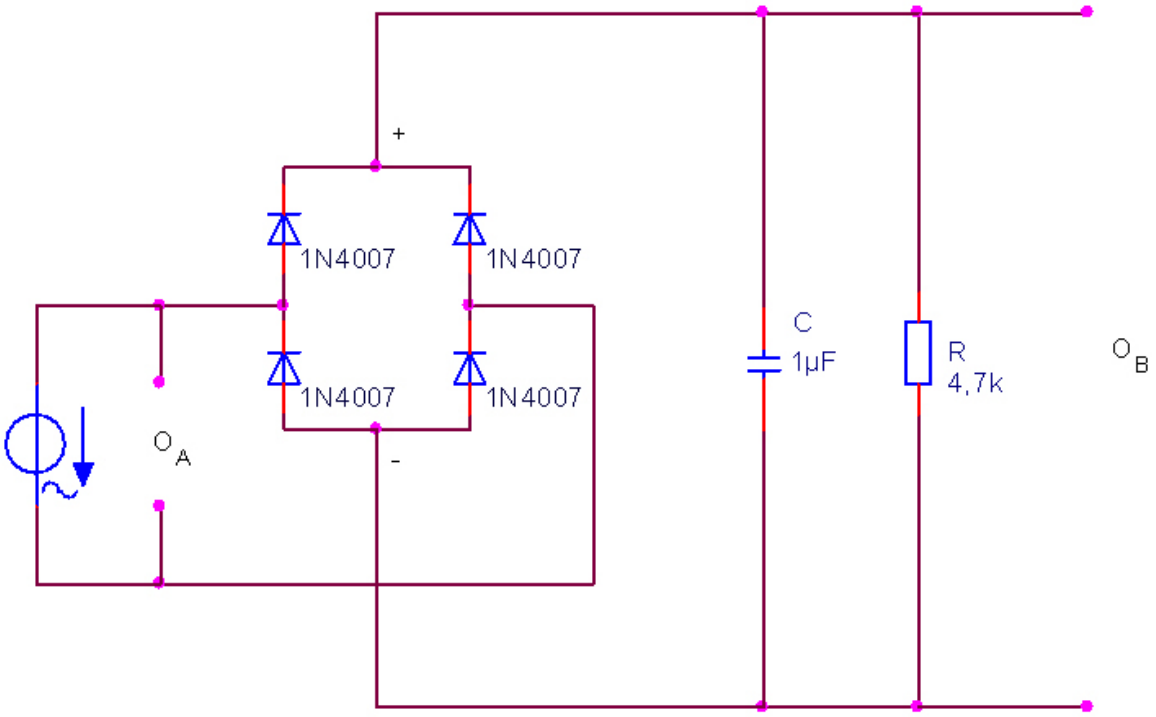
(1) Bridge rectifiers

Circuit diagram

The following circuit diagram is used for this experiment:



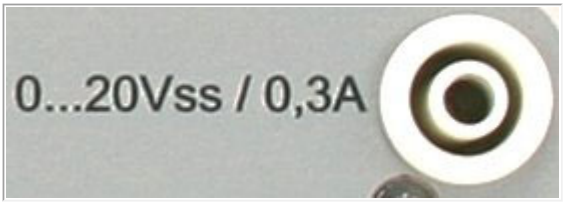
Components

The following components are needed for this experiment:

Parts	Id no.	Designation
2	SO5126-5M	Cables
14	SO5124-6F	Bridge, small
1	PS4121-3L	R 4,7k
1	PS4122-1W	C 1µ
4	PS4122-7C	Diode 1N4007

Cable connections

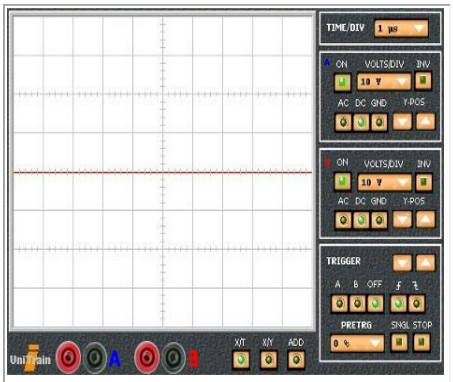
The following cable connections are used in this experiment:

Designation	Symbol	Equipment	Sockets
FG		FUNCTION GENERATOR	
GND		MULTI POWER SUPPLY 60VA / 500KHz	

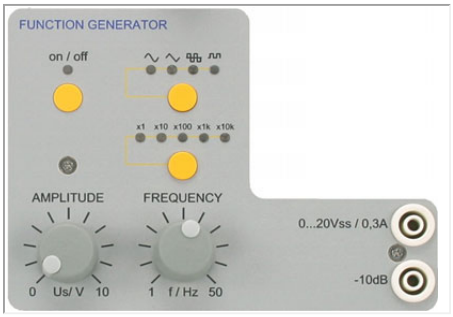
Connect the specified sockets with the corresponding connections on the layout diagram.

Equipment

The following equipment with their corresponding settings are needed for this experiment:

Equipment	Settings
	

	Channel A	Channel B
Sensitivity	1 V/DIV	1 V/DIV
Coupling	DC	DC
Polarity	norm	norm
y-pos	0	0
Time base	2 msec/DIV	
Mode	X/T	
Trigger channel	A	
Trigger edge	pos	



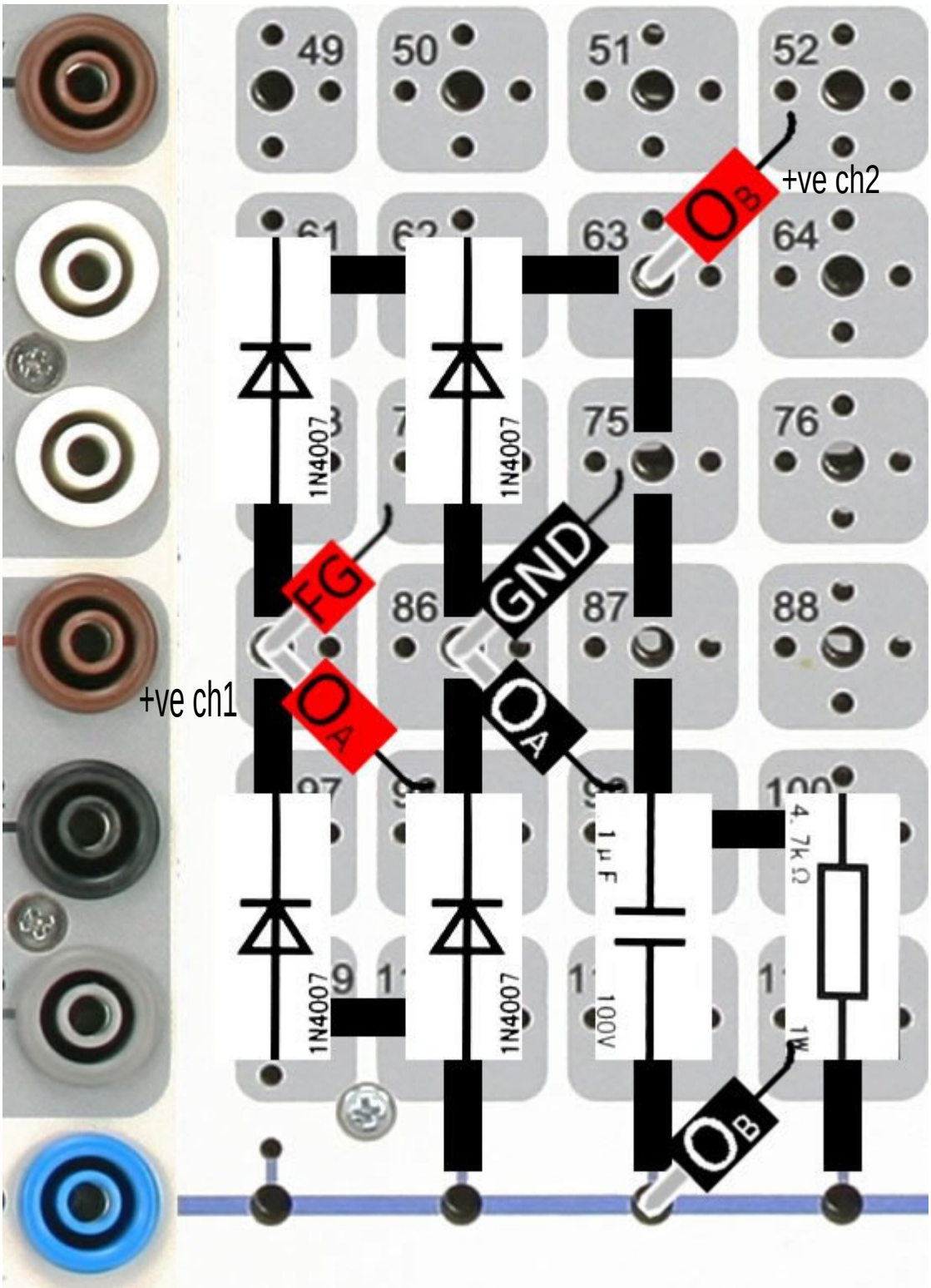
Curve shape	sinusoidal
Amplitude	4V
Frequency factor	x1
Frequency	50 Hz

Experiment setup

Now please set up the experiment in the following sequence on the patch panel.

- Bridging plugs, starting at pad 109
- Electronic components
- Measuring instruments and cables

Please bear in mind: there are **no grounding bridges** connected between the power supply and the blue ground line of the patch panelt!

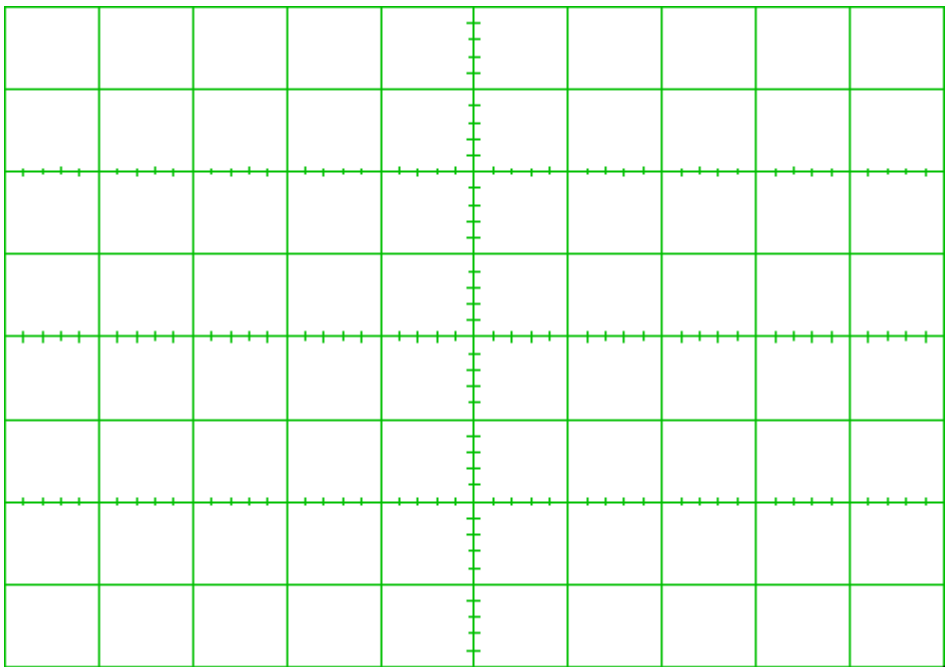

49
50
51
52
61
63
64
75
76
86
87
88
97
100
+ve ch2
+ve ch1
FG
GND
1N4007
1N4007
1N4007
1N4007
1 µ F
100V
4.7kΩ
1W

Experiment procedure and exercises

After completing the experiment the user is able to:

- recognise the output voltage of a bridge rectifier
- assess the ripple due to load.
- recognise the oscillograph of a partially damaged bridge rectifier.

Now set the oscilloscope to X/Y display mode. Please remove the capacitor from the circuit and enter the oscillscope trace below.



Set the input voltage to a value of 4 V peak voltage. How high is the peak voltage on the output side of the bridge rectifier?

U_{pp} = _____ V

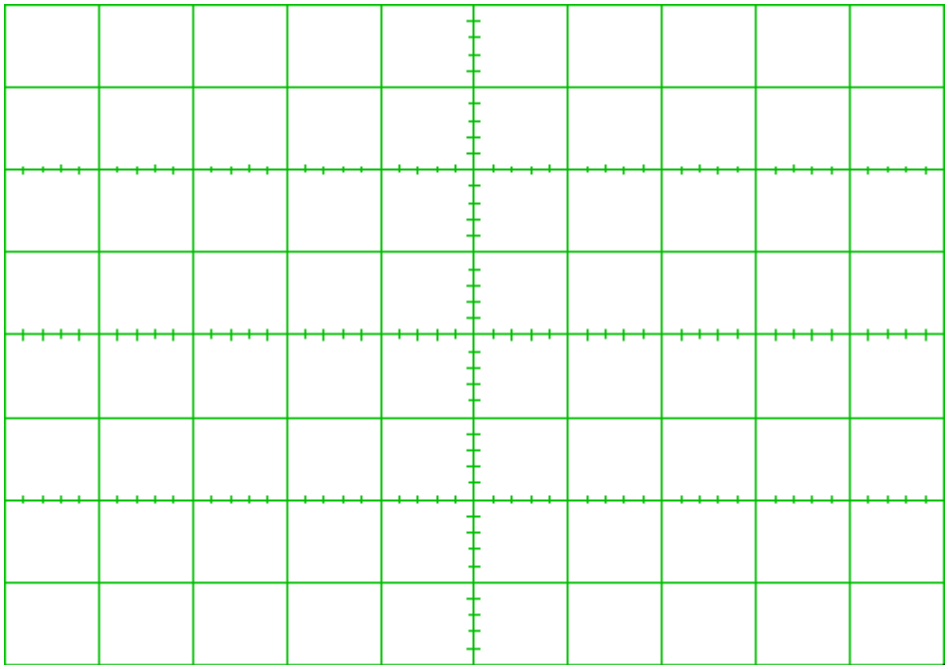
Set the osciilloscope so that you can get an optimum reading of the values.

Why is the peak voltage on the output side lower than the input voltage?

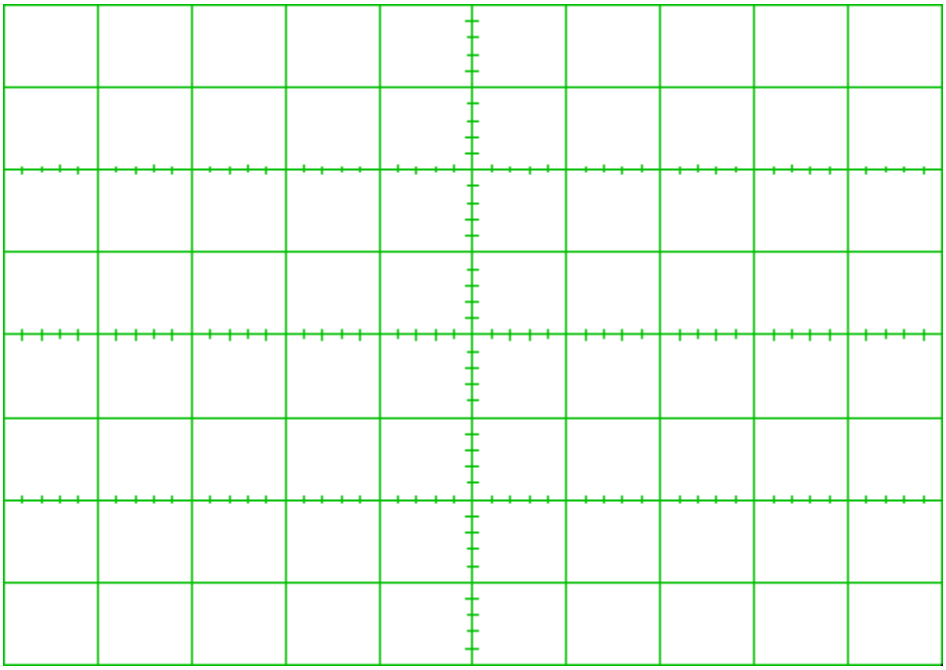
- ○ The voltage is lower because the signal is time-shifted.
- ○ The voltage is lower because a voltage of approx. 0.7 V drops across each diode.
- ○ The voltage is lower because it is closer to the load.

Remember that the current at each phase has to pass through two diodes!

Now connect the capacitor to the position specified. Enter the oscilloscope trace taken below.



Remove one diode from the circuit. Enter the oscilloscope trace recorded below.

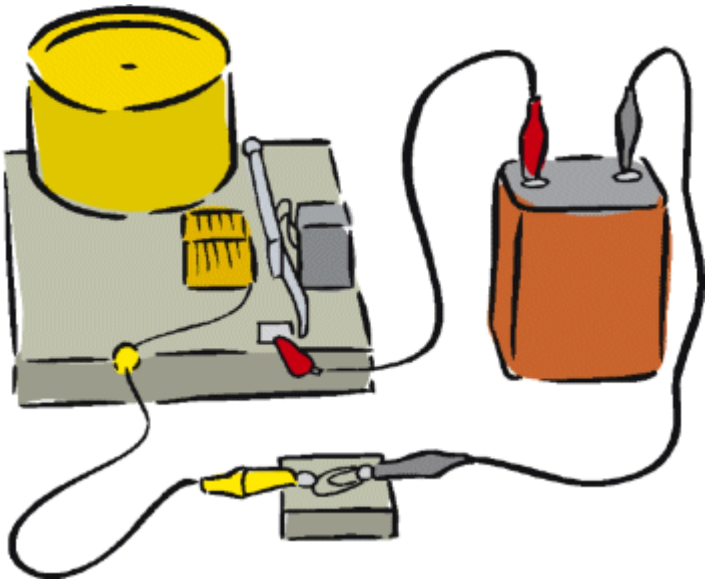


What do you observe on the oscillograph?

- The oscillograph trace does not change.
- The oscillograph trace corresponds exactly to the half-wave rectifier.
- The oscillograph trace corresponds roughly to that of the half-wave rectifier, but the output voltage is lower by another 0.7 V, making it a total of 1.4 V lower than that of the half-wave rectifier

The removal of one diode is comparable to the damage of one component by an excessive load.

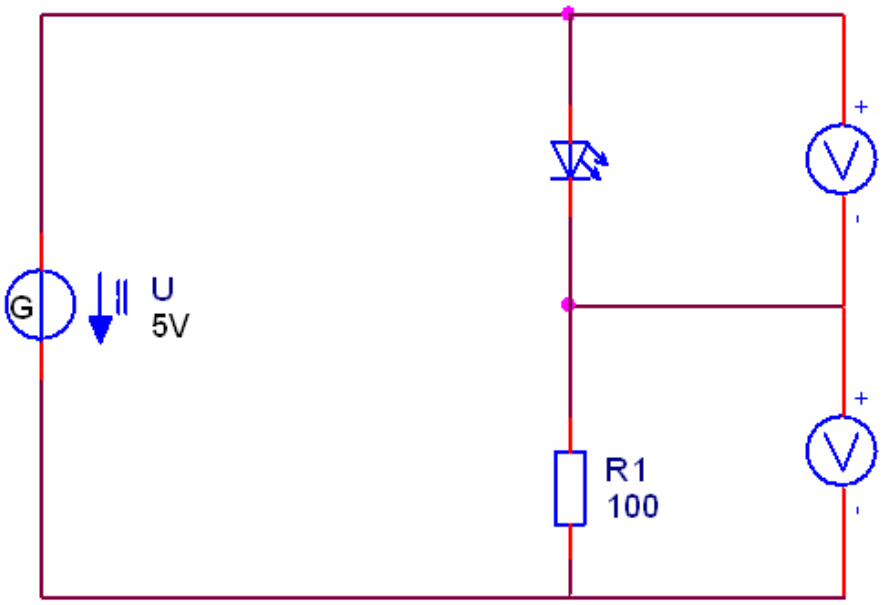
(2) Light emitting diode



Experiment procedure

Circuit diagram

The following circuit diagram is used for this experiment:



Components

The following components are used in this experiment:

Parts	Id no.	Designation
2	SO5126-5M	Cables
11	SO5124-6F	Bridge, small
1	PS4121-2N	R 100
1	PS4123-5E	LED green
1	PS4123-5B	LED red
1	PS4122-7C	Diode 1N4007
1	PS4122-7D	Diode Ge AA118
1	PS4122-8A	Z-Diode 4.7 V

Colour	*Threshold voltage*
IR	1.3 V
red	1.6 V - 1.8 V
orange	2.0 V
yellow	2.2 V
green	2.4 V
blue	4V - 4.5 V

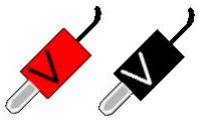
Cable connections

The following cable connections are used in this experiment:

Designation	Symbol	Equipment	Sockets
5V / 1A		DC Power Supply	
GND		MULTI POWER SUPPLY 60VA / 500KHz	

Equipment

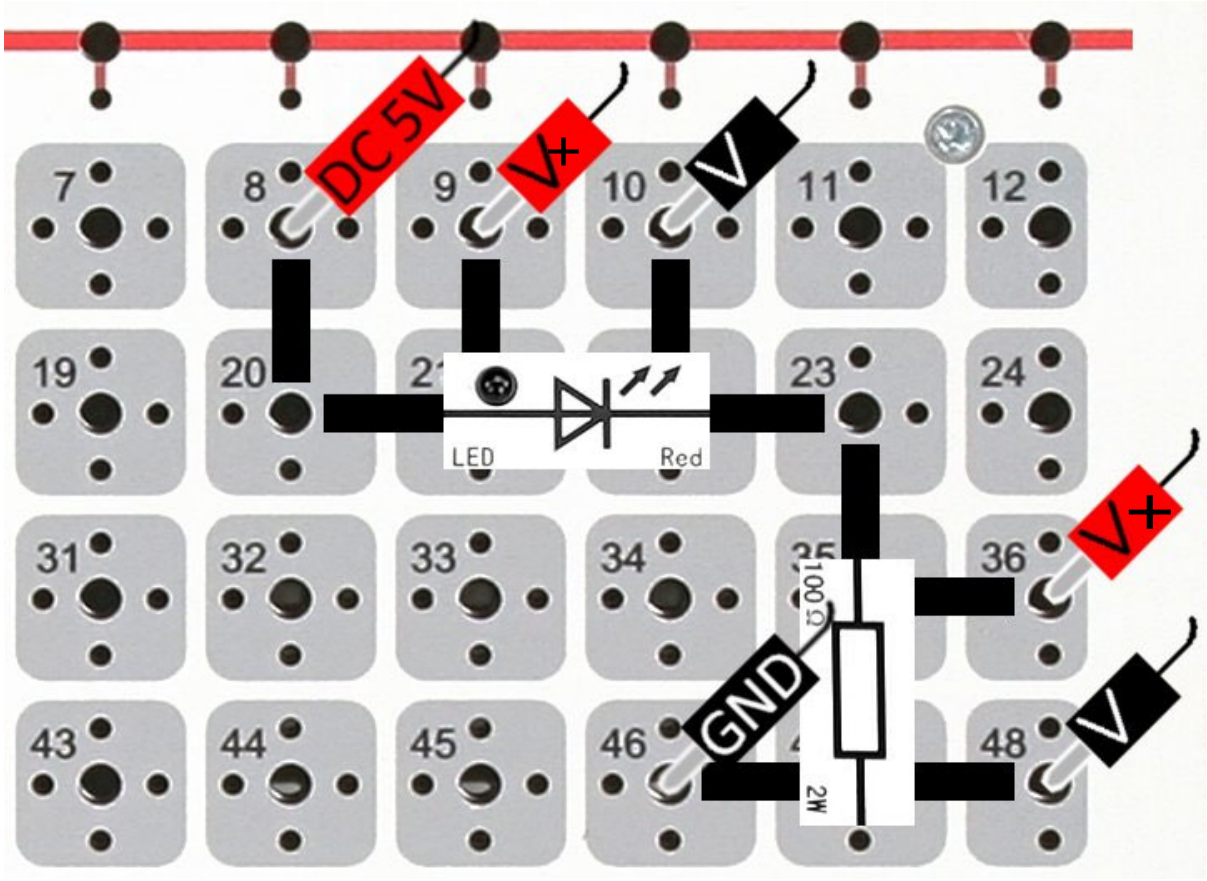
The following equipment with their corresponding settings are needed for the experiment:

Equipment	Settings	
	Black cable	Ground
	Red cable	V Ohm input
	Control knob	V DC
		Please plug in the red and black probes at the specified locations

Experiment set-up

Now please set up the experiment as a testing station in the upper right hand corner of the patch panel. Begin with the following:

- Bridging plugs
- Electronic components
- Measuring instruments and cables



Experiment procedure and exercises

Compute the currents based on the voltage across the resistor by applying Ohm's law.

Measure the threshold voltage at the various types of light emitting diodes or diodes. To do this connect the corresponding diode at the specified position and then please enter the voltage drop across the diode and the associated current. Begin with the red light emitting diode.

U_S = _____ V

I_S = _____ mA

Now connect the green to the location where the diode was. Measure the voltage and current and enter the values below.

U_S = _____ V

I_S = _____ mA

Now connect the germanium diode into the diode position. Measure the voltage and current and enter these values below.

U_S = _____ V
I_S = _____ mA

Now connect the silicon diode into the diode position. Measure the voltage and current and enter the values below.

U_S = _____ V
I_S = _____ mA

Now connect the zener diode into the diode position. Measure the voltage and current and enter the values below.

U_S = _____ V
I_S = _____ mA