

# How to use the circuit simulator from: [www.falstad.com/circuit](http://www.falstad.com/circuit)

Simulation of electronic circuits always used by engineers in order create the perfect product for the real world design. Lots of commercial simulators can be purchased (like Ltspice) but for our purpose will the simulator from falstad be perfect.

This java applet is an electronic circuit simulator. When the applet starts up you will see an animated schematic of a simple LRC circuit. The green color indicates positive voltage. The gray color indicates ground. A red color indicates negative voltage. The moving yellow dots indicate current.

To turn a switch on or off, just click on it. If you move the mouse over any component of the circuit, you will see a short description of that component and its current state in the lower right corner of the window. To modify a component, move the mouse over it, click the right mouse button (or control-click if you have a Mac) and select "Edit".

The "Circuits" menu contains a lot of sample circuits for you to try.

If you don't have Java, get the [Java plug-in](#).

[Directions](#).

User instructions can be found here

[Index of Circuit Examples](#).

Which circuit included (extra information)

[More applets](#).

[Zip archive of this applet](#) (double-click on circuit.jar to run)

Please download the applet here as well. Hence will you be able use the circuit simulator without net-connection.

# Default circuit of [www.falstad.com/circuit](http://www.falstad.com/circuit)

The screenshot displays the Circuit Simulator v1.5n interface. The main window shows a default circuit consisting of a 11.8 V AC voltage source, a 1H inductor, and a 100 resistor connected in series. A 'Circuits' menu is open, listing various circuit types, with 'Blank Circuit' highlighted at the bottom. The simulation results at the bottom show three waveforms: a voltage waveform with a peak of 11.8 V, a voltage waveform with a peak of 11.79 V, and a current waveform with a peak of 442.97 mV. The simulation parameters are  $t = 33.77 \text{ ms}$  and  $\text{res.f} = 41.09 \text{ Hz}$ . The right sidebar contains a 'Reset' button, a 'Stopped' checkbox, and sliders for 'Simulation Speed', 'Current Speed', and 'Power Brightness'. The website URL 'www.falstad.com' and the current circuit name 'LRC Circuit' are also visible.

The default circuit will not be useful in the first lesson. Hence use the "Blank Circuit" to clear the screen

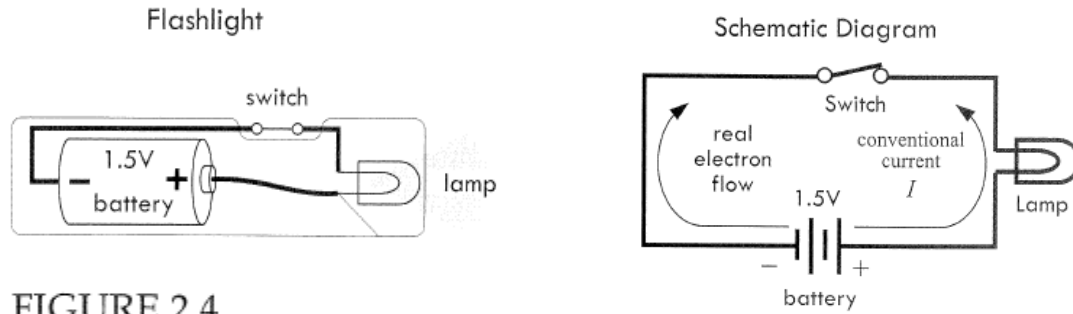
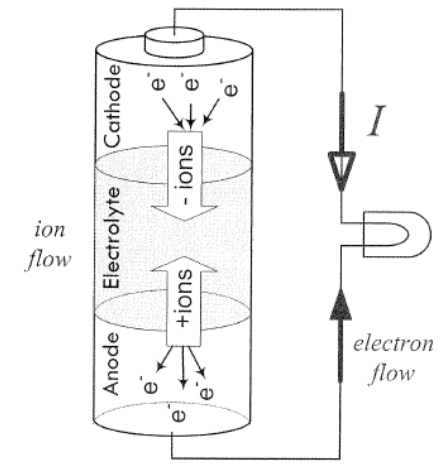


FIGURE 2.4



- Options Circuits
- ✓ Show Current
- ✓ Show Voltage
- Show Power
- ✓ Show Values
- Small Grid
- European Resistors
- White Background
- ✓ Conventional Current Motion
- Other Options...

Circuit Simulator v1.5n

File Edit Scope Options Circuits

This demo just inspired of fig 2.4

5V 1.1A

16 A

t = 65,76 ms

Reset

Stopped

Simulation Speed

Current Speed

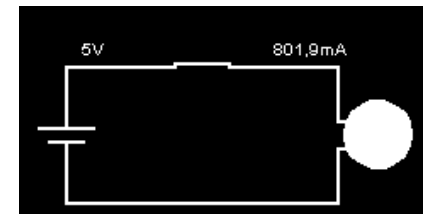
Power Brightness

www.falstad.com

Current Circuit: untitled

**Simulation Speed** will enable you to study fast changes of current and voltage.

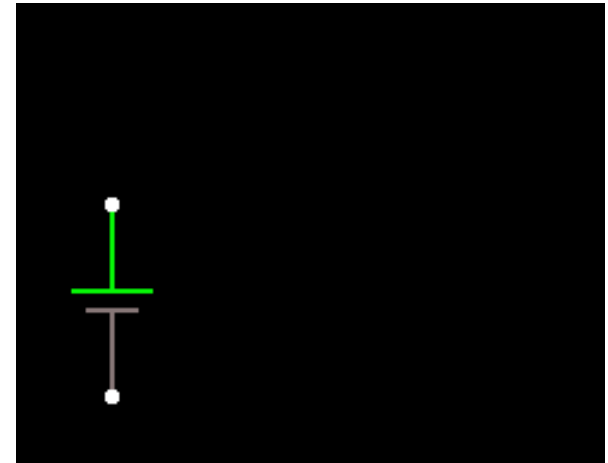
**Current Speed** will give a visual comparison between current in different paths of the circuit



Show Current  
Show Voltage

# Add Voltage Source (2-terminal)

A screenshot of a circuit design software menu. The main menu is open, showing options like 'Add Wire (w)', 'Add Resistor (r)', 'Passive Components', 'Inputs/Outputs', 'Active Components', 'Logic Gates', 'Chips', 'Other', and 'Select/Drag Selected (space or Shift-drag)'. The 'Inputs/Outputs' option is highlighted in blue. A sub-menu is open from 'Inputs/Outputs', listing various components. The 'Add Voltage Source (2-terminal)' option is highlighted in blue. Other options in the sub-menu include 'Add Ground (g)', 'Add A/C Source (2-terminal)', 'Add Voltage Source (1-terminal)', 'Add A/C Source (1-terminal)', 'Add Square Wave (1-terminal)', 'Add Analog Output', 'Add Logic Input', 'Add Logic Output', 'Add Clock', 'Add A/C Sweep', 'Add Var. Voltage', 'Add Antenna', 'Add Current Source', 'Add LED', and 'Add Lamp (beta)'.

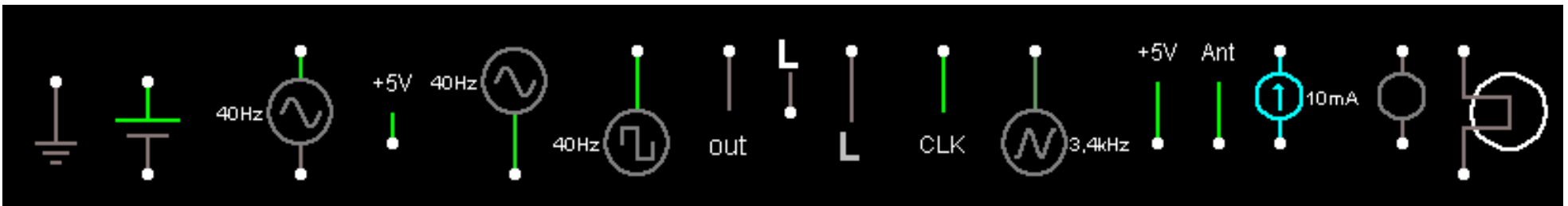


In order to get a circuit inspired of PEFI page 10 please select the 2-terminal Voltage Source.

Alternatives could be:

- 1-terminal Voltage Source** (remember **Ground**)
- Var. Voltage** (with a slider to change value)

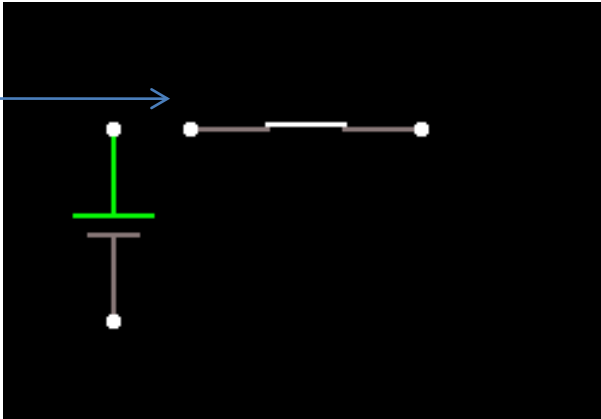
## Inputs / Outputs



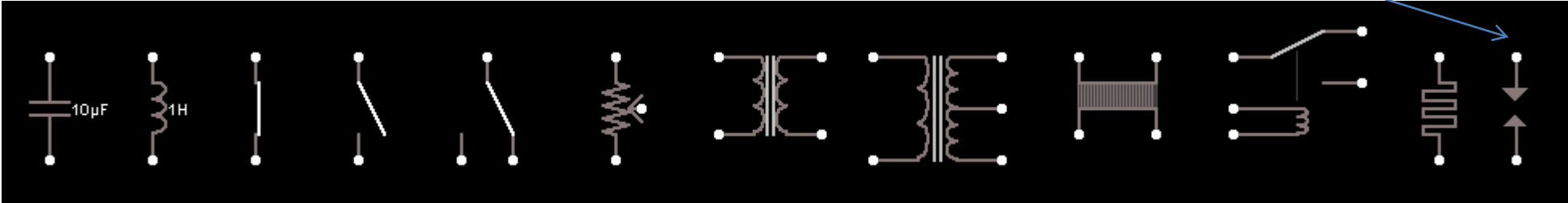
# Add Switch

- Add Wire (w)
- Add Resistor (r)
- Passive Components**
- Inputs/Outputs
- Active Components
- Logic Gates
- Chips
- Other
- ✓ Select/Drag Selected (space or Shift-drag)

- Add Capacitor (c)
- Add Inductor
- Add Switch**
- Add Push Switch
- Add SPDT Switch
- Add Potentiometer
- Add Transformer
- Add Tapped Transformer
- Add Transmission Line
- Add Relay
- Add Memristor
- Add Spark Gap



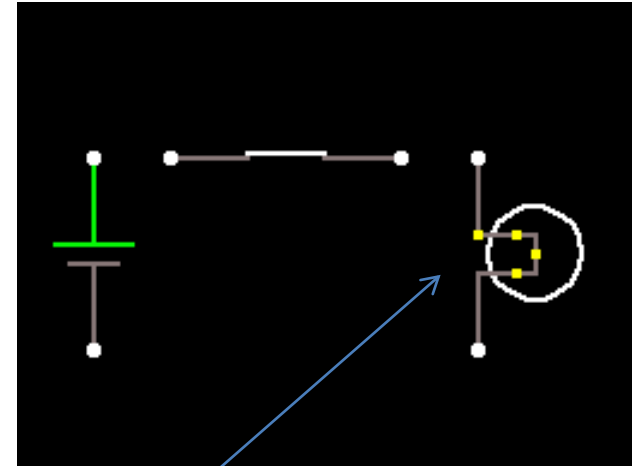
## Passive Components



# Add Lamp

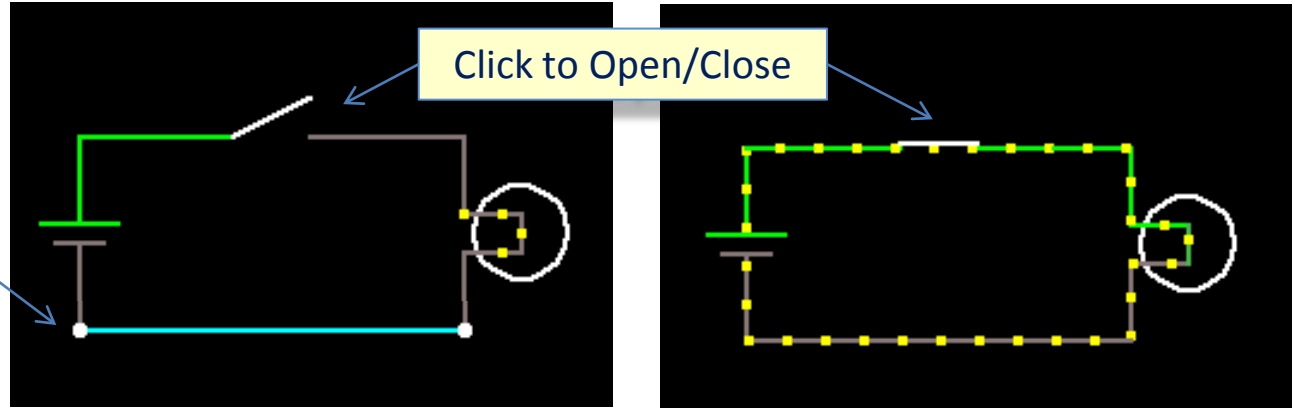
- Add Wire (w)
- Add Resistor (r)
- Passive Components ▶
- Inputs/Outputs ▶**
- Active Components ▶
- Logic Gates ▶
- Chips ▶
- Other ▶
- ✓ Select/Drag Selected (space or Shift-drag)

- Add Ground (g)
- Add Voltage Source (2-terminal)
- Add A/C Source (2-terminal)
- Add Voltage Source (1-terminal)
- Add A/C Source (1-terminal)
- Add Square Wave (1-terminal)
- Add Analog Output
- Add Logic Input
- Add Logic Output
- Add Clock
- Add A/C Sweep
- Add Var. Voltage
- Add Antenna
- Add Current Source
- Add LED
- Add Lamp (beta)**

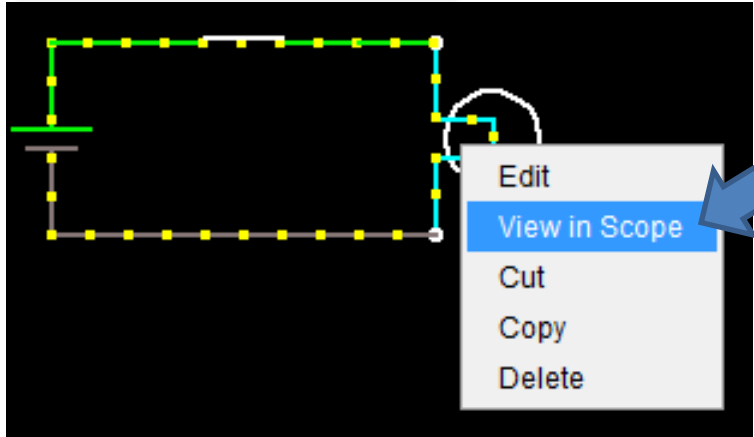


# Add Voltage Source (2-terminal)

- Add Wire (w)
- Add Resistor (r)
- Passive Components
- Inputs/Outputs
- Active Components
- Logic Gates
- Chips
- Other
- ✓ Select/Drag Selected (space or Shift-drag)

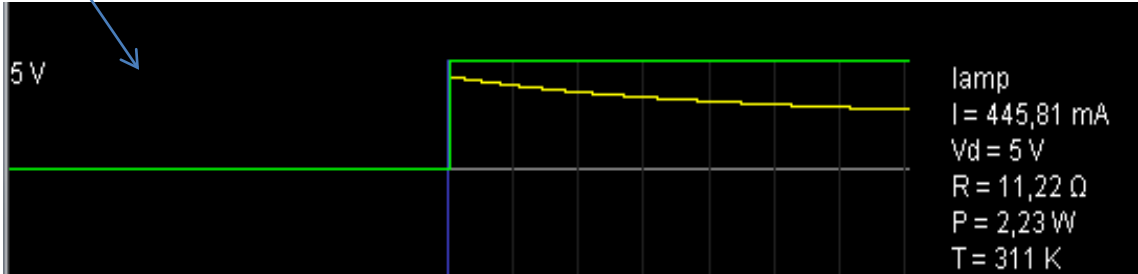


## Add a Scope

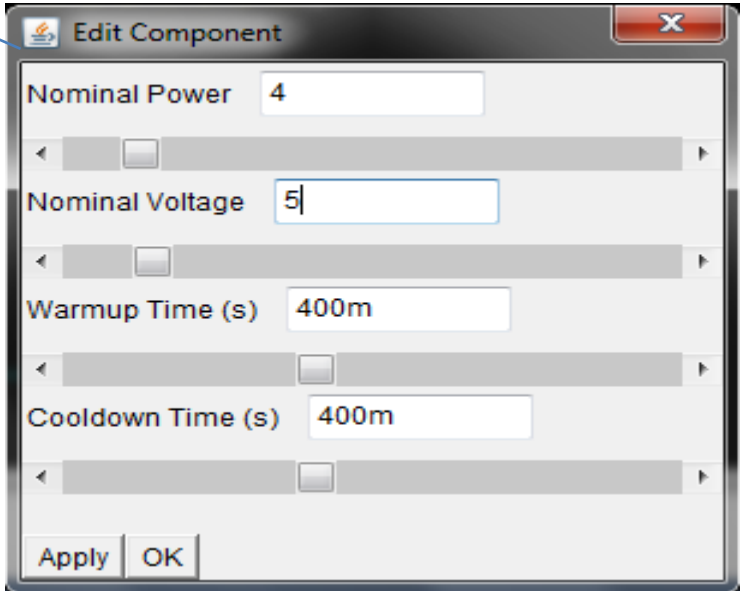
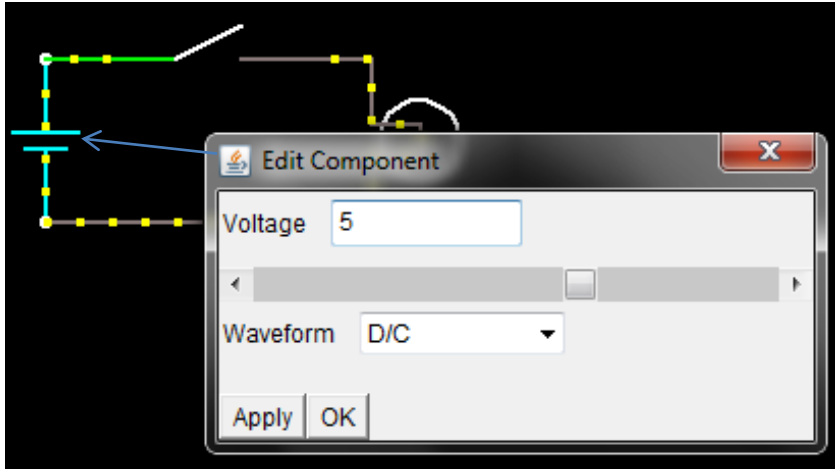
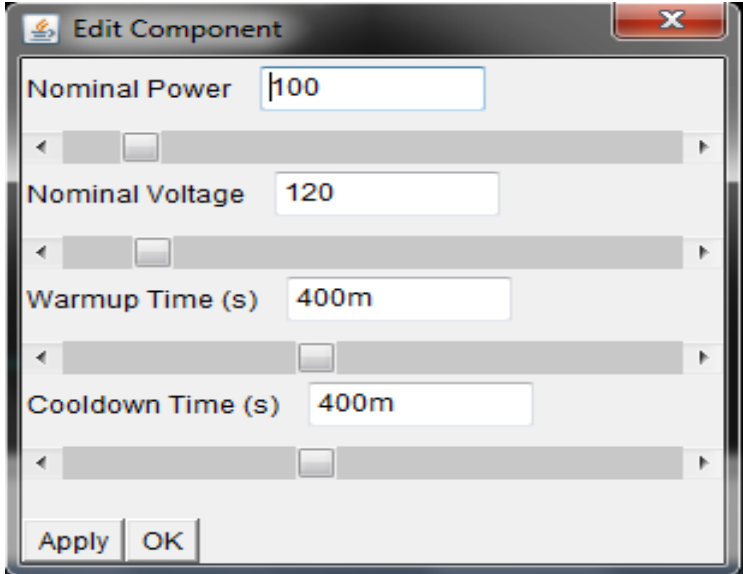
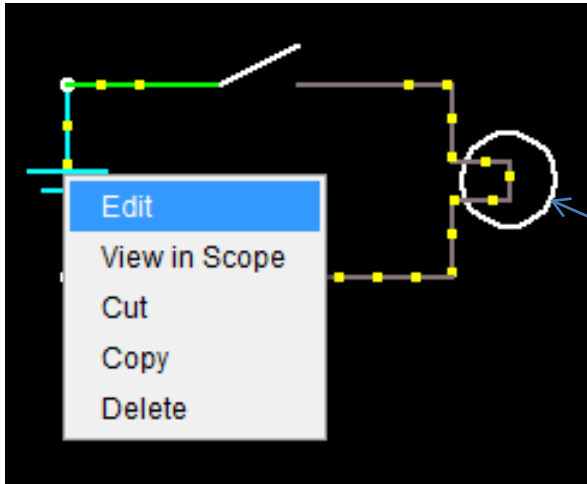


- Remove
- Speed 2x
- Speed 1/2x
- Scale 2x
- Max Scale
- Stack
- Unstack
- Reset
- ✓ Show Voltage
- ✓ Show Current
- Show Power Consumed
- ✓ Show Peak Value
- Show Negative Peak Value
- Show Frequency
- Show V vs I
- Plot X/Y

Right click to change the scope setup



# Edit a component (changing values)





# Edit a component (changing values)

File Edit Scope Options Circuits

Reset

Stopped

Simulation Speed

Current Speed

Power Brightness

www.falstad.com

Current Circuit:

Blank Circuit

lamp  
I = 1,22 A  
Vd = 5 V  
R = 4,11  $\Omega$   
P = 6,09 W  
T = 962 K

Get data of a component by placing to mouse above

16 A

File Edit Scope Options Circuits

Reset

Stopped

Simulation Speed

Current Speed

Power Brightness

www.falstad.com

Current Circuit:

Blank Circuit

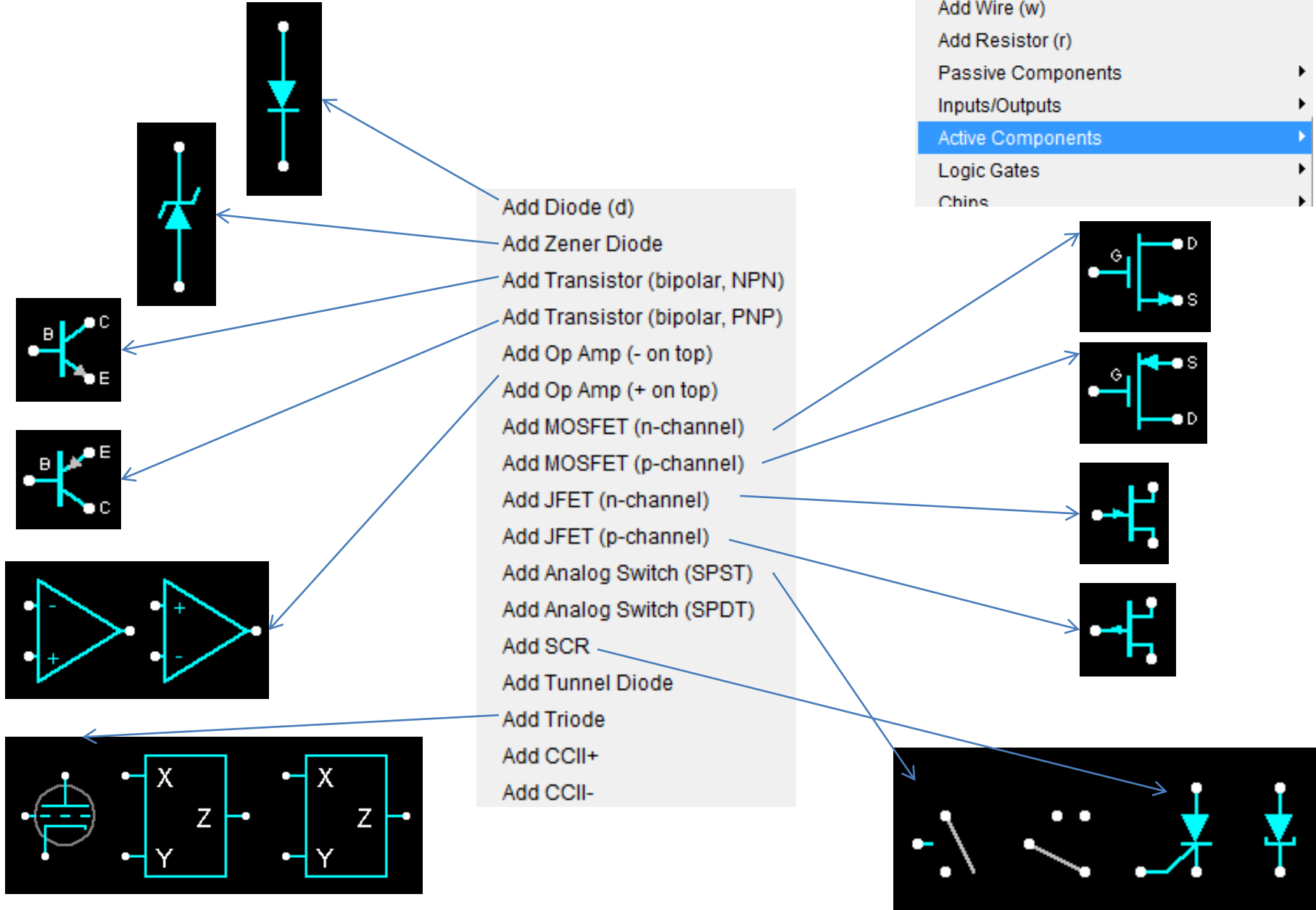
lamp  
I = 806,9 mA  
Vd = 5 V  
R = 6,2  $\Omega$   
P = 4,03 W  
T = 2798 K

808,41 mA

# Active Components of the Circuit Simulator

- Add Wire (w)
- Add Resistor (r)
- Passive Components
- Inputs/Outputs
- Active Components**
- Logic Gates
- Chins

- Add Diode (d)
- Add Zener Diode
- Add Transistor (bipolar, NPN)
- Add Transistor (bipolar, PNP)
- Add Op Amp (- on top)
- Add Op Amp (+ on top)
- Add MOSFET (n-channel)
- Add MOSFET (p-channel)
- Add JFET (n-channel)
- Add JFET (p-channel)
- Add Analog Switch (SPST)
- Add Analog Switch (SPDT)
- Add SCR
- Add Tunnel Diode
- Add Triode
- Add CCII+
- Add CCII-



# How to copy an example from a pdf-document

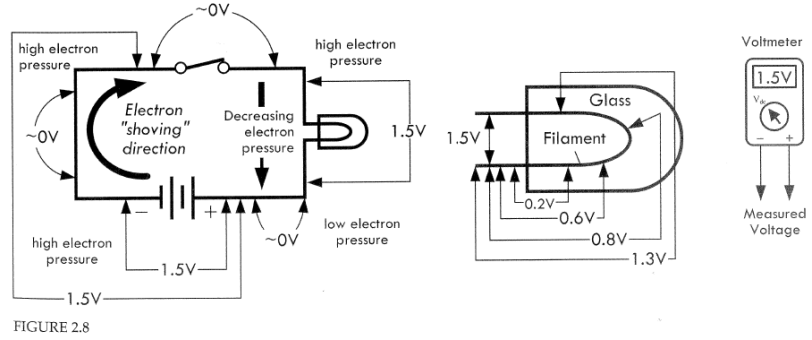
1

```
$ 1 5.0E-6 2.275989509352673 50 5.0 50
v 160 256 160 176 0 0 40.0 1.5 0.0 0.0 0.5
s 192 176 288 176 0 1 false
181 320 176 320 256 0 977.4052486905284 1.0 1.5 0.4 0.4
w 160 176 192 176 2
w 320 176 288 176 1
w 320 256 160 256 0
174 432 176 432 272 0 1000.0 0.331700000000000005 Resistance
w 320 176 432 176 0
w 320 256 320 272 0
w 320 272 432 272 0
O 448 224 496 224 1
o 2 64 0 33 6.674959487252844E-5 8.543948143683641E-5 0 -1
o 10 64 0 34 7.136238463529799E-5 9.765625E-55 1 -1
x
```

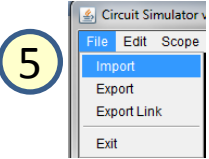
```
$ 1 5.0E-6 2.275989509352673 50 5.0 50
v 160 256 160 176 0 0 40.0 1.5 0.0 0.0 0.5
s 192 176 288 176 0 1 false
181 320 176 320 256 0 977.4052486905284 1.0 1.5 0.4 0.4
w 160 176 192 176 2
w 320 176 288 176 1
w 320 256 160 256 0
174 432 176 432 272 0 1000.0 0.331700000000000005 Resistance
w 320 176 432 176 0
w 320 256 320 272 0
w 320 272 432 272 0
O 448 224 496 224 1
o 2 64 0 33 6.674959487252844E-5 8.543948143683641E-5 0 -1
o 10 64 0 34 7.136238463529799E-5 9.765625E-55 1 -1
x
```

2 Mark with the mouse  
3 Ctrl+C

Read more – PEFI page 13



4 [www.falstad.com/circuit](http://www.falstad.com/circuit)



5  
6 Ctrl+V

9 Press Reset

```
Import
$ 1 5.0E-6 2.275989509352673 50 5.0 50
v 160 256 160 176 0 0 40.0 1.5 0.0 0.0 0.5
s 192 176 288 176 0 1 false
181 320 176 320 256 0 300.0 1.0 1.5 0.4 0.4
w 160 176 192 176 2
w 320 176 288 176 1
w 320 256 160 256 0
174 432 176 432 272 0 1000.0 0.331700000000000005 Resistance
w 320 176 432 176 0
w 320 256 320 272 0
w 320 272 432 272 0
O 448 224 496 224 1
o 2 64 0 33 6.674959487252844E-5 8.543948143683641E-5 0 -1
o 10 64 0 34 7.136238463529799E-5 9.765625E-55 1 -1
Import Close
```

7

