Changeover switches and alternate switches

(Item No.: P1380500)

Curricular Relevance

Area of Expertise: Physics
Education Level: Age 14-16
Topic: Electricity
Subtopic: The simple electrical circuit
Experiment: Changeover switches and alternate switches

Difficulty	Preparation Time	Execution Time	Recommended Group Size
Intermediate	10 Minutes	10 Minutes	2 Students

Additional Requirements:

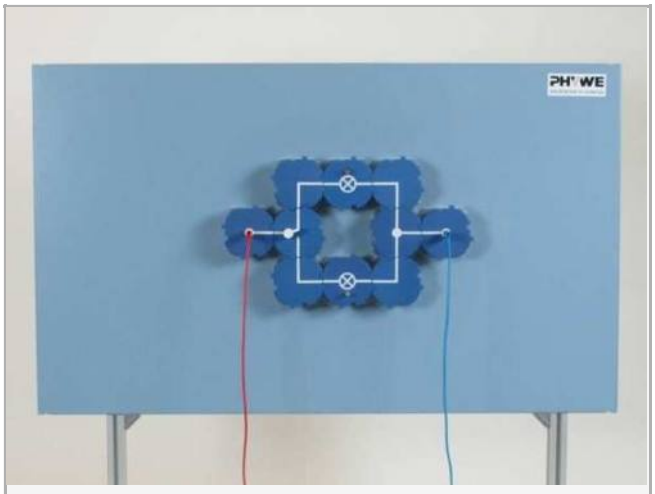
Experiment Variations:

Keywords:

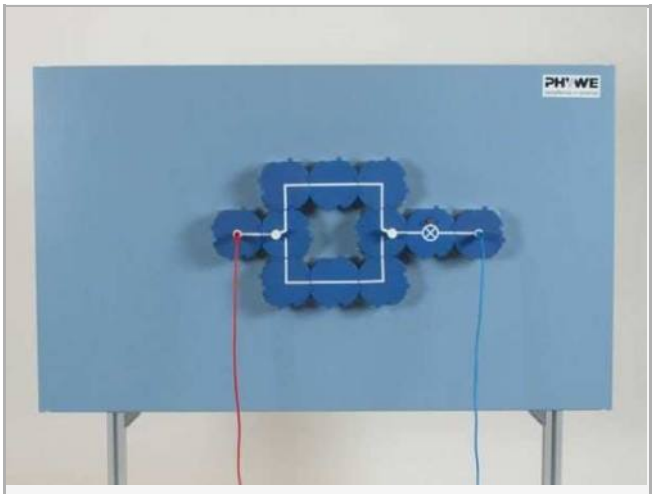
Principle and equipment

Principle

This demonstration shows how switching between two electrical devices is possible, and how alternate switching functions.



Experimental set-up Part 1



Experimental set-up Part 2

Equipment

Position No.	Material	Order No.	Quantity
1	PHYWE power supply, universal DC: 0...18 V, 0...5 A / AC: 2/4/6/8/10/12/15 V, 5 A	13500-93	1
2	Demo Physics board with stand	02150-00	1
3	Switch, change-over, module DB	09402-02	2
4	Socket for incandescent lamp E10 ,module DB	09404-00	2
5	Junction, module DB	09401-10	2
6	Electr.symbols f.demo-board,12pcs	02154-03	1
7	Connector, straight, module DB	09401-01	2
8	Connector, angled, module DB	09401-02	4
9	Connector, T-shaped, module DB	09401-03	1
10	Filament lamps 12V/0.1A, E10, 10 pieces	07505-03	1
11	Connecting cord, 32 A, 1000 mm, red	07363-01	1
12	Connecting cord, 32 A, 1000 mm, blue	07363-04	1

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Set-up and procedure

1st. Experiment

- Connect up the circuit as shown in Fig. 1, the power supply is set to 0 V and switched off.
- Switch on the power supply and adjust the voltage to the 12 V rated voltage of the lamp; observe the lamp (1).
- Repeatedly operate the changeover switch and observe the behaviour of the lamp (2).
- Switch off the power supply.

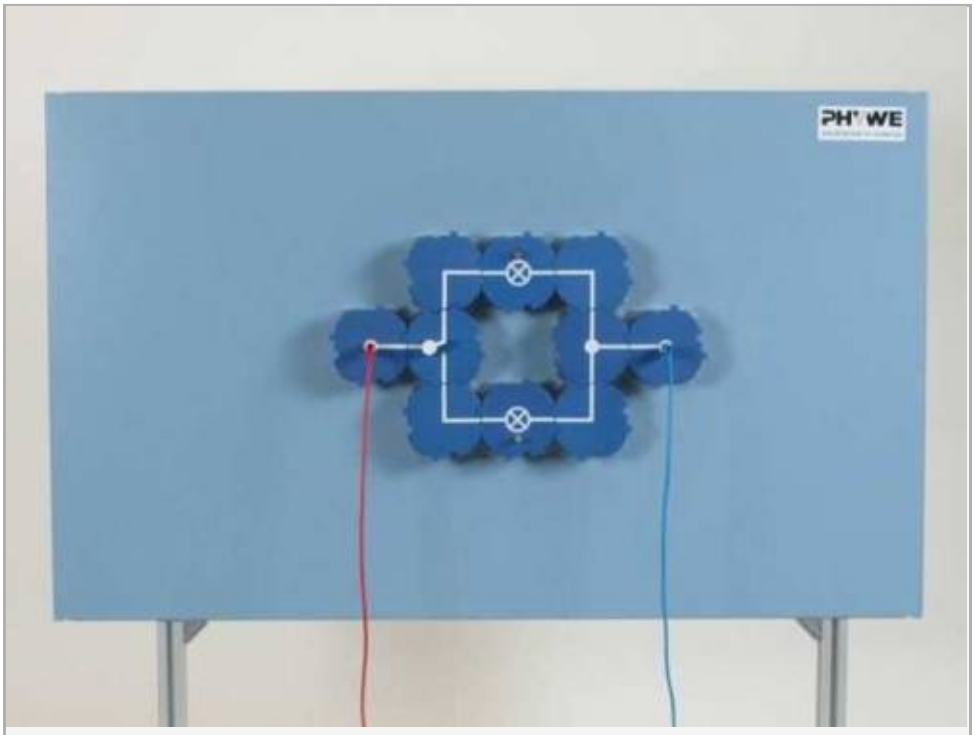

Fig. 1

2nd. Experiment

- Connect up the circuit as shown in Fig. 2.
- Switch on the power supply and repeatedly operate the changeover switches in any way you want, observe the lamp (3).
- Set the power supply to 0 V and switch it off.

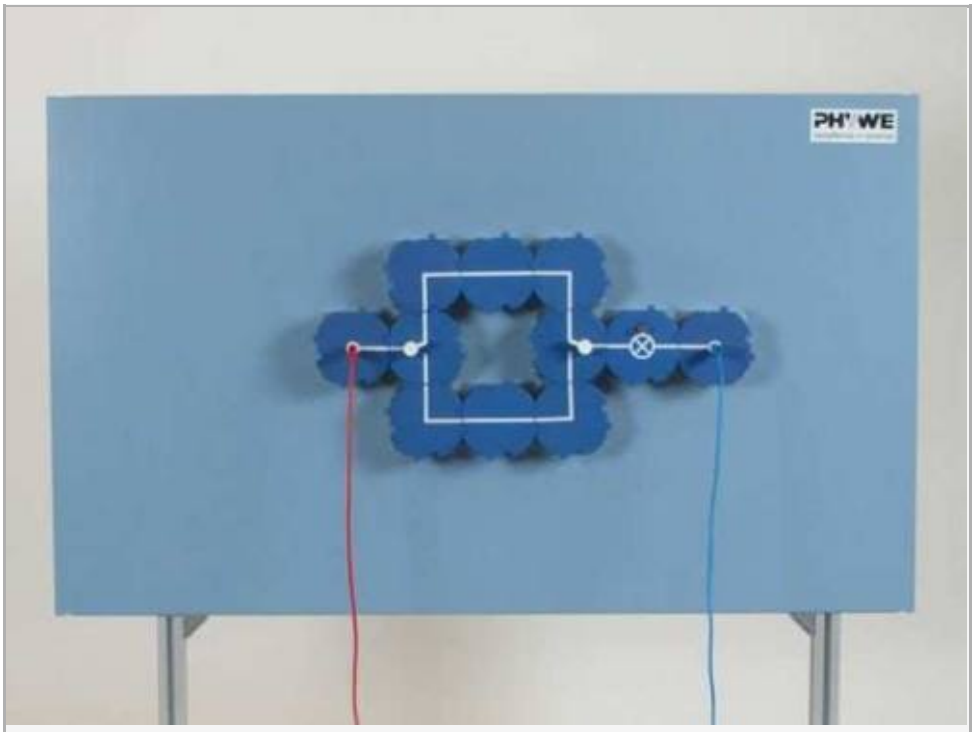

Fig. 2

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Observation and evaluation

Observation

1. Only one lamp lights up when the circuit is closed.
2. The lamps light up alternately when the changeover switch is switched.
3. The lamp can be switched on and off with each of the two changeover switches.

Evaluation

A changeover switch enables you to switch over in a circuit from one electrical appliance to another one. With two changeover switches and three connections (one of these to the source of current), you can close or break a circuit from two different positions any way you wish. This is called alternate switching.

Remarks

Alternate switching is mostly used in the lighting of staircases and long corridors. The changeover switches which are used for alternate switching are called alternate switches.

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