

ELITRONS

SCIENCE EDUCATION ELECTRON SET



ELEKTRONIK-EXPERIMENTIERKASTEN
STAVEBNICE ELEKTRICKÝ OBVOD



PHYSICAL
SCIENCE



KNOWLEDGE
OF CIRCUIT



BEGINNING
ABILITY



TECHNOLOGICAL
CREATIVITY

150



EXPERIMENTS

EXPERIMENTE | EXPERIMENTŮ



FREE

FREI | ZDARMA



MANUAL

IN MULTIPLE LANGUAGES

HANDBUCH IN
MEHREREN SPRACHEN
MANUÁL
VE VÍCE JAZYCÍCH

eliPlay



Battery Installation

1. Ensure that the power host is shut down.
2. Open the battery box cover on the back of the power host using a screwdriver.
3. The subject should follow the correct polarity (+, -). Load three new 1.5V AA batteries.
4. Place the battery case cover and tighten the screws.

Precautions For Battery Use

1. Toy battery type: 3 1.5V AA non-rechargeable batteries.
2. Non-rechargeable batteries cannot be recharged.
3. Rechargeable batteries should only be charged under adult supervision.
4. The rechargeable battery should be removed from the toy before charging.
5. Do not mix old and new batteries or different types of batteries.
6. The battery should be placed with the correct polarity (+, -).
7. Used batteries should be removed from toys.
8. Do not short circuit the power terminal.
9. Take out the battery if it is not used for a long time.
10. Do not put the battery in the fire.
11. Toys with battery cases do not state that toys cannot be connected to more than the recommended amount of power.



Caution

For children over 8 years old only.

Before use and play, please read the instructions carefully.

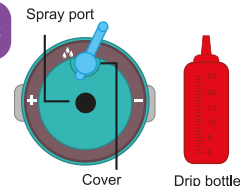
All packing materials (e.g., tape, plastic sheets, bags) must be excluded.

Some parts of the product may not be suitable for children to play with.

For your child's safety, please properly dispose of all packing materials.

Spray module precautions

1. Step Remove the lid
2. Use a drip bottle add water to the injection port
3. Add water and close the lid tightly



- After opening the water can be added once, should not be too full
- If the water is too full, the water will come out of the spray nozzle, which is the internal pressure enhancement, resulting in higher water level.
- Simply remove the lid, pour off the excess water, and wipe off the spray nozzle.
- Please carefully distinguish between (spray port) and (water injection port).
- Please do not add water to the spray port!

Care And Maintenance

1. Use a soft dry cloth to wipe the outside of the power supply host to clean it.
2. Avoid direct sunlight and any heat sources.
3. Take out the battery if it is not used for a long time.
4. Do not collide with hard objects or try to disassemble the host.
5. Do not immerse the power host in water and avoid moisture.

Common Troubleshooting

1. If for some reason the power host stops responding, please follow the following steps:
2. Disconnect the cable from the power host.
3. Take out the battery.
4. Place the power host for a few minutes, and then reinstall the battery.
5. Restart the machine and use it again.
6. If the power host still cannot work, please install a new battery.



PREFACE

There are only two kinds of electric charge in nature, positive and negative. The charge on a glass rod rubbed by silk is called a positive charge, the charge carried by a rubber rod rubbed by fur is called negative charge. The most basic property of charge is that like charges repel each other, different charges attract each other.

One of the intrinsic properties of matter.

Amber attracts small and light objects when it is rubbed — the earliest discovery of electrified objects — and found lightning strikes, vibrations, heat, light, and so on can charge an object.

There are positive and negative charges, same sign repels, different sign attracts, positive and negative combine, neutralize each other. Electricity can be transferred, increased or decreased, but the total amount remains the same.

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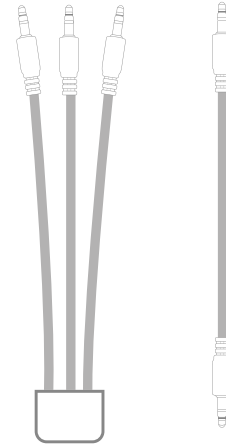
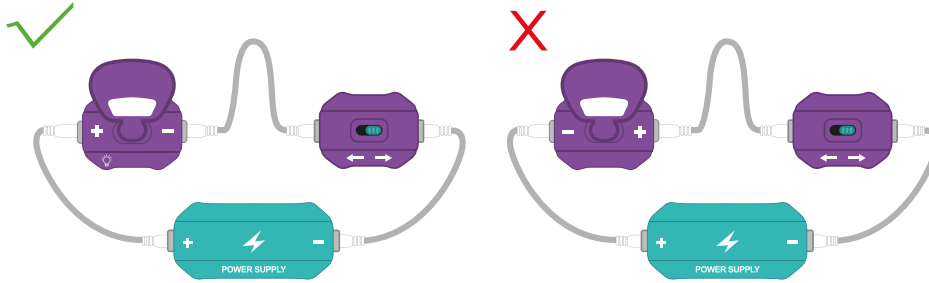
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LIST OF COMPONENTS



BASIC FUNCTIONS

CORRECT AND INCORRECT CONNECTION



PRECAUTIONS FOR USING CONNECTING CABLES

Please read the following instructions carefully before experimenting.
Every child has different abilities, so parents should carefully select activities suitable for their children.
Make sure the child understands the following rules:

- Only connect cables as instructed in the lesson.
- Not all connections are used in every activity.
- Never plug the cable into any outlet in your home.
- Never connect the same cable to both ends of the power supply unit at the same time – risk of battery short circuit.
- Make sure the cable is not placed in a humid environment – risk of water damage.
- Do not insert any conductive objects (e.g. wire, key, etc.) into the ports other than the supplied cables.
- Do not remove or modify any electronic module – modification may cause damage or overheating.
- Disconnect the circuit when the product is not in use to avoid draining the battery.

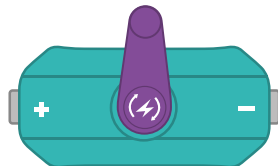
CONNECTING CABLE

The product contains two different types of connecting cables. As the child gradually gains knowledge, they can choose the appropriate cable for combinations.

INTRODUCTION OF MODULE FUNCTIONS

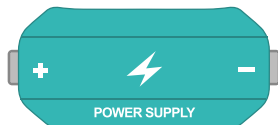
Generator

It is a hand-held electric power generator that has a wired connection.



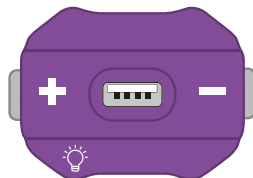
Power module

Serves as a source, to connect wires and supply electrical energy.



USB module

Used to connect a desk lamp as a light source.



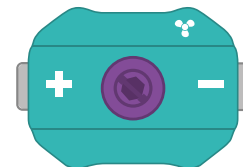
Vibration module

(functional regardless of positive or negative poles) Uses pressure to change the amount of current passing through it.



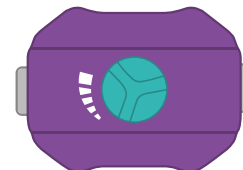
Motor module, fan head

With correct positive and negative connection, it works by electricity rotating the motor clockwise. With opposite connection it can also be switched to rotate in the opposite direction.



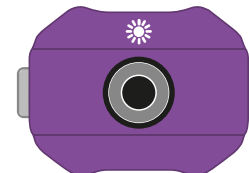
Rotary module

(functional regardless of positive or negative poles). You can control the amount of current passing through with the rotary switch.



Photosensitive module

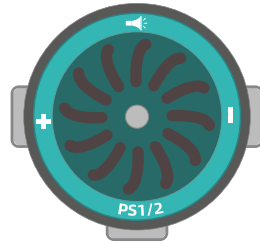
(functional regardless of positive or negative poles). Light intensity affects the amount of current passing through the circuit.



INTRODUCTION OF MODULE FUNCTIONS

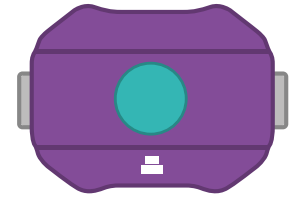
Speaker module

Emits a beeping sound when turned on.



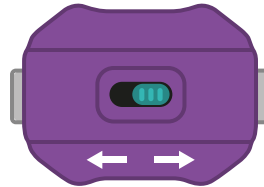
Button module

(functional regardless of positive or negative poles). Pressing the button module controls the amount of current passing through.



Switch module

Close the switch. Inside, metal contacts touch the connecting wire, connecting the circuit and the power module starts working.



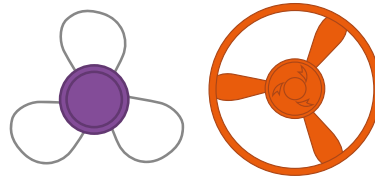
USB desk lamp module

Insert the USB module into the port. Electric current lights up the light.



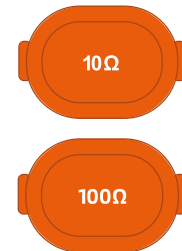
Fan and Flying saucer

Place them on the motor module.



Resistor

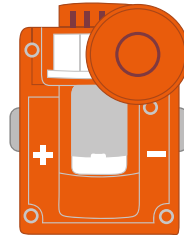
The amount of current passing through it is limited by the size of the resistance.



INTRODUCTION OF MODULE FUNCTIONS

Air generator

When electrical energy is supplied and the additional air attachment is connected, it keeps the ball in the air.



Additional air attachments

Attaches to the air generator.



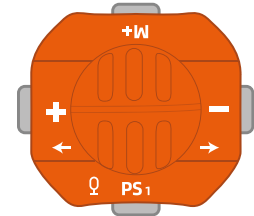
Vacuum tube

Connects individual air devices.



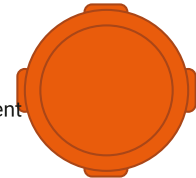
Microphone module

When the power is on, switch to the positive pole for recording, to the negative pole for voice control.



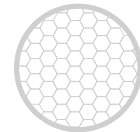
Adapter

The adapter can connect up to four wires simultaneously and distribute current to multiple modules.



Ball

You will need it for experiments with the air generator.



INTRODUCTION OF MODULE FUNCTIONS

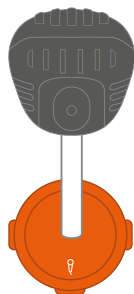
Bluetooth module

When electrical energy is supplied, the module can work with the speaker module and karaoke microphone.



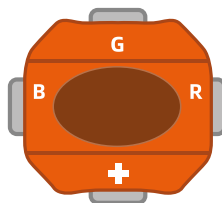
Karaoke microphone

Add-on module for Bluetooth module.



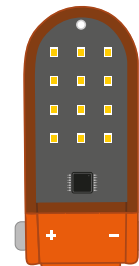
RGB light

The positive pole, port R, port G and port B can connect up to four wires at the same time, which then carry current to multiple modules.



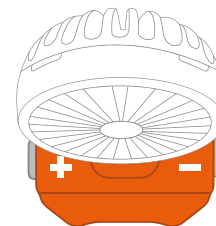
Light show module

When the power is on, the LED lights will flash.



Fan

Connects individual air devices.



RGB light attachment

Attaches to the RGB light.



CIRCUIT CONNECTION (NO. 1):

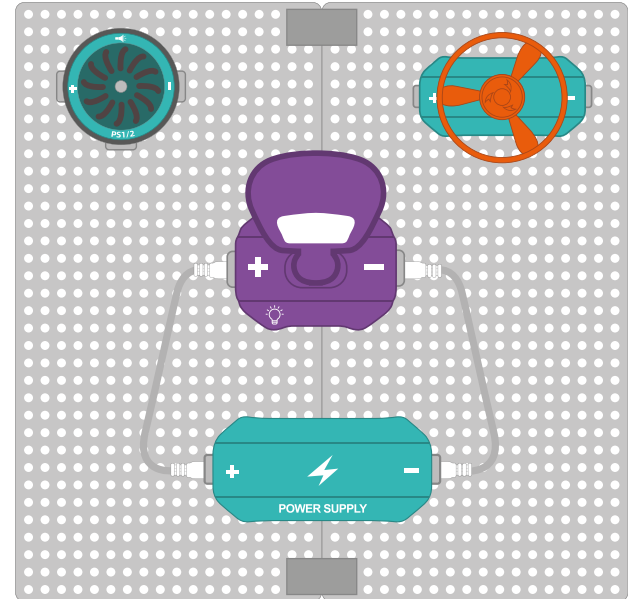
Use the motor module with the flying saucer or the USB desk lamp module.

- 1 Insert one end of the wire into the positive pole of the power module.
- 2 Insert the other end of the wire into the positive pole of the USB desk lamp.
- 3 Insert the next end of the wire into the negative pole of the USB desk lamp.
- 4 Insert the last, fourth end of the wire into the negative pole of the power module.

ACTION:

1. Did the USB light turn on? If not, check the connections.
2. What happens if you replace the USB desk lamp with a sound module?
(Experiment 2)
3. What will be the reaction if you replace the desk lamp with a motor module?
(Experiment 3)

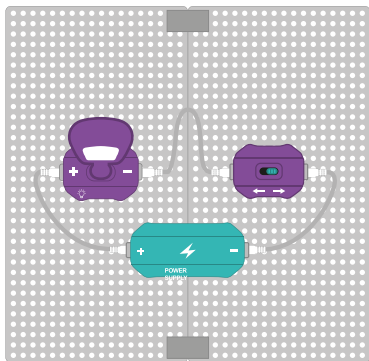
TIP: The USB desk lamp can be replaced with a speaker or motor module.

**WHY IS THIS SO?**

When the circuit is switched on, current flows from the positive pole of the source, passes through the cables to the USB desk lamp and returns to the negative pole of the source. This creates a closed circuit and the appliance starts working. Let's think: where does electricity come from? How is the circuit connected when using common electrical appliances? And what would life be like without electricity?

4

Switch



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the USB desk lamp.
- 2 Connect the second wire into the negative pole of the USB desk lamp and into the switch module (switch).
- 3 Connect the third wire to the negative pole of the power module and to the other side of the switch module.

ACTION

Close the switch. How will the desk lamp react?

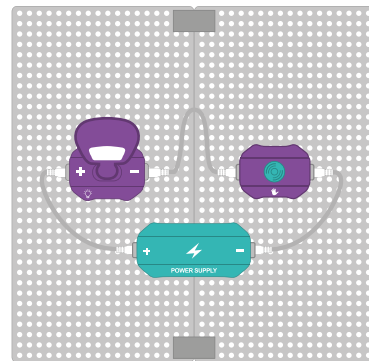


WHY IS THIS SO?

A switch can turn a circuit on or off. If you open the switch, the metal contained in the switch touches the two wires and creates a circuit, the lamp then lights up. If you turn off the switch, the metal does not touch the wires and no current flows through the circuit, so the lamp does not light up.

5

Vibration switch



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the USB desk lamp.
- 2 Connect the second connecting cable wire into the negative pole of the USB desk lamp and into the vibration module.
- 3 Connect the third cable wire into the other side of the vibration module and into the negative pole of the power module.

ACTION

How will the desk lamp react when you press the vibration switch?

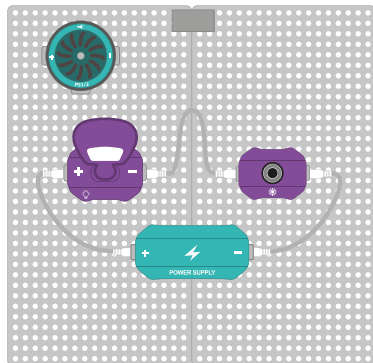


WHY IS THIS SO?

Pressure transfers current by induction to the circuit device. The spring connects two wires creating a closed circuit. The electrical appliance (in our case the lamp) starts working.

6-7

Understanding the photosensitive switch



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert one end of the cable wire into the positive pole of the power module and the other end into the negative pole of the USB desk lamp.
- 2 Connect the second connecting cable wire into the negative pole of the USB desk lamp and into the photosensitive module.
- 3 Connect the third cable wire into the other side of the photosensitive module and into the negative pole of the power module.

ACTION 1. Turn on the light and simply shine it on the photosensitive module. What reaction will the brightness have on the USB desk lamp?
 2. Replace the desk lamp with the speaker module and shine on the photosensitive module. How will the speaker module react?
 (Experiment No. 7)

TIP The USB module can be replaced with a speaker module.

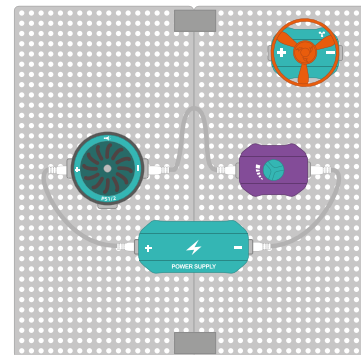


WHY IS THIS SO?

A photosensitive switch is a type of resistor whose resistance value changes depending on the intensity of incident light due to the use of the photoconductive effect of a semiconductor.

8-9

Rotary switch



CIRCUIT CONNECTION

We can also use the flying saucer module, which we attach to the motor module.

- 1 Insert one end of the wire into the positive pole of the power module and into the positive pole of the speaker module.
- 2 Insert the second wire into the negative pole of the speaker module and into the rotary module.
- 3 Then use the third wire to connect the other side of the rotary module to the negative pole of the power module.

ACTION 1. How will the speaker module react when you turn the wheel on the rotary module?
 2. Replace the speaker module with the motor module with the flying saucer and turn the wheel. How will the flying saucer react? (Experiment No. 9)

TIP The speaker module can be replaced with a motor module.

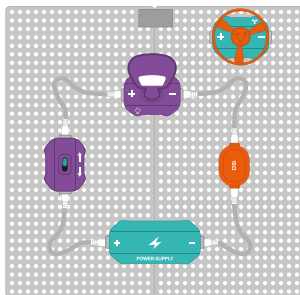


WHY IS THIS SO?

The rotary switch serves to change the resistance value. By turning it, the gear size can be adjusted to regulate the amount of passing current.

10-11

Understanding resistance



CIRCUIT CONNECTION

Use the USB desk lamp or the motor module with the flying saucer.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire into the other side of the switch module and into the positive pole of the USB desk lamp.
- 3 Insert the third wire into the negative pole of the USB desk lamp and into the 10Ω resistor.
- 4 Insert the fourth wire onto the other side of the 10Ω resistor and connect it to the negative pole of the power module.

ACTION 1. Close the switch. How will the lamp react?
2. Replace the USB desk lamp with the motor module with the flying saucer. How will the flying saucer react? (Experiment No. 11)

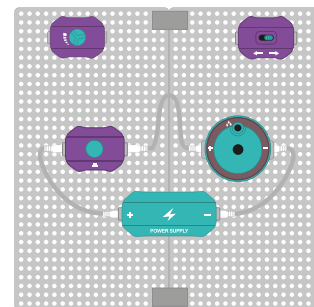
TIP The USB desk lamp module can be replaced with the motor module with the flying saucer.

WHY IS THIS SO?

Resistance limits the passage of current passing through the branch, acting as a voltage divider and current splitter, thereby ensuring the normal operation of the power module. Ω (ohm) is the unit of electrical resistance. The greater the resistance, the smaller the current passing through, and the lower the working efficiency of the power module.

12-14

Spray module



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and the positive pole of the button module.
- 2 Insert the second wire into the negative pole of the button module and into the positive pole of the spray module.
- 3 Insert the third wire into the negative pole of the spray module and into the negative pole of the power module.

ACTION 1. Press the button module. How will the spray module react?
2. Replace the button module with the switch module and close the switch. How will the spray module react? (Experiment No. 13)
3. Replace the button module with the rotary module and turn the rotary wheel. How will the spray module react? (Experiment No. 14)

TIP The button module can be replaced with a switch module or a rotary module.

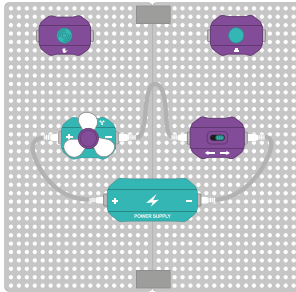


WHY IS THIS SO?

Pressing the button on the button module determines the amount of current flowing to the spray module, so the spray module produces water mist according to the amount of current.

15-17

Understanding the motor module



CIRCUIT CONNECTION

Use the fan module and attach it to the motor module.

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the motor module.
- 2 Insert the second wire into the negative pole of the motor module and into the switch module.
- 3 Connect the third wire to the negative pole of the power module and to the other side of the switch module.

ACTION

1. Close the switch. How will the motor module with the fan react?
2. Replace the switch module with the vibration module. How will the motor module react to vibrations? (Experiment No. 16)
3. Replace the switch module with the button module. How will the motor module with the fan react when the button is pressed? (Experiment No. 17)

TIP The switch module can be replaced with a vibration module or a button module.

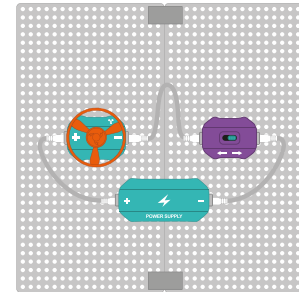


WHY IS THIS SO?

The motor converts electrical energy into mechanical energy and uses a coil to create a rotating magnetic field that acts on the rotor. The magnetic field acts on the current, causing the motor to rotate.

18-19

Positive and negative direction of module rotation



CIRCUIT CONNECTION

Use the flying saucer module and attach it to the motor module.

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the motor module.
- 2 Insert the second wire into the negative pole of the motor module and into the switch module.
- 3 Connect the third wire to the negative pole of the power module and to the other side of the switch module.

ACTION

1. Close the switch. How will the motor module with the flying saucer react?
2. Reverse the poles of the motor module and close the switch. How will the motor module react? (Experiment No. 19)

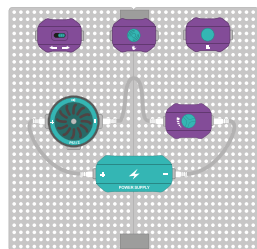


WHY IS THIS SO?

Positive and negative rotation of the motor represents its rotation clockwise and counter-clockwise. Current flows through the energized coil in different directions. If the direction of the coil's magnetic field changes, the direction of rotation also changes.

20-23

Speaker module



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the speaker module.
- 2 Insert the second wire into the negative pole of the speaker module and into the rotary module.
- 3 Insert the third wire onto the other side of the rotary module and into the negative pole of the power module.

- ACTION**
1. Turn the wheel on the rotary module. How will the speaker module react?
 2. Replace the rotary module with the switch module. How will the speaker module react when the switch is toggled? (Experiment No. 21)
 3. Replace the rotary module with the vibration module. How will the speaker module react to vibrations? (Experiment No. 22)
 4. Replace the rotary module with the button module. How will the speaker module react when the button is pressed? (Experiment No. 23)

TIP The rotary module can be replaced with a switch module, a vibration module, or a button module.

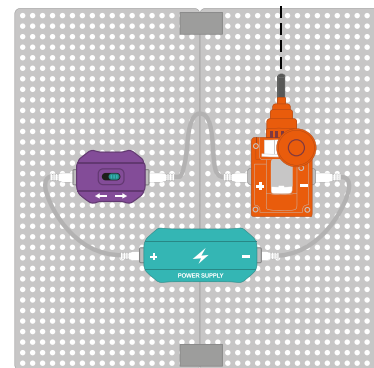


WHY IS THIS SO?

The speaker is a very common electro-acoustic component. When current passes through the speaker coil, a corresponding magnetic field is created. The interaction between the magnetic field and the coil causes vibrations, which subsequently create sound.

24

Vacuum cleaner



CIRCUIT CONNECTION

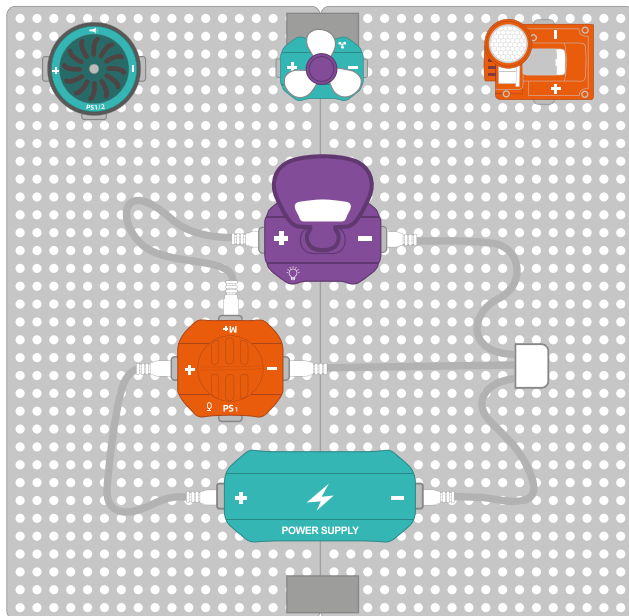
- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire onto the other side of the switch module and into the positive pole of the air generator.
- 3 Then insert the third wire into the negative pole of the air generator and into the negative pole of the power module.

ACTION Close the switch. What happens to the air from the module?



WHY IS THIS SO?

Close the switch and current will begin to flow through the air generator, creating a corresponding magnetic field. Changes in the magnetic field create vibrations that transmit sound.



CIRCUIT CONNECTION

Use the USB desk lamp module, the fan module on the motor module, and the air generator with the ball.

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the microphone module.
- 2 Insert the second wire into the M+ pole on the microphone module and into the positive pole of the USB desk lamp.
- 3 Then insert the 3-conductor wire into the negative pole of the desk lamp, the negative pole of the microphone module and the negative pole of the power module.

- ACTION**
1. Switch the microphone module to the negative pole. How does the lamp react?
 2. Replace the desk lamp with the speaker module. How will the speaker module react after the above operations? (Experiment No. 26)
 3. Replace the USB desk lamp with the motor module. How will the motor module react after the above operation? (Experiment No. 27)
 4. Replace the desk lamp with the air generator. How will the air generator react after the above operations? (Experiment No. 28)

TIP The desk lamp can be replaced with the speaker, motor, or air module.



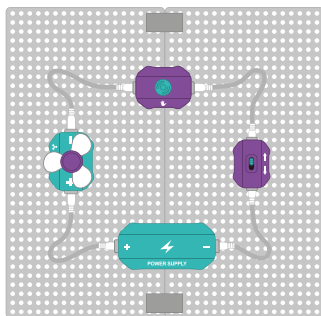
WHY IS THIS SO?

When the microphone module is on, it is voice-controlled by connecting to the negative pole.

It is a switch that converts sound signals into electrical signals.

When sound is present, current flows through the USB lamp and the lamp lights up.

Series connection of the module



CIRCUIT CONNECTION

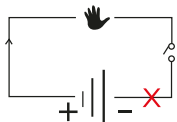
Use the motor module with the flying saucer module.

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the motor module.
- 2 Insert the second wire into the negative pole of the motor module to the vibration module.
- 3 Insert the third wire into the switch module and into the other side of the vibration module. Insert the fourth wire into the negative pole of the power module and into the other side of the switch module.

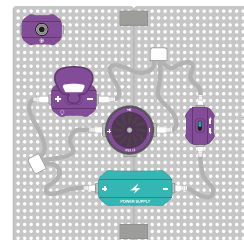
ACTION Close the switch and gently tap the vibration module. How will the motor module react?

WHY IS THIS SO?

A series circuit is a circuit in which individual electrical appliances influence each other. If a break or short circuit occurs anywhere in the circuit, the entire circuit stops working. The voltage from the power source is divided among the connected appliances, causing a reduction in the efficiency of the electrical appliances.



Parallel connection



CIRCUIT CONNECTION

Use the USB desk lamp module.

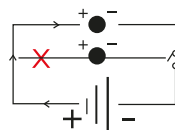
- 1 Insert a 3-connector wire into the positive pole of the power module, into the speaker module, and into the positive pole of the USB desk lamp.
- 2 Insert the second 3-connector wire into the negative pole of the USB desk lamp, the negative pole of the speaker module, and into the switch module.
- 3 Insert another wire onto the other side of the switch module into the negative pole of the power module.

- ACTION**
1. What will be the reaction of the USB desk lamp and the speaker module?
 2. Replace the switch module with the photosensitive module. What will be the reaction of the desk lamp and the speaker module when light hits the photosensitive module? (Experiment No. 31)

TIP The switch module can be replaced with a photosensitive module.

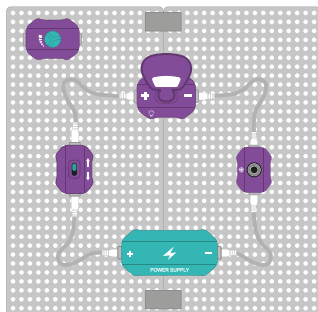
WHY IS THIS SO?

Current in a parallel circuit passes through several branches and flows through multiple appliances, whereupon it finally returns to the power source. Each electrical appliance in the circuit can be used independently. The voltage in the circuit does not change and the electrical effect is not affected.



32-33

Gate circuit I.



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire into the other side of the switch module and into the positive pole of the USB desk lamp.
- 3 Insert the third wire into the negative pole of the USB desk lamp and into the photosensitive module.
- 4 Insert the fourth wire onto the other side of the photosensitive module into the negative pole of the power module.

ACTION 1. Close the switch, light falls on the photosensitive module. How will the USB desk lamp react?

2. Replace the photosensitive module with the rotary module. Close the switch and turn the wheel on the rotary module. How will the USB desk lamp react? (Experiment No. 33)

TIP The photosensitive module can be replaced with a rotary module.

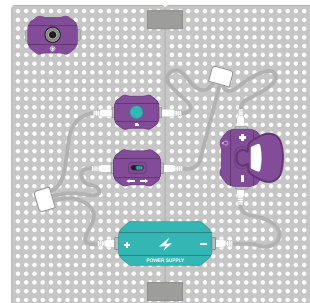


WHY IS THIS SO?

Two switch modules are connected in a gate circuit. Both switches must be turned on simultaneously for current to flow and for the USB lamp to light up.

34-35

Gate circuit II.



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a 3-connector wire into the positive pole of the power module, into the switch module and into the button module.
- 2 Insert the second 3-connector wire into the other side of the switch module, into the other side of the button module and into the positive pole of the USB desk lamp.
- 3 Insert another wire into the negative pole of the USB desk lamp and into the negative pole of the power module.

ACTION 1. Close the switch and press the button on the button module. What will be the reaction of the USB desk lamp?

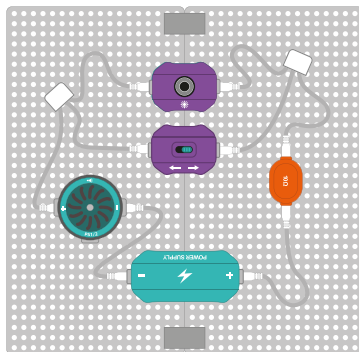
2. Replace the button module with a photosensitive module. What will be the reaction of the USB desk lamp when light hits the photosensitive module? (Experiment No. 35)

TIP The button module can be replaced with a photosensitive module.



WHY IS THIS SO?

This gate circuit consists of two switches connected in parallel in the circuit, with each switch belonging to one branch. If one of the switches is open, the circuit can work. It is similar to a bedside lamp at home, which can be controlled by two switches – one at the door and one at the bed.



CIRCUIT CONNECTION

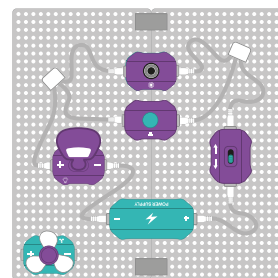
- 1 Insert a wire into the negative pole of the power module and into the negative pole of the speaker module.
- 2 Insert a 3-conductor wire into the positive pole of the speaker module, into the switch module, and into the photosensitive module.
- 3 Insert the second 3-conductor wire into the other side of the photosensitive module, into the other side of the switch module, and into the 10Ω resistor.
- 4 Insert another wire onto the other side of the 10Ω resistor and into the positive pole of the power module.

ACTION Close the switch, turn on the flashlight on your phone and shine it on the photosensitive module. What reaction will the speaker module have?



WHY IS THIS SO?

A photoresistor is a resistor made of light-sensitive materials. The stronger the light intensity, the lower the resistance and the smaller the ability to block the current. The weaker the light, the greater the resistance.



CIRCUIT CONNECTION

Use the motor module and the fan module. Use the USB desk lamp module.

- 1 Insert a wire into the negative pole of the power module and into the negative pole of the USB desk lamp.
- 2 Insert a 3-conductor wire into the positive pole of the USB desk lamp, into the button module and into the photosensitive module.
- 3 Insert the second 3-conductor wire into the other side of the photosensitive module, into the button module and into the switch module. Insert another wire into the positive pole of the power module.

ACTION 1. Close the switch and press the button module. How will the lamp react when light hits the photosensitive module?
2. Replace the USB desk lamp with the motor module and add the fan accessory. Repeat the above steps. How will the motor module with the fan react? (Experiment No. 38)

TIP

The button module can be replaced with a photosensitive module.

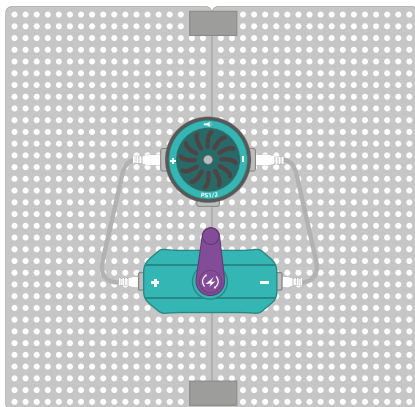


WHY IS THIS SO?

In everyday life, a hybrid circuit method is often used for more convenient use, which means a combination of series and parallel circuits. This ensures comfort in everyday life, but also reduces the risk of easy short circuits.

39

Hand-powered sound



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the generator and into the positive pole of the speaker module.
- 2 Insert the second wire into the negative pole of the speaker module and into the negative pole of the generator.

ACTION How does the speaker module react when turning the generator crank clockwise?

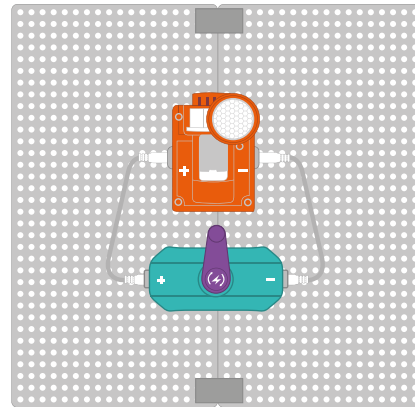


WHY IS THIS SO?

Turning the hand generator crank clockwise generates an electric current that passes through the speaker module, which emits sound.

40

Manual Maglev (magnetic levitation)



CIRCUIT CONNECTION

The air generator comes with a ball.

- 1 Insert a wire into the positive pole of the generator and into the positive pole of the air generator.
- 2 Insert the second wire into the negative pole of the air generator and into the negative pole of the generator.

ACTION How does the ball react when turning the generator crank clockwise?

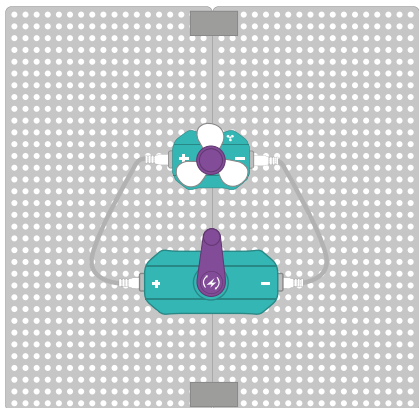


WHY IS THIS SO?

Turning the hand generator clockwise generates an electric current that passes through the generator, which starts working and the ball lifts off.

41

Hand-powered fan



CIRCUIT CONNECTION

Use the motor module with the fan module attached.

- 1 Insert a wire into the positive pole of the generator and into the positive pole of the motor module.
- 2 Insert the second wire into the negative pole of the motor module and into the negative pole of the generator.

ACTION How does the motor module with the fan react when turning the crank clockwise?

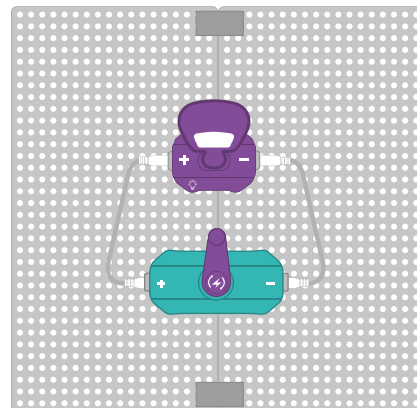


WHY IS THIS SO?

Turning the hand generator crank clockwise generates an electric current that passes through the speaker module, which emits sound.

42

Hand-powered lamp



CIRCUIT CONNECTION

Use the USB desk lamp module

- 1 Insert a wire into the positive pole of the generator and into the positive pole of the USB desk lamp.
- 2 Use the second wire to connect the negative pole of the USB desk lamp to the negative pole of the generator.

ACTION How will the USB desk lamp react when turning the generator crank clockwise?

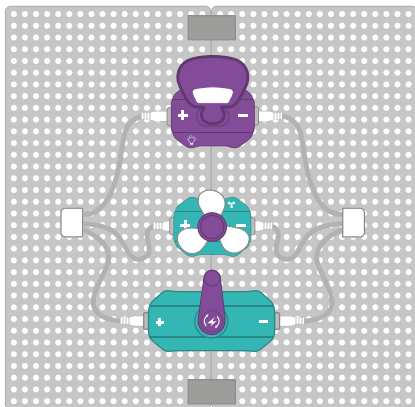


WHY IS THIS SO?

Turning the generator crank clockwise can generate an electric current that passes through the desk lamp. It starts working and lights up.

43

Hand power plant



CIRCUIT CONNECTION

Use the USB desk lamp module and the motor module with the fan attached.

- 1 Insert a 3-connector wire into the positive pole of the generator, the positive pole of the motor module and into the positive pole of the USB desk lamp.
- 2 Insert the second 3-connector wire into the negative pole of the USB desk lamp, the negative pole of the motor module and into the negative pole of the generator.

ACTION How will the fan and USB desk lamp react when turning the generator crank clockwise?

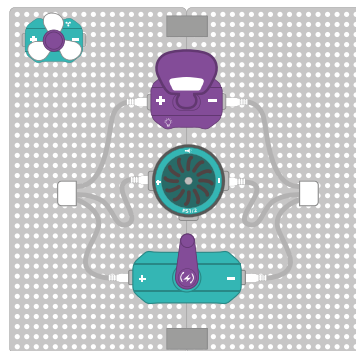


WHY IS THIS SO?

If you turn the crank clockwise, the generator creates a current that flows through the motor module and the desk lamp. They then work.

44-45

Hand-powered alarm clock



CIRCUIT CONNECTION

Use the USB desk lamp module and the speaker module.

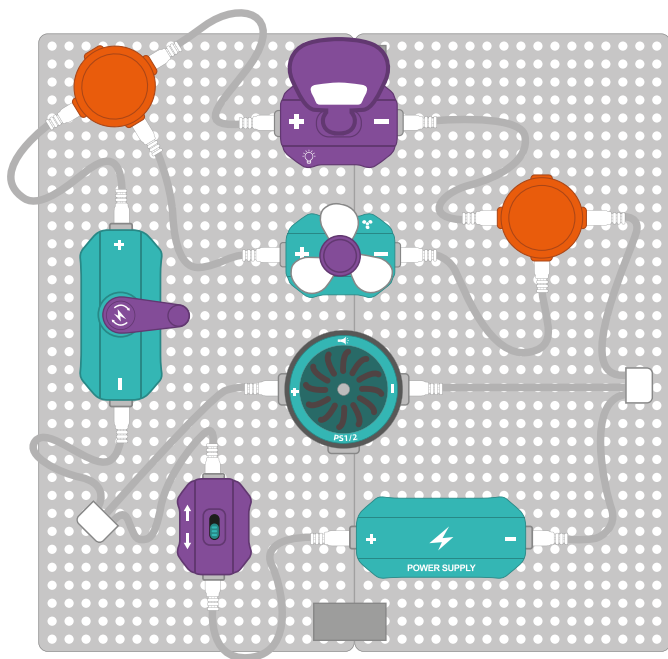
- 1 Insert a 3-connector wire into the positive pole of the generator, the positive pole of the speaker module and into the positive pole of the USB desk lamp.
- 2 Insert the second 3-connector wire into the negative pole of the USB desk lamp, the negative pole of the speaker module and the negative pole of the generator.

ACTION 1. What will be the reaction of the speaker module and USB desk lamp when turning the generator crank clockwise?
2. Replace the USB desk lamp with the motor module with the fan. Turn the generator crank clockwise. What will be the reaction? (Experiment No. 45)



WHY IS THIS SO?

Turning the generator crank clockwise generates current. This flows through the USB desk lamp and the speaker module. The speaker and USB desk lamp start working.



CIRCUIT CONNECTION

Use the USB desk lamp module and the motor module with the fan attached.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Take a 3-connector connecting wire and insert it onto the other side of the switch module, into the positive pole of the speaker module and into the negative pole of the generator.
- 3 Take the second wire and insert it into the positive pole of the generator and into the adapter.
- 4 Take the third wire and insert it onto the other side of the adapter and into the positive pole of the motor module with the fan.
- 5 Insert the fourth wire onto the other side of the adapter and into the positive pole of the USB desk lamp.
- 6 Take the fifth wire and insert it into the negative pole of the USB desk lamp and into the second adapter.
- 7 Take the sixth wire and insert it onto the other side of the adapter and into the negative pole of the motor module with the fan.
- 8 Take the second 3-connector wire and insert it into the adapter, into the negative pole of the speaker module and into the negative pole of the power module.

- ACTION**
1. What happens with the closed circuit?
 2. Close the switch and turn the generator crank clockwise. How will the speaker module, fan, and desk lamp react?

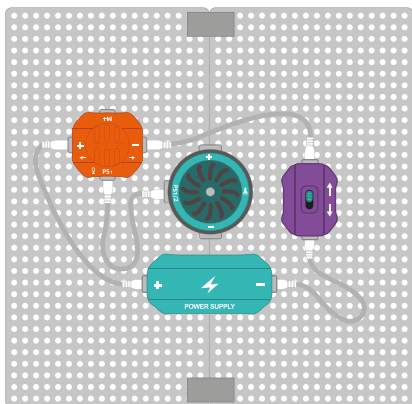


WHY IS THIS SO?

Turning the generator crank produces current, which amplifies the current in the circuit. The stronger the current, the higher the working efficiency of the electrical appliances.

47

Fun recorder



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and the microphone module.
- 2 Connect the microphone module PS1 to the speaker module PS1/2 using the second wire.
- 3 Then insert the third wire into the negative pole of the microphone module and into the switch module.
- 4 Insert the fourth wire from the other side of the switch module into the negative pole of the power module.

ACTION Close the switch, toggle the recording microphone module in the positive direction, speak into the microphone – how will the speaker module react?

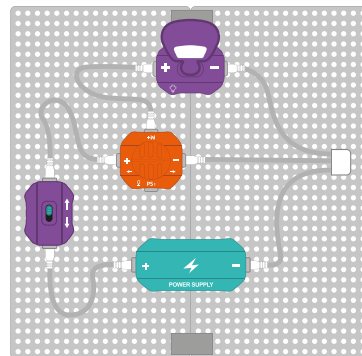


WHY IS THIS SO?

The microphone module has a small computer inside which, when connected in the positive direction, converts our voice into electronic sound and plays it back through the speaker module.

48

Voice-controlled night light



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Use the second wire to connect the other side of the switch module to the positive pole of the microphone module.
- 3 Then use the third wire to connect the microphone module M+ to the positive pole of the USB desk lamp.
- 4 Connect a 3-connector wire into the negative pole of the USB desk lamp, the negative pole of the microphone module and into the negative pole of the power module.

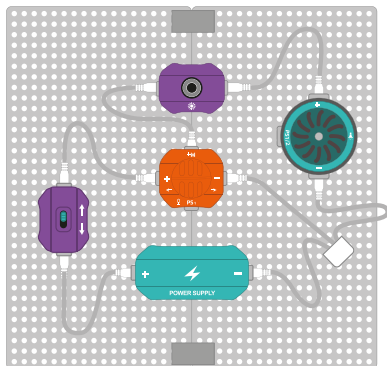
ACTION Close the switch, toggle the microphone module to the negative direction and speak into the microphone. How will the desk lamp react?



WHY IS THIS SO?

When the microphone module is switched towards the negative pole, the module converts the audio signal into an electrical signal. Thanks to the sound, current begins to flow and the lamp lights up.

Alarm clock with voice controlled light



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Use the second wire to connect the other side of the switch module to the positive pole of the microphone module.
- 3 Then connect the microphone module M+ to the photosensitive module using the third wire.
- 4 Insert the fourth wire into the positive pole of the speaker module to the other side of the photosensitive module.
- 5 Insert a 3-conductor wire into the negative pole of the power module, the negative pole of the microphone module and the negative pole of the speaker module.

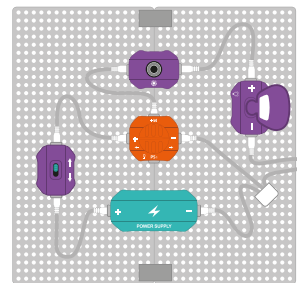
ACTION Close the switch and move the microphone module towards the negative pole. When you speak into the microphone, what will be the reaction of the speaker module when light hits the photosensitive module?



WHY IS THIS SO?

When the switch is on, the photosensitive module senses light, reducing its ability to block the flow of electricity and the speaker slowly sounds. Just like your alarm clock in the morning.

Small night light – voice controlled



CIRCUIT CONNECTION

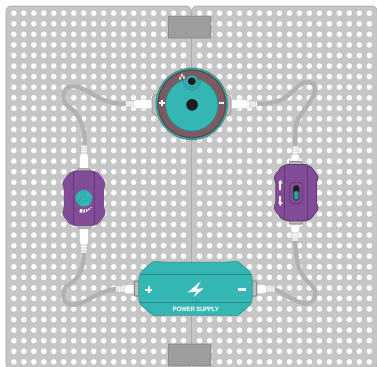
- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Use the second wire to connect the other side of the switch module to the positive pole of the microphone module.
- 3 Then insert the third wire into the microphone module M+ and into the photosensitive module.
- 4 Insert the fourth wire into the other side of the photosensitive module and to the positive pole of the USB desk lamp.
- 5 Insert a 3-conductor wire into the negative pole of the USB desk lamp, the negative pole of the microphone module and into the negative pole of the power module.

ACTION 1. Close the switch, toggle the microphone module to the negative direction and speak into the microphone. How will the USB desk lamp react?
2. Close the switch, toggle the recording microphone module to the negative direction, speak into the microphone. Shine on the photosensitive module. How will the desk lamp react?



WHY IS THIS SO?

When the switch is on, the photosensitive module senses light and the ability to block current flow is reduced. The USB desk lamp slowly lights up.



CIRCUIT CONNECTION

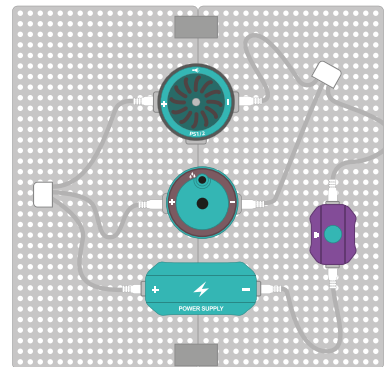
- 1 Insert a wire into the positive pole of the power module and into the rotary module.
- 2 Insert the second wire onto the other side of the rotary module and into the positive pole of the spray module.
- 3 Insert the third wire into the negative pole of the spray module and into the switch module.
- 4 Insert the fourth wire from the other side of the switch module and into the negative pole of the power module.

ACTION Close the switch and slowly turn the wheel on the rotary module. How will the spray module react?



WHY IS THIS SO?

The human body perceives humidity differently. Only by turning the module can we adjust the spray size to suit us and achieve perfect humidification. Optimal environmental humidity, adapted to one's own needs, is important because an environment that is too humid or too dry is not suitable.



CIRCUIT CONNECTION

- 1 Insert a 3-connector wire into the positive pole of the power module, the positive pole of the spray module and the positive pole of the speaker module.
- 2 Then connect the negative pole of the speaker module, the negative pole of the spray module and the button module with a 3-connector wire.
- 3 Insert another wire on the other side of the button module into the negative pole of the power module.

ACTION What happens to the spray module and speaker module when pressing the button on the button module?

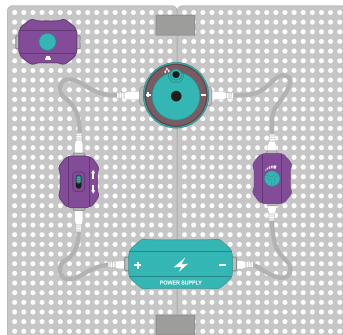


WHY IS THIS SO?

Pressing the button starts creating current. The button module receives the signal and current flows through the spray module and speaker module, emitting music and water spray.

53-54

Humidifier adjustment



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire onto the other side of the switch module and into the positive pole of the spray module.
- 3 Insert the third wire into the negative pole of the spray module and into the rotary module.
- 4 Insert the fourth wire onto the other side of the rotary module and into the negative pole of the power module.

ACTION 1. Close the switch and slowly turn the wheel on the rotary module. How will the spray module react?
 2. Replace the switch module with a button module. Press the button. How will the spray module react? (Experiment No. 54)

TIP The switch module can be replaced with a button module.

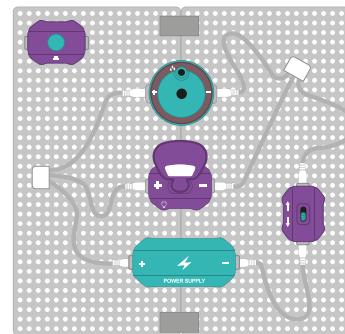


WHY IS THIS SO?

The human body perceives humidity differently. Only by turning the module can we adjust the spray size to suit us and thus achieve perfect humidification. Optimal environmental humidity, adapted to one's own needs, is important because an environment that is too humid or too dry is not suitable.

55-56

Light sprayer



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a 3-connector wire into the positive pole of the power module, the positive pole of the USB desk lamp and the positive pole of the spray module.
- 2 Insert the second 3-connector wire into the negative pole of the spray module, the negative pole of the USB desk lamp and into the switch module.
- 3 Insert another wire onto the other side of the switch module and into the negative pole of the power module.

ACTION 1. What happens to the desk lamp and spray module when you turn on the switch?
 2. Replace the switch module with a button module and press the button. What will the spray module react to? (Experiment No. 56)

TIP The switch module can be replaced with a button module.

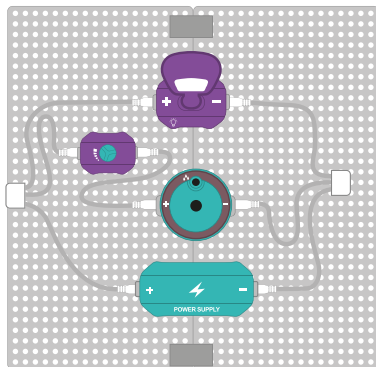


WHY IS THIS SO?

The switch module as the main switch in the circuit can cause the desk lamp to emit bright light and the spray module to constantly spray fine water mist.

57

Twist spray



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a 3-connector wire into the positive pole of the power module, into the rotary module and into the positive pole of the USB desk lamp.
- 2 Insert another wire onto the other side of the rotary module and to the positive pole of the spray module.
- 3 Then insert a 3-connector wire into the negative pole of the USB desk lamp, the negative pole of the spray module and into the negative pole of the power module.

ACTION Turn the wheel on the rotary module left and right.
How will the USB desk lamp and the spray module react?

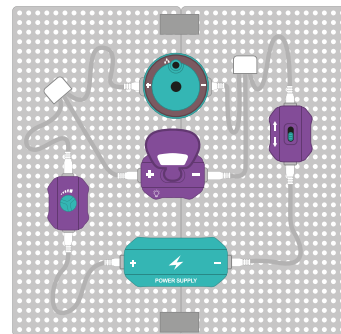


WHY IS THIS SO?

In this circuit, a rotary module and a spray module are connected to the power supply. When turning the wheel, you can observe how the water mist changes.

58

Sleep comfortably



CIRCUIT CONNECTION

Use the USB desk lamp module.

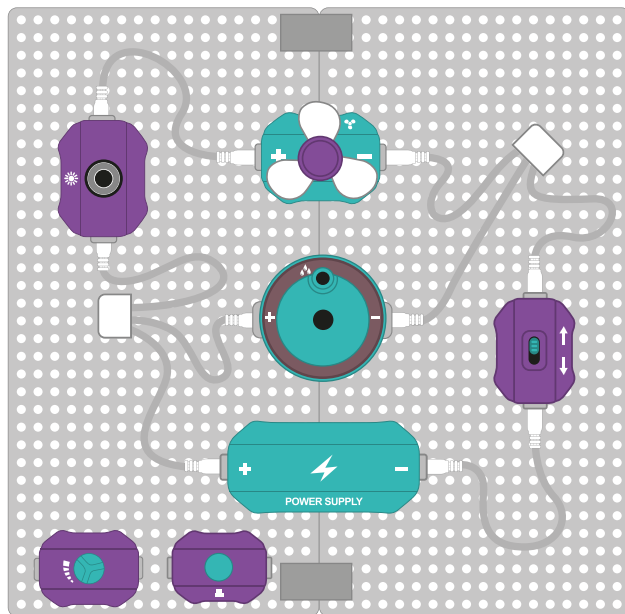
- 1 Insert a wire into the positive pole of the power module and into the rotary module.
- 2 Insert a 3-connector wire into the other side of the rotary module, into the positive pole of the USB desk lamp and into the positive pole of the spray module.
- 3 Insert another 3-connector wire into the negative pole of the spray module, into the negative pole of the USB desk lamp and into the switch module.
- 4 Insert the second wire from the other side of the switch module and into the negative pole of the power module.

ACTION Close the switch and turn the wheel on the rotary module.
How will the USB desk lamp and the spray module react?



WHY IS THIS SO?

The USB desk lamp and the spray module are connected in the circuit. By closing the switch, the wheel on the rotary module can control the brightness of the lamp and the amount of water mist produced by the spray module. You have just created an environment pleasant for sleeping.



CIRCUIT CONNECTION

- 1 Insert a 3-connector wire into the positive pole of the power module, the positive pole of the spray module and into the photosensitive module.
- 2 Insert another wire into the photosensitive module and into the positive pole of the motor module with the fan attached.
- 3 Take the second 3-connector wire and insert it into the negative pole of the motor module with the fan, the negative pole of the spray module and into the switch module.
- 4 Insert the second wire onto the other side of the switch module and to the negative pole of the power module.

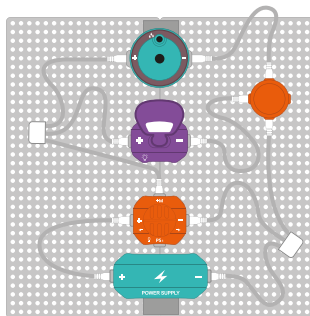
- ACTION**
1. Close the switch and shine light on the photosensitive module. How will the motor module with the fan react?
 2. Replace the photosensitive module with the rotary module, close the switch and turn the wheel on the rotary module. How will the motor module with the fan react? (Experiment No. 60)
 3. Replace the photosensitive module with the button module, close the switch and press the button on the button module. How will the motor module with the fan react? (Experiment No. 61)

TIP The photosensitive module can be replaced with a rotary module or a button module.



WHY IS THIS SO?

By closing the switch, the spray module starts working. The current passing through the motor module is controlled by the light intensity. The air flow created by the spray module droplets and the fan significantly increases the wind speed above the liquid surface, increases the evaporation area and lowers the ambient temperature, providing you with pleasant cooling in the hot summer.



CIRCUIT CONNECTION

Use the USB desk lamp module.

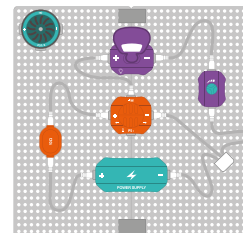
- 1 Insert a wire into the positive pole of the power module and into the microphone module.
- 2 Insert a 3-connector wire into the microphone module M+, into the positive pole of the USB desk lamp and into the positive pole of the spray module.
- 3 Insert the second wire into the negative pole of the spray module and into the adapter.
- 4 Insert another wire into the negative pole of the USB desk lamp and into the adapter.
- 5 Then insert the second 3-connector wire into the other side of the adapter, into the negative pole of the microphone module and into the negative pole of the power module.

ACTION How will the desk lamp and spray module react when the microphone makes a sound when switching the recording microphone module towards the negative pole?



WHY IS THIS SO?

When the microphone module is powered, it is voice controlled when switched towards the negative pole. The audio signal is converted into an electrical signal, current passes through the USB desk lamp and the spray module, causing both to start working.



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a wire into the positive pole of the power module and into the 10Ω resistor.
- 2 Use the second wire to connect the other side of the 10Ω resistor and the positive pole of the microphone module.
- 3 Then use the third wire to connect the recording microphone module M+ to the positive pole of the USB desk lamp.
- 4 Insert the fourth wire into the negative pole of the USB desk lamp and into the rotary module.
- 5 Into the other side of the rotary module, into the negative pole of the microphone module and the negative pole of the power module insert another 3-connector wire.

- ACTION**
1. Turn the wheel on the rotary module and switch the microphone module towards the negative pole. How will the USB lamp react to sound from the microphone?
 2. Replace the USB desk lamp with a speaker module, turn the wheel on the rotary module and speak into the microphone. How will the speaker module react? (Experiment No. 64)

TIP

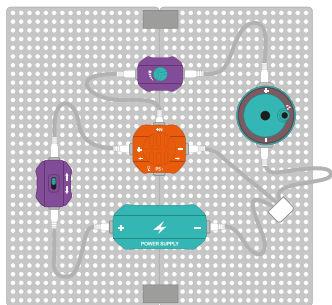
The USB desk lamp module can be replaced with a speaker module.



WHY IS THIS SO?

When the microphone module is powered, it is voice controlled when switched towards the negative pole. Slowly turning the wheel on the rotary module can influence the amount of current passing through it. Current flow can be recognized by the brightness of the USB desk lamp.

Humidifier setting by voice control



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the switch module.
- 2 Insert the second wire onto the other side of the switch module and into the positive pole of the microphone module.
- 3 Then insert the third wire into the microphone module M+ and into the rotary module.
- 4 Insert the fourth wire into the positive pole of the spray module and to the other side of the rotary module.
- 5 Into the negative pole of the spray module, the negative pole of the microphone module and into the negative pole of the power module insert a 3-connector wire.

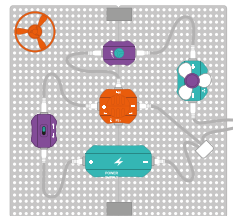
ACTION Close the switch and toggle the microphone module towards the negative pole. How does the spray module react when you make a sound into the microphone?



WHY IS THIS SO?

Close the switch, the microphone module is voice-controlled after switching towards the negative pole. The audio signal is converted into an electrical signal. Turn the wheel on the rotary module. Current passes through the spray module, it starts working and spraying mist.

Voice-controlled regulation of a small windmill



CIRCUIT CONNECTION

Use the motor module with the fan and flying saucer module.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Use the second wire to connect the other side of the switch module to the positive pole of the microphone module.
- 3 Then insert the third wire into the microphone module M + and into the rotary module.
- 4 Insert the fourth wire into the positive pole of the motor module with fan and into the other side of the rotary module.
- 5 Into the negative pole of the motor module with fan, into the negative pole of the microphone module and into the negative pole of the power module insert a 3-connector wire.

ACTION 1. Close the switch and toggle the microphone module towards the negative pole. How does the motor module with the fan react to sound from the microphone?

2. Close the switch and toggle the microphone module towards the negative pole. How will the motor module with the flying saucer react when turning the wheel on the rotary module and upon sound into the microphone? (The fan head is replaced by a flying saucer.) (Experiment No. 67)

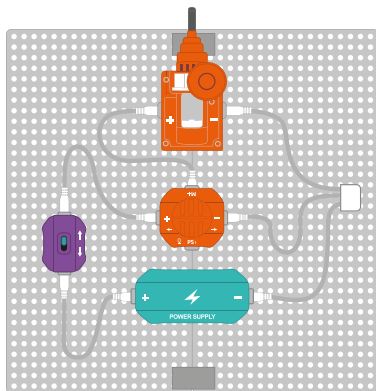


WHY IS THIS SO?

Close the switch, after powering the microphone module, switching towards the negative pole is voice-controlled. The audio signal is converted into an electrical signal, turn the wheel on the rotary module. Current passes through the motor module and the motor module starts working.

65

Humidifier setting by voice control



CIRCUIT CONNECTION

Use the air generator with the additional air attachment and the vacuum tube.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire into the other side of the switch module and into the positive pole of the microphone module.
- 3 Insert the third wire into the microphone module M+ and into the positive pole of the air generator.
- 4 Insert another 3-conductor wire into the negative pole of the air generator, the negative pole of the microphone module and the negative pole of the power module.

ACTION Close the switch, switch the microphone module towards the negative pole and make a sound into the microphone. How will the air generator react?

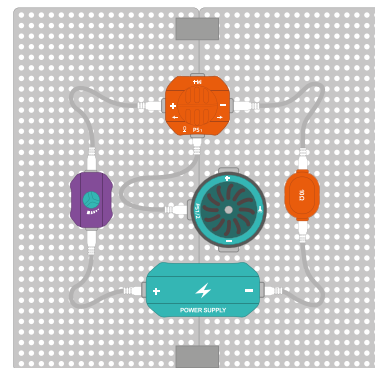


WHY IS THIS SO?

The microphone module detects sound, current flows through the air generator and the vacuum cleaner starts working.

66-67

Voice-controlled regulation of a small windmill



CIRCUIT CONNECTION

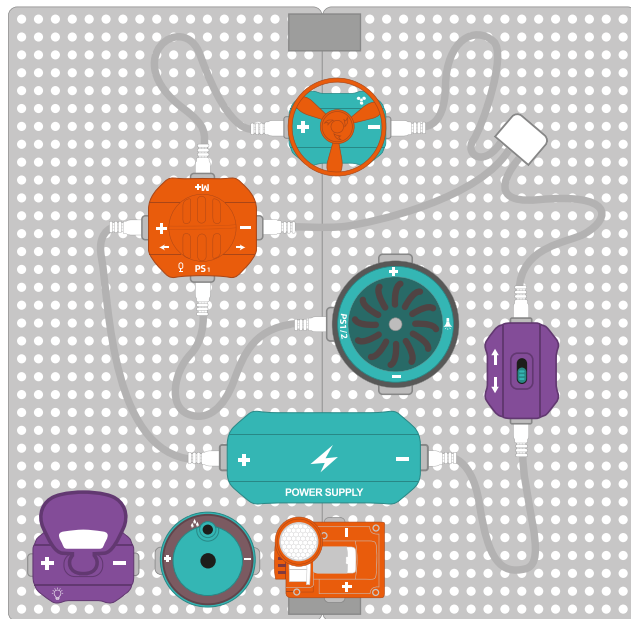
- 1 Insert a wire into the positive pole of the power module and into the rotary module.
- 2 Insert the second wire into the rotary module and into the positive pole of the microphone module.
- 3 Insert the third wire into the microphone module PS1 to the speaker module PS1/2.
- 4 Insert the fourth wire into the negative pole of the microphone module and into the 10Ω resistor.
- 5 Use the fifth wire to connect the other side of the 10Ω resistor and the negative pole of the power module.

ACTION Switch the microphone module towards the positive pole and make a sound. How will the speaker module react?



WHY IS THIS SO?

By switching the microphone module and activating the recording function towards the positive pole, our voice can be recorded and played back in real time, which corresponds to the dictaphone function in everyday life.



CIRCUIT CONNECTION

Use the motor module with the flying saucer attached, the USB desk lamp module, the spray module, and the air generator with the ball.

- 1 Take a wire and insert it into the positive pole of the power module and the microphone module.
- 2 Take the second wire and insert it into the microphone module PS1 to the speaker module PS1/2.
- 3 Take the third wire and insert it into the microphone module M+ and to the positive pole of the motor module with the flying saucer.
- 4 Take another 3-connector wire and insert it into the negative pole of the motor module with the flying saucer, the negative pole of the microphone module and into the switch module.
- 5 Take the fourth wire and insert it onto the other side of the switch module and into the negative pole of the power module.

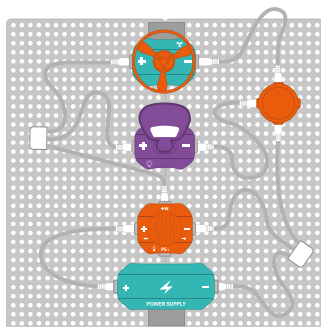
- ACTION**
1. Close the switch and toggle the microphone module. Recording takes place in the positive pole direction and voice control in the negative pole direction.
 2. Replace the motor module with the desk lamp, close the switch, turn the microphone module to the negative direction and make a sound into the microphone. How will the USB desk lamp react? (Experiment No. 71)
 3. Replace the motor module with the spray module. Close the switch, toggle the microphone module towards the negative pole and make a sound into the microphone. (Experiment No. 72)
 4. Replace the motor module with the air generator, close the switch, toggle the microphone module towards the negative pole and make a sound into the microphone. How will the air generator react? (Experiment No. 73)

TIP The motor module can be replaced with the USB desk lamp module, the spray module, or the air generator.



WHY IS THIS SO?

Ports M+ and PS1 on the microphone module each have their own function. They are independent of each other and control the operation of the circuit.



CIRCUIT CONNECTION

Use the motor module with the flying saucer attached and the USB desk lamp module.

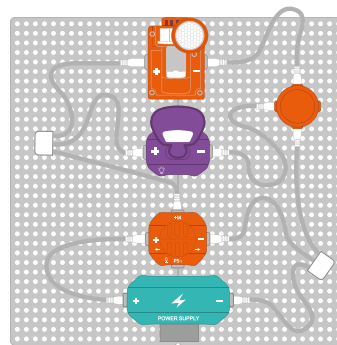
- 1 Insert a wire into the positive pole of the power module and into the microphone module.
- 2 Insert a 3-connector wire into the microphone module M+, into the positive pole of the USB desk lamp and into the positive pole of the motor module with the flying saucer.
- 3 Insert the second wire into the negative pole of the motor module with the flying saucer and into the adapter.
- 4 Insert the third wire into the negative pole of the USB desk lamp and into the adapter.
- 5 Then insert the second 3-connector wire into the other side of the adapter, into the negative pole of the microphone module and into the negative pole of the power module.

ACTION Switch the microphone module towards the negative pole and speak into it. How will the USB desk lamp and speaker module react?



WHY IS THIS SO?

The microphone module detects sound, current flows through the air generator and the vacuum cleaner starts working.



CIRCUIT CONNECTION

Use the air generator with the ball and the USB desk lamp module.

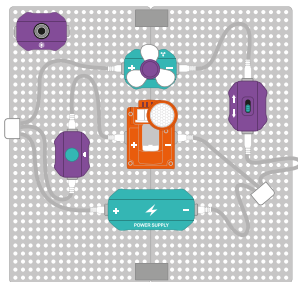
- 1 Insert a wire into the positive pole of the power module and into the microphone module.
- 2 Insert a 3-connector wire into the microphone module M+, into the positive pole of the USB desk lamp and into the positive pole of the air generator.
- 3 Insert the second wire into the negative pole of the air generator and into the adapter.
- 4 Insert another wire into the negative pole of the USB desk lamp and into the adapter.
- 5 Then insert the second 3-connector wire onto the other side of the adapter, into the negative pole of the microphone module and into the negative pole of the power module.

ACTION Switch the microphone module towards the negative pole and speak into it. How will the USB desk lamp and air generator react?



WHY IS THIS SO?

The microphone module detects sound, current passes through the USB desk lamp and the motor module, the USB desk lamp and air generator start working.



CIRCUIT CONNECTION

Use the air generator with the ball and the motor module with the fan attached.

- 1 Insert a 3-connector wire into the positive pole of the power module, into the button module and into the motor module with the fan.
- 2 Insert another wire onto the other side of the button module into the positive pole of the air generator.
- 3 Insert another wire into the negative pole of the motor module and the switch module.
- 4 Insert the second 3-connector wire onto the other side of the switch module, into the negative pole of the air generator and into the negative pole of the power module.

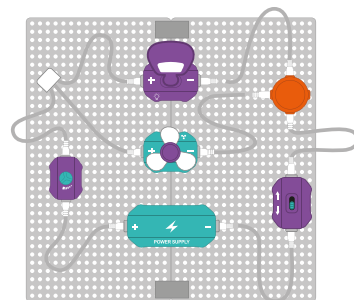
ACTION 1. Close the switch, how will the motor module react? What happens to the air generator when you press the button?
 2. Replace the switch module with a photosensitive module. What happens when light hits the photosensitive module?
 (Experiment No. 77)

TIP The switch module can be replaced with a photosensitive module.



WHY IS THIS SO?

The button module and the air generator are connected in parallel in the circuit. The switch module and the motor module are connected in parallel in the circuit to control the current.



CIRCUIT CONNECTION

Use the motor module with the fan attached and the USB desk lamp module.

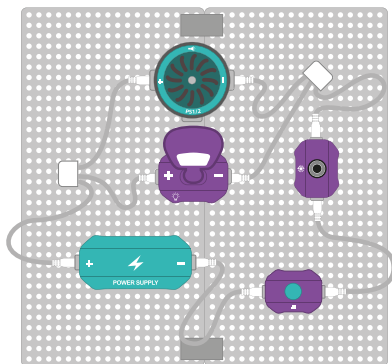
- 1 Insert a wire into the positive pole of the power module and into the rotary module.
- 2 Insert a 3-connector wire into the other side of the rotary module, into the positive pole of the motor module with the fan and into the positive pole of the USB desk lamp.
- 3 Using the second wire, connect the negative pole of the USB desk lamp and the adapter.
- 4 Insert the third wire into the negative pole of the motor module and into the adapter.
- 5 Insert the fourth wire into the switch module and into the other side of the adapter. Using the fifth wire, connect the other side of the switch module to the negative pole of the power module.

ACTION Close the switch and turn the wheel of the rotary module. What happens to the USB desk lamp and the fan?



WHY IS THIS SO?

When the switch is closed and current begins to flow, the motor module and USB desk lamp start. By turning the rotary switch of the module, you can simultaneously control the fan rotation speed and the brightness of the USB desk lamp. The hot air fan can also regulate the temperature of the blown hot air and the brightness of the light by turning.



CIRCUIT CONNECTION

Use the USB desk lamp module.

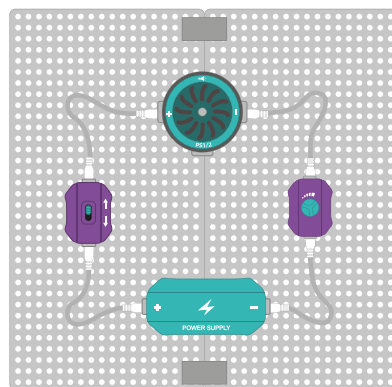
- 1 Insert a 3-connector wire into the positive pole of the power module, into the positive pole of the USB desk lamp and the positive pole of the speaker module.
- 2 Insert the second 3-connector wire into the negative pole of the speaker module, the negative pole of the USB desk lamp and into the photosensitive module.
- 3 Insert another wire onto the other side of the photosensitive module and into the button module.
- 4 Insert the second wire onto the other side of the button module and into the negative pole of the power module.

ACTION Press the button on the button module, light hits the photosensitive module. How will the speaker module and USB desk lamp react?



WHY IS THIS SO?

The speaker module and USB desk lamp are connected in parallel in the circuit. When you press the button, the current forms a loop, light hits the photosensitive module and both electrical devices start working at the same time, emitting sound and light.



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire onto the other side of the switch module and to the positive pole of the speaker module.
- 3 Then insert the third wire into the negative pole of the speaker module and to the rotary module.
- 4 Use the fourth wire to connect the other side of the rotary module to the negative pole of the power module.

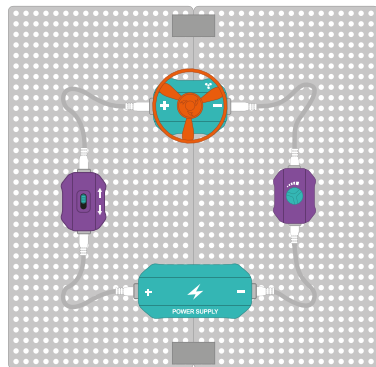
ACTION Close the switch and turn the wheel on the rotary module. How will the speaker module react?



WHY IS THIS SO?

Turning the wheel changes the amount of resistance, changing the current flowing through the speaker module, and the speaker module emits sounds of different volumes.

Speed-controlled flying saucer



CIRCUIT CONNECTION

Use the motor module with the flying saucer attached.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Use the second wire to connect the other side of the switch module and the positive pole of the motor module with the flying saucer.
- 3 Then insert the third wire into the negative pole of the motor module and into the rotary module.
- 4 Use the fourth wire to connect the other side of the rotary module to the negative pole of the power module.

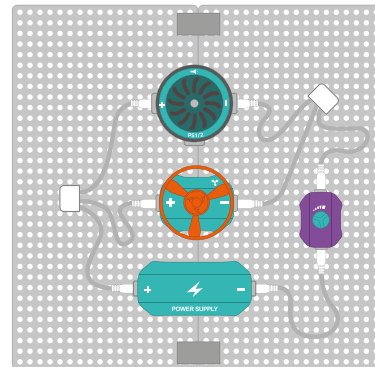
ACTION Close the switch and turn the wheel on the rotary module. How will the motor module react?



WHY IS THIS SO?

Turning the wheel changes the amount of resistance, changes the current flowing through the motor module, changes the speed of the motor module and thus the rotation speed of the flying saucer.

Flying alarm



CIRCUIT CONNECTION

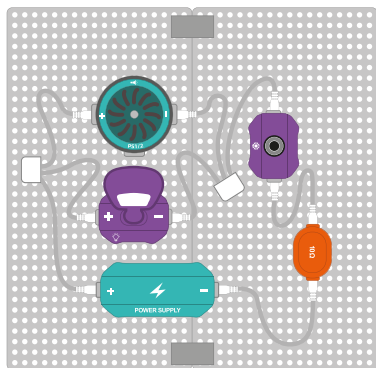
- 1 Insert a 3-connector wire into the positive pole of the power module, into the positive pole of the motor module with the flying saucer and into the positive pole of the speaker module.
- 2 Insert the second 3-connector wire into the negative pole of the speaker module, into the negative pole of the motor module and into the rotary module.
- 3 Use another wire to connect the other side of the rotary module to the negative pole of the power module.

ACTION What will be the reaction of the rotary module, speaker module and motor module?



WHY IS THIS SO?

Turn the wheel of the rotary module, resistance in the circuit decreases, current starts flowing through the motor module and speaker module and the power module starts working.



CIRCUIT CONNECTION

Use the USB desk lamp module.

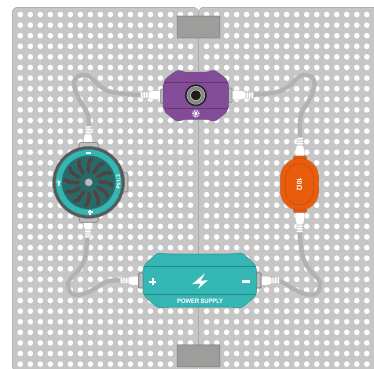
- 1 Insert a 3-connector wire into the positive pole of the power module, positive pole of the USB desk lamp and positive pole of the speaker module.
- 2 Insert a 3-connector wire into the negative pole of the speaker module, negative pole of the USB desk lamp and into the photosensitive module.
- 3 Insert another wire onto the other side of the photosensitive module and to the 10Ω resistor.
- 4 Insert the second wire onto the other side of the 10Ω resistor and connect it to the negative pole of the power module.

ACTION How will the desk lamp and speaker module react to the photosensitive module?



WHY IS THIS SO?

Light hits the photosensitive module, thereby reducing its ability to block current. Current then flows through the speaker module and USB desk lamp, which emit bright light and sound.



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the speaker module.
- 2 Insert the second wire into the negative pole of the speaker module and into the photosensitive module.
- 3 Insert the third wire onto the other side of the photosensitive module and to the 10Ω resistor.
- 4 Insert the fourth wire into the other side of the 10Ω resistor and into the negative pole of the power module.

ACTION How will the speaker module react when light falls on the photosensitive module?

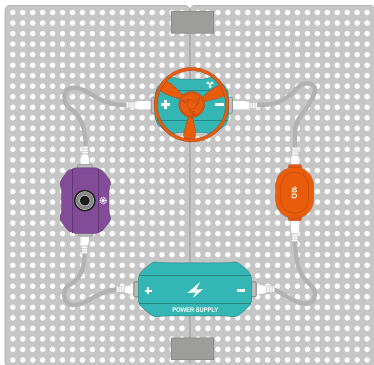


WHY IS THIS SO?

Light hits the photosensitive module and the ability of the photosensitive module to block current decreases. Current flows through the speaker module, which emits sound.

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Light-controlled small windmill



CIRCUIT CONNECTION

Use the motor module with the flying saucer module attached.

- 1 Insert a wire into the positive pole of the power module and into the photosensitive module.
- 2 Insert the second wire onto the other side of the photosensitive module and to the positive pole of the motor module with the flying saucer.
- 3 Insert the third wire into the negative pole of the motor module and to the 10Ω resistor.
- 4 Use the fourth wire to connect the other side of the 10Ω resistor and the negative pole of the power module.

ACTION Shine on the photosensitive module. How does the motor module with the flying saucer react?

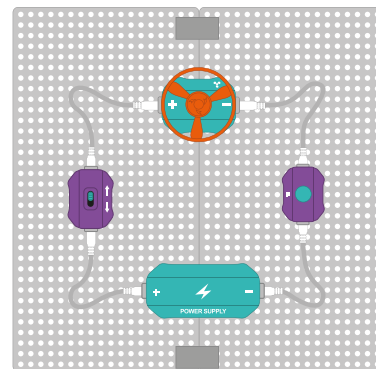


WHY IS THIS SO?

Light hits the photosensitive module, the ability of the photosensitive module to block current decreases, current flows through the resistor and the motor with the flying saucer starts to rotate.

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Flying saucer



CIRCUIT CONNECTION

Use the motor module with the flying saucer module attached.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire into the positive pole of the motor module with the flying saucer and into the switch module.
- 3 Use the third wire to connect the negative pole of the motor module and the button module.
- 4 Then insert the fourth wire onto the other side of the button module and into the negative pole of the power module.

ACTION Close the switch, press the button module. How does the motor module with the flying saucer react?

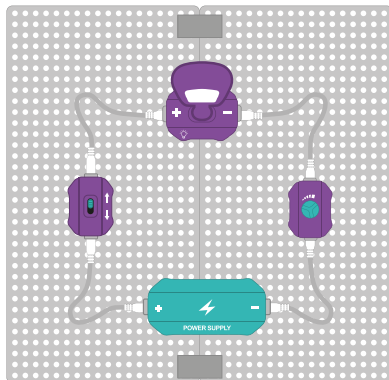


WHY IS THIS SO?

Close the switch, current flows through the wire to the motor module. Pressing the button creates a complete closed circuit. The faster the motor spins, the more lift the flying saucer gains as it rotates.

87

Dim the lights



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire into the positive pole of the USB desk lamp and into the switch module.
- 3 Insert the third wire into the negative pole of the USB desk lamp and to the rotary module.
- 4 Use the fourth wire to connect the other side of the rotary module to the negative pole of the power module.

ACTION Close the switch and turn the wheel on the rotary module. How will the USB desk lamp react?

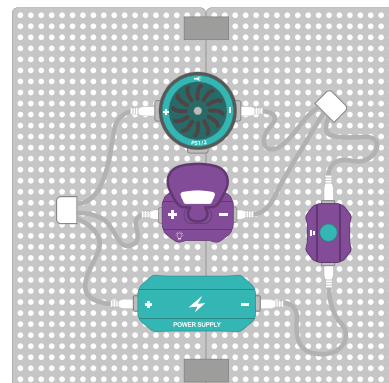


WHY IS THIS SO?

The current passing through the USB desk lamp changes depending on the change of the rotary module. When the current passing through the USB desk lamp increases, the lamp brightens. Conversely, when the current decreases, the lamp light dims.

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Quick responder



CIRCUIT CONNECTION

Use the USB desk lamp module.

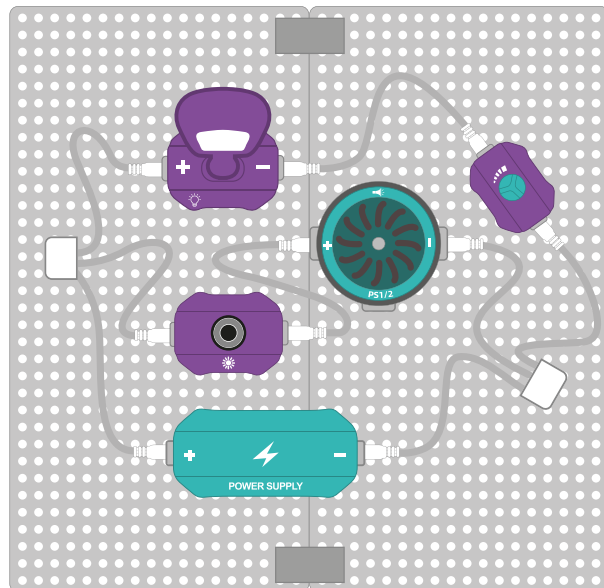
- 1 Insert a 3-connector wire into the positive pole of the power module, positive pole of the speaker module and positive pole of the USB desk lamp.
- 2 Insert the second 3-connector wire into the negative pole of the speaker module, negative pole of the USB desk lamp and into the button module.
- 3 Insert another wire onto the other side of the button module and into the negative pole of the power module.

ACTION Press the button on the button module. How will the lamp and speaker react?



WHY IS THIS SO?

The speaker and desk lamp are connected in parallel in the circuit. When you press the button, the current forms a loop and both electrical appliances start working - emitting sound and light.



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a 3-connector wire into the positive pole of the power module, into the photosensitive module and into the positive pole of the USB desk lamp.
- 2 Insert a wire onto the other side of the photosensitive module and into the positive pole of the speaker module.
- 3 Insert the second wire into the negative pole of the USB desk lamp and to the rotary module.
- 4 Then insert the second 3-connector wire into the other side of the rotary module, into the negative pole of the speaker module and into the negative pole of the power module.

- ACTION**
1. How will the USB desk lamp react when turning the wheel on the rotary module? (The rotary module controls the USB desk lamp separately.)
 2. How will the speaker module react when light hits the photosensitive module? (The photosensitive module controls the speaker module separately.)

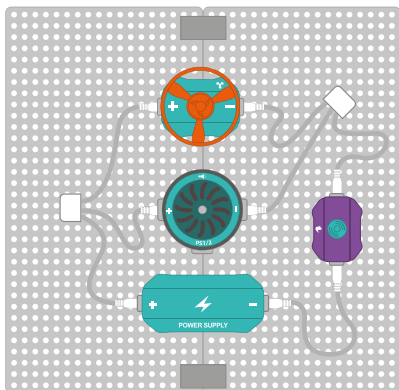


WHY IS THIS SO?

A rotary module and a desk lamp, a photosensitive module and a speaker module are connected in the circuit. The rotary module can control the brightness of the lamp and the photosensitive module controls the sound of the speaker.

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Seismic alarm



CIRCUIT CONNECTION

Use the motor module with the flying saucer attached.

- 1 Insert a 3-connector wire into the positive pole of the power module, speaker module and motor module with the flying saucer.
- 2 Insert the second 3-connector wire into the negative pole of the motor module, into the negative pole of the speaker module and into the vibration module.
- 3 Insert another wire onto the other side of the vibration module and into the negative pole of the power module.

ACTION Gently tap the vibration module. What reaction will the speaker module and flying saucer have?

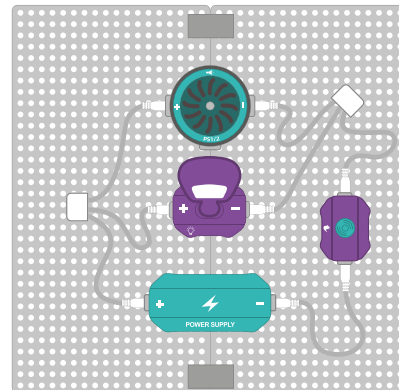


WHY IS THIS SO?

An earthquake causes vibrations which are picked up by the vibration module. The signal is converted into an electrical current which passes through the motor module and the speaker module, triggering a warning alert.

91

Seismic alarm 2



CIRCUIT CONNECTION

Use the USB desk lamp module.

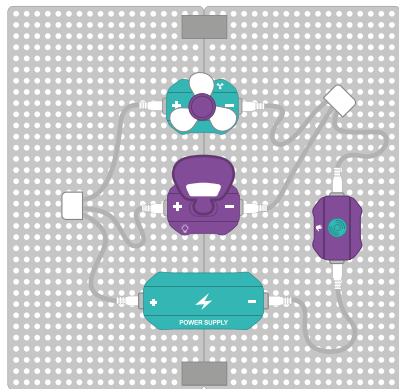
- 1 Insert a 3-connector wire into the positive pole of the power module, positive pole of the USB desk lamp and positive pole of the speaker module.
- 2 Insert a 3-connector wire into the negative pole of the speaker module, negative pole of the USB desk lamp and into the vibration module.
- 3 Insert another wire onto the other side of the vibration module and into the negative pole of the power module.

ACTION Gently tap the vibration module. How will the speaker and desk lamp react?



WHY IS THIS SO?

An earthquake causes vibrations which are picked up by the vibration module. The signal is converted into an electrical current which passes through the motor module and the speaker module, triggering a warning alert.



CIRCUIT CONNECTION

Use the USB desk lamp module and the motor module with the fan attached.

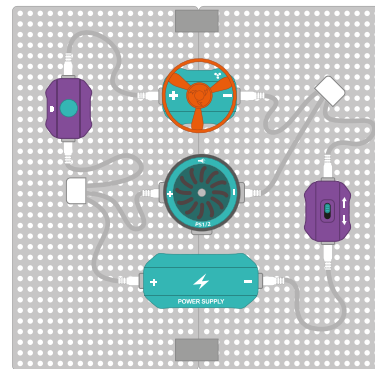
- 1 Insert a 3-connector wire into the positive pole of the power module, positive pole of the USB desk lamp and positive pole of the motor module with the fan.
- 2 Insert a 3-connector wire into the negative pole of the motor module, negative pole of the USB desk lamp and into the vibration module.
- 3 Insert another wire onto the other side of the vibration module and into the negative pole of the power module.

ACTION Gently tap the vibration module.
How will the fan and desk lamp react?



WHY IS THIS SO?

When tapped, the vibration module receives a signal and current passes through the motor module with the fan and the desk lamp. As the amount of current increases, the fan rotates and the desk lamp flashes.



CIRCUIT CONNECTION

Use the motor module with the flying saucer attached.

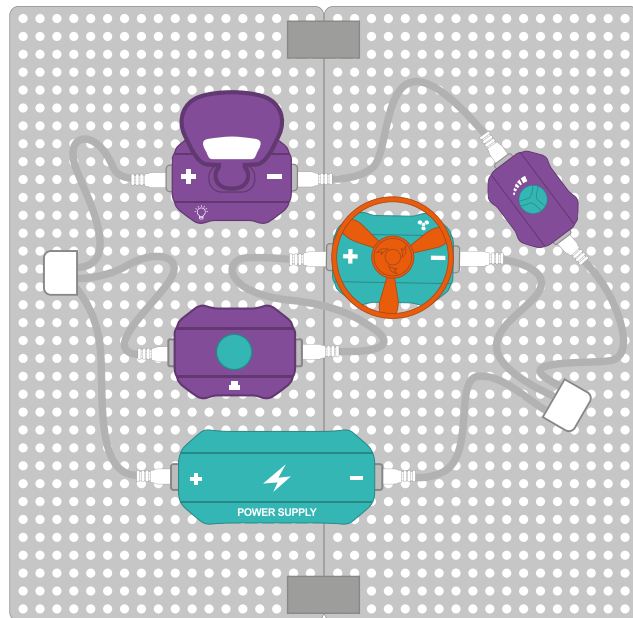
- 1 Insert a 3-connector wire into the positive pole of the power module, positive pole of the speaker module and into the button module.
- 2 Insert another wire into the button module and into the motor module with the flying saucer.
- 3 Connect the negative pole of the motor module, speaker module and switch module with another 3-connector wire.
- 4 Take the second wire and insert it onto the other side of the switch module and to the negative pole of the power module.

ACTION Close the switch. What happens to the speaker module?
Press the button module. How will the motor module with the flying saucer react?



WHY IS THIS SO?

The switch and button each control the motor module and speaker module separately. When the switch is opened, the speaker module emits sound. Press the button and the flying saucer begins to rotate due to the current passing through.



CIRCUIT CONNECTION

Use the USB desk lamp module and the motor module with the flying saucer attached.

- 1 Insert a 3-connector wire into the positive pole of the power module, into the button module and into the positive pole of the USB desk lamp.
- 2 Insert another wire into the button module and to the positive pole of the motor module with the flying saucer.
- 3 Insert the second wire into the negative pole of the USB desk lamp and to the rotary module.
- 4 Then insert the second 3-connector wire into the other side of the rotary module, into the negative pole of the motor module and into the negative pole of the power module.

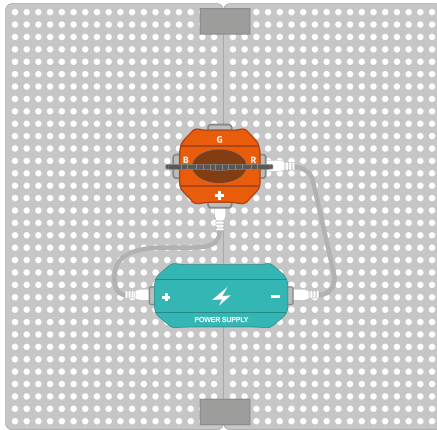
- ACTION**
1. How will the desk lamp react when turning the wheel on the rotary module? (The wheel on the rotary module controls the desk lamp separately.)
 2. Press the button on the button module. How will the motor module with the flying saucer react? (The button module controls the motor module separately.)

WHY IS THIS SO?

Slowly turn the wheel on the rotary module. This will change the current passing through the desk lamp, which also adjusts the brightness of its light. By pressing the button module, current passes through the flying saucer, adjusting its rotation speed.

95-96

RGB Lamp



CIRCUIT CONNECTION

Use the RGB module.

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the RGB lamp.
- 2 Insert the second wire into port R on the RGB lamp and into the negative pole of the power module.

ACTION When the wire is in port R, what color is the RGB lamp light? Disconnect the wire from port R on the RGB lamp and insert it into port G or B. What light color will shine on the RGB lamp? (Experiment No. 96)

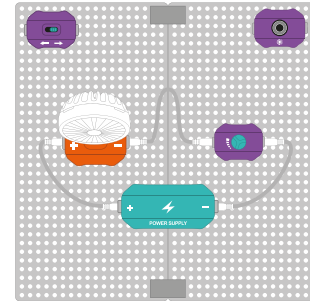


WHY IS THIS SO?

The term RGB is an acronym for the names of three different colors of LEDs. Each port represents a different color: R: red, G: green, B: blue.

97-99

Small table fan



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the fan module.
- 2 Insert the second wire into the fan module and into the negative pole of the rotary module.
- 3 Insert the third wire from the other side of the rotary module and into the negative pole of the power module.

ACTION

1. How does the fan module react when turning the wheel on the rotary module?
2. Replace the rotary module with a switch module and close the switch. How does the table fan module react? (Experiment No. 98)
3. Replace the rotary module with a photosensitive module. How will the fan module react when light hits the photosensitive module? (Experiment No. 99)

TIP

The rotary module can be replaced with a switch module, or a photosensitive module.

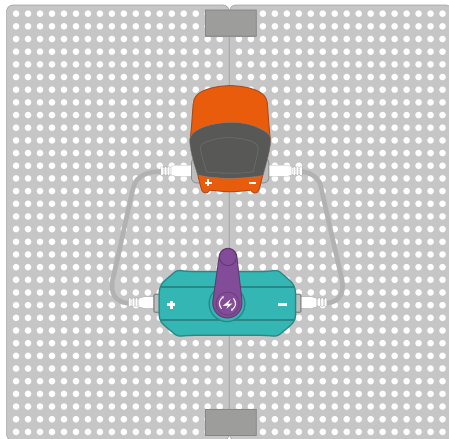


WHY IS THIS SO?

Current is controlled by turning the wheel on the rotary module and subsequently controls the fan speed. Press the button and the flying saucer begins to rotate due to the current passing through.

100

Flash show



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the generator and into the positive pole of the light show module.
- 2 Use the second wire to connect the negative pole of the light show module and the negative pole of the generator.

ACTION Turn the generator crank clockwise.
How will the light show module react?

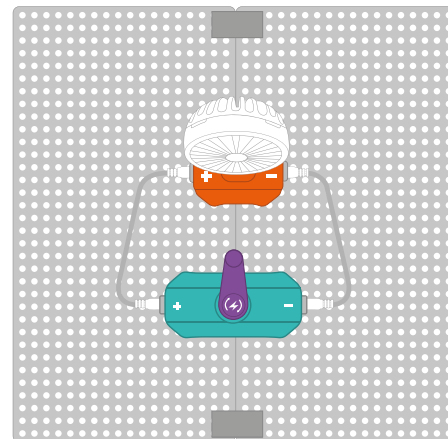


WHY IS THIS SO?

Turning the generator crank clockwise generates an electric current that passes through the light show module and causes the diodes in the module to flash.

101

Manual table fan



CIRCUIT CONNECTION

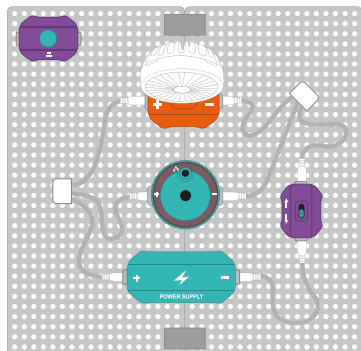
- 1 Insert a wire into the positive pole of the power module and into the fan module.
- 2 Insert the second wire into the negative pole of the fan module and into the negative pole of the generator.

ACTION Turn the generator crank clockwise.
How will the fan react?



WHY IS THIS SO?

Turning the generator crank clockwise generates an electric current that passes through the fan module and causes it to rotate.



CIRCUIT CONNECTION

- 1 Insert a 3-connector wire into the positive pole of the power module, spray module and into the fan module.
- 2 Insert the second 3-connector wire into the negative pole of the fan, negative pole of the spray module and into the switch module.
- 3 Insert another wire onto the other side of the switch module and into the negative pole of the power module.

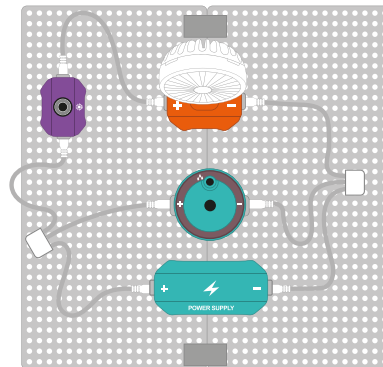
ACTION 1. How will the spray module and fan module react when the switch is toggled?
 2. Replace the switch module with a button module and press the button. What happens to the spray module and fan module?
 (Experiment No. 103)

TIP The rotary module can be replaced with a switch module, or a photosensitive module.



WHY IS THIS SO?

Turning the generator crank clockwise generates an electric current that passes through the light show module and causes the diodes in the module to flash.



CIRCUIT CONNECTION

- 1 Insert a 3-connector wire into the positive pole of the power module, positive pole of the spray module and the photosensitive module.
- 2 Insert another wire onto the other side of the photosensitive module and into the positive pole of the fan module.
- 3 Insert the second 3-connector wire into the negative pole of the fan, into the negative pole of the spray module and into the negative pole of the power module.

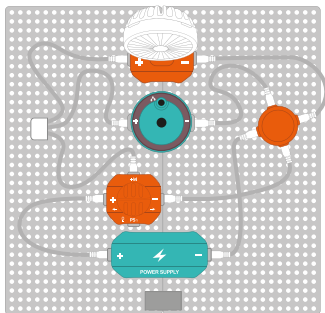
ACTION How will the fan module react when light hits the photosensitive module?



WHY IS THIS SO?

The spray module starts working when the power is turned on. When the light turns on, current passes through the fan module and adjusts its speed according to the intensity of the incident light.

Voice-controlled table fan with sprayer



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the microphone module.
- 2 Insert a 3-connector wire into the microphone module M+, into the positive pole of the spray module and into the positive pole of the fan module.
- 3 Insert the second wire into the negative pole of the fan and to the adapter.
- 4 Insert the third wire into the negative pole of the spray module and to the adapter.
- 5 Insert the fourth wire into the negative pole of the microphone module and to the adapter.
- 6 Use the fifth wire to connect the adapter and the negative pole of the power module.

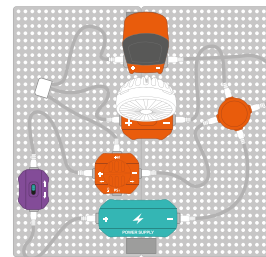
ACTION When you move the microphone module towards the negative pole and speak into the microphone, how will the spray module and fan module react?



WHY IS THIS SO?

When the power is turned on, the microphone module converts the audio signal into an electrical signal when switched towards the negative pole. When you speak into the microphone, current passes through the spray module, which starts emitting water mist, and the table fan turns on.

Voice-controlled light show with fan



CIRCUIT CONNECTION

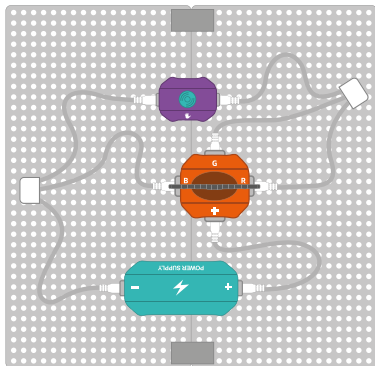
- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire onto the other side of the switch module and to the positive pole of the microphone module.
- 3 Insert a 3-connector wire into the microphone module M+, into the positive pole of the fan module and into the positive pole of the light show module.
- 4 Insert the third wire into the negative pole of the light show module and to the adapter.
- 5 Insert the fourth wire into the negative pole of the fan module and to the adapter.
- 6 Insert the fifth wire into the negative pole of the microphone module and to the adapter.
- 7 Use the sixth wire to connect the other side of the adapter to the negative pole of the power module.

ACTION Close the switch, toggle the microphone module towards the negative pole and speak into the microphone. How will the light show module and the fan module react?



WHY IS THIS SO?

Close the switch and toggle the microphone module towards the negative pole. This module works as a switch that converts sound signals into electrical signals. When it detects sound, current passes through the fan which spins up and the light show module starts.



CIRCUIT CONNECTION

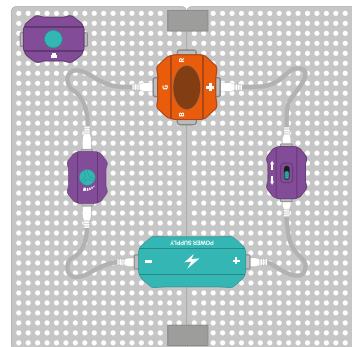
- 1 Insert a wire into the positive pole of the power module and into the positive pole of the RGB lamp.
- 2 Insert a 3-conductor wire into port R and port G on the RGB lamp and into the vibration module.
- 3 Insert the second 3-conductor wire onto the other side of the vibration module, into port B on the RGB lamp and into the negative pole of the power module.

ACTION Tap the vibration module. How does the RGB lamp color change? Pull the wire from port B or R and then tap the vibration module. How does the color on the RGB lamp change now?



WHY IS THIS SO?

In this circuit, port B (blue light), port G (green light) and port R (red light) of the RGB lamp are connected simultaneously. Tapping the vibration module changes the color of the RGB light. Then disconnect port B or R, tap the vibration module again and you can observe various color changes of the RGB light.



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire onto the other side of the switch module and to the positive pole of the RGB lamp.
- 3 Insert the third wire into port G of the RGB lamp and into the rotary module. Use the fourth wire to connect the other side of the rotary module to the negative pole of the power module.

ACTION 1. Close the switch and turn the wheel on the rotary module. What will the RGB lights do?
2. Replace the switch module with a button module. How will the RGB light react when controlling the individual modules? (Experiment No. 109)

TIP

The switch module can be replaced with a button module.

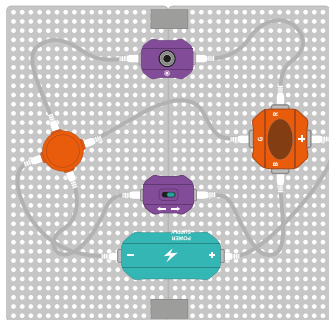


WHY IS THIS SO?

The circuits are connected in series, the amount of current flowing can be changed using the rotary module and thus adjust the brightness of the RGB lamp.

110

Multicolor lamp



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the RGB lamp.
- 2 Insert the second wire into port B on the RGB lamp and into the switch module. Insert the third wire into port G of the RGB lamp and into the adapter. Insert the fourth wire into port R of the RGB lamp and into the photosensitive module.
- 3 Insert the fifth wire onto the other side of the photosensitive module and into the adapter.
- 4 Insert the sixth wire into the switch module and to the other side of the adapter. Use the seventh wire to connect the other side of the adapter to the negative pole of the power module.

ACTION When you close the switch, how do the colors on the RGB lamp change? Close the switch, light falls on the photosensitive module. What color will the light from the RGB lamp have?

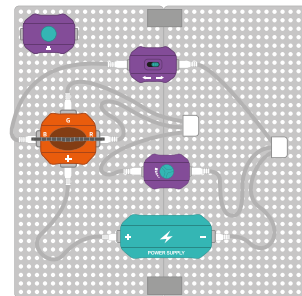


WHY IS THIS SO?

The color perceived by the human eye is usually composed of three primary colors - red, green and blue. Using different switches to control RGB lights, the principle of three primary colors can be freely used to create different color combinations, creating new shades.

111-112

Dimmer



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the RGB lamp.
- 2 Insert the second 3-connector wire into port G and R on the RGB lamp and into the rotary module.
- 3 Insert the second wire into port B on the RGB lamp and into the switch module. Insert the second 3-connector wire onto the other side of the switch module, into the other side of the rotary module and into the negative pole of the power module.

ACTION 1. Turn the wheel on the rotary module. How does the light color of the RGB lamp change? Close the switch. How does the color of the RGB lamp change?
2. Replace the switch module with a button module. Perform actions as in the action above. How will the color of the RGB lamp change? (Experiment No. 112)

TIP

The switch module can be replaced with a button module.

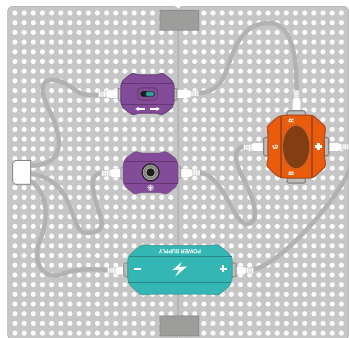


WHY IS THIS SO?

In this circuit, ports G (green light) and R (red light) of the RGB lamp are controlled by a rotary module which allows changing the color ratio between green and red light. After closing the switch, port B (blue light) connects to the circuit. At this moment, the RGB light mixes and the resulting color is different from the one when the switch was off.

113

Traffic light



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the RGB lamp.
- 2 Insert the second wire into port G of the RGB lamp and into the photosensitive module.
- 3 Insert the third wire into port R on the RGB lamp and into the switch module.
- 4 Use another 3-conductor wire to connect the other side of the switch module, the other side of the photosensitive module and the negative pole of the power module.

ACTION How does the RGB lamp react when light hits the photosensitive module? Close the switch and light hits the photosensitive module. What color will the RGB lamp have?

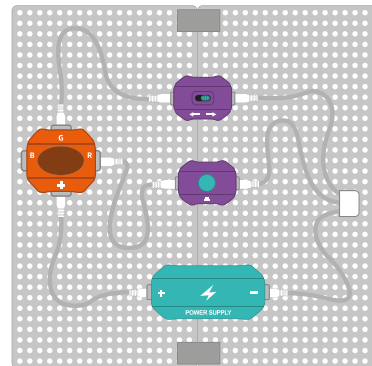


WHY IS THIS SO?

Light hits the photosensitive module, current starts flowing through port G and the RGB lamp emits green color. After closing the switch, current flows through port R and the RGB lamp glows red. When combining these two modules, the ratio of red and green light changes, the colors mix and create a yellow color.

114

Red, green and yellow light



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the RGB lamp.
- 2 Insert the second wire into port R of the RGB lamp and into the button module. Insert the third wire into port G of the RGB lamp and into the switch module.
- 3 Use another 3-conductor wire to connect the other side of the switch module, the other side of the button module and the negative pole of the power module.

ACTION Close the switch and press the button on the button module. How does the RGB lamp color change?

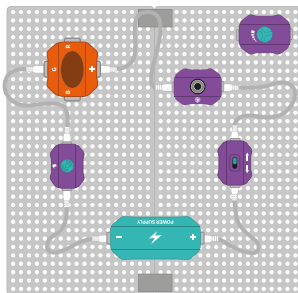


WHY IS THIS SO?

When the switch is closed, current flows through the green light and the RGB lamp emits green color. When the button is pressed, current flows through the red RGB light, which glows red. When both the switch and button are pressed simultaneously, the RGB light emits both red and green colors, which combine to create yellow light.

115-116

Green light to cross!



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire onto the other side of the switch module and into the photosensitive module.
- 3 Insert the third wire onto the other side of the photosensitive module and to the positive pole of the RGB lamp.
- 4 Insert the fourth wire into port G of the RGB lamp and into the vibration module.
- 5 Insert the fifth wire onto the other side of the vibration module and into the negative pole of the power module.

ACTION 1. Close the switch, light hits the photosensitive module and you press the vibration module. How will the RGB lamp react?
 2. Replace the vibration module with a rotary module. What will be the reaction of the RGB lamp during the above actions?
 (Experiment No. 116)

TIP The vibration module can be replaced with a rotary module.

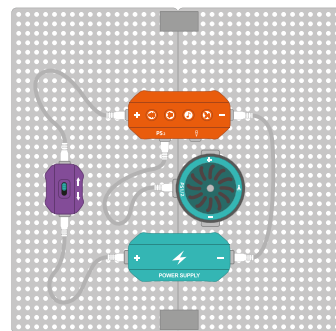


WHY IS THIS SO?

This circuit uses the principle of series connection. All switch modules must be on for electrical current to flow and the green light to light up.

117-118

Little passion speaker



CIRCUIT CONNECTION

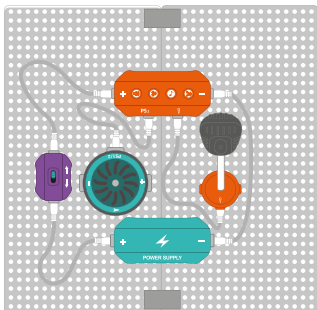
- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Use the second wire to connect the other side of the switch module to the positive pole of the Bluetooth module.
- 3 Use the third wire to connect the Bluetooth module PS2 to the speaker module PS1/2.
 Use the fourth wire to connect the negative pole of the Bluetooth module to the negative pole of the power module.

ACTION 1. Close the switch and switch the Bluetooth module to music mode. What will the speaker module react to?
 2. Close the switch, press Bluetooth mode, connect Bluetooth to your mobile phone and turn on music on your mobile phone.
 3. What will the speaker module react to? (Experiment No. 118)



WHY IS THIS SO?

The Bluetooth module is an integrated small computer where 4 modes are set. When music mode is connected to the speaker module, it starts playing music.



CIRCUIT CONNECTION

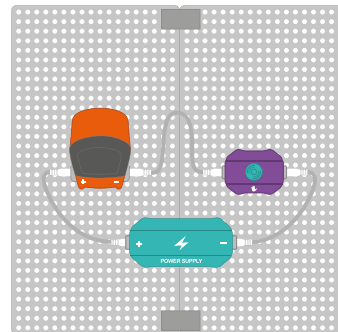
- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Use the second wire to connect the other side of the switch module to the positive pole of the Bluetooth module.
- 3 Use the third wire to connect the Bluetooth module PS2 to the speaker module PS1/2.
- 4 Use the fourth wire to connect the Bluetooth module at the microphone icon location to the karaoke microphone.
- 5 Use the fifth wire to connect the negative pole of the Bluetooth module to the negative pole of the power module.

ACTION 1. Close the switch, switch the Bluetooth module to volume mode and speak into the karaoke microphone. How will the speaker module react?

2. Close the switch, switch to Bluetooth mode, connect Bluetooth to your mobile phone and turn on music on your mobile phone. What will the speaker module react to? (Experiment No. 120)

WHY IS THIS SO?

The Bluetooth module is an integrated small computer where 4 modes are set. When volume mode is selected and the karaoke microphone is connected, you can sing like a real singer.



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the light show module.
- 2 Insert the second wire into the negative pole of the light show module and into the vibration module.
- 3 Insert the third wire onto the other side of the vibration module and into the negative pole of the power module.

ACTION How will the light show module react when you tap the vibration module?

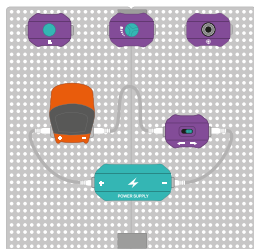


WHY IS THIS SO?

Tapping the vibration switch vibrates the spring inside, creating an electrical circuit which activates the light grid inside the light show.

122-125

Magic light show



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the positive pole of the light show module.
- 2 Insert a wire into the negative pole of the light show module and into the switch module.
- 3 Use the third wire to connect the other side of the switch module to the negative pole of the power module.

- ACTION**
1. Close the switch. How will the light show module react?
 2. Replace the switch module with a button module. How will the light show module react when the button is pressed? (Experiment No. 123)
 3. How will the light show module react when the switch module is replaced by a rotary module and you turn the wheel? (Experiment No. 124)
 4. Replace the switch module with a photosensitive module. How will the light show module react when light hits the photosensitive module? (Experiment No. 125)

TIP The switch module can be replaced with a button module, rotary module, or photosensitive module.

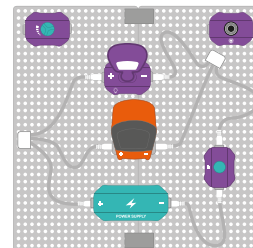


WHY IS THIS SO?

The light show module is a component composed of multiple LED lights. When power is connected, the LEDs light up, creating different patterns.

126-128

Dazzling light show



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a 3-conductor wire into the positive pole of the power module, into the positive pole of the light show module and into the positive pole of the USB desk lamp.
- 2 Use the second 3-conductor wire to connect the negative pole of the USB desk lamp with the negative pole of the light show module and with the negative pole of the button module.
- 3 Use another wire to connect the other side of the button module to the negative pole of the power module.

- ACTION**
1. Press the button of the button module. How will the light show module and USB desk lamp react?
 2. What happens if you replace the button module with a rotary module? (Experiment No. 127)
 3. Replace the button module with a photosensitive module. What will be the reaction of the light show module and USB desk lamp when light hits the photosensitive module? (Experiment No. 128)

TIP The button module can be replaced with a rotary module, or a photosensitive module.

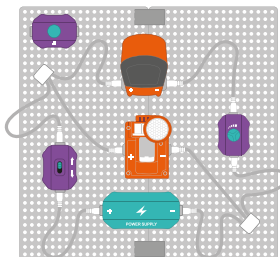


WHY IS THIS SO?

Pressing the button closes the circuit, current starts flowing through the light show module and the USB desk lamp. The power module activates and creates a dazzling light show.

129-130

Floating light show



CIRCUIT CONNECTION

Use the air generator with the ball.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Use another 3-connector wire to connect the other side of the switch module, the positive pole of the air generator and the positive pole of the light show module.
- 3 Insert a wire into the negative pole of the light show module and into the rotary module.
- 4 Insert a 3-connector wire onto the other side of the rotary module, into the negative pole of the air generator and into the negative pole of the power module.

- ACTION**
1. Close the switch and turn the wheel on the rotary module. How will the air generator and light show module react?
 2. Replace the rotary module with a button module. Close the switch and press the button. How will the air generator and light show module react? (Experiment No. 130)

TIP The rotary module can be replaced with a button module.

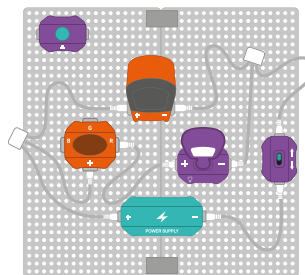


WHY IS THIS SO?

Close the switch and turn the wheel, the circuit closes and current starts to flow through the air generator and the light show module.

131-132

Shining stars



CIRCUIT CONNECTION

Use the USB desk lamp module.

- 1 Insert a 3-connector wire into the positive pole of the power module, positive pole of the RGB lamp and positive pole of the light show module. Use another wire to connect port R of the RGB lamp to the positive pole of the USB desk lamp.
- 2 Insert a 3-connector wire into the negative pole of the light show module, negative pole of the USB desk lamp and into the switch module.
- 3 Connect the other side of the switch module to the negative pole of the power module with the second wire.

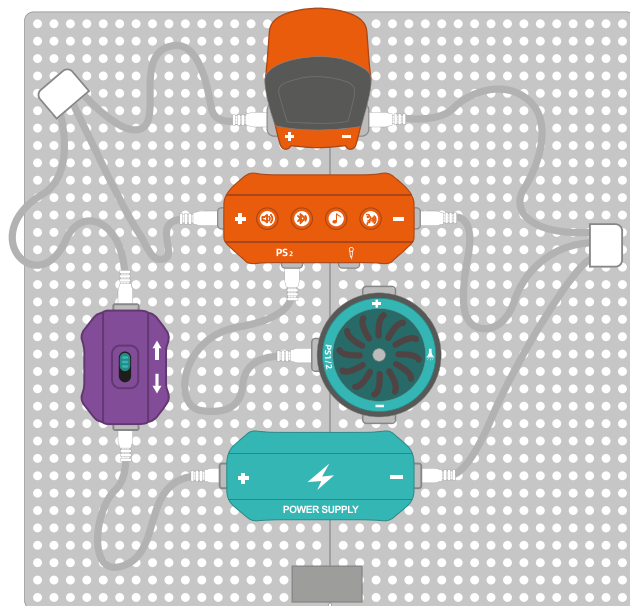
- ACTION**
1. How will the RGB lamp, USB desk lamp and light show module react when the switch is closed?
 2. Replace the switch module with a button module. What will be the reaction of the RGB lamp, light show module and USB desk lamp when pressing the button module? (Experiment No. 132)

TIP The switch module can be replaced with a button module.



WHY IS THIS SO?

This circuit is a combination of series and parallel connection. The RGB lamp and USB desk lamp are connected in series and in parallel with the light show module. The switch module controls all three modules simultaneously. Since the RGB lamp and USB desk lamp are connected in series, the current passing through the branch will be weakened and thus the power module output will also decrease.



CIRCUIT CONNECTION

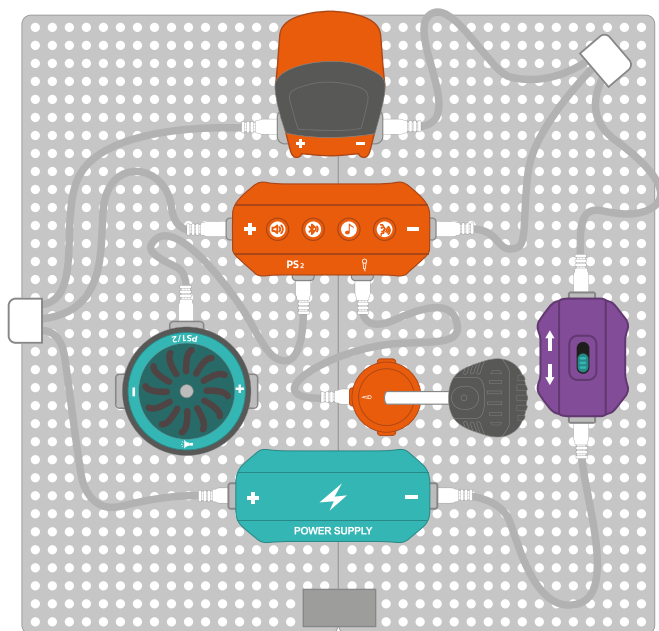
- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert a 3-connector wire into the other side of the switch module, into the positive pole of the Bluetooth module and into the positive pole of the light show module.
- 3 Connect the Bluetooth module PS2 to the speaker module PS1/2 using the second wire.
- 4 Insert a 3-connector wire into the negative pole of the light show module, negative pole of the Bluetooth module and into the negative pole of the power module.

- ACTION**
1. What is the reaction of the speaker module and light show module when the switch is closed and the Bluetooth module is switched to music mode?
 2. Close the switch, press Bluetooth mode, connect Bluetooth to your mobile phone, turn on music on your mobile phone. What will be the response of the speaker module and light show module?
(Experiment No. 134)



WHY IS THIS SO?

The Bluetooth module is an integrated small computer where four modes are set. When music mode is selected, the light show module contains a pre-programmed system that receives the electrical signal and converts it into corresponding light effects.



CIRCUIT CONNECTION

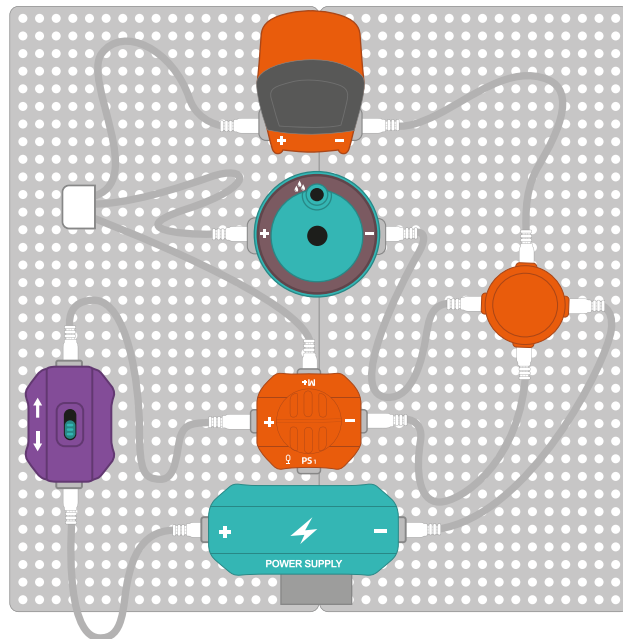
- 1 Insert a 3-connector wire into the positive pole of the power module, positive pole of the Bluetooth module and positive pole of the light show module.
- 2 Connect the Bluetooth module PS2 to the speaker module PS1/2 using another wire.
- 3 Insert the second wire into the port with the microphone icon on the Bluetooth module and into the karaoke microphone.
- 4 Insert a 3-connector wire into the negative pole of the light show module, into the negative pole of the Bluetooth module and into the switch module.
- 5 Use another wire to connect the other side of the switch module to the negative pole of the power module.

- ACTION**
1. When the switch is closed, switch the Bluetooth module to volume mode and make sounds into the karaoke microphone. What is the reaction of the speaker module and light show module?
 2. Close the switch, press Bluetooth mode and connect Bluetooth to your mobile phone. What will be the reaction of individual modules during the above operations? (Experiment No. 136)



WHY IS THIS SO?

This circuit is a combination of series and parallel connection. The Bluetooth module, speaker module and karaoke microphone are connected in series and then in parallel with the light show module. The switch module can control all four modules simultaneously. Since the Bluetooth module, speaker module and karaoke microphone are connected in series, the current passing through the branch will be weakened, which will also reduce the power module output.



CIRCUIT CONNECTION

- 1 Take a wire and insert it into the positive pole of the power module and into the switch module.
- 2 Take the second wire and insert it on the other side of the switch module into the positive pole of the microphone module.
- 3 Take a 3-connector wire and insert it into the microphone module M+, positive pole of the spray module and positive pole of the light show module.
- 4 Insert the third wire into the negative pole of the light show module and to the adapter.
- 5 Take the fourth wire and insert it into the adapter and into the negative pole of the spray module.
- 6 Take the fifth wire and insert it into the adapter and into the negative pole of the microphone module.
- 7 Take the sixth wire and insert it into the adapter and into the negative pole of the power module.

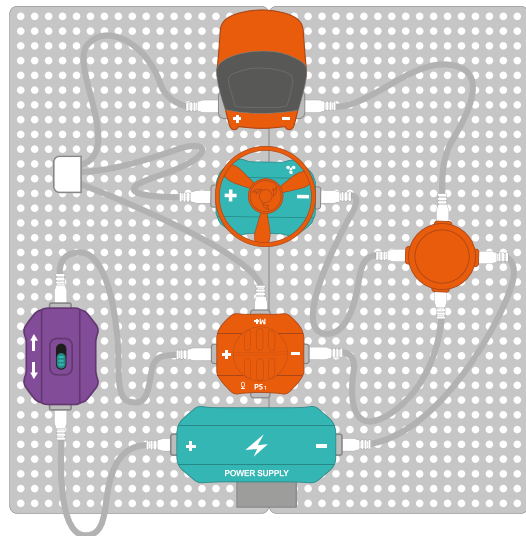
ACTION Switch the recording microphone module towards the negative pole, close the switch and speak into the microphone. How will the spray module and light show module react?



WHY IS THIS SO?

Close the switch.

Switch the microphone module towards the negative pole. When you speak, current passes through the spray module, which starts emitting water mist, and the light show module lights up.



CIRCUIT CONNECTION

Use the motor module with the flying saucer attached.

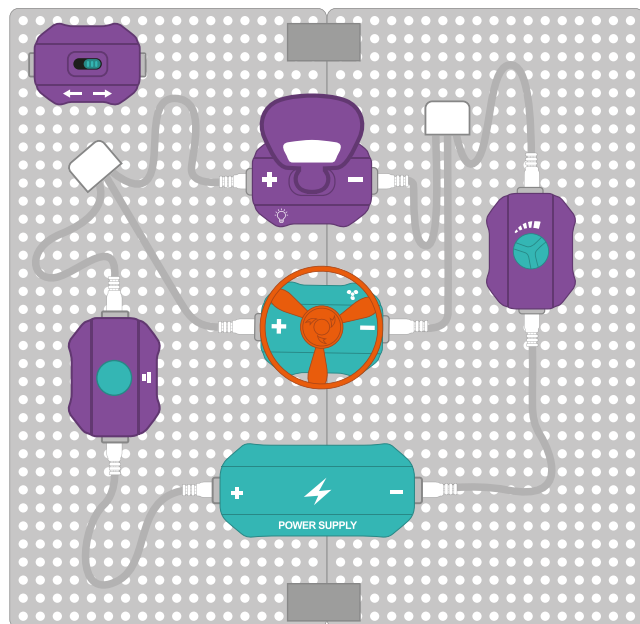
- 1 Take a wire and insert it into the positive pole of the power module and into the switch module.
- 2 Take the second wire and insert it on the other side of the switch module and into the positive pole of the microphone module.
- 3 Take a 3-connector wire and insert it into the microphone M+, into the positive pole of the motor module with the flying saucer and into the positive pole of the light show module.
- 4 Insert the third wire into the negative pole of the light show module and to the adapter.
- 5 Take the fourth wire and insert it into the adapter and into the negative pole of the motor module with the flying saucer.
- 6 Take the fifth wire and insert it into the adapter and into the negative pole of the microphone module.
- 7 Take the sixth wire and insert it into the adapter and into the negative pole of the power module.

ACTION Switch the recording microphone module towards the negative pole, close the switch and speak into the microphone. How will the flying saucer and light show module react?



WHY IS THIS SO?

Close the switch. After turning on the microphone module towards the negative pole, the switch converts the sound signal into an electrical signal. When you speak into the microphone, current passes through the motor module, the flying saucer starts to rotate and the light show module lights up.



CIRCUIT CONNECTION

Use the USB desk lamp module and the motor module with the flying saucer attached.

- 1 Insert a wire into the positive pole of the power module and into the button module.
- 2 Take a 3-connector wire and insert it into the button module, positive pole of the motor module and into the positive pole of the USB desk lamp.
- 3 Take the second 3-connector wire and insert it into the negative pole of the USB desk lamp, negative pole of the motor module and into the rotary module.
- 4 Insert the second wire onto the other side of the rotary module and into the negative pole of the power module.

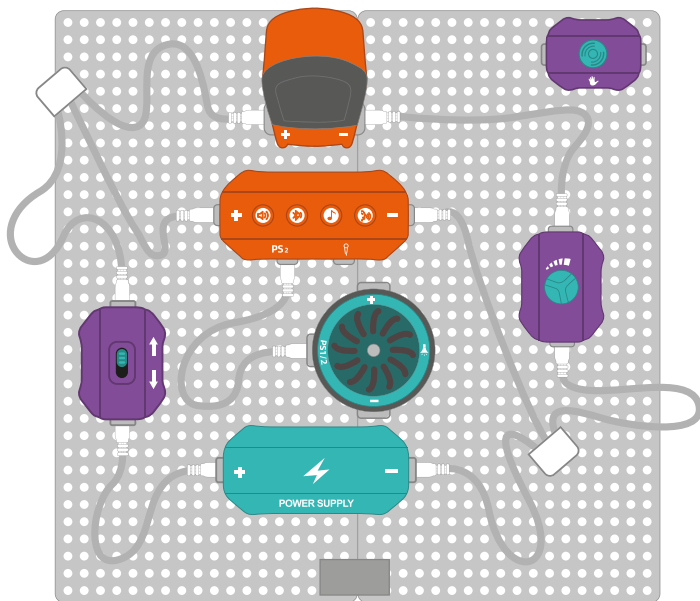
- ACTION**
1. Press the button of the button module and turn the wheel on the rotary module. How will the USB desk lamp and flying saucer react?
 2. Replace the button module with a switch module, close the switch, turn the wheel on the rotary module. What will be the reaction of the USB desk lamp and flying saucer? (Experiment No. 140)

TIP The button module can be replaced with a switch module.



WHY IS THIS SO?

The USB desk lamp and motor module are simultaneously connected in the circuit to the rotary module. To adjust the voltage, it is necessary to turn the rotary wheel, press the button, or close the switch to create a circuit so both modules can work simultaneously.



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert a 3-connector wire into the other side of the switch module, into the positive pole of the Bluetooth module and into the positive pole of the light show module.
- 3 Connect the Bluetooth module PS2 to the speaker module PS1/2 using the second wire.
- 4 Insert the third wire into the negative pole of the light show module and into the rotary module.
- 5 Then insert the second 3-connector wire into the other side of the rotary module, into the negative pole of the Bluetooth module and negative pole of the power module.

- ACTION**
1. Close the switch, switch the Bluetooth module to music mode, turn the wheel on the rotary module. How will the speaker module and light show module react?
 2. Replace the rotary module with a vibration module. What will be the reaction of individual modules during the above action? (Experiment No. 142)
 3. Switch the Bluetooth module to Bluetooth mode and connect it to your mobile phone where you play music. How will individual modules react during the above action? (Experiment No. 143)

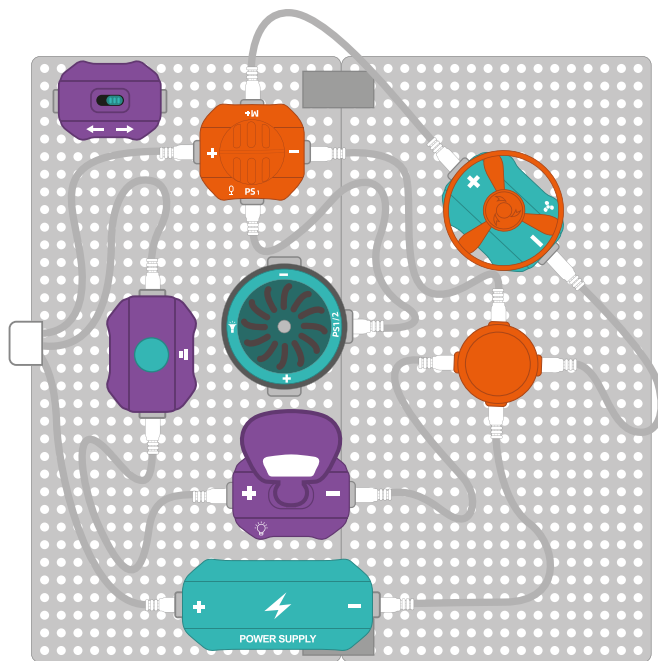
TIP

The rotary module can be replaced with a vibration module.



WHY IS THIS SO?

Close the switch and by turning the wheel control the brightness of the light show and the sound of the speaker.



WHY IS THIS SO?

Ports M+ and PS1 of the microphone module have independent functions. The motor module starts when switched towards the negative pole, while the speaker module is activated when switched to the positive pole. After pressing the button of the button module, the USB desk lamp starts flashing.

CIRCUIT CONNECTION

Use the USB desk lamp module and the motor module with the flying saucer attached.

- 1 Take a 3-conductor wire and insert it into the positive pole of the power module, into the button module and into the microphone module.
- 2 Insert a wire to the other side of the button module and connect it to the microphone module.
- 3 Take the second wire and insert it into the microphone module M+ and to the positive pole of the motor module with the flying saucer.
- 4 Take the third wire and insert it into the microphone PS1 and to the speaker module PS1/2.
- 5 Take the fourth wire and insert it into the negative pole of the microphone module and to the adapter.
- 6 Take the fifth wire and insert it into the negative pole of the motor module and to the adapter.
- 7 Take the sixth wire and insert it onto the other side of the adapter and to the negative pole of the USB desk lamp.
- 8 Take the seventh wire and insert it onto the other side of the adapter and into the negative pole of the power module.

- ACTION**
1. What will be the reaction of the USB desk lamp after pressing the button on the button module?
 2. Switch the recording microphone module towards the positive pole and speak into the microphone. How will the speaker module react? When you switch the microphone module towards the negative pole and speak into the microphone, how will the motor module with the flying saucer react?
 3. Replace the button module with a switch module. What is the reaction of the USB desk lamp? (Experiment No. 145)

TIP

The button module can be replaced with a switch module.

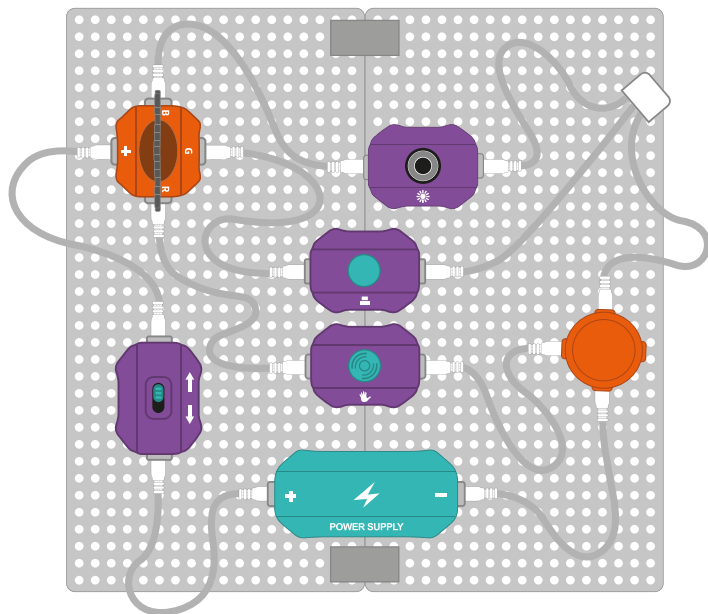


Ports M+ and PS1 of the microphone module have separate functions that are independent of each other. Switching the microphone towards the negative pole activates the air generator, switching towards the positive pole activates the speaker module. After pressing the button on the button module the USB desk lamp starts flashing.

- 1 Take a 3-connector wire and insert it into the positive pole of the power module, into the button module and into the microphone module.
- 2 Insert a wire to the other side of the button module and into the positive pole of the USB desk lamp.
- 3 Insert the second wire into the microphone module M+ and into the positive pole of the air generator.
- 4 Take the third wire and connect it to the microphone PS1 and to the speaker module PS1/2.
- 5 Take the fourth wire and insert it into the negative pole of the microphone module and to the adapter.
- 6 Take the fifth wire and insert it into the negative pole of the air generator and to the adapter.
- 7 Take the sixth wire and insert it onto the other side of the adapter and to the negative pole of the USB desk lamp.
- 8 Take the seventh wire and insert it onto the other side of the adapter and into the negative pole of the power module.

- ACTION**
1. What will be the reaction of the USB lamp after pressing the button on the button module?
 2. Switch the recording microphone module towards the positive pole and speak into the microphone. How will the speaker module react? When you switch the recording microphone module towards the negative pole and speak into the microphone, how will the air generator react?
 3. Replace the button module with a rotary module and turn its wheel. What is the reaction of the USB desk lamp? (Experiment No. 147)
 4. Replace the button module with a photosensitive module. When you shine light on the photosensitive module, how does the USB desk lamp react? (Experiment No. 148)

The button module can be replaced with a rotary module, or a photosensitive module.



CIRCUIT CONNECTION

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert the second wire onto the other side of the switch module and to the positive pole of the RGB lamp. Insert the third wire into port R of the RGB lamp and to the vibration module. Insert the fourth wire into port G of the RGB lamp and into the button module. Insert the fifth wire into port B of the RGB lamp and into the photosensitive module.
- 3 Insert a 3-connector wire onto the other side of the photosensitive module, onto the other side of the button module and into the adapter.
- 4 Insert another wire into the adapter and onto the other side of the vibration module.
- 5 Use the seventh wire to connect the other side of the adapter to the negative pole of the power module.

- ACTION**
1. Close the switch and tap the vibration module. What color will the RGB lamp shine?
 2. Press the button on the button module. What color will the RGB lamp light up?
 3. When light hits the photosensitive module, what color will the RGB lamp be?
 4. What color will the RGB lamp light up when combining different modules?

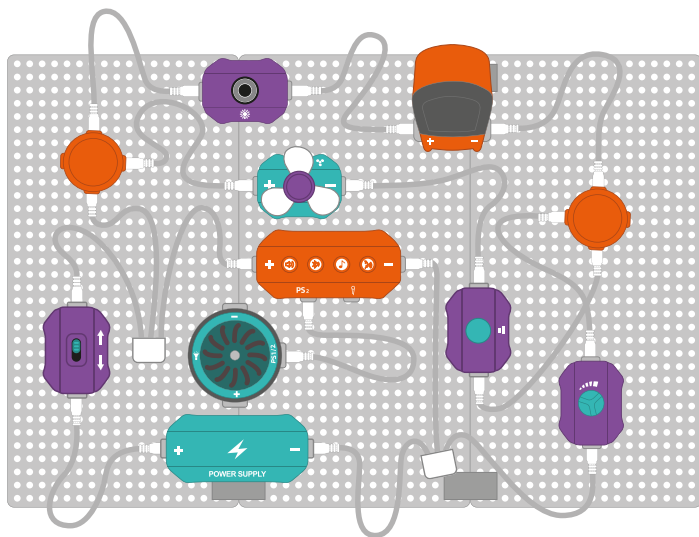
TIP

Vibration module, button module and photosensitive module can be used in combination.



WHY IS THIS SO?

RGB lights shine in different colors on port R, G and B, which can be combined to create different colors.

**ACTION**

1. Close the switch and switch the Bluetooth module to music mode. How will the speaker module react?
2. Press the button of the button module and turn the wheel of the rotary module. How will the motor module with the fan react? How will the light show react when light hits the photosensitive module and you turn the wheel on the rotary module? (Experiment No. 151)

CIRCUIT CONNECTION

Use the motor module with the fan attached.

- 1 Insert a wire into the positive pole of the power module and into the switch module.
- 2 Insert a 3-connector wire into the other side of the switch module, into the adapter and into the positive pole of the Bluetooth module.
- 3 Take the second wire and insert it into the Bluetooth module PS2 and into the speaker module PS1/2.
Take the third wire and insert it onto the other side of the adapter and to the positive pole of the motor module with the fan.
Take the fourth wire and insert it into the negative pole of the motor module with the fan and to the button module.
Take the fifth wire and insert it onto the other side of the adapter and into the photosensitive module.
Insert the sixth wire onto the other side of the photosensitive module and into the positive pole of the light show module.
Take the seventh wire and insert it into the negative pole of the light show module and into the adapter.
Take the eighth wire and insert it into the other side of the adapter and into the button module.
Take the ninth wire and insert it to the next side of the adapter and into the rotary module.
- 4 Take the second 3-connector wire and insert it into the other side of the rotary module, into the negative pole of the Bluetooth module and into the negative pole of the power module.

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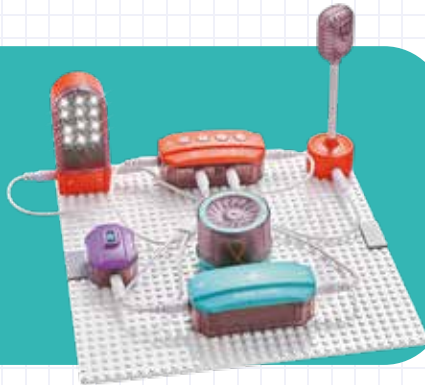


BEGINNING
ABILITY



TECHNOLOGICAL
CREATIVITY

Little singer



Light-sensitive
module



Understanding
RGB lights



Manual power
generation

