The protective separating transformer (Item No.: P1377500)

Curricular Relevance

Area of Expertise: Physik
Education Level: Klasse 7-10
Topic: Elektrizitätslehre
Subtopic: Energieversorgung und Umwelt
Experiment: Der Schutz-Trenntransformator

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

Additional Requirements:

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Additional information

When a separating transformer is used, there is no conductive connection between the primary circuit ("ring main") and the secondary circuit ("consumer circuit"). There is no voltage between the consumer circuit and earth. When a person touches a lead in the consumer circuit that is carrying current but is not insulated, he is protected by this transformer (protective separating transformer).

Notes on setup and prodecure

The students should be familiar with the terms primary circuit and secondary circuit.
The upper lead represents the L-lead and the lower lead the N-lead. Earthing of the person model is achieved with a connecting cord. It may be necessary for you to remind the students of this.
The building block with the lamp socket is positioned in the circuit so that the thread is connected to the upper lead.

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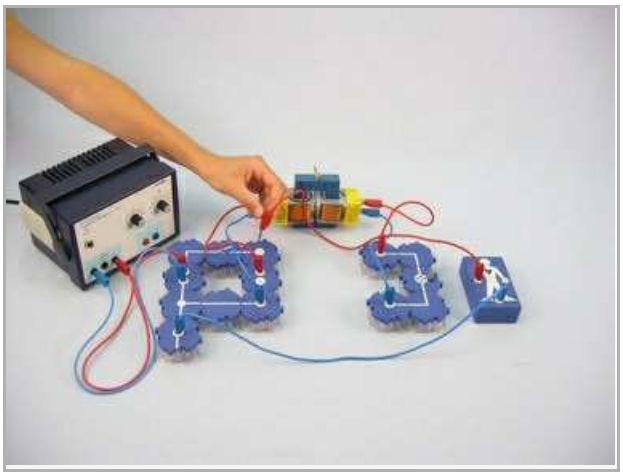
Task and equipment

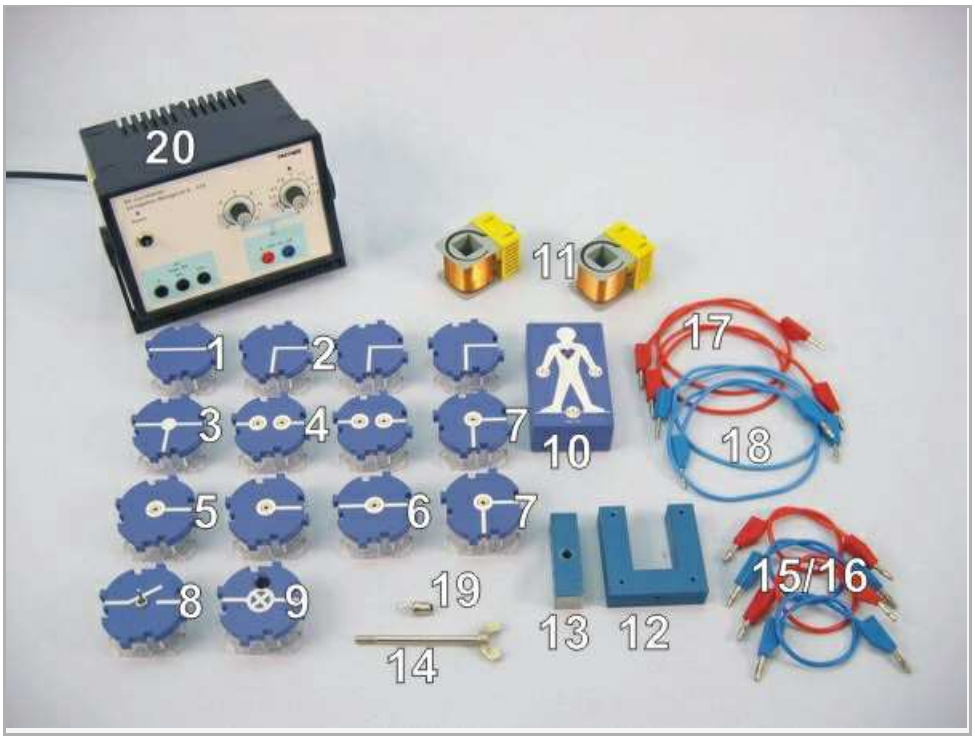
Task

How can a dangerous flow of current from an L-lead through the human body to earth be prevented?

Set up a power supply with a protective separating transformer.



Equipment



Position No.	Material	Order No.	Quantity
1	Straight connector module, SB	05601-01	1
2	Angled connector module, SB	05601-02	3
3	T-shaped connector module, SB	05601-03	1
4	Interrupted connector module, SB	05601-04	2
5	Junction module, SB	05601-10	2
6	Straight connector module with socket, SB	05601-11	1
7	Angled connector module with socket, SB	05601-12	2
8	On-off switch module, SB	05602-01	1
9	Socket module for incandescent lamp E10, SB	05604-00	1
10	Model person for electrical safety, SB	05680-00	1
11	Coil, 400 turns	07829-01	2
12	U-core	07832-00	1
13	Yoke	07833-00	1
14	Tightening screw	07834-00	1
15	Connecting cord, 32 A, 250 mm, red	07360-01	2
16	Connecting cord, 32 A, 250 mm, blue	07360-04	2
17	Connecting cord, 32 A, 500 mm, red	07361-01	2
18	Connecting cord, 32 A, 500 mm, blue	07361-04	2
19	Filament lamps 12V/0.1A, E10, 10	07505-03	1 piece
20	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1

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Set-up and procedure

Set-up

- Set up the experiment as shown in Fig. 1 and Fig. 2.
- Insert the lamp socket so that the socket thread is connected to the upper lead.
- Assemble the transformer with two coils, each with 400 windings, fix the yoke and the U-core tightly together with the tightening screw.

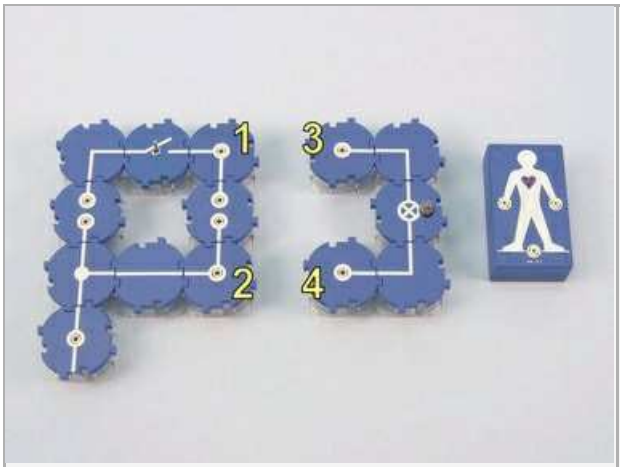

Fig. 1

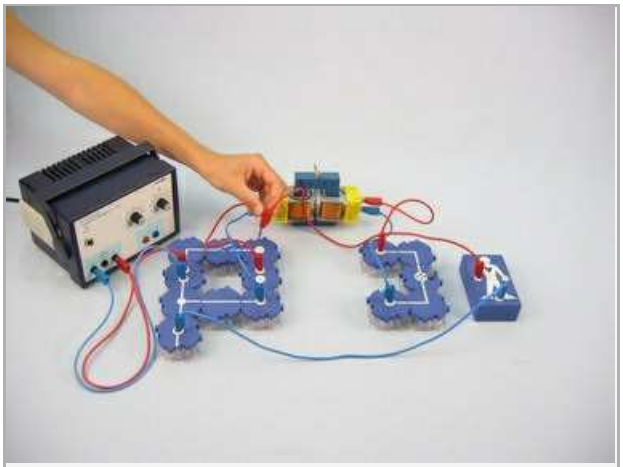
Fig. 2

Procedure

- Close the switch.
- Connect one hand of the person model successively with the measurement positions 1, 2 in the primary circuit.
- Observe the person model, record your observations under Result - Observations 1 and 2 in the report.
- Connect the hand of the person model with the measurement position 3 in the secondary circuit.
- Record your observations under Result - Observations 3.
- Connect the hand of the person model with the measurement postion 4 in the secondary circuit or with the lamp socket.
- Record your observations under Result - Observations 4.
- Remove the connecting cord between the foot of the person model and earth.
- Connect one hand of the person model with the measurement position 3 in the secondary circuit, the other with position 4.
- Record your observations under Result - Observations 5.

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Report: The protective separating transformer

Result - Observations 1

Note your observations.

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Result - Observations 2

Note your observations.

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Result - Observations 3

Note your observations.

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Result - Observations 4

Note your observations.

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Result - Observations 5

Note your observations.

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Evaluation - Question 1

Explain Observations 1 and 2.

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Evaluation - Question 2

Explain the behaviour of the diodes in Observations 3 and 4.

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Evaluation - Question 3

What happens in Observations 5?

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