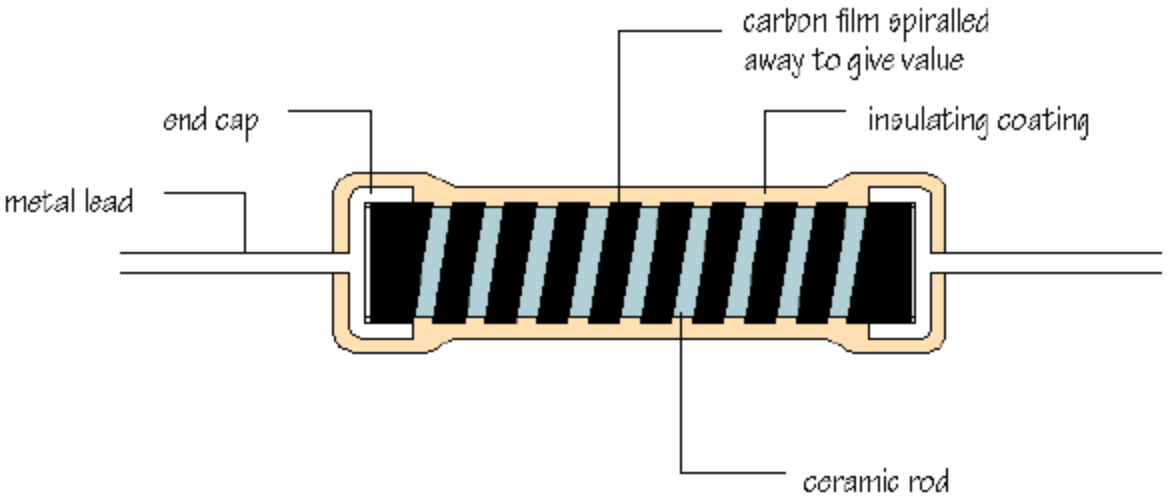
Water Analogy of Wires



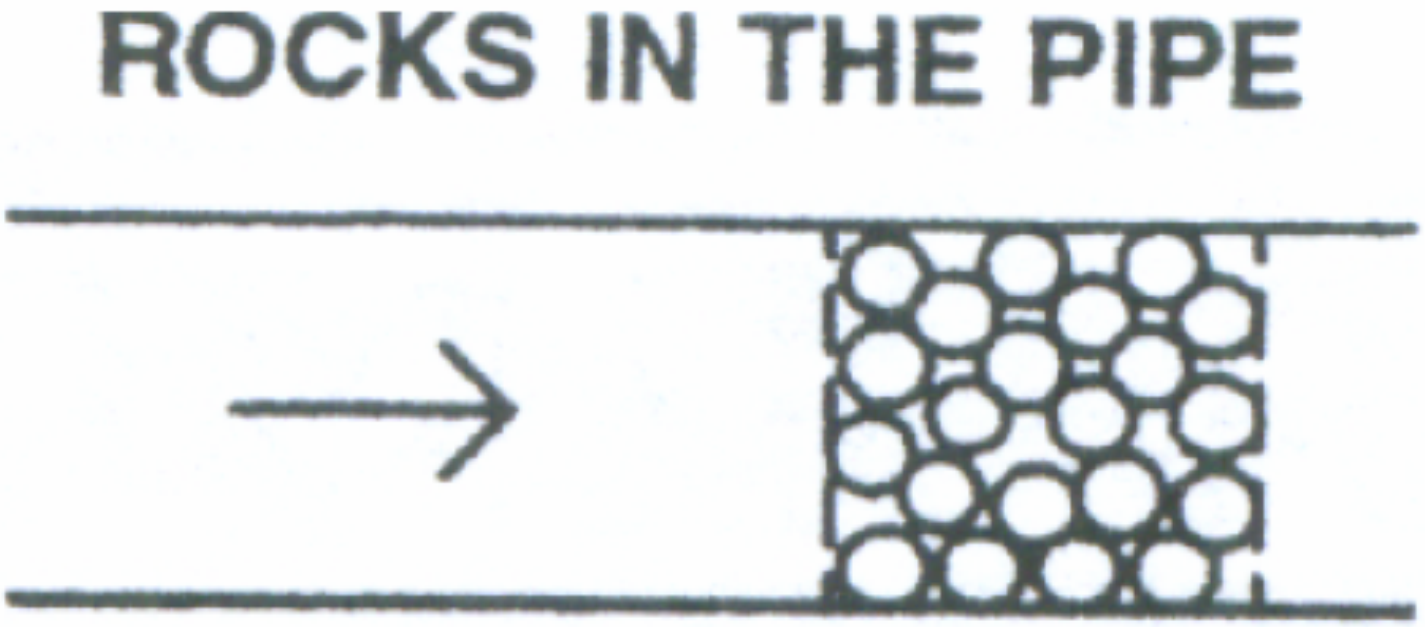
Resistors

- Dissipative elements that convert electrical into heat
- Resistors limit current
- Unit is ohms, Ω



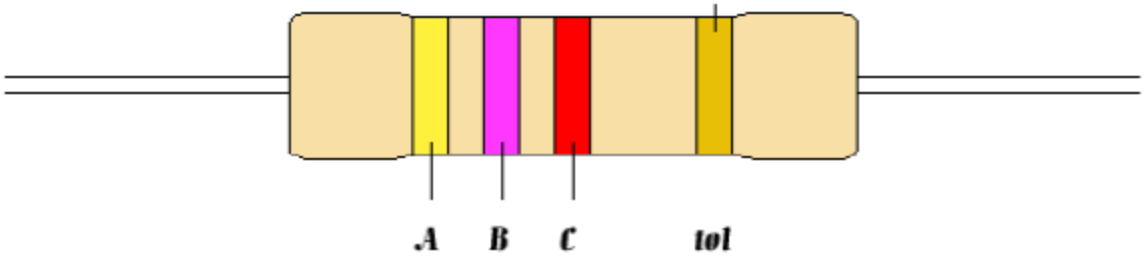


Water Analogy of Resistor



How to Read Resistor Values 1

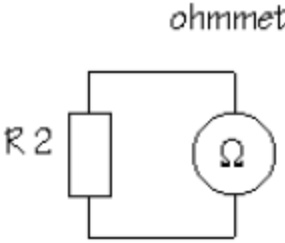
1. By color code



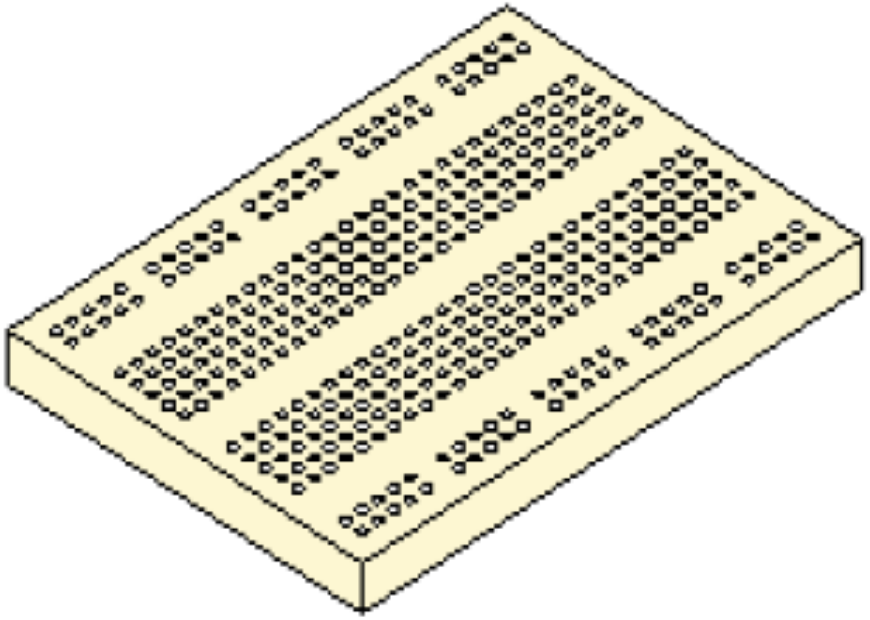
$$\text{Resistor value} = AB \times 10^{C} \pm tol\%(\Omega)$$

Number	Color
0	black
1	brown
2	red
3	orange
4	yellow
5	green
6	blue
7	violet
8	grey
9	white

2. B ti meter (DMM)

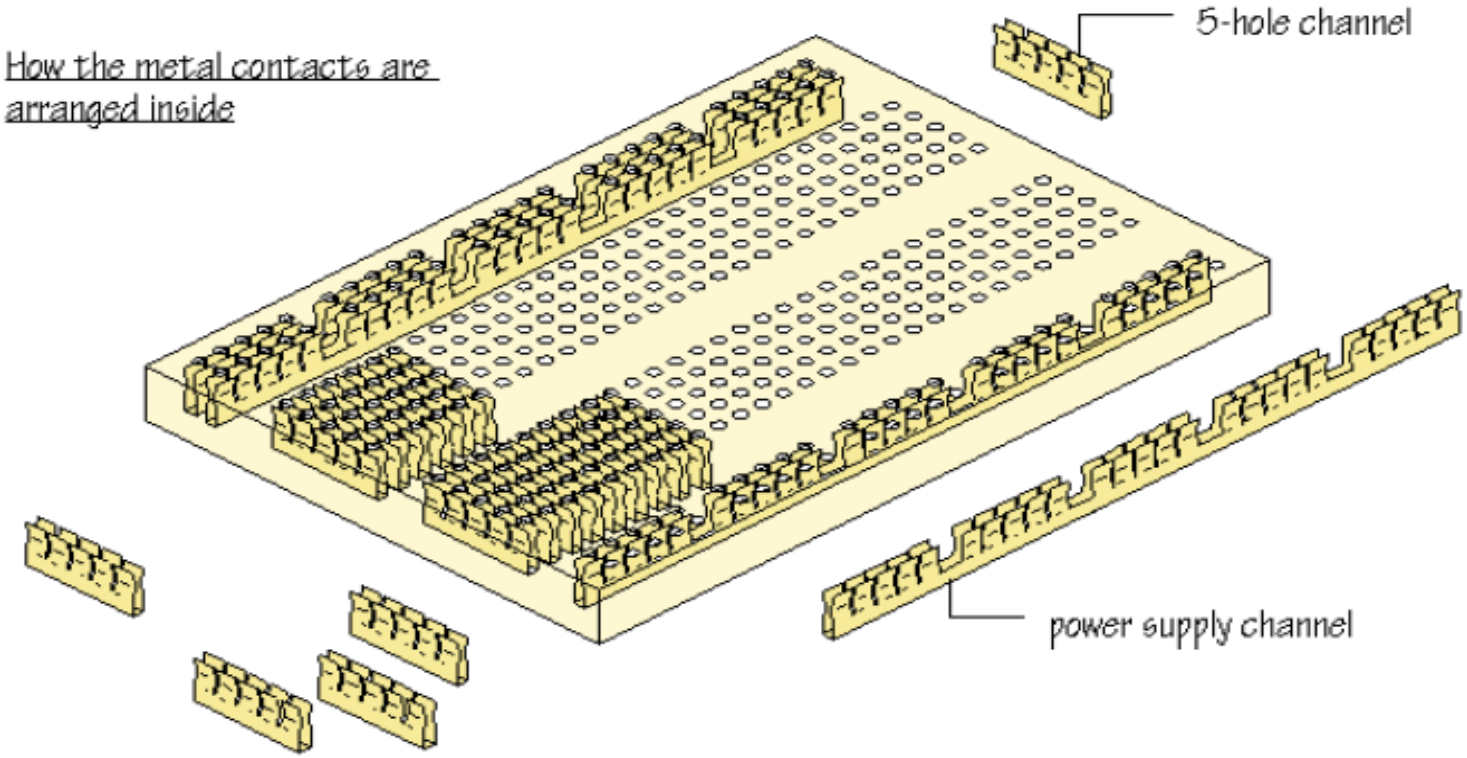


Breadboard 1



Prototype board is used for building temporary circuits, without soldering. Component leads are pushed into the holes in the board to make connections.

Breadboard 2

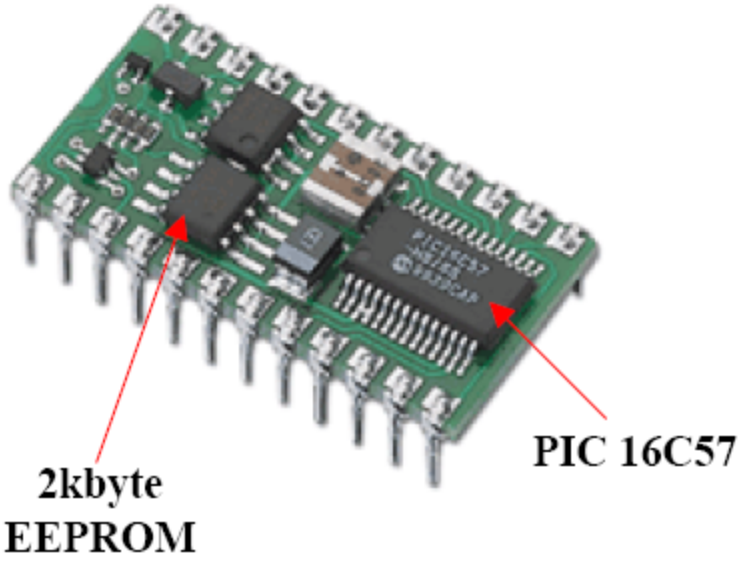


Basic Stamp 2

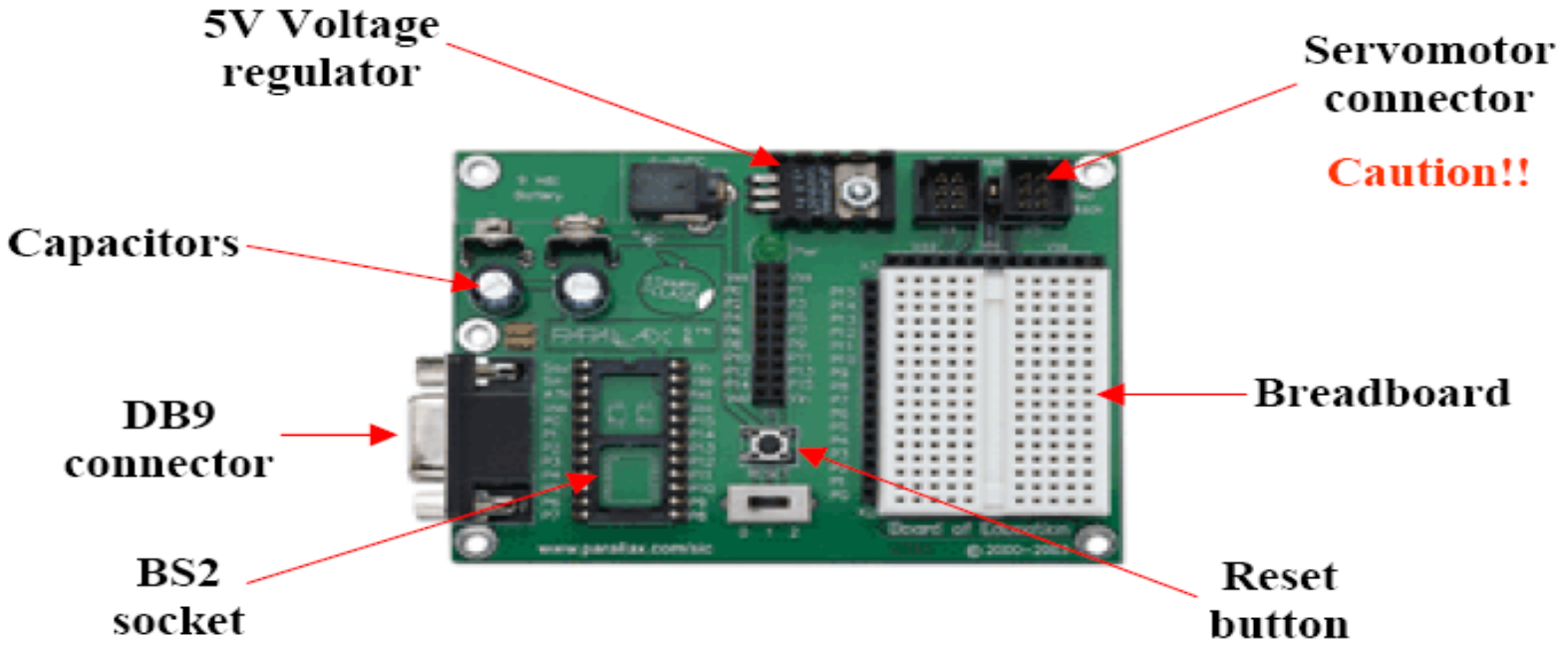
–Simple and easy to use

–PIC-based PBASIC interpreter on ROM

–16 digital I/O



Stamp Development Board

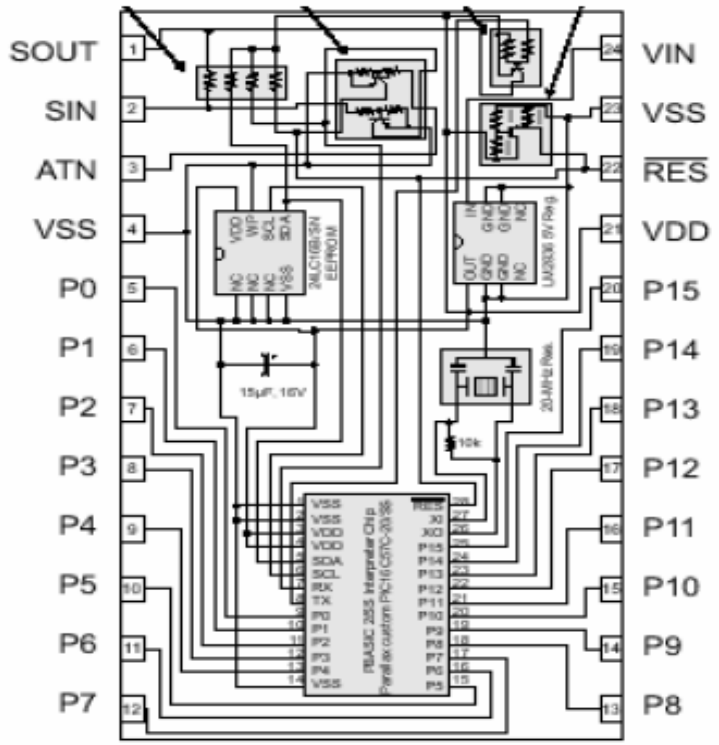


Board of education

Hardware Considerations

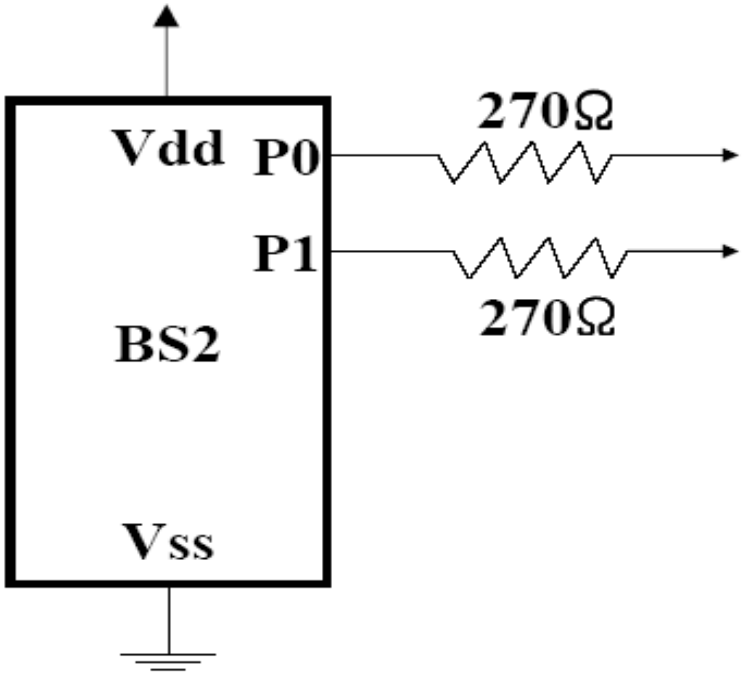
- Power requirements
  - BS2 requires regulated 5DCV and draws about 8mA
- Each I/O pin of BS2 can
  - Source up to **20mA**
  - Sink up to **25 mA**
- When the voltage regulator on BOE is being used, all I/O pin as a group can
  - Source up to **40mA**
  - Sink up to **50mA**

BS2 Pin Descriptions



Pin	Name	Description
1	SOUT	Serial out
2	SIN	Serial in
3	ATN	Attention
4	VSS	System ground
5-20	P0-P15	Input/Output pins
21	VDD	5DC V
22	RES	Reset
23	VSS	System ground
24	VIN	Unregulated power in

How to Protect the I/O Pins



$$I = \frac{5}{270} \approx 19mA$$