



Illustrations from "Practical Electronics for Inventors" by P. Scherz

Questions?

- Project?
- Schedule
 - Readings
 - Soldering

Show and tell

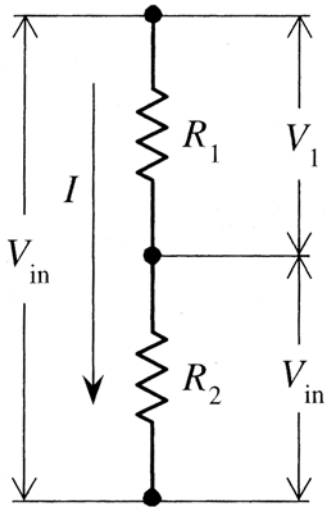
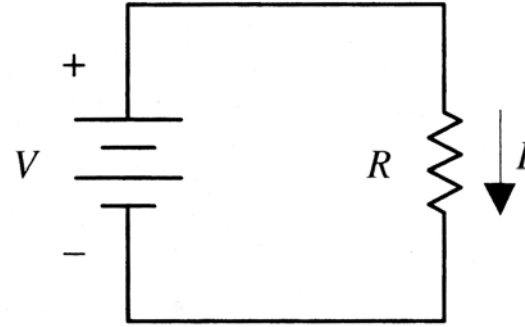
Introduction to electronics

- Based on “Practical Electronics for Inventors” by P. Scherz
 - All the drawing and sketches are from this book
- Today
 - Overview of the key components
 - Simple circuits design

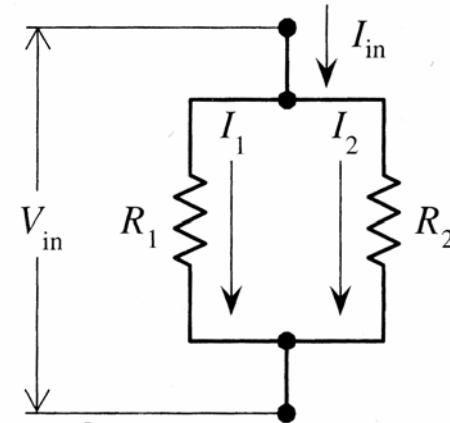
Resistor: key facts

$$V = RI$$

$$I = \frac{V}{R}$$



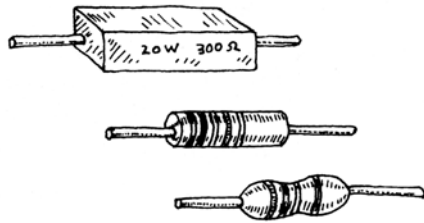
$$R_{eq} = R_1 + R_2$$



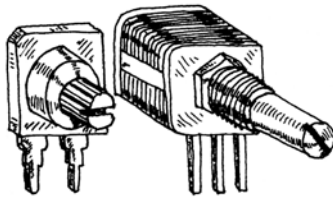
$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$$

Resistor: Examples

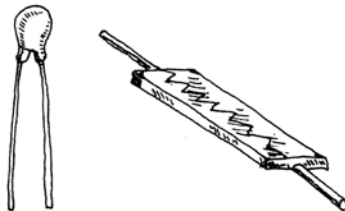
RESISTOR COLOR CODE GUIDE



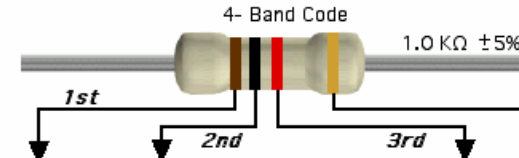
Fixed Resistors



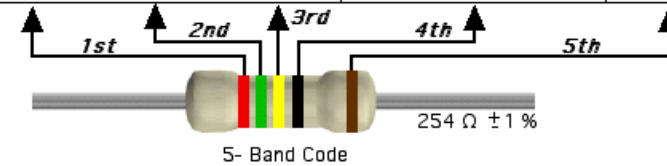
Potentiometers and Trimmers



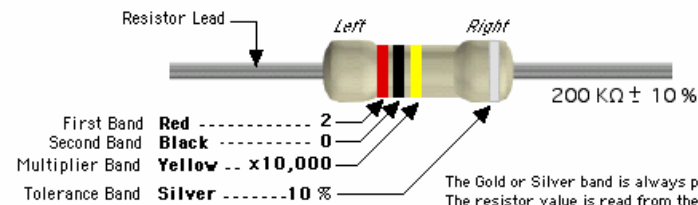
Thermistors and Phototransistors



Color	1st Band	2nd Band	3rd Band	Decimal Multiplier		Tolerance
Black	0	0	0	1	1	
Brown	1	1	1	10	10	± 1 %
Red	2	2	2	100	100	± 2 %
Orange	3	3	3	1K	1,000	
Yellow	4	4	4	10K	10,000	
Green	5	5	5	100K	100,000	
Blue	6	6	6	1M	1,000,000	
Violet	7	7	7	10M	10,000,000	
Gray	8	8	8		100,000,000	
White	9	9	9		1,000,000,000	
Gold				0.1		± 5 %
Silver				0.01		± 10 %
None						± 20 %



Calculation



The Gold or Silver band is always placed to the right. The resistor value is read from the left to right.

If there is no tolerance band, then find the side that has a band closest to a lead and make that the first band.

Equation

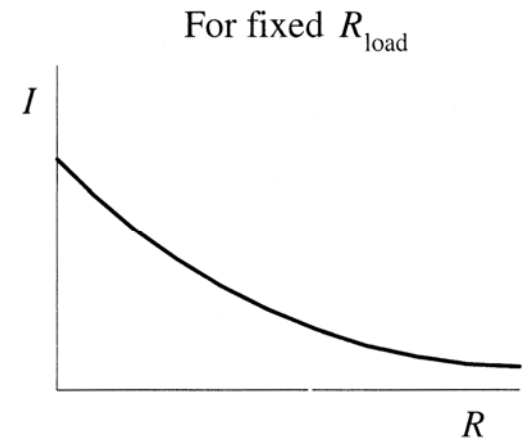
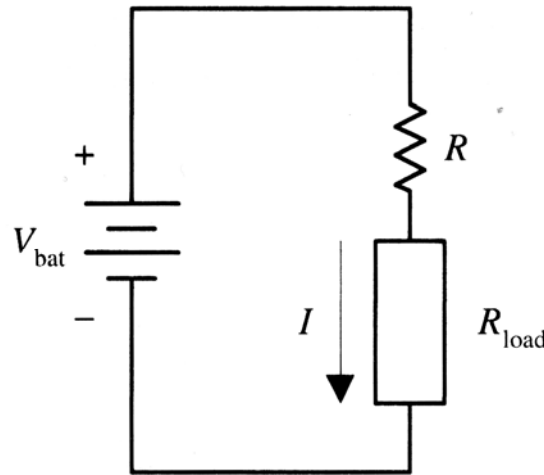
$$20 \times 10,000 = 200,000$$

$$1,000 = 1K$$

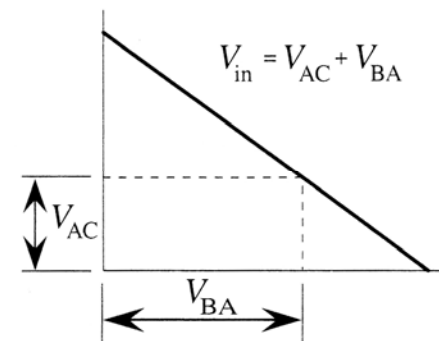
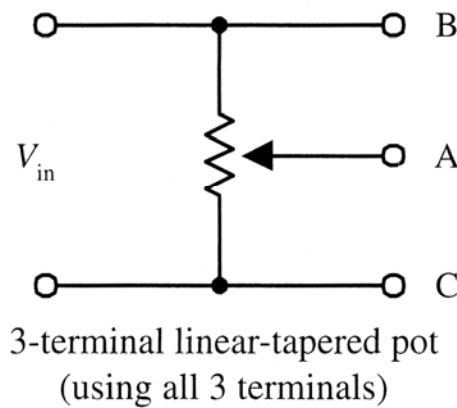
Resistor = 200 KΩ
with a ± 10 % Tolerance

Resistor: Key circuits

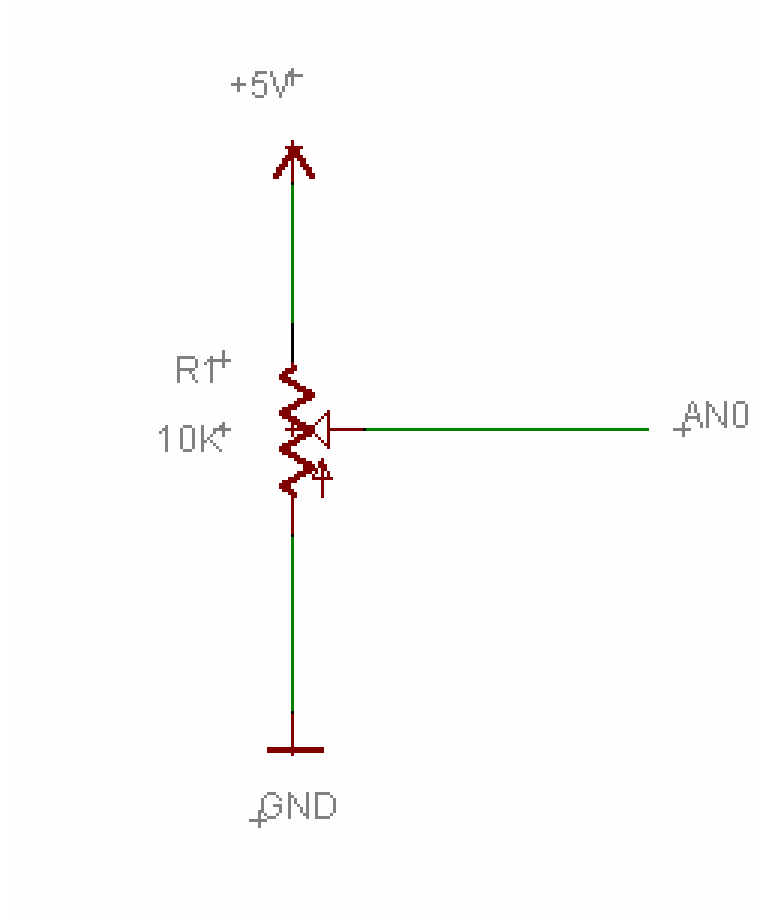
- Load limiting



- Voltage control

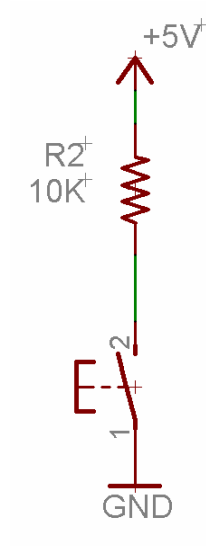


Assignment for next class



Resistor: Key circuits

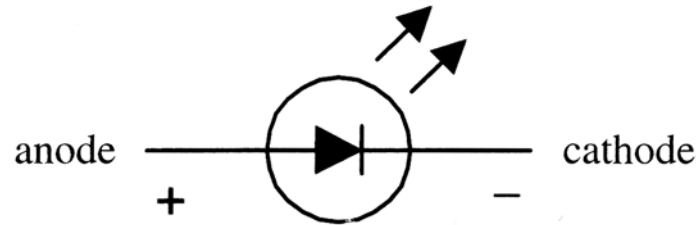
- Push button



- *Be careful about the bouncing effect*

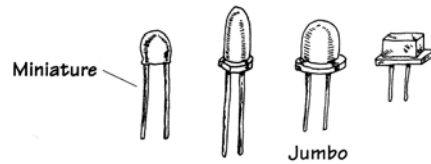
LED: key facts

- Light Emitting Diode



- Examples

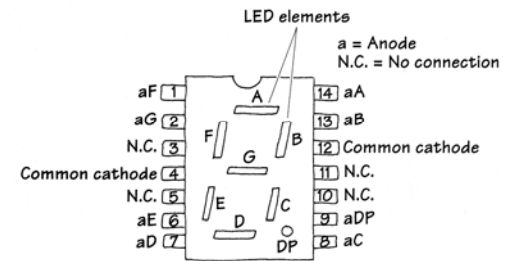
Visible-Light LEDs



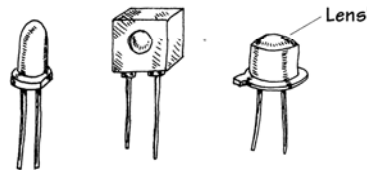
Blinking LEDs



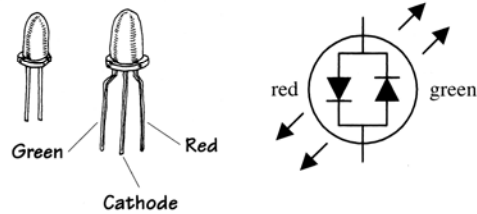
LED Displays



Infrared LEDs

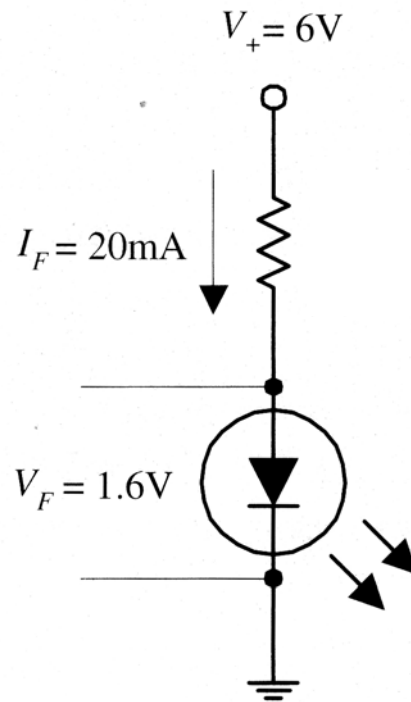


Tricolor LEDs



LED: Key circuits

- Load limitation



LED: Key circuits

- Load limitation

