A
MOE University
Course

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The Miracle Workerz, FIRST Team 365

First State Robotics, Inc.
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MOE University

Fundamentals of Electrical Hardware and Wiring

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Safety

- Always wear safety glasses
- Beware of shock
- Disconnect power source before working on robot

Ohm's Law

$$V = IR$$

- V - Voltage (V)
- I - Current (Amps)
- R - Resistance (Ω)
- Nothing interesting obey Ohm's Law

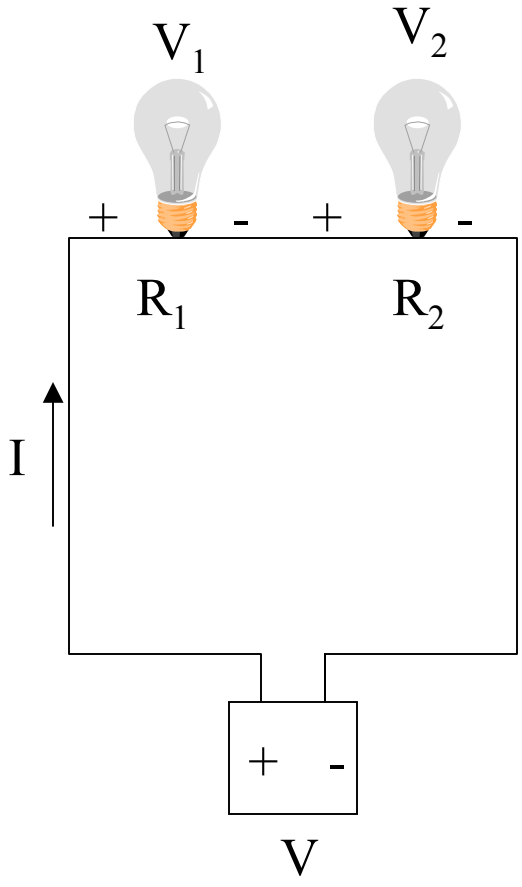
Power

$$P = IV$$

- P - Power (Watts)
- I - Current (Amps or A)
- V - Volts (V)

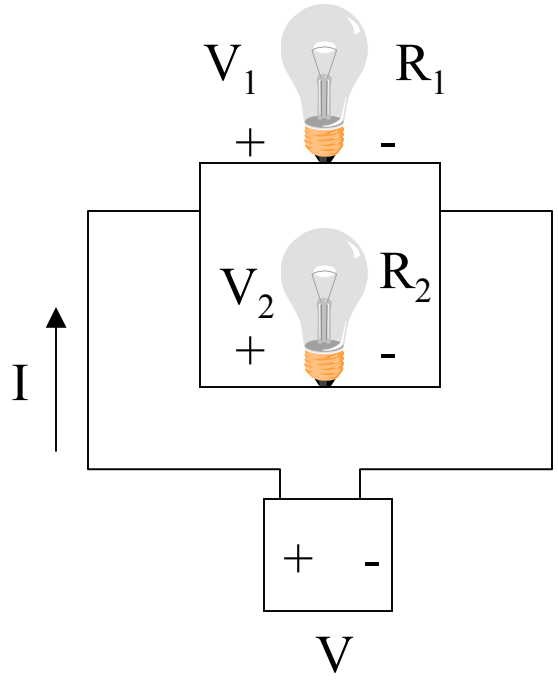
Series Circuit

- $R = R_1 + R_2$
- $I = V/ (R_1 + R_2)$
- $V_1 = IR_1$
- $V_2 = IR_2$
- $V = V_1 + V_2$



Parallel Circuit

- $1/R = 1/R_1 + 1/R_2 + 1/R_3 + \ldots$
- $R = R_1R_2/(R_1+R_2)$ If there's only 2.
- $V = V_1 = V_2$
- $I_1 = V/R_1$
- $I_2 = V/R_2$



Color Value Bands

Color	First Band	Second Band	Third Band
Black	0	0	x 1
Brown	1	1	x 10
Red	2	2	x 100
Orange	3	3	x 1000 (kilo-)
Yellow	4	4	x 10000
Green	5	5	x 100000
Blue	6	6	x 1000000 (mega-)
Violet	7	7	-
Gray	8	8	-
White	9	9	-

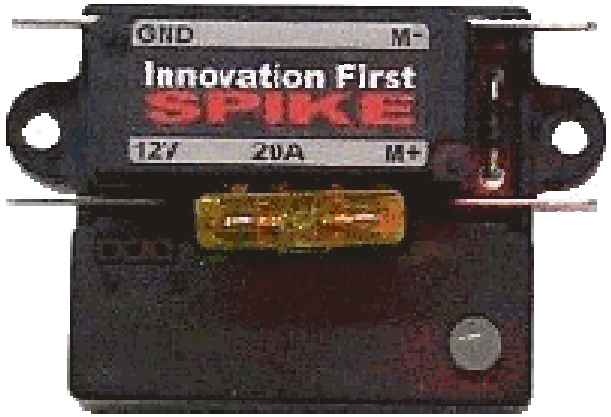
Color Value Band (cont'd)

- If the part has 4 color bands, the last indicates the tolerance.
- Tolerance refers to how far away the part may be from the specified value.

Color	Tolerance
(none)	20%
Silver	10%
Gold	5%
Red	2%
Brown	1%

Relay Modules

- Spike is designed for driving small motors in forward, reverse, or stop (brake). It can also be used to control solenoids, pumps, and lights.

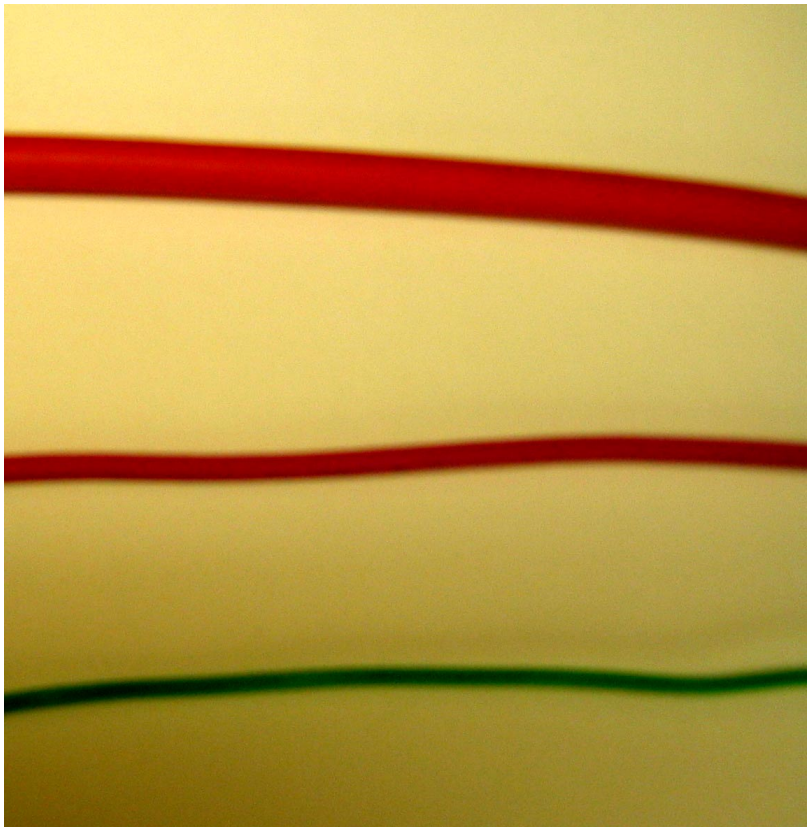


Speed Controllers

- The high current capacity, low voltage drop, and peak surge capacity make the Victor 883/4 ideal for drive system, while its breaking option and precise control meet the demanding needs of arms and lift systems.

Wires

- Smaller the wire gauge number, bigger the wire.



Electrical Board