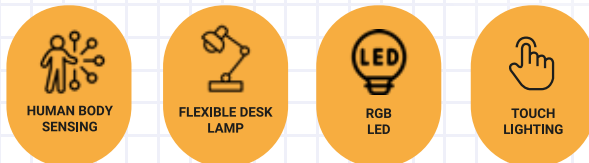


ELITRONS

ELECTRONIC BLOCKS

CIRCUIT BUILDING BLOCKS

8+



LEARNING CIRCUIT KNOWLEDGE

BUILD OVER

3899

PROJECTS

PROJEKTE | PROJEKTŮ

72

PCS | STK | KS



MANUAL

IN MULTIPLE LANGUAGES

HANDBUCH IN
MEHREREN SPRACHEN
MANUÁL
VE VÍCE JAZYCÍCH



eliPlay

Parent manual

This product is intended for use by children aged 8 and above. Please supervise your child during experiments and ensure they are conducted under parental guidance. Before conducting experiments, parents must accompany their children to carefully read the manual. Incorrect circuit connections may cause short circuits or overheating. If a short circuit occurs after the power is connected, it may result in damage to the power supply, electronic components, and wires, and could even pose a risk of burns to children.



Warning

This product uses direct current (DC) power supply. It contains small parts that should not be ingested to avoid the risk of choking; this product is not suitable for children under 3 years old. The product includes light bulbs. When assembling circuits with light bulbs, be cautious as the bulbs may become hot after the circuit is energized; do not touch them to prevent burns. After the experiment, disassembling the wiring and batteries should be done with adult assistance to avoid direct contact with potentially overheated parts. Please read the instruction manual carefully before use, operate according to the requirements, and keep the manual for reference.

Safety Guidance

Before starting the experiment, parental consent must be obtained. When conducting experiments, always wear eye protection and ensure your hands are dry to avoid contact with exposed wires or terminals. Never connect the experimental circuit to household power outlets or use domestic electricity, as its energy is much greater than that of the batteries used in experiments. Improper use may lead to serious consequences or even death. When installing batteries, correctly install the positive and negative terminals according to the manual's instructions. Before energizing the circuit, carefully check the wiring to ensure there are no incorrect connections. If any part is found to be overheating, immediately disconnect the power and inspect the wires. Always connect the circuit according to the configurations or part connections described in the product manual. After the experiment, disassemble the circuit and remove the batteries. Do not leave the circuit unattended while it is powered to ensure safety.

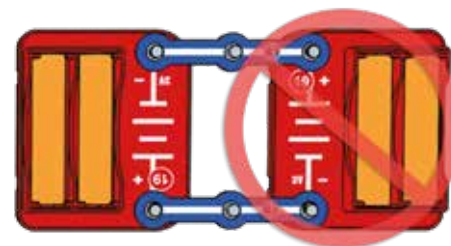
Caution

After completing the circuit experiments in the instruction manual, you may wish to attempt to build experiments of your own design. When engaging in personalized design, it is still recommended to refer to the connection methods in the instruction manual, as many important design concepts are introduced through it. Each circuit design should include a power source, a switch, a load (such as a resistor, light bulb, motor, integrated circuit, etc.), and the connecting wires. It is particularly important to avoid creating a “short circuit”, which is a direct connection between two ends of the power source without passing through a load. This could lead to component damage, rapid battery depletion, and heating, posing safety hazards.



Never do this!

This is the most direct short circuit, connecting wire 3 directly across the battery box terminals.



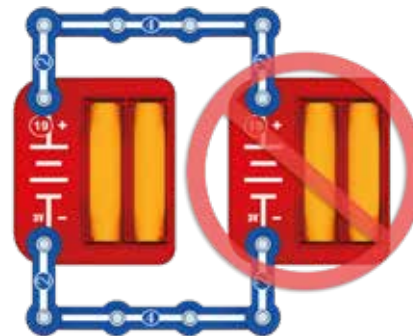
Never do this!

This is also a short circuit, directly connecting two battery boxes in series.



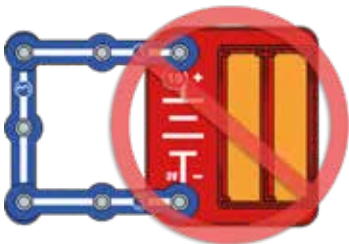
Never do this!

This is also a short circuit, which is the easiest for children to mistakenly assemble, thinking it can also control the circuit's switch.



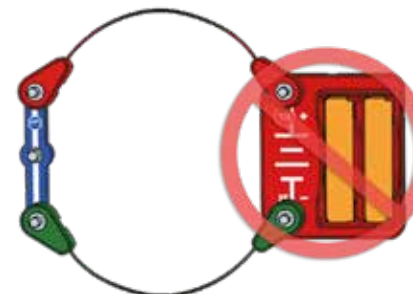
Never do this!

Do not connect two battery boxes in parallel to the circuit.



Never do this!

This is also a short circuit, even though it goes around, it still directly connects the positive and negative terminals of the power supply.



Never do this!

This is also a short circuit, even though it goes around, it still directly connects the positive and negative terminals of the power supply.

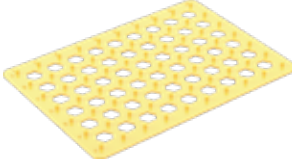
PARTS LIST

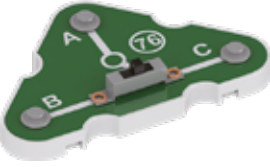
NO	PART NAME	PART PICTURES
1	Wire 1 6x	
2	Wire 2 12x	
3	Wire 3 4x	
4	Wire 4 2x	
5	Wire 5	
6	Wire 6	
7	Wire 7	
9	Colorful LED	

NO	PART NAME	PART PICTURES
14	Tact switch	
15	Slide switch	
16	Photoresistor	
17	Red LED	
18	3V light bulb	
19	3V battery box 2x	
20	Speaker	
22	Alarm IC	

NO	PART NAME	PART PICTURES
24	Motor	
26	Green LED	
27	6V light bulb	
31	1KΩ resistor	
34	100KΩ resistor	
51	PNP transistor	
52	NPN transistor	
53	Variable resistor	

PARTS LIST

NO	PART NAME	PART PICTURES
H1	Buzzer	
	Red/green jumper wire (50cm)	
	Fan blade 2x	
	Base grid	
	Optical fiber tree light post base 2x	
	Invisible pen	

NO	PART NAME	PART PICTURES
87	Purple LED	
71	Colorful fan	
72	Gravity switch	
76	SPDT switch 2x	
92	Electronic keyboard	

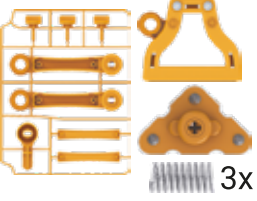
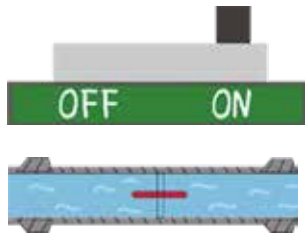
NO	PART NAME	PART PICTURES
L4	RGB LED	
U12	Touch IC	
	3D base 2x	
U19	Motion detector	
	Flexible desk lamp set	

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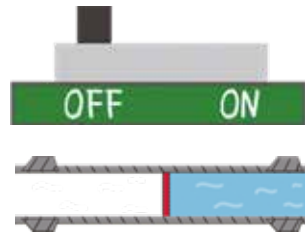
PART INTRODUCTION

A switch is an electronic component that can open a circuit, interrupt the flow of current, or direct it to other circuits.



Circuit Symbol

When the switch is set to the ON position, the circuit is completed.



Circuit Symbol

When the switch is set to the OFF position, the circuit is broken.

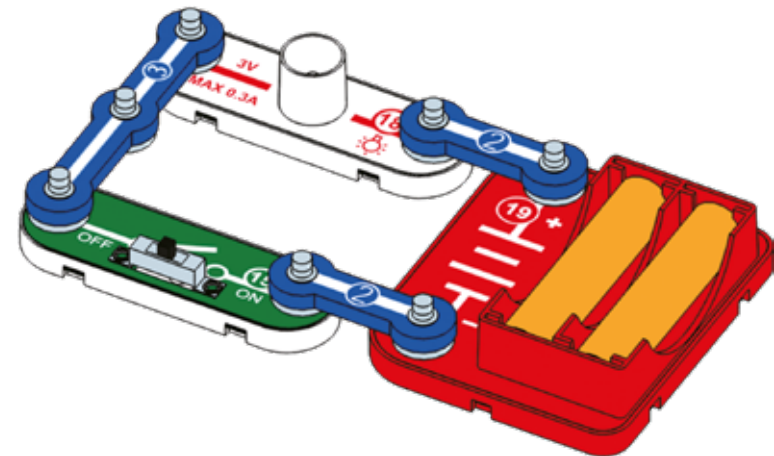


Electric current is like water flow, and a switch is like a faucet.
When you want to break the circuit, you can close the switch (faucet);
When you want to complete the circuit, you can open the switch (faucet).



1. LIGHT BULB

- 1 Turn on the switch 15, and the bulb lights up.
- 2 Turn off the switch 15, and the bulb lights goes out.



PART INTRODUCTION

A tact switch is a recoverable switch that can be pressed and released.

A copper plate that can return to its original shape after being pressed down



Tact switch symbol



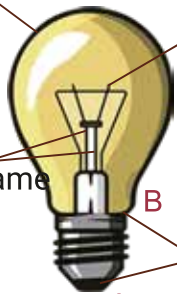
PART INTRODUCTION

The light bulb is made based on the principle of the thermal effect of electric current. When the light bulb is connected to the rated voltage, the current passing through the filament heats it to an incandescent state (over 2000°C), causing it to emit light and heat, thereby converting electrical energy into thermal and light energy.

Glass Bulb

Filament

Metal Frame



Connection Points

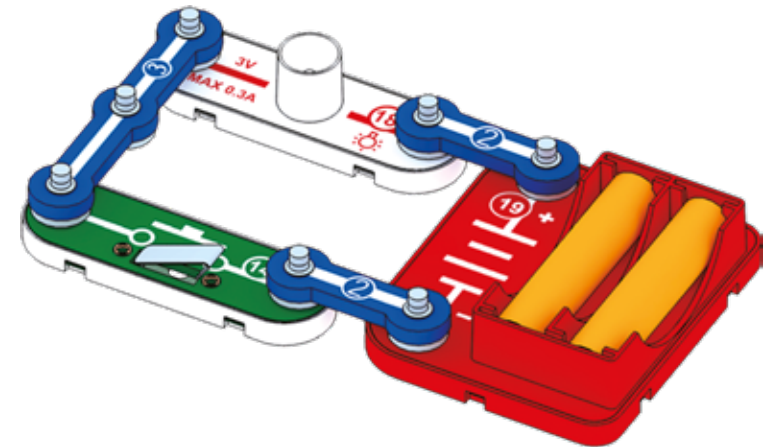
Bulb symbol



1. TACT SWITCH LIGHT (1-10)

- 1 Press tact switch 14, and the bulb lights up.
- 2 Release Tact Switch 14, and the bulb goes out.

You can replace 18 with 9, 17, 24, 26, 27, 71, 87, H1, L4, totaling 10 combinations.

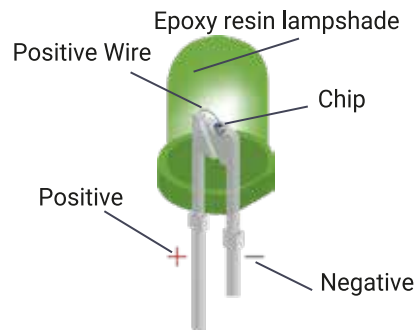


Adding inert gas into the glass envelope can slow down the sublimation of the filament (tungsten filament).



PART INTRODUCTION

A Light Emitting Diode, abbreviated as LED, is a diode that can directly convert electrical energy into light energy, hence the name "light emitting diode." Like diodes, it also has unidirectional conductivity.

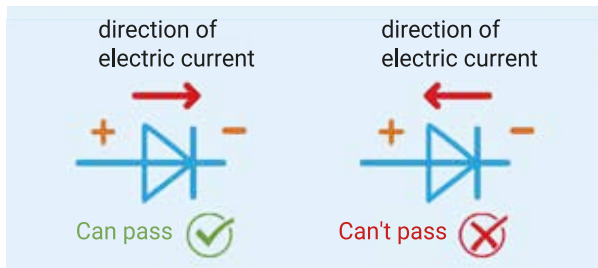


Diodes, like waterfalls, can only flow from top to bottom.

LED symbol



Light Emitting Diodes (LEDs) can emit lights of various colors such as red, yellow, blue, green, white, and purple, depending on the materials used in their manufacture.



1. LED LIGHT (1-5)

1

Turn on the switch 15, and the colorful LED lights up.

You can replace 17 with 9, 26, 87, L4.



2. UNIDIRECTIONAL CONDUCTIVITY OF LED LIGHT (1-5)

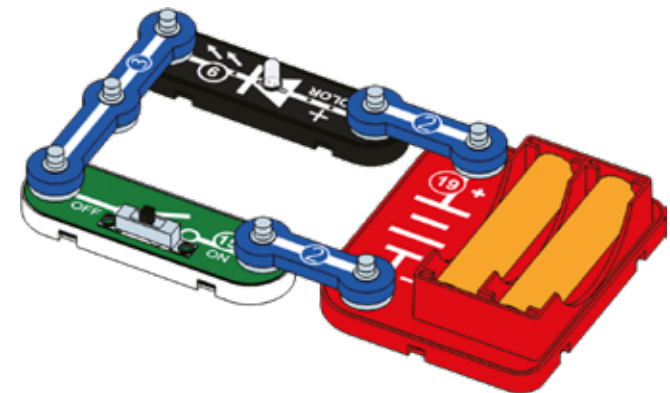
1

Connect the LED light with its polarity reversed (change the direction of the "+" sign).

2

Turn on the switch 15, and the LED light will not light up, which demonstrates the unidirectional conductivity of the light-emitting diode.

You can replace 17 with 9, 26, 87, L4.



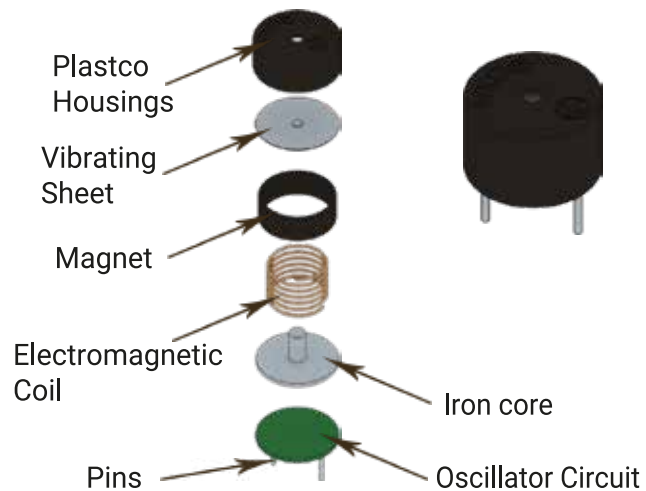
PART INTRODUCTION

The active electromagnetic buzzer, commonly referred to as a "buzzer," is a sound-producing device that can convert electrical signals into audible signals.

Buzzer symbol



Buzzers are widely used in electronic products such as computers, printers, alarms, and electronic toys, serving as sound-emitting devices.



Buzzer Structure Diagram

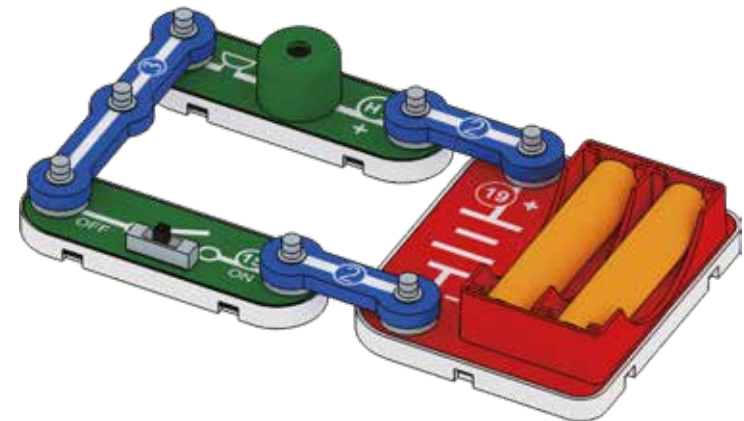


1. BUZZER (1-2)

- 1 Turn on the switch, and the buzzer emits a "beep beep beep" sound.

You can replace 15 with 14..

You can replace 17 with 9, 26, 87, L4.



The working principle of an active buzzer

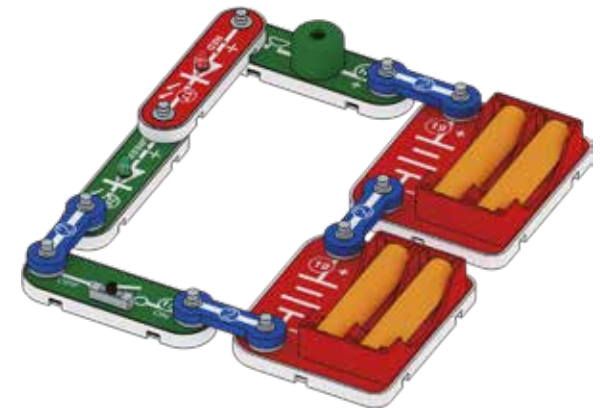
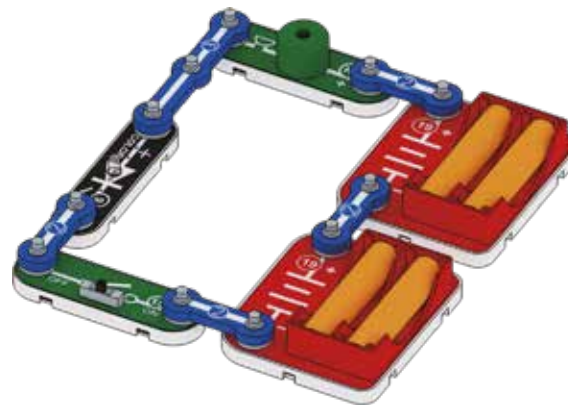
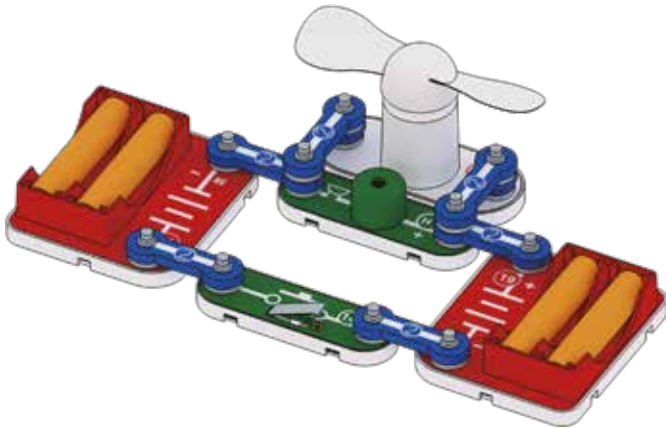
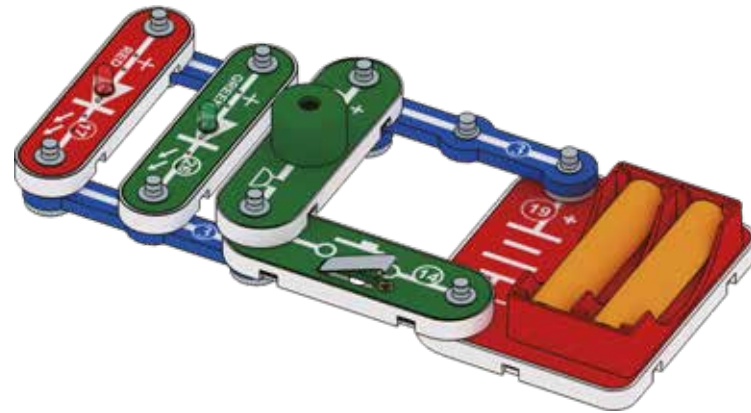
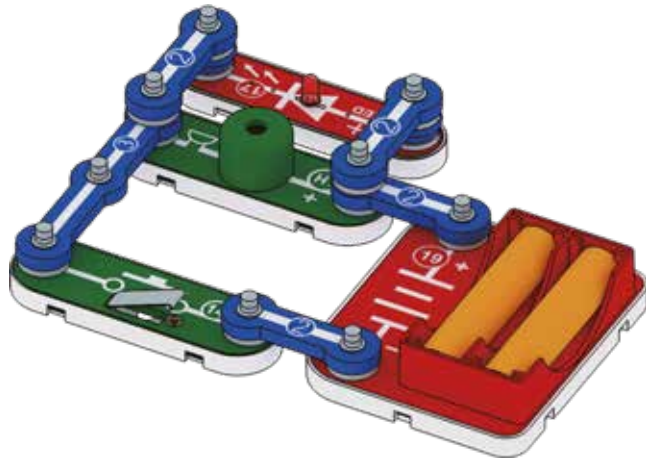
An active electromagnetic buzzer consists of an oscillator, electromagnetic coil, magnet, vibration diaphragm, and plastic case. When powered, the audio AC signal generated by the oscillator passes through the electromagnetic coil, causing it to produce a magnetic field. The vibration diaphragm vibrates and produces sound periodically due to the interaction between the electromagnetic coil and the magnet.



2. OTHER COMBINATIONS OF BUZZER (1-200)



You can use parts 9, 17, 18, 24, 26, 27, 71, 8, and L4 for mutual replacement, or series and parallel connections, with a total of no less than 200 combinations. Not listed one by one here.



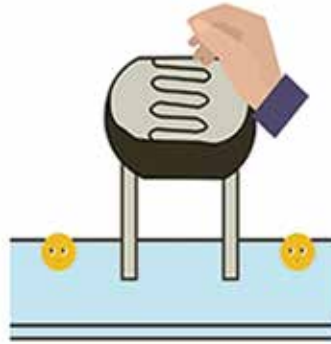
PART INTRODUCTION

A photoresistor is made of special photosensitive material, and its resistance value changes with the intensity of light exposure.

What a strong light!



The light dimmed.



The stronger the light exposure, the lower the resistance value, and the greater the current in the circuit.
The weaker the light exposure, the higher the resistance value, and the smaller the current in the circuit.

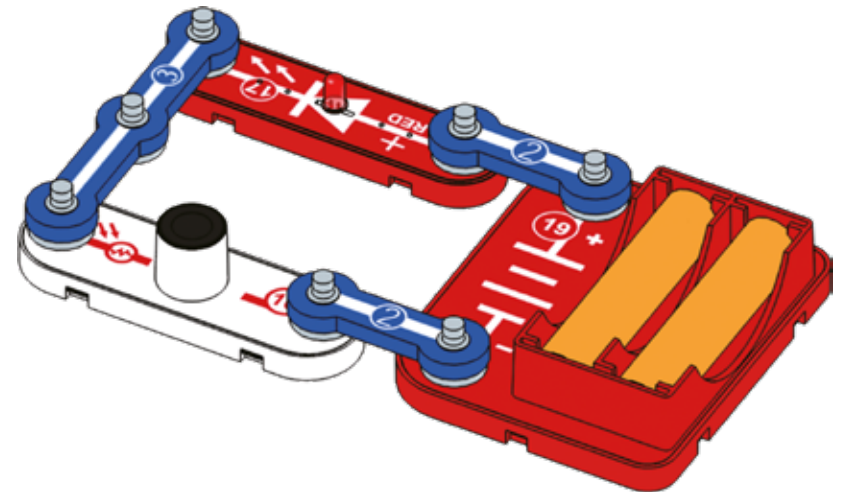
Photoresistor symbol



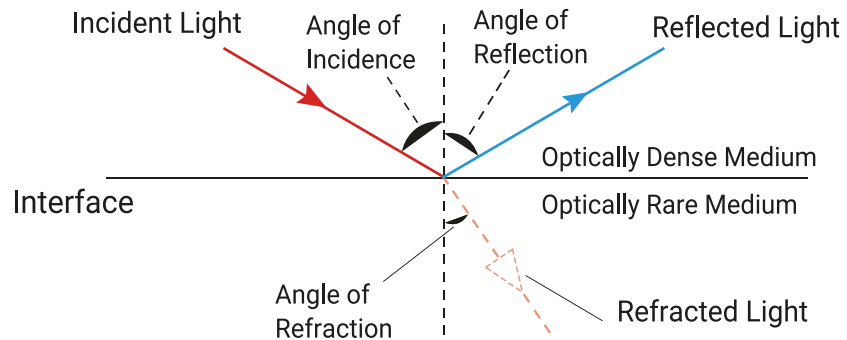
1. PHOTORESISTOR-CONTROLLED LED (1-5)

- 1 When light enters the photoresistor 16, the red LED lights up.
- 2 Block the photoresistor 16, and the red LED goes out.

You can replace 17 with 9, 26, 87, L4.



Total internal reflection diagram



LIGHT RAYS ARE SUPPOSED TO BE STRAIGHT, SO WHY DO THEY FOLLOW THE DIRECTION OF THE OPTICAL FIBER AND BECOME CURVED? IS THIS RELATED TO THE TOTAL INTERNAL REFLECTION OF LIGHT?



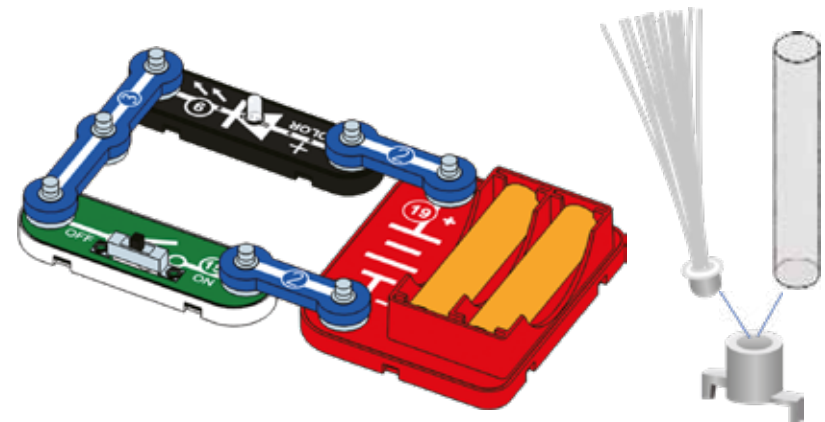
Yes: So-called total internal reflection occurs when an incident light ray passes through the interface between a denser medium and a less dense medium, simultaneously producing reflected and refracted rays. The angle each ray makes with the normal to the interface corresponds to the incident angle, reflection angle, and refraction angle, respectively. As the incident angle continuously increases, the reflection and refraction angles also increase. After reaching a certain extent, the refracted ray disappears, leaving only the reflected ray.

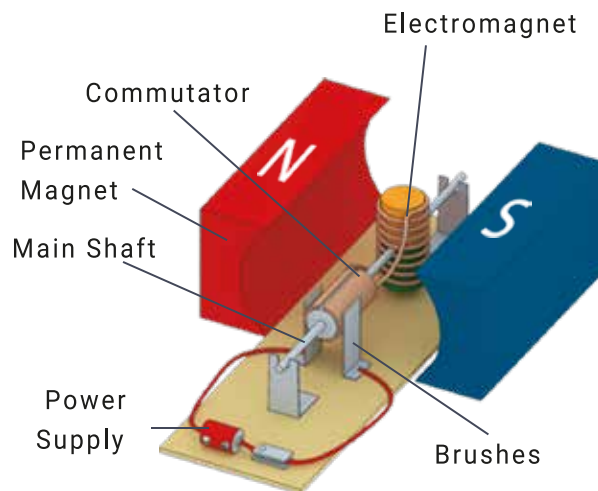


1. COLORFUL OPTICAL FIBER TREE (1-5)

- 1 Secure the fiber optic base onto the colorful LED light, then attach the fiber optic tree..
- 2 Turn on the switch, and the colorful light will travel from the base of the fiber optic to the top, causing the entire fiber to twinkle with colorful light.
- 3 Bend a single fiber outward and use it in a dark environment for a more pronounced effect.

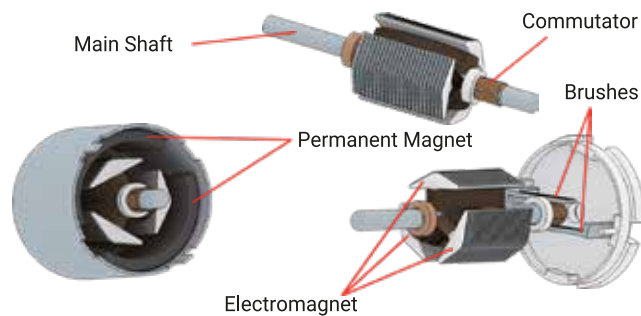
You can replace 9 with 17, 26, 87, or L4.





Schematic diagram of a small electric motor

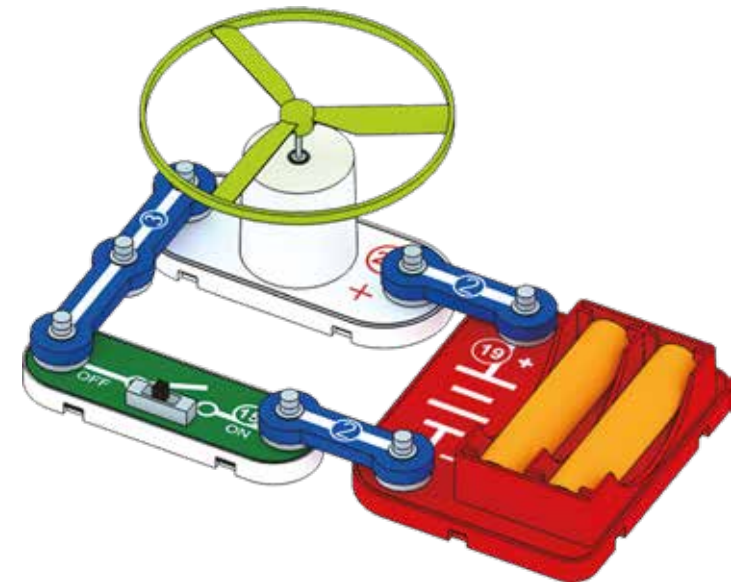
By disassembling a small motor for observation, you can find that there are two permanent magnets mounted on the inner wall of the casing, and three electromagnets on the rotating shaft.



1. FAN (1-2)

- 1 Attach the fan.
- 2 Turn on the switch 15, and the fan starts to rotate.

You can replace 15 with 14

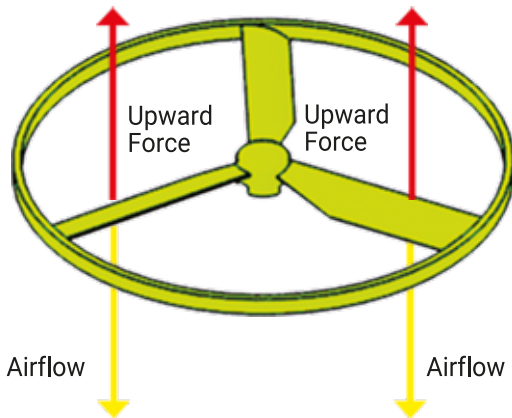


Motor symbol



The principle of blade operation

When the blades rotate, they push air downward, which in turn generates an upward reaction force that could, in a theoretical flying disc (or "flying saucer") design, propel the disc into the air. For the blades to ascend successfully, the direction of rotation of the electric motor is essential. If the rotation is in the opposite direction, the airflow direction on the blades will also be reversed, effectively turning the blades into an air-pushing device like a fan.



Air flows beneath the blades, and the blades are subjected to a force in the opposite direction.

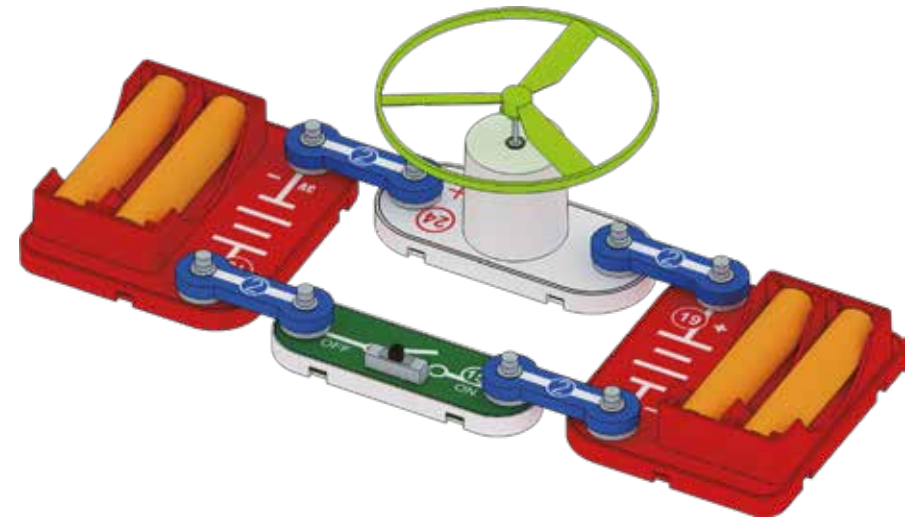
The blades contain fluorescent materials, which can absorb sunlight when placed under the sun during the day; in the dark, they can emit a green fluorescence.



1. FLUORESCENT FLYING SAUCER (1-2)

- 1 Turn on the switch 15, and once the motor 24 reaches a high speed, the flying saucer will automatically fly into the sky.
- 2 If the effect is not good, please repeat the operation several times.

You can replace 15 with 14



Warning

Do not touch the fan blades or motor while in operation. Keep your face away from the fan blades. Do not direct the fan blades towards people or animals.

The principle of helicopter flight

Helicopters use engines to drive the rotor blades to spin, pushing air downward, and utilizing the lift generated to hover in the air. The principle is the same as that of the flying saucer mentioned earlier. If the lift generated by pushing air downward exceeds the weight of the helicopter (i.e., gravity), the helicopter will rise. If the lift is equal to gravity, the helicopter will remain stationary (hover) in the air. If there is only one rotor, the fuselage would rotate along with the rotor. To prevent this, a small vertical rotor is installed at the tail, applying a force in the opposite direction to prevent the fuselage from rotating.



The main rotor is used not only to generate the lift needed to stay airborne but also to provide thrust for forward movement. By slightly lowering the nose of the helicopter and tilting it forward, the main rotor can generate two forces.

Preventing body rotation

Some helicopters, as shown in the figure below, have two rotors of the same size but with opposite directions. In this way, they prevent the fuselage from rotating.



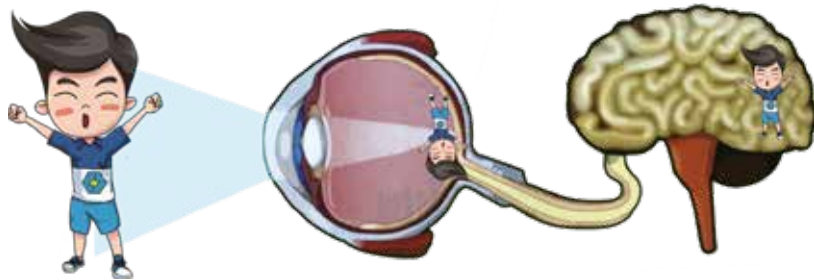
The two rotors are arranged vertically with opposite directions.



The two rotors are arranged horizontally with opposite directions.



Why is a colored halo formed?



Visual persistence

This is due to the visual inertia of our eyes, a phenomenon also known as "persistence of vision." As the term suggests, "persistence of vision" refers to the brief retention of an image by the eye. When our eyes look at an object, it forms an image on the retina, which is then transmitted to the brain via the optic nerve, allowing us to perceive the object. However, when the object is removed, the impression on the optic nerve does not disappear immediately but lingers for about 0.1 to 0.4 seconds. This characteristic of the human eye is called "visual persistence."

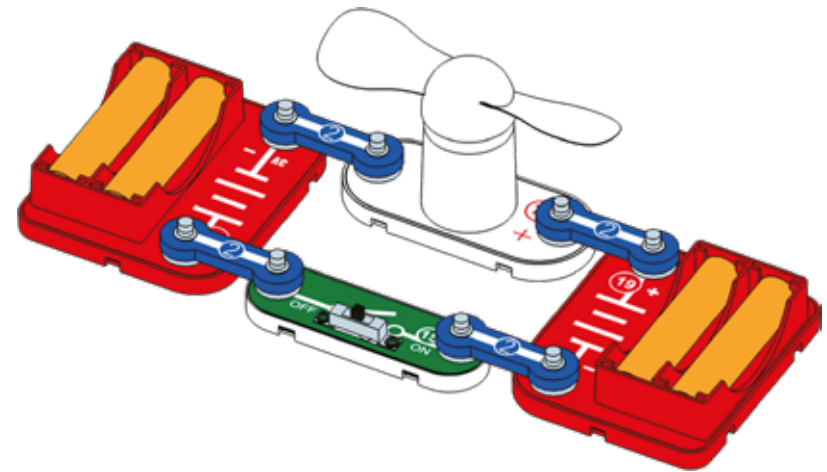


1. COLORFUL FAN (1-2)

- 1 Turn on the switch 15.
- 2 The colorful fan 71 starts to spin, with the LEDs on the blades flashing in a pattern, creating a changing aura of colors.

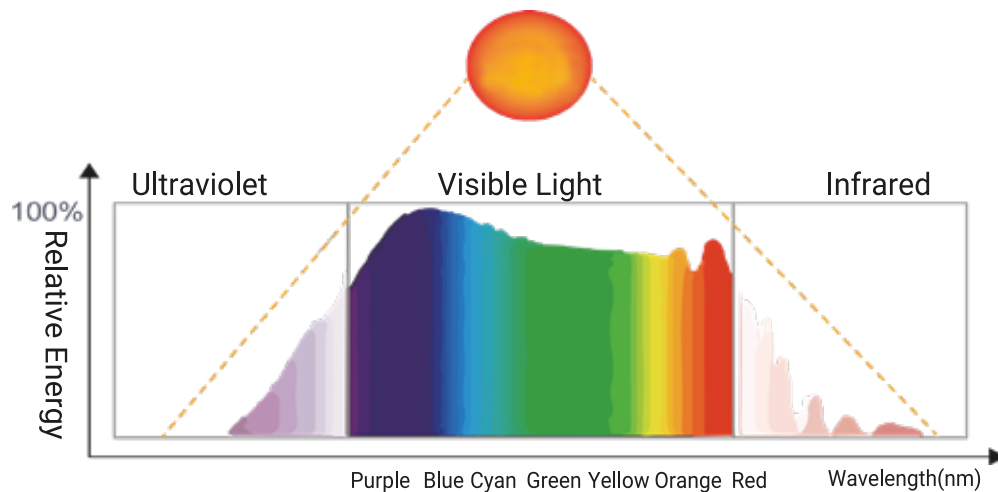
The effect is more noticeable in a dark environment.

You can replace 15 with 14..





The light waves beyond red light are known as infrared rays. The light waves beyond violet light are known as ultraviolet rays.



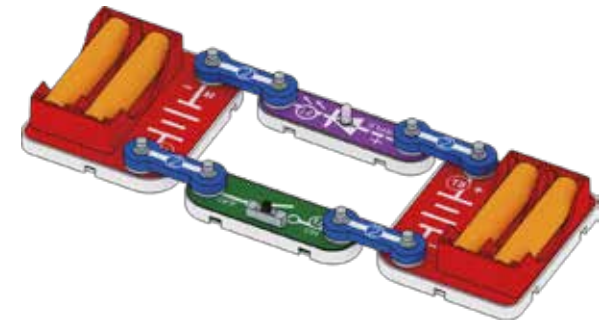
In addition to the visible light that is visible to the human eye in sunlight, there are also ultraviolet and infrared rays that are invisible to our eyes.

Many other organisms can see a different range of light waves than humans. For example, some insects, including bees, can see the ultraviolet band, which is very helpful in finding nectar.



1. BILL VALIDATOR LIGHT

- 1 Turn on the switch 15, and the purple LED lights up.
- 2 Shine the light onto the banknote; if the banknote has anti-counterfeiting features, the hidden numbers will become visible.



①The purple light emitted by the bill validator is not pure UV light but visible light produced alongside the UV radiation from the UV light-emitting tube. Due to the low power of the bill validator, the UV light it emits is safe for human exposure.



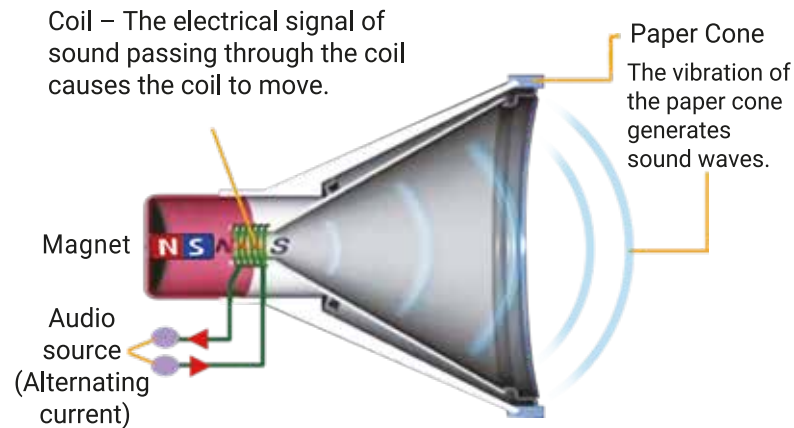
②You can use a fluorescent pen to draw patterns on paper, and then shine the bill validator light on these patterns to observe if there is a magical fluorescent effect.



③You can also shine the bill validator light on clothing; if the clothing glows, it may indicate that the detergent used contains optical brighteners. The same method can be used to test other items such as facial masks.

PART INTRODUCTION

A speaker is a transducer that converts electrical signals into acoustic signals.



Speaker symbol



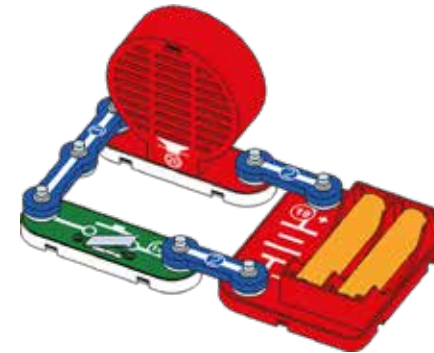
Principle of the speaker

The electrical signal output by the audio source is alternating current, which changes in magnitude and direction. When the alternating current passes through the coil on the speaker, it interacts with the magnet, causing the coil to vibrate up and down. The coil also drives the speaker's diaphragm (paper cone) to vibrate, which repeatedly stretches and compresses the air around it, generating sound waves; when the sound waves reach our ears, we hear the sound (music).



1. SPEAKER POWERED ON

- 1 Continuously press and release the push button.
- 2 The speaker emits a faint squeaking sound, which is the sound produced when the current passes through the speaker..

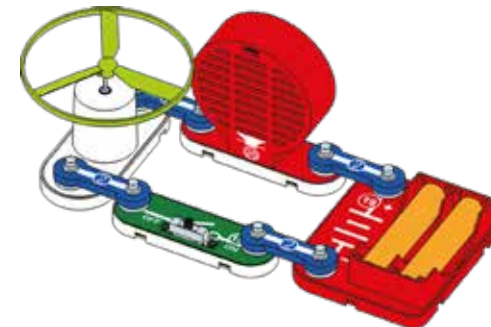


Do not hold down tact switch for a long time, as this can damage the speaker!



2. MOTOR SOUND (1-2)

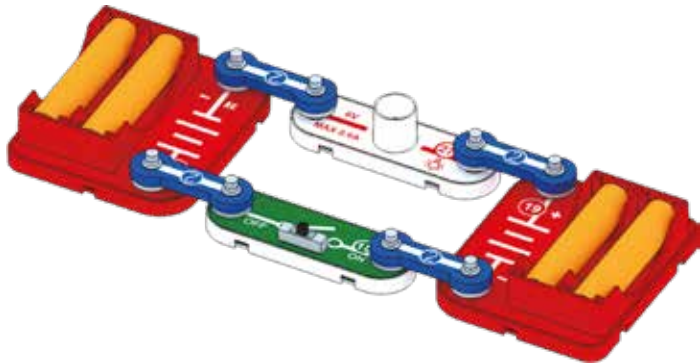
- 1 Turn on the switch.
- 2 The motor rotates, the speaker emits the sound of the motor rotating.





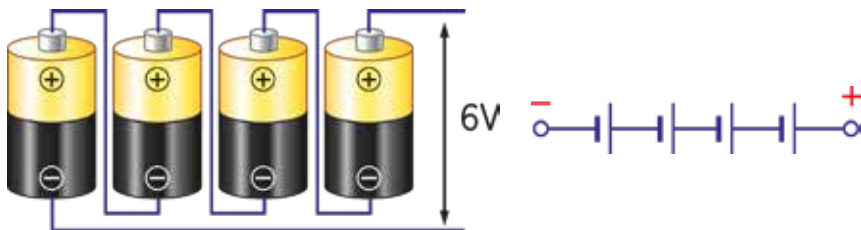
1. SERIES CONNECTION OF BATTERIES

- 1 Turn on the switch 15, and the light bulb 27 lights up.



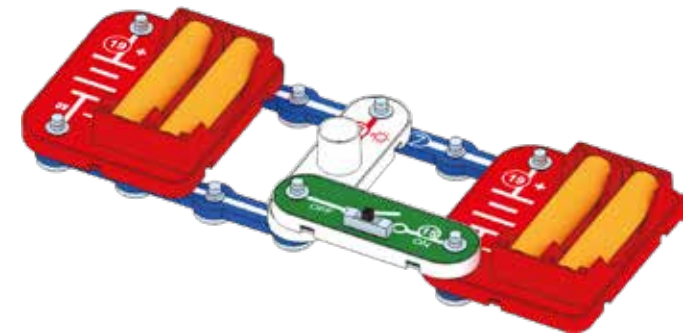
Series Connection of Batteries:

Connect the batteries end-to-end, meaning the positive terminal of one battery is connected to the negative terminal of the next battery, forming a series. The voltage of batteries in series equals the sum of the individual battery voltages; two 3V battery boxes in series will have a voltage of 6V.



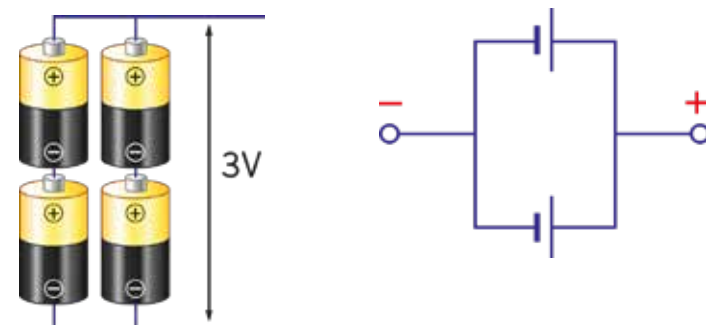
2. PARALLEL CONNECTION OF BATTERIES

- 1 As shown, bulb 18 lights up.
- 2 Turn on the switch 15, if the voltage of the battery box on the left is lower than the one on the right, then bulb 18 will be brighter.



Parallel Connection of Batteries:

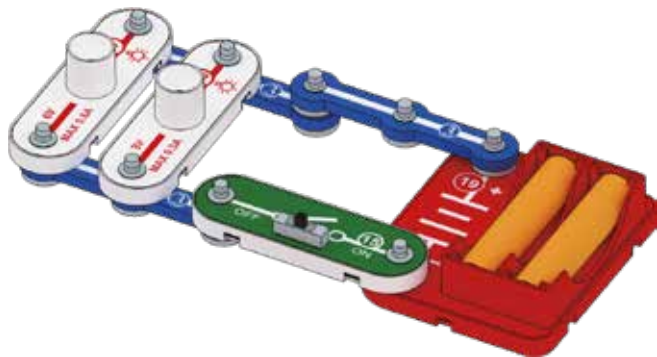
Connect the batteries in a way that all positive terminals are linked together and all negative terminals are linked together.



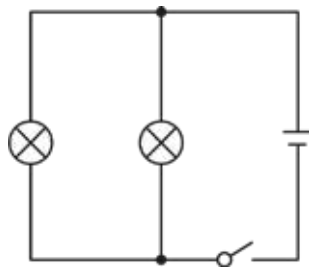


1. LIGHT BULBS IN PARALLEL

- 1 As shown in the diagram, connect both ends of the two light bulbs together (connect the positive terminals to each other and the negative terminals to each other), and connect them in parallel to the circuit.
- 2 Turn on the switch 15, and both small light bulbs will light up at the same time.



A circuit where circuit elements (such as appliances, resistors, etc.) are connected side by side is called a parallel circuit.

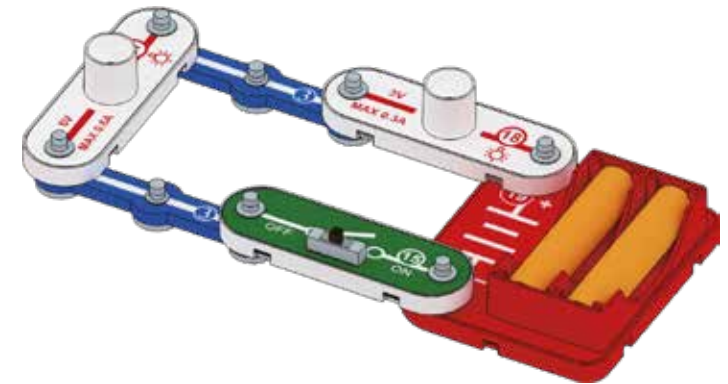


You can replace 18 and 27 with any two parts from 9, 17, 24, 26, 27, 71, 87, H1, and L4 to form a parallel circuit. There are 45 possible combinations, not listed one by one here.

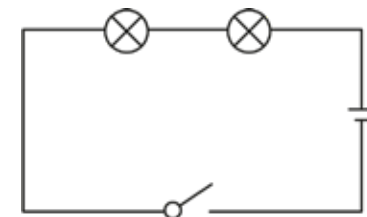


2. LIGHT BULBS IN SERIES

- 1 As shown in the diagram, connect the two light bulbs end-to-end in sequence within the circuit.
- 2 Turn on the switch 15, and both light bulbs will light up simultaneously.



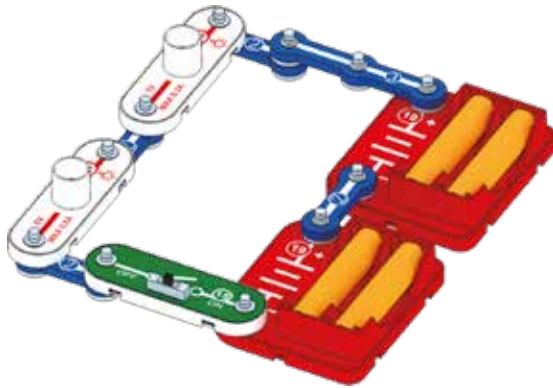
A circuit where circuit elements (such as appliances, resistors, etc.) are connected end-to-end in a sequential manner is called a series circuit.





3. LIGHT BULBS IN SERIES (6V)

- 1 Turn on the switch 15, and both light bulbs light up simultaneously.

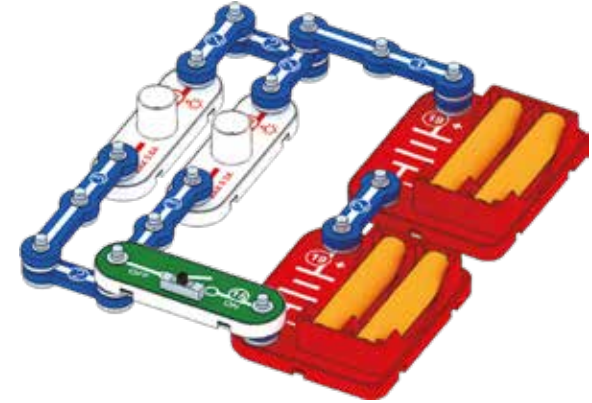


You can replace 18 and 27 with any two parts from 9, 17, 24, 26, 27, 71, 87, H1, and L4 to form either a series or parallel circuit. There are a total of 90 combinations. Not listed one by one here.



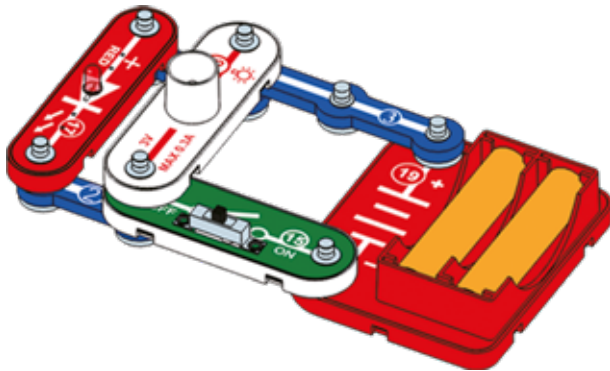
4. LIGHT BULBS IN PARALLEL (6V)

- 1 Turn on the switch 15, and both light bulbs light up simultaneously.



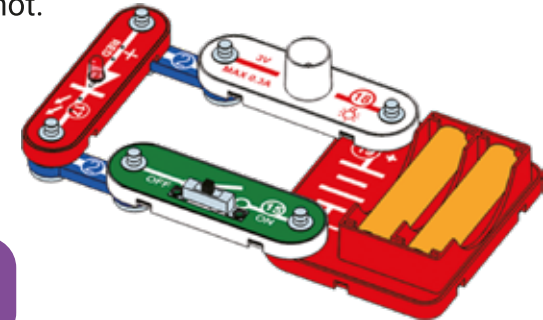
5. LED AND LIGHT BULB IN PARALLEL

- 1 Turn on the switch 15, and LED 17 and light bulb 18 light up at the same time.



6. LIGHT BULB AND LED IN SERIES

- 1 Turn on the switch 15, only LED 17 lights up, while light bulb 18 does not.



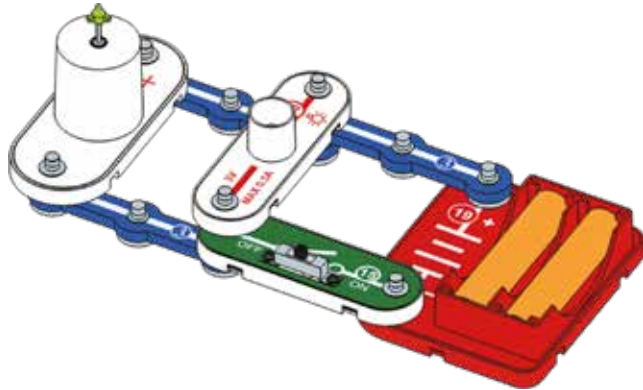
WHY DOES LIGHT BULB 18 NOT LIGHT UP?

LEDs only require a small amount of current to light up, while light bulb 18 needs a larger current to illuminate. In this series circuit, the current in the circuit is limited by the LED to a small amount, so light bulb 18 does not light up because it does not receive enough current to illuminate.



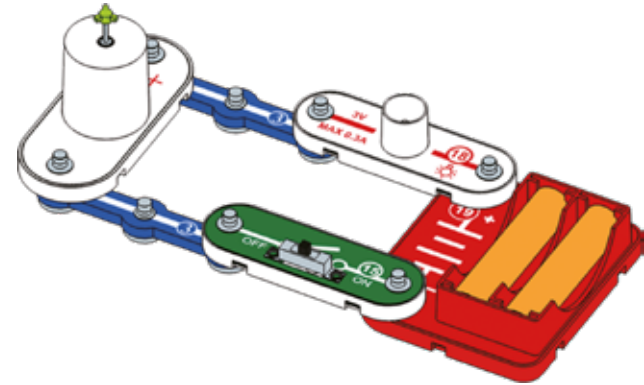
7. MOTOR AND LIGHT BULB IN PARALLEL

- 1 Turn on the switch 15, and motor 24 and light bulb 18 start up at the same time.



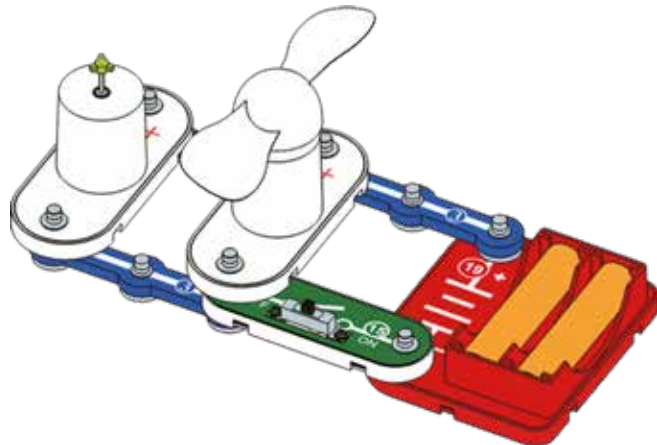
8. MOTOR AND LIGHT BULB IN SERIES

- 1 Turn on the switch 15, and motor 24 and light bulb 18 start up simultaneously. (Sometimes you may need to manually turn the motor shaft to get it going.)



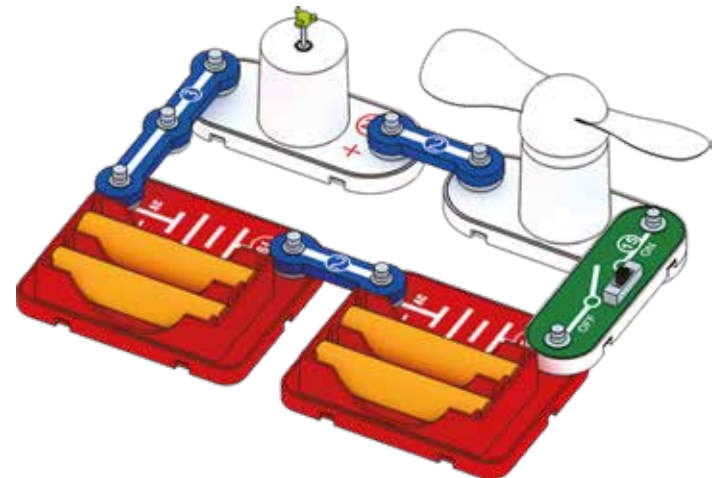
9. MOTOR AND COLORFUL FAN IN PARALLEL

- 1 Turn on the switch 15, and both motors start up at the same time.



10. MOTOR AND COLORFUL FAN IN SERIES (6V)

- 1 Turn on the switch 15, and both motors start up at the same time.





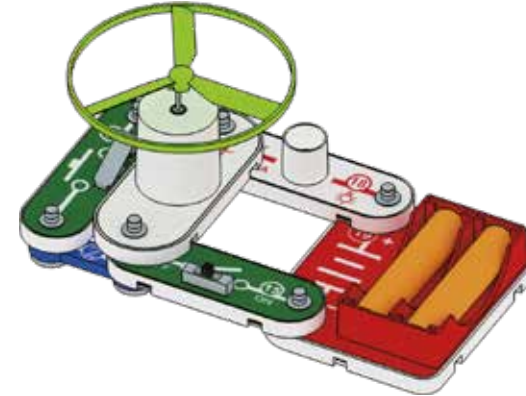
11. SHORT CIRCUIT OF LIGHT BULB

- 1 Turn on the switch 15, and motor 24 and light bulb 18 start up at the same time.
- 2 Press tact switch 14, and light bulb 18 is short-circuited, causing the fan to spin faster.



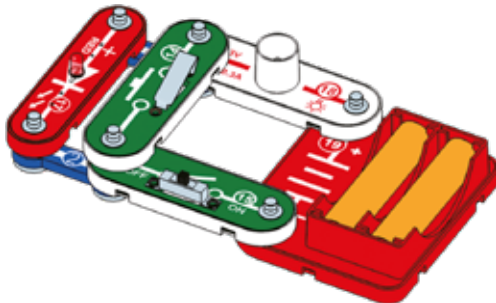
12. SHORT CIRCUIT OF MOTOR

- 1 Turn on the switch 15, and the motor 24 and light bulb 18 start up simultaneously.
- 2 After pressing the Tact Switch 14, motor 24 is short-circuited, the light bulb will become brighter.



13. SHORT CIRCUIT OF KEY-CONTROLLED LED LIGHT

- 1 Turn on the switch 15, and only LED 17 lights up.
- 2 Press tact switch 14, and LED 17 is short-circuited, extinguishing the light and allowing current to flow directly through Tact Switch 14, lighting up light bulb 18.



14. TWO LED LIGHTS IN SERIES

- 1 Turn on the switch 15, and both LEDs light up.

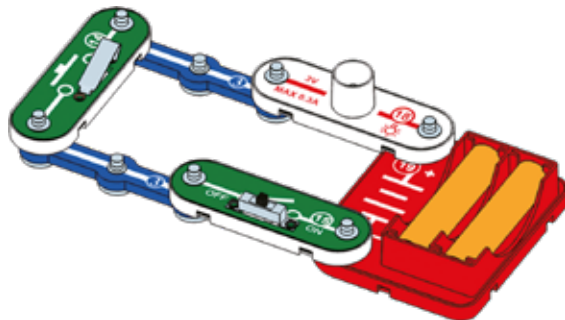




1. AND GATE

- 1 Only when both switch 15 and tact switch 14 are turned on will the red LED 17 light up.

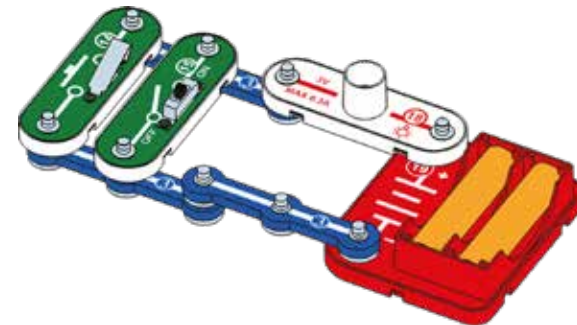
This is called an "AND" gate.



2. OR GATE

- 1 As long as either switch 15 or tact switch 14 is turned on, the red LED 17 will light up.

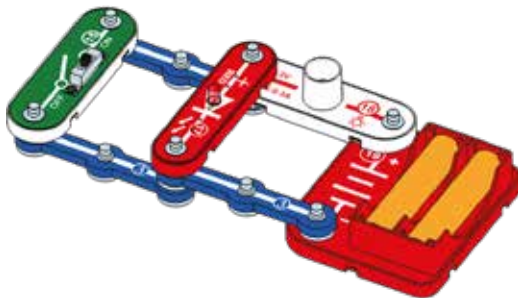
This is called an "OR" gate.



3. NOT GATE

- 1 When switch 15 is turned on, LED 17 goes out, and light bulb 18 lights up.

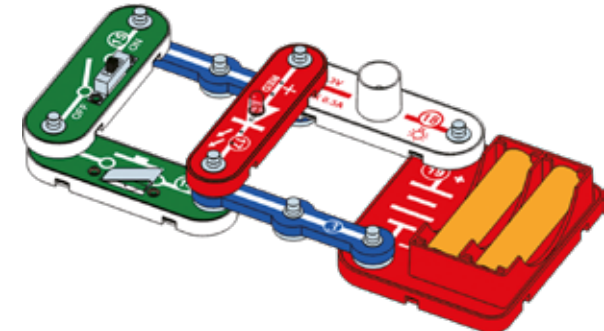
This is called a "NOT" gate.



4. NAND GATE

- 1 Only when both switch 15 and tact switch 14 are turned on will the red LED 17 go out, and light bulb 18 light up.

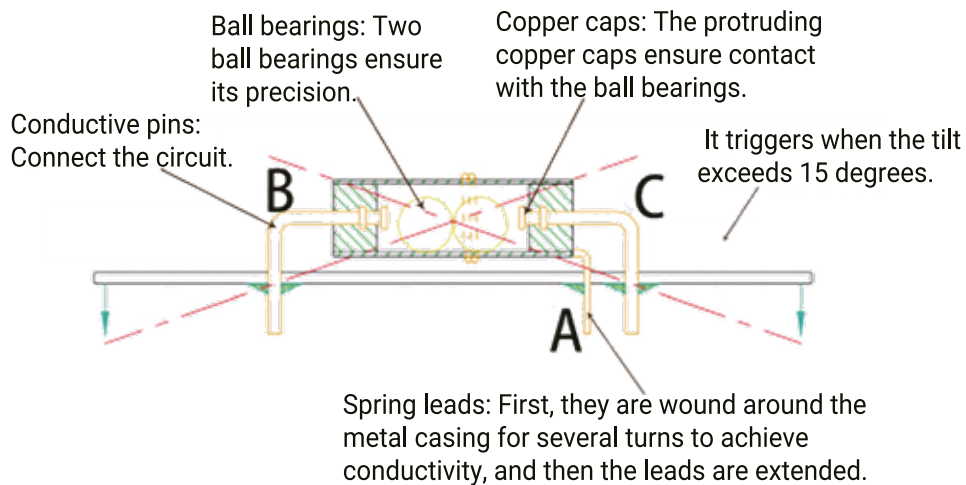
This is called an "AND-NOT" gate.



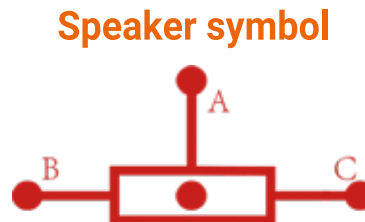
You can replace 18 with 9, 17, 24, 26, 27, 71, 87, H1, and L4, or replace 17 with 9, 26, 87, or use a 6V power supply to form logic gate circuits. There are no less than 50 combinations in total.

PART INTRODUCTION

A gravity sensor, also known as a ball switch, encloses a ball within a metal tube. When the metal tube tilts, the circuit becomes conductive.

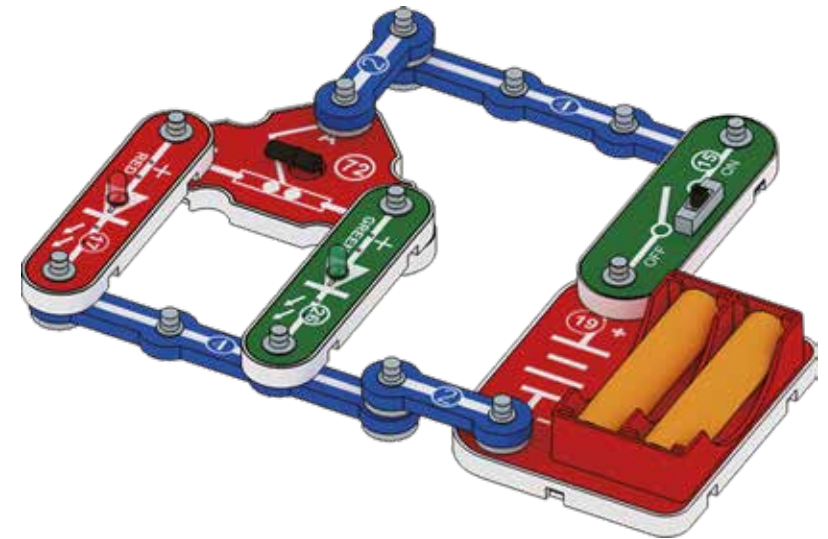


When tilted towards the trigger end (B), terminal A is conductive with terminal B; when tilted towards the trigger end (C), terminal A is conductive with terminal C.



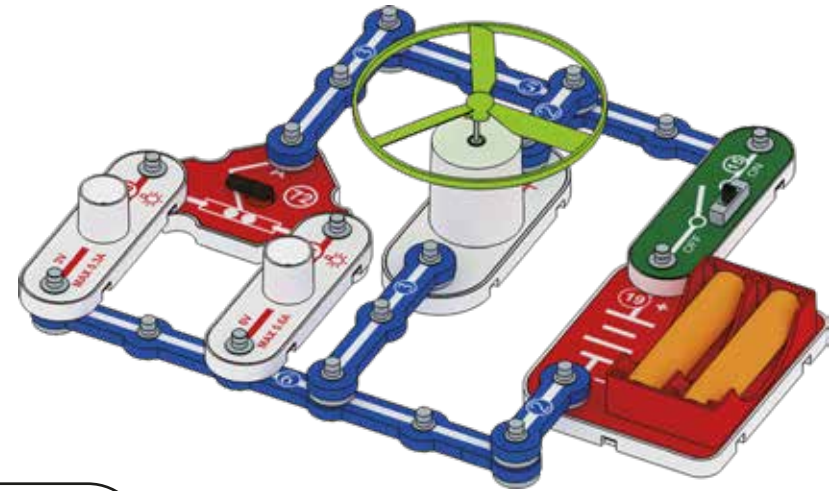
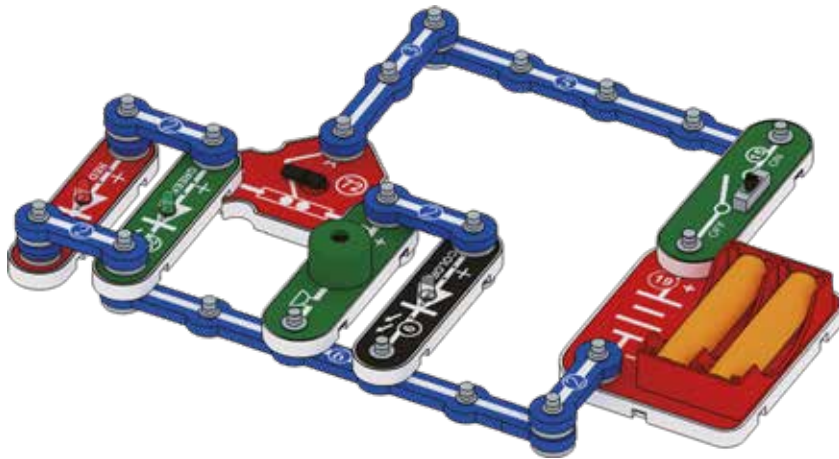
1. BALL SWITCH

- 1 Turn on the switch 15, hold the entire assembly base in your hand.
- 2 When tilted towards end B, the red LED lights up; when tilted towards end C, the green LED lights up; when balanced, neither LED lights up.

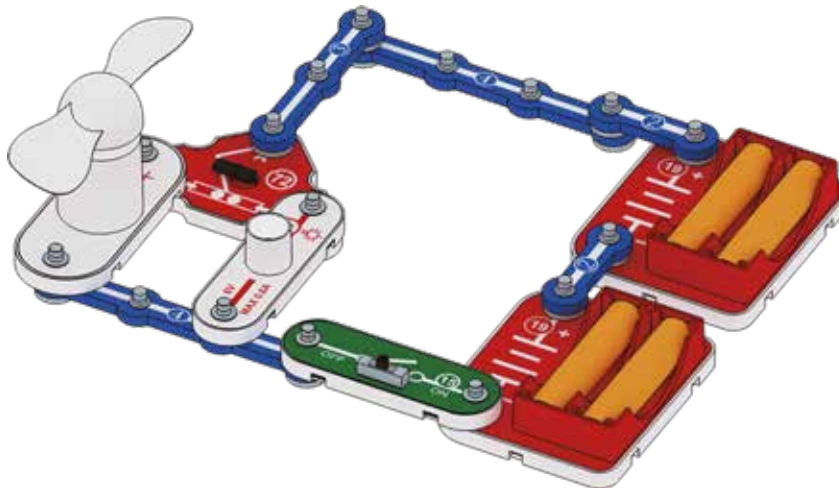




2. OTHER CONFIGURATIONS OF BALL SWITCH (1-300)

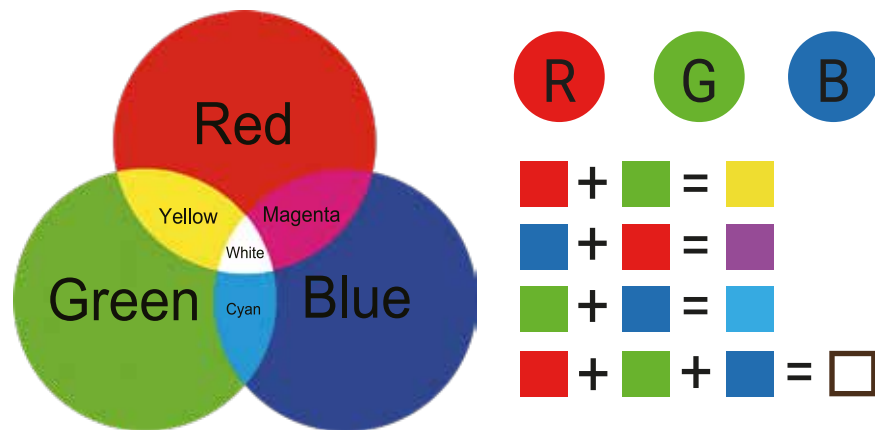


You can replace parts 9, 17, 18, 24, 26, 27, 71, 87, and L4 with each other, or connect them in series or parallel, with a total of no less than 300 combinations. Not all combinations are listed here.

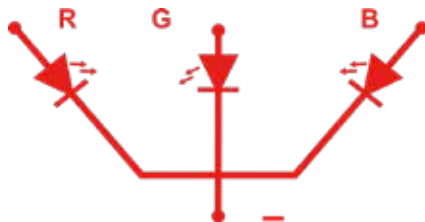


PART INTRODUCTION

The RGB tri-color LED light, referred to as RGB, combines red, green, and blue lights in the same lamp bead, and can be combined to emit a variety of colors through circuit control.

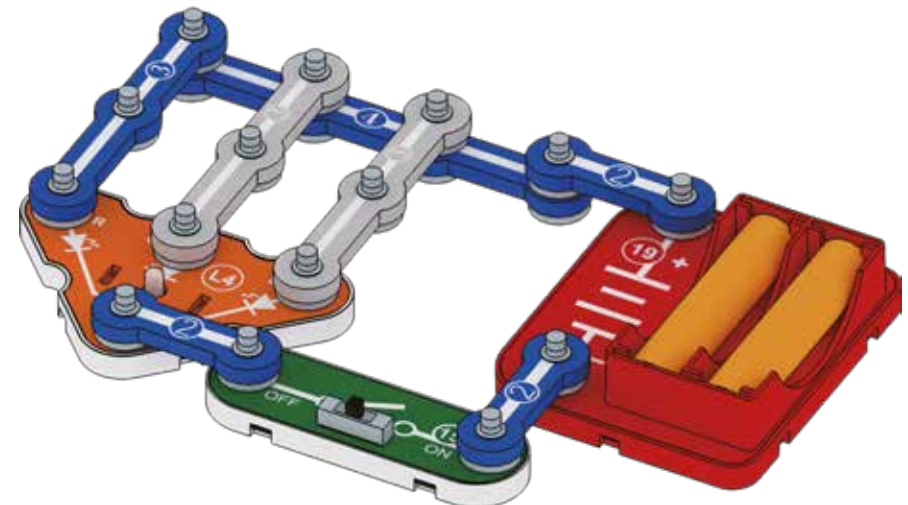


RGB LED symbol



1. USE OF RGB LED (1-7)

- 1 Turn on the switch, the RGB LED emits red light.
- 2 Connect the wire to the G terminal, the RGB LED emits green light.
- 3 Connect the wire to the B terminal, the RGB LED emits blue light.
- 4 Connect two terminals to create three other colors (refer to the diagram on the left).
- 5 Connect three terminals to create white light (refer to the diagram in the lower right corner).



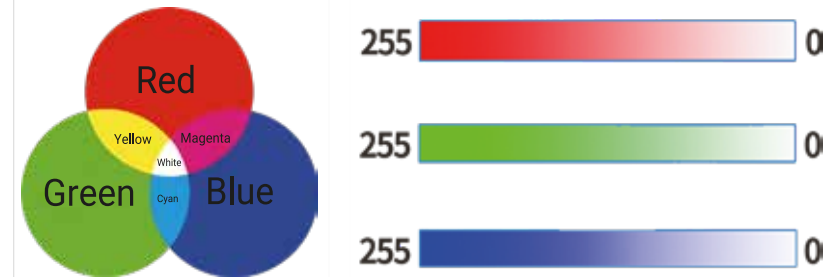
The three colors of RGB are commonly referred to as the optical primary colors, where R stands for Red, G stands for Green, and B stands for Blue. Any color that the human eye sees in nature can be created by mixing and overlaying these three colors, which is why it is also called the additive color model. The RGB primary colors are widely used in our lives, such as in televisions, computers, mobile phones, and slides, all of which use light to display colors.



The different brightness combinations of the three colors can produce over sixteen million colors.

Red Green Blue

$$256 * 256 * 256 = 16,777,216$$



Each color of the light can be divided into brightness levels from 0 to 255, a total of 256 levels. Red has 256 levels of brightness, green has 256 levels of brightness, and blue has 256 levels of brightness.



Red has 256 levels of brightness



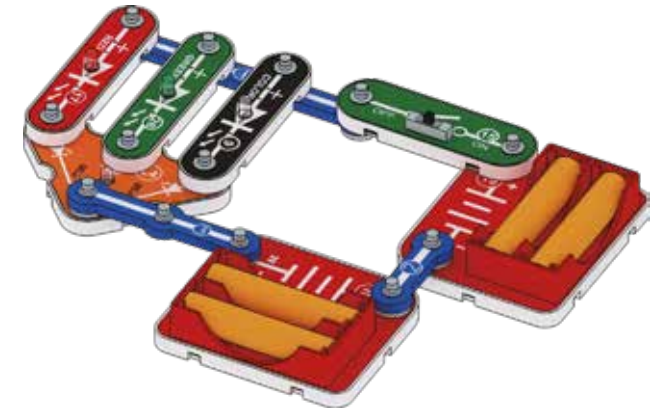
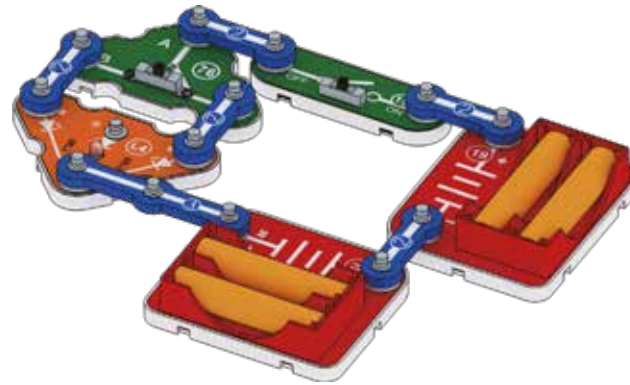
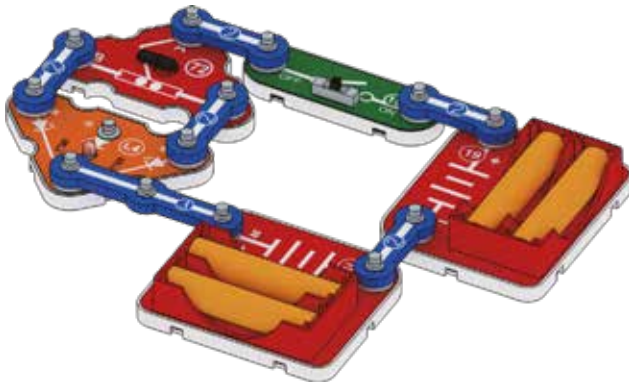
Green has 256 levels of brightness



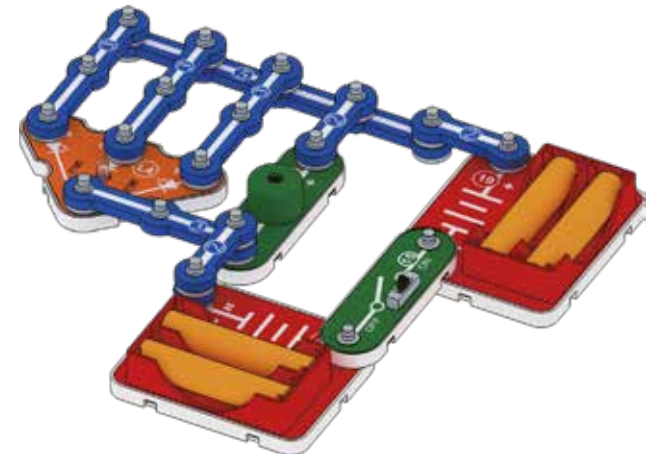
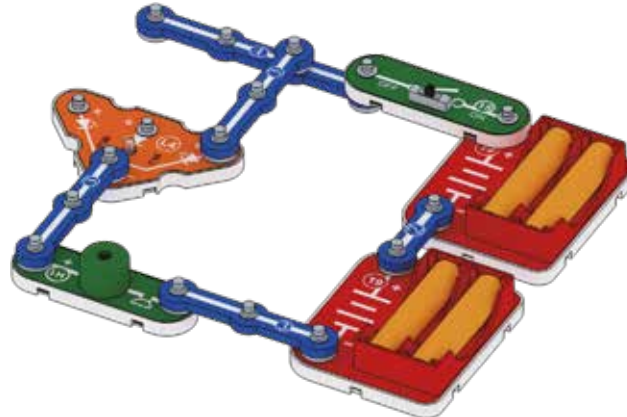
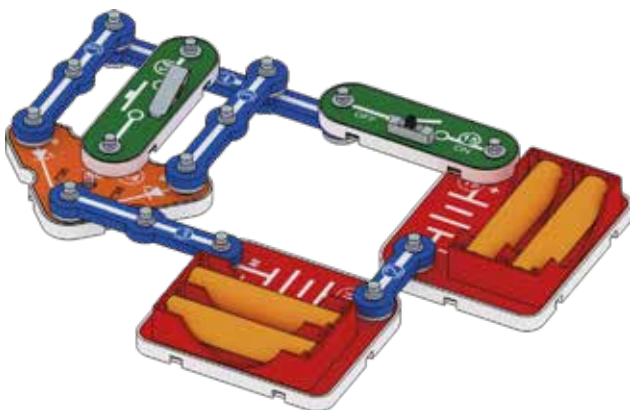
Blue has 256 levels of brightness



2. OTHER COMBINATIONS OF RGB THREE-COLORED LED (1-300)

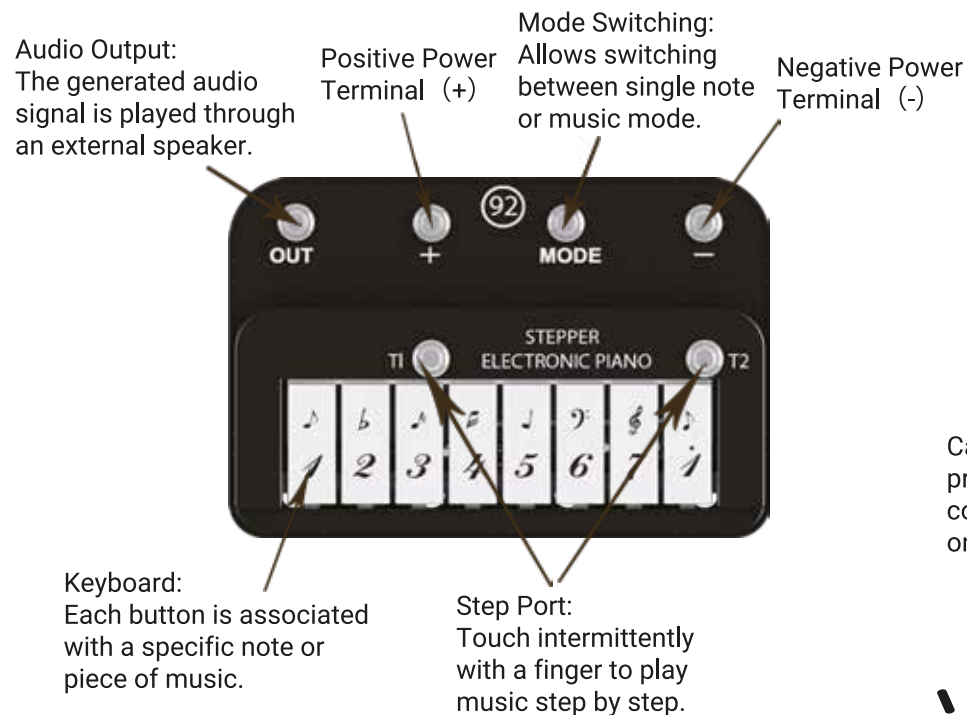


You can connect 9, 17, 26, 87, and H1 individually in series with L4, or you can also connect one, two, or three of 17, 18, 24, 26, 27, 71, 87, and H1 in parallel with L4, with a total of no less than 300 combinations. Not all combinations are listed here.



PART INTRODUCTION

The Step Sequencer Electronic Keyboard, also known as an electronic keyboard, records notes and music in a sound source chip, which can be played through the press of buttons.



Sound Source Chip: recorded notes and music in the sound source chip Then produces the corresponding audio output based on the input signal.

Carbon Film Conductive Silicone: When a key on the keyboard is pressed the conductive silicone is also pressed, making contact with the circuit board allowing the corresponding circuit on the board to conduct.

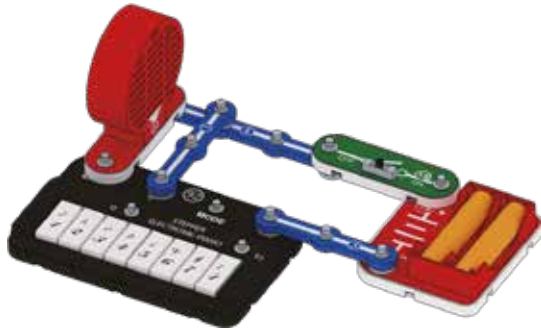


Each button is associated with a specific note or piece of music. When a button is pressed, the corresponding circuit is completed, allowing the sound chip to receive the signal and generate the appropriate sound, which is then played through an external speaker. By pressing different buttons, various pieces of music can be played.



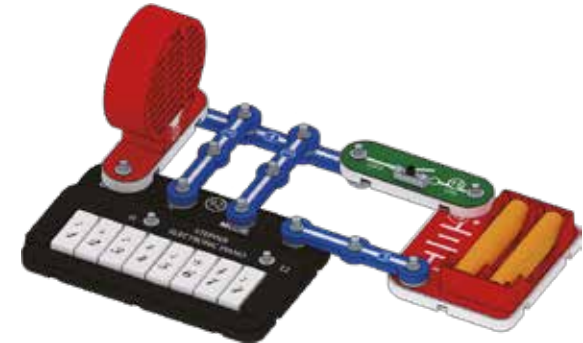
1. MONOPHONIC ELECTRONIC KEYBOARD

- 1 Turn on the switch.
- 2 Pressing the keys from left to right on the keyboard will produce the musical notes do, re, mi, fa, sol, la, si respectively from the speaker.



3. MUSICAL ELECTRONIC KEYBOARD

- 1 Turn on the switch 15.
- 2 After connecting the wire to the mode terminal, you can switch to the music mode.
- 3 When you press the keys on the keyboard, the speaker will emit sounds corresponding to 8 different pieces of music.



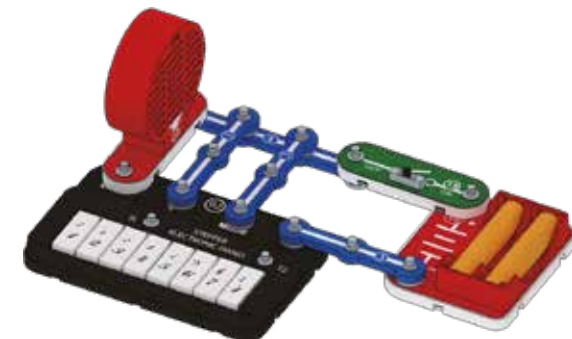
2. STEP MONOPHONIC ELECTRONIC KEYBOARD

- 1 Turn on the switch, using two fingers to operate, one finger holds down the T1 key while the other finger intermittently touches the T2 key.
- 2 Each time T2 key is touched, the speaker will produce the next note.
This method of operation is also the origin of the name "step electronic keyboard".



4. STEP MUSICAL ELECTRONIC KEYBOARD

- 1 Turn on the switch and using two fingers one holding down the T1 key while the other intermittently touches the T2 key, the speaker will step to the next note of the current musical tune after each touch.



Brother John

$\frac{4}{4}$

1 2 3 1 | 1 2 3 1 | 3 4 5 - | 3 4 5 -

Are you sleeping? Are you sleeping? Brother John, Brother John?

5. 6 5. 4 3 1 | 5. 6 5. 4 3 1 | 2 5 1 - | 2 5 1 - ||

Morning bells are ringing. Morning bells are ringing. Ding, dang, dong. Ding, dang, dong.



Can you sing "Little star"?

little star

1 = G $\frac{4}{4}$

$\text{♩} = 100$

1 1 5 5 | 6 6 5 - | 4 4 3 3 | 2 2 1 - |
Twinkle, twinkle, little star, How I wonder what you are!
1. 5. 3. 5. 1. 5. 3. 5. | 1. 6. 4. 6. 1. 5. 3. 5. | 1. 6. 4. 6. 1. 5. 3. 5. | 7. 5. 2. 5. 1. 5. 3. 5. |

5 5 4 4 | 3 3 2 - | 5 5 4 4 | 3 3 2 - |
Up above the world so high, Like a diamond in the sky.
1. 3. 5. 1. 1. 4. 6. 1. | 1. 3. 5. 1. 5. 7. 2. 5. | 1. 3. 5. 1. 1. 4. 6. 1. | 1. 3. 5. 1. 5. 7. 2. 5. |

TOUCH IC MODE TABLE

MODE	TERMINAL A	TERMINAL B	OUTPUT STATE (OUT)
Momentary High	Not Connected (0)	Not Connected (0)	Outputs High (1) when touched, Low (0) when away
Momentary Low	Connected (1)	Not Connected (0)	Outputs Low (0) when touched, High (1) when away
Latching High	Not Connected (0)	Connected (1)	Outputs Low (0) on power-up, High (1) when touched, Low (0) on second touch
Latching Low	Connected (1)	Connected (1)	Outputs High (1) on power-up, Low (0) when touched, High (1) on second touch



1. TOUCH TO LIGHT UP LED

- 1 Turn on the switch 15, and the purple LED 87 lights up, while the green LED 26 goes out.
- 2 When you touch the touch chip U12 with your finger, the green LED lights up, and the purple LED goes out.



2. OTHER MODES OF TOUCH TO LIGHT UP LED (2-4)

- 1 Assemble as above, and refer to the mode table.
- 2 By choosing to connect or not connect the A and B terminals of the touch chip to the positive power supply, the output state at the output end will vary, thus achieving other functions of the touch LED.

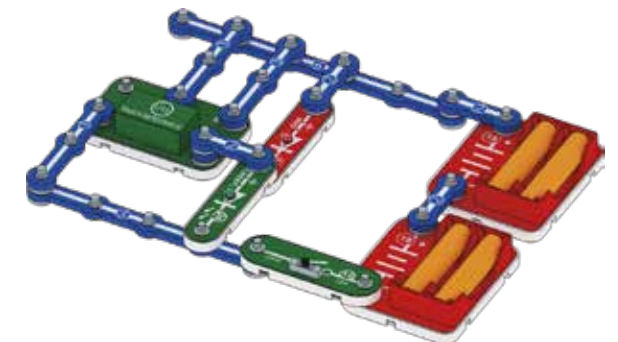


3. OTHER MODES OF TOUCH TO LIGHT UP LED

- 1 Turn on the switch 15, and the red LED 17 lights up, while the green LED 26 goes out.
- 2 When you touch the touch chip U12 with your finger, the green LED lights up, and the red LED goes out.

WHY DOES THE RED LED ONLY DIM DOWN AND NOT GO OUT DIRECTLY?

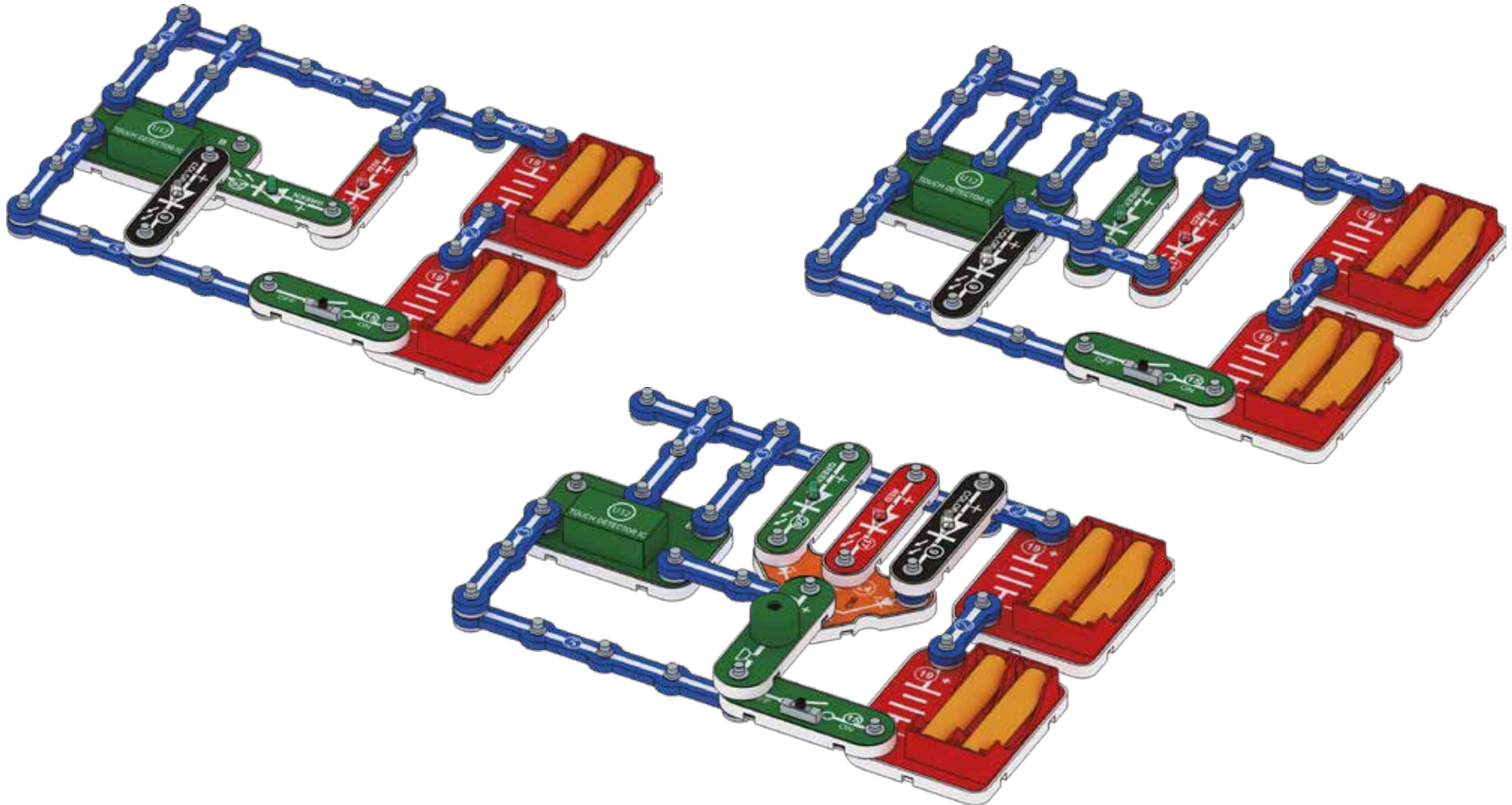
This is because when the touch chip U12 is at a high voltage level, the output voltage has a certain difference with the power supply voltage. If the power supply voltage is relatively high, then the voltage difference is significant, and this voltage difference can still light up the red LED.





4. OTHER MODES OF TOUCH TO LIGHT UP LED (1-300)

- 1 You can replace parts 9, 17, 18, 24, 26, 27, 71, 87, and L4 with each other, or connect them in series or parallel, with a total of no less than 300 combinations. Not all combinations are listed here.



PART INTRODUCTION

Single Pole, Double Throw (SPDT) Switch: A switch that can control the power supply to output in two different directions or to operate the same appliance in different directions.

Two States of the Single Pole, Double Throw Switch

State 1: When the switch is thrown to B, A is connected to B, and A is disconnected from C.

State 2: When the switch is thrown to C, A is connected to C, and A is disconnected from B.

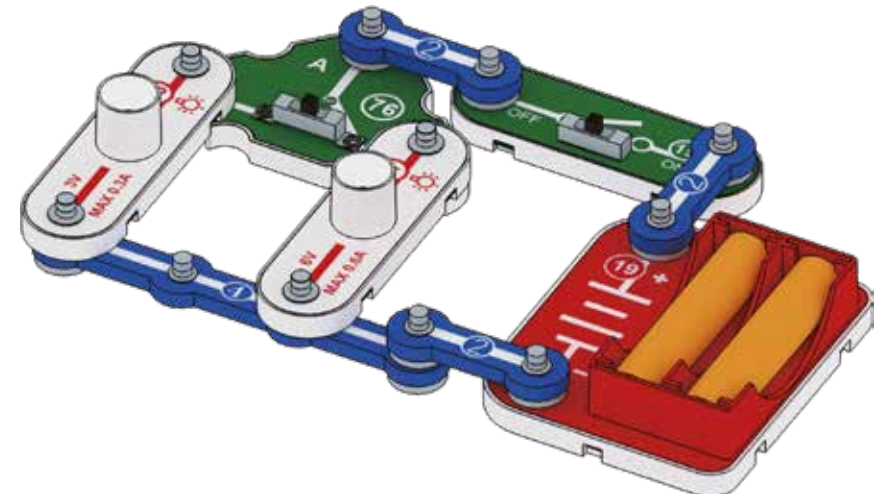
- 1 The single pole, double throw switch consists of a moving terminal and a stationary terminal. "Single" refers to the moving terminal, and "double throw" refers to the two throwing directions.
- 2 The moving terminal connects to the incoming power supply, which is one end of the incoming electricity.
- 3 The stationary terminal is the other output end, which is connected to the appliances. Its function is to control the power supply to output in two different directions, meaning it can be used to control two appliances, or to control the same appliance in different operational directions.

SPDT switch symbol



1. (SPDT) SWITCH

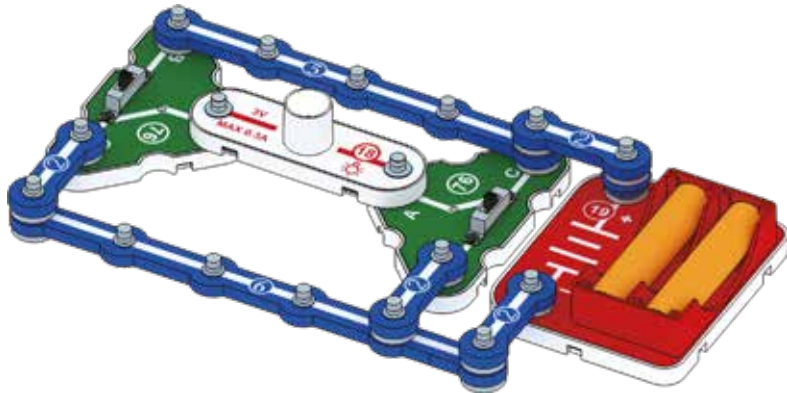
- 1 Flip the switch to the B position, and the left bulb 18 lights up.
- 2 Flip the switch to the C position, and the right bulb 27 lights up.



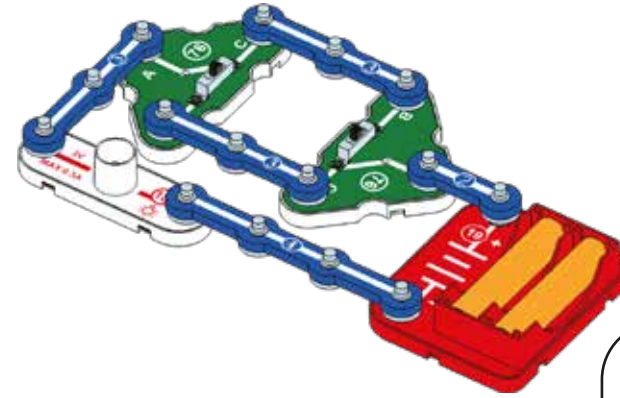


2. STAIRCASE LIGHT CONTROL CIRCUIT (1)

- 1 As assembled in the diagram, when bulb 18 is lit, it can be turned off with any switch 76.
- 2 When bulb 18 is off, it can be turned on with any switch 76.



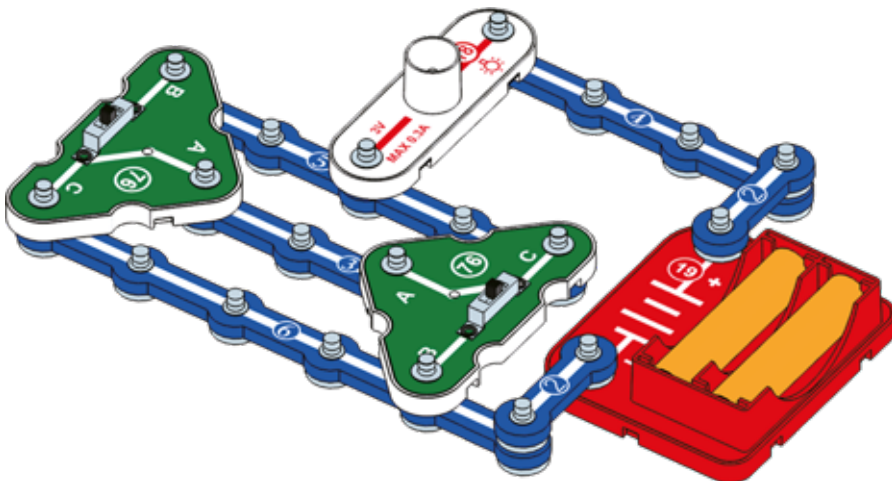
3. STAIRCASE LIGHT CONTROL CIRCUIT (2)



You can replace 18 with 9, 17, 24, 26, 27, 71, 87, H1, and L4, and also use combinations of parallel or series connections, with a total of no less than 200 combinations. Not all combinations are listed here.

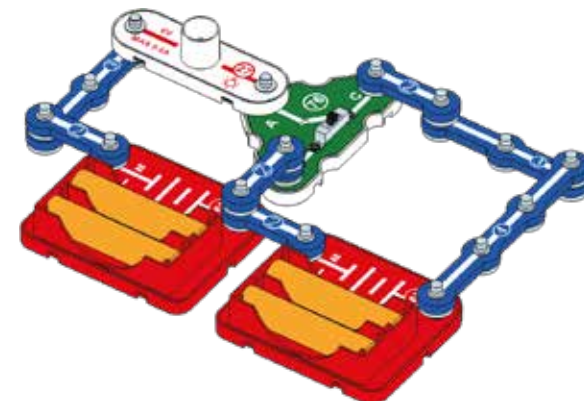


4. STAIRCASE LIGHT CONTROL CIRCUIT (3)



5. SWITCHING BETWEEN 3V AND 6V POWER SUPPLY

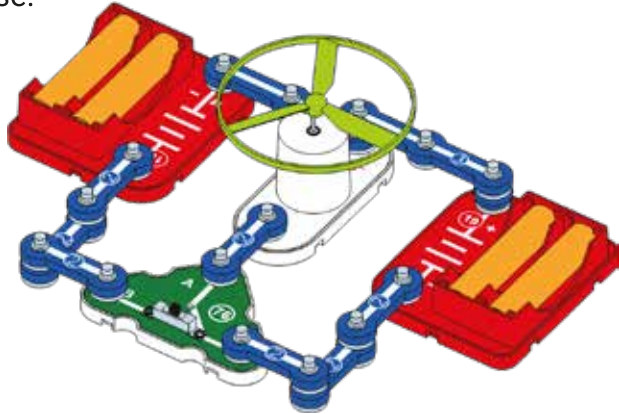
- 1 When switch 76 is thrown to the C position, it supplies power to bulb 27 with a 6V power source, making the bulb brighter.
- 2 When thrown to the B position, it supplies power to bulb 27 with a 3V power source, making the bulb dimmer.





6. MOTOR REVERSAL

- 1 When switch 76 is thrown to the B position, motor 24 rotates counterclockwise.
- 2 When thrown to the C position, motor 24 rotates clockwise.

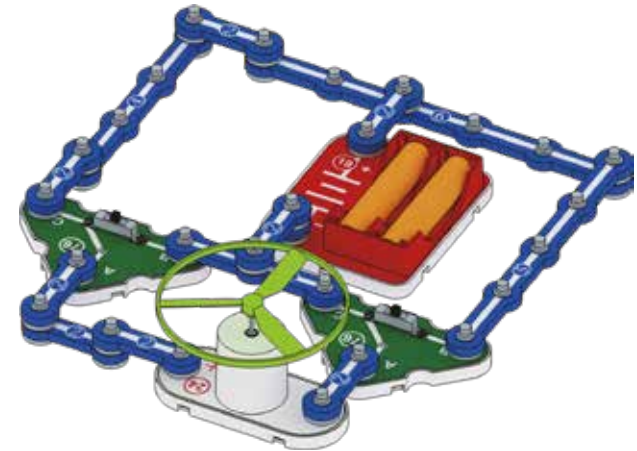


Replace 76 with the previous 14 or 15, which can double the number of ways to play.

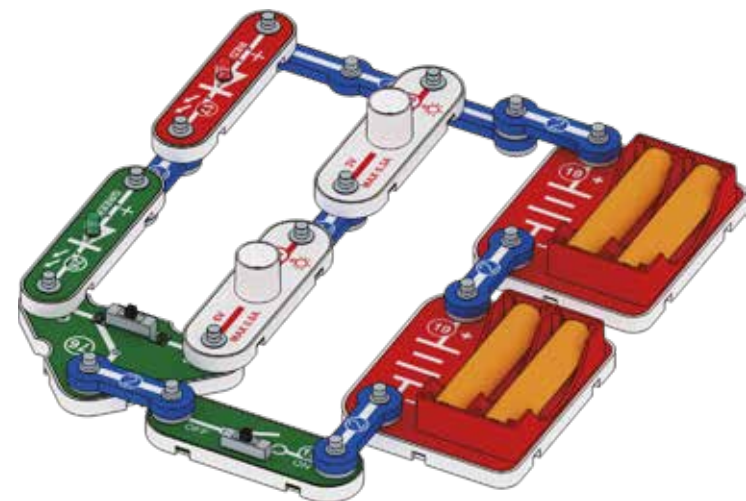
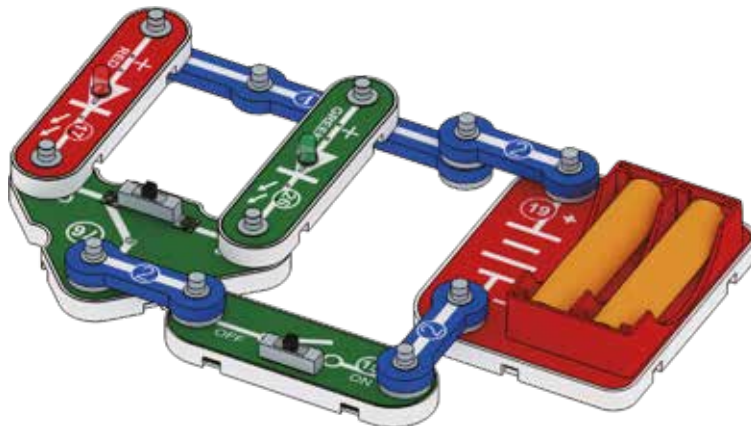


7. MOTOR REVERSAL (2)

- 1 When both switches 76 are thrown to the B position, motor 24 rotates counterclockwise.
- 2 When both are thrown to the C position, motor 24 rotates clockwise.

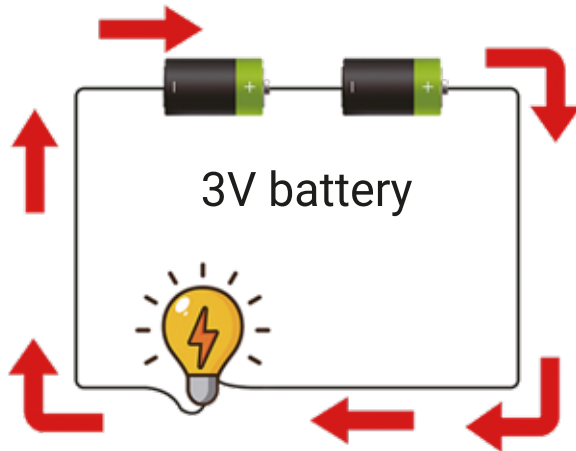


8. OTHER COMBINATIONS OF THE SPDT SWITCH



PART INTRODUCTION

A resistor is used to reduce voltage and limit current.



The voltage is low

What is Resistance?

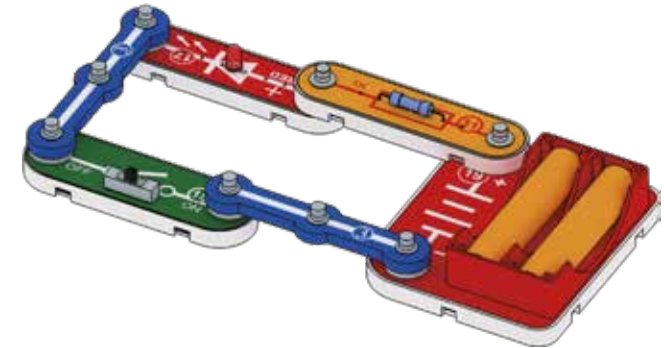
Anything that impedes the flow of electric current is resistance. When a 3V current passes through a wire, the light bulb acts as an obstacle to the current, causing the voltage to drop, which is the inherent resistance of the bulb!

Resistor symbol



1. THE ROLE OF RESISTANCE

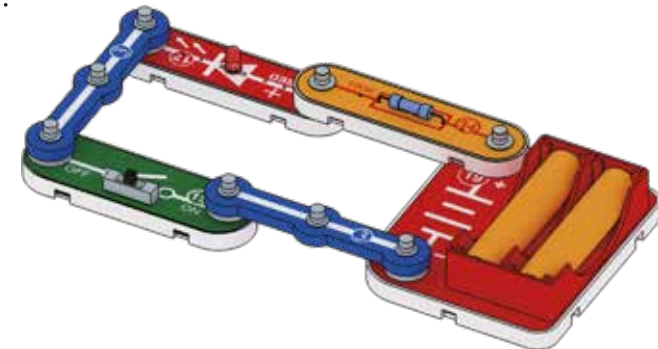
- 1 Turn on the switch 15, and LED 17 lights up.
- 2 Replace resistor 31 with a wire 3, and the brightness of the LED increases, indicating that the resistor plays a role in limiting the current in the circuit



2. THE ROLE OF RESISTANCE (2)

- 1 Turn on the switch 15, and LED 15 lights up.

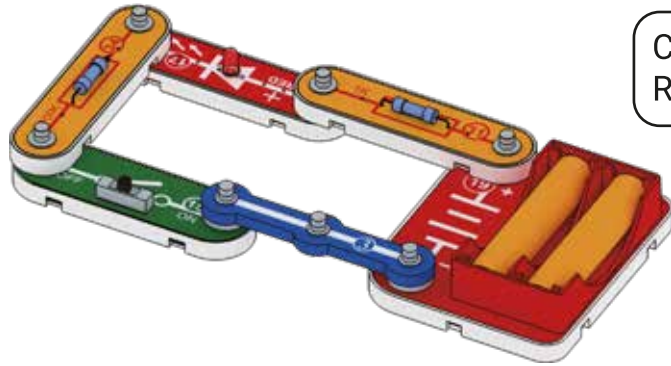
However, the brightness of the LED is dimmer than in Figure 1 because the resistance connected in the circuit is higher than in Figure 1, reducing the current in the circuit, thus making the LED dimmer.





3. SERIES CONNECTION OF RESISTORS

When resistors are connected in series, the total resistance is the sum of the individual resistances, increasing the resistance value and decreasing the current. It can be compared that the light in Figure 3 is dimmer than those in Figures 1 and 2.



Calculate the formula:
 $R_{\text{total}} = R_1 + R_2$



The thinner the wire, the greater the resistance encountered by the electric current as it passes through.



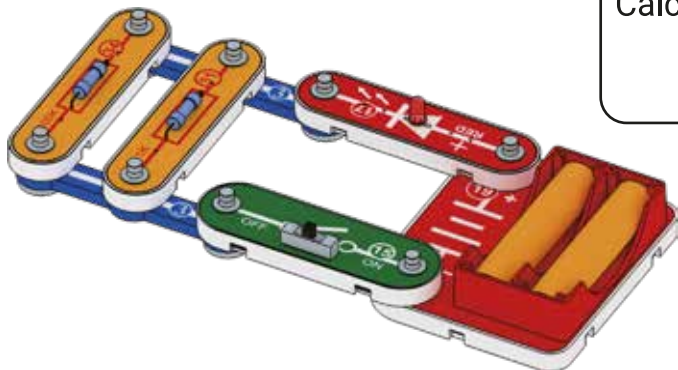
The thicker the wire, the smaller the resistance encountered by the electric current as it passes through.

Atoms and electrons within the wire also hinder the flow of electric current. Therefore, the wire itself can also be considered as a resistor.



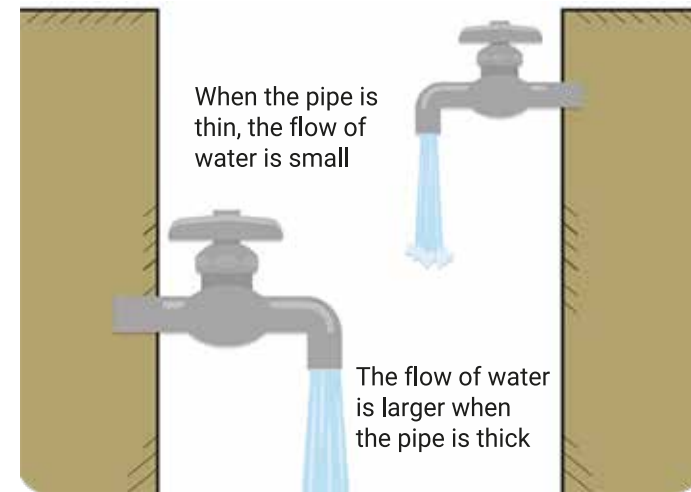
4. PARALLEL CONNECTION OF RESISTORS

When resistors are connected in parallel, the total resistance is less than any of the individual resistors, reducing resistance and allowing more current to flow. It can be compared that the light in Figure 4 is brighter than those in Figures 1 and 2.



Calculate the formula:
 $R_{\text{total}} = \frac{R_1 R_2}{R_1 + R_2}$

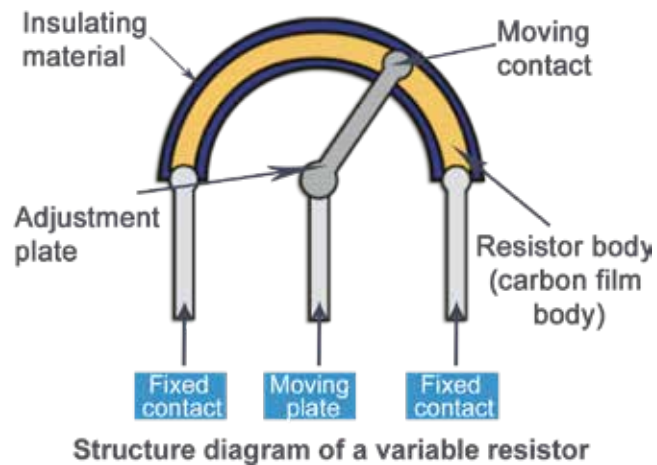
The movement of water is called water flow



The size of the water flow varies depending on the thickness of the pipe. This is easier to understand

PART INTRODUCTION

Adjustable resistor, a resistor whose resistance value can be varied, also known as a variable resistor.

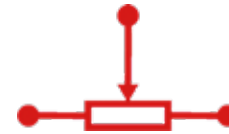


1. VARIABLE RESISTOR

- 1 Slide the handle of the variable resistor 53 to the far left, and the red LED lights up.
- 2 Slide it to the far right, and the green LED lights up.

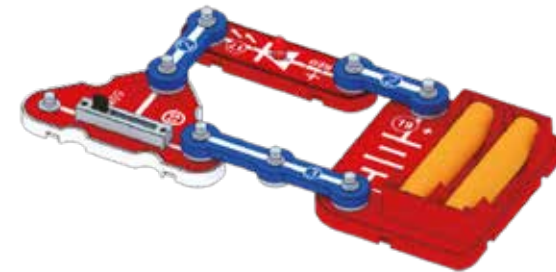


Adjustable resistor symbol



2. USE OF VARIABLE RESISTOR (CURRENT LIMITING TYPE)

- 1 By changing the size of the resistance in the circuit, the current in the circuit is altered.



3. USE OF VARIABLE RESISTOR (VOLTAGE DIVIDER TYPE)

- 1 By altering the resistance, the voltage across the LED lights is changed, serving as a voltage regulator.



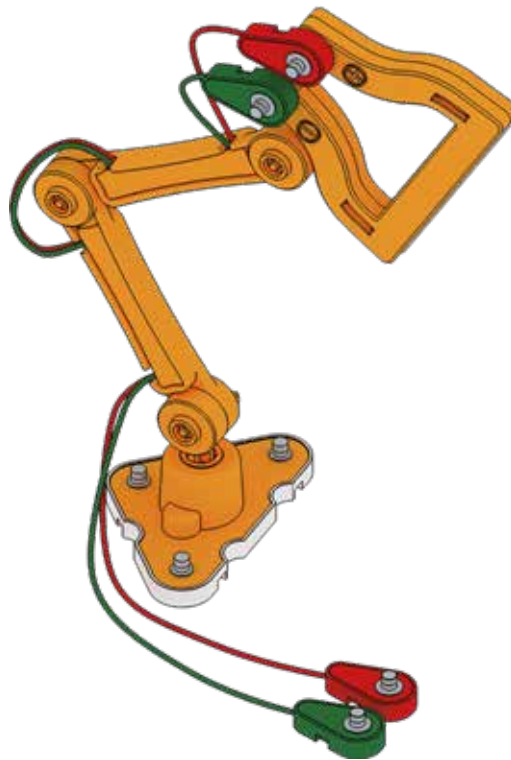
PART INTRODUCTION

The flexible desk lamp, also known as a lamp, uses a combination of springs and clasps to quickly adjust the direction of the light.

Working principle of the flexible desk lamp

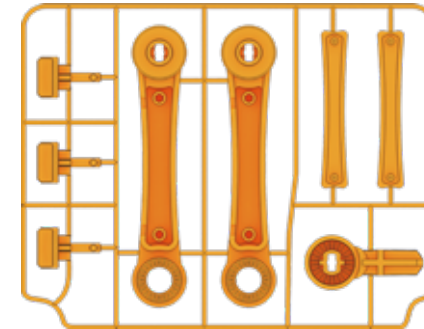
The joints of the flexible desk lamp have concave and convex slots on both sides. By threading the spring onto the clasp and through the joint, and then rotating the clasp to lock it, the spring's tension ensures a tight fit between the slots, holding the position firmly.

Adjusting the joints causes the slots to push against each other, compressing the spring inward. Once in the new position, the spring's tension causes the slots to grip again, locking the joint in place.

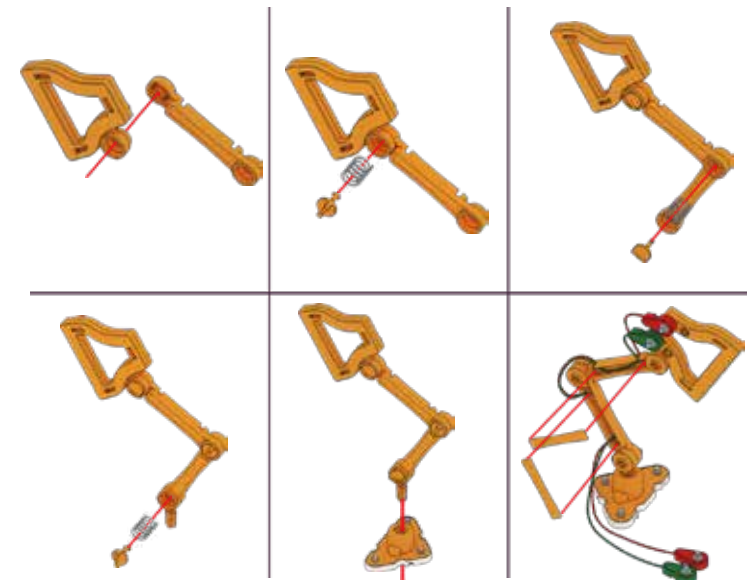


Assembling the flexible desk lamp

- 1 Remove the accessories first.



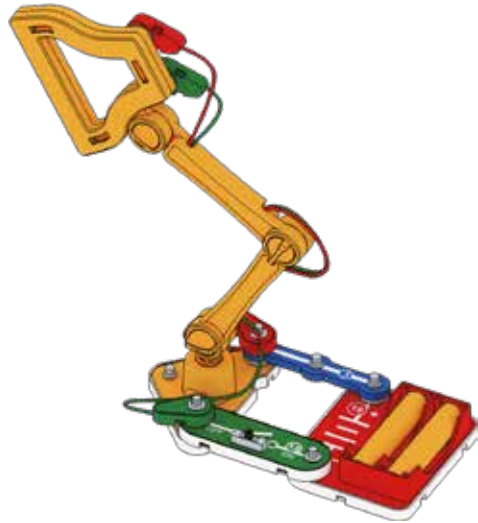
- 2 Assemble the flexible desk lamp as shown in the diagram.





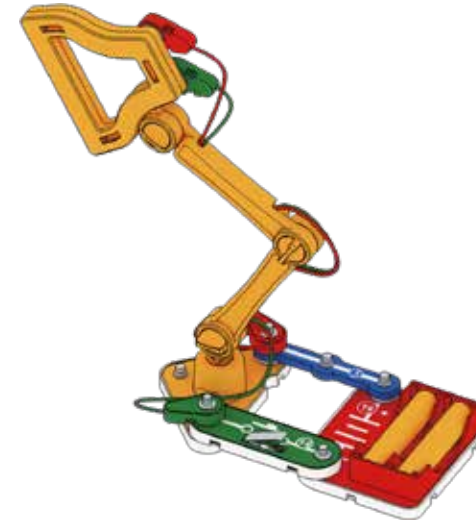
1. FLEXIBLE DESK LAMP

- 1 Turn on the switch 15, and the desk lamp lights up.



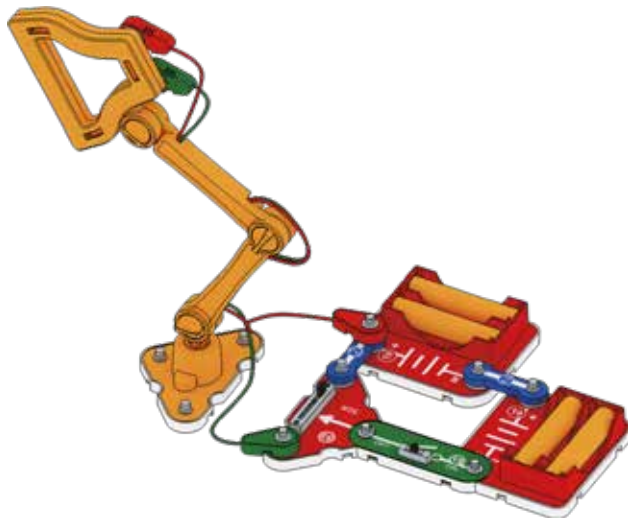
2. KEY-CONTROLLED FLEXIBLE DESK LAMP

- 1 Press tact switch 14, and the desk lamp lights up.



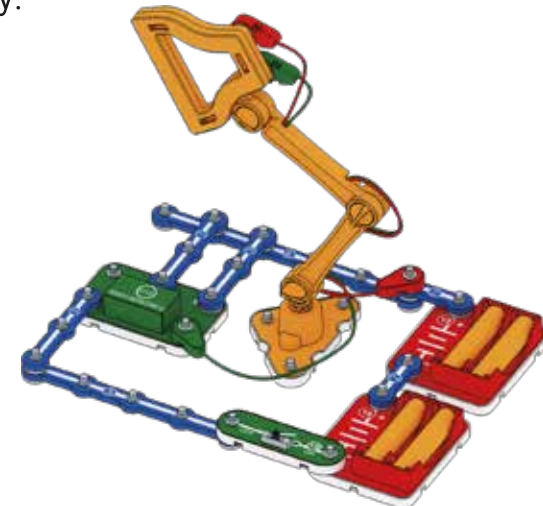
3. ADJUSTABLE BRIGHTNESS DESK LAMP

- 1 Turn on the switch 15, and slowly slide the handle of variable resistor 53 from top to bottom, the desk lamp will gradually become brighter.



4. TOUCH DESK LAMP

- 1 Turn on the switch 15, and you can turn on the desk lamp with a touch. Refer to the previous touch chip circuit unit for more ways to play.

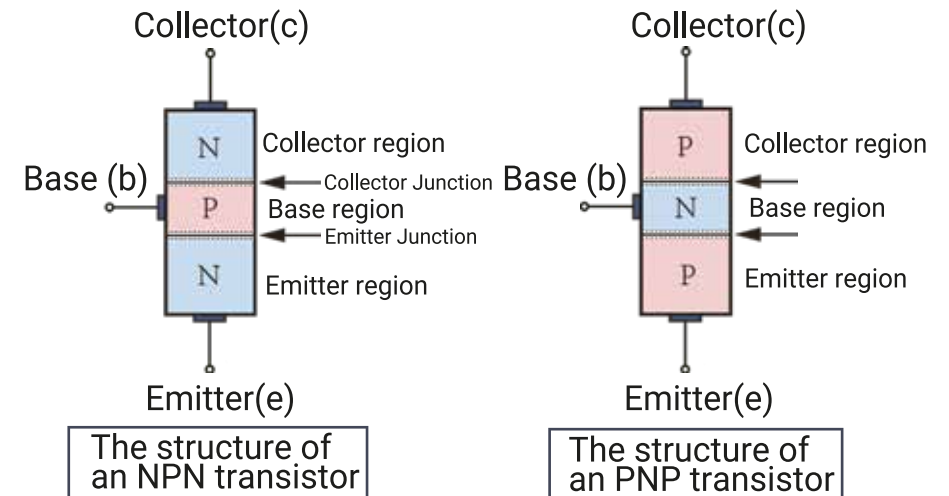


PART INTRODUCTION

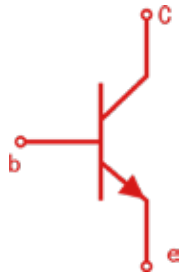
A transistor is a semiconductor device that controls electric current. It primarily serves to amplify signals and act as a switch.

A transistor is composed of two PN junctions. To create two PN junctions, a combination of three semiconductor regions is required. There are two possible configurations of these three semiconductor regions that can form two PN junctions. Therefore, transistors come in two configurations, which are the NPN and PNP configurations.

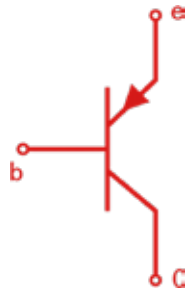
The names of the three electrodes of a transistor are as follows:
the base is represented by "b",
the collector by "c",
the emitter by "e".



NPN transistor symbol



PNP transistor symbol



NPN transistor

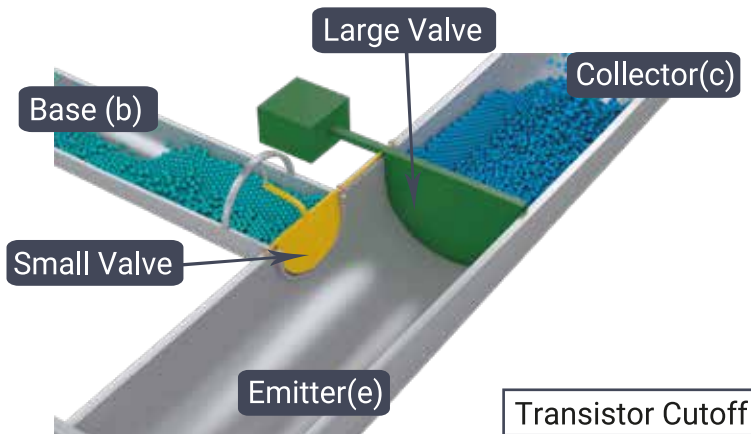
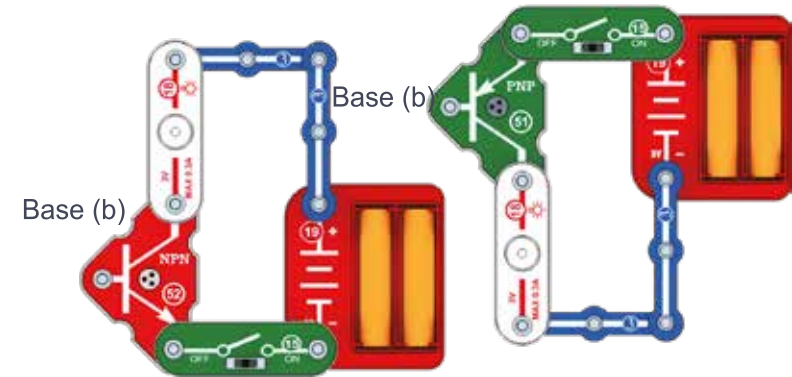


PNP transistor

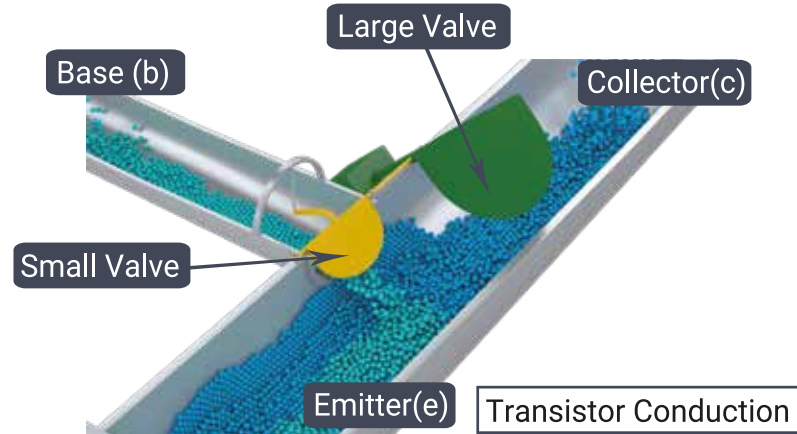


1. NON-CONDUCTING TRANSISTOR

- 1 In the light bulb circuit, a transistor is connected in series.
- 2 When there is no control voltage at the base of the transistor, the transistor is in the off state, and there is no current in the circuit, so bulb 18 does not light up.



When there is no current at the base (analogous to water flow), the valve is in a closed state, and the current (water flow) stops flowing.



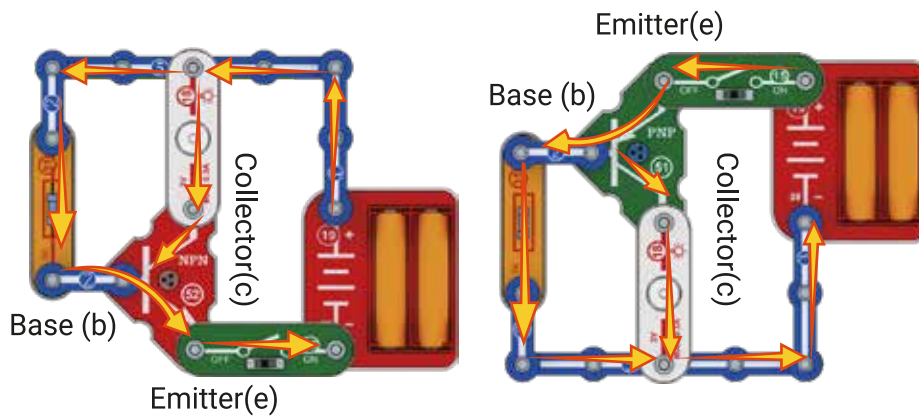
When there is a certain amount of current (water flow) passing through the base, it will open the small valve, which in turn opens the large valve, allowing a greater current (water flow) to pass through.





2. SWITCHING ROLE OF TRANSISTORS

When the base of the transistor is connected to either the positive or negative terminal of the power supply (a resistor in series is required to prevent short-circuiting the transistor), there is a current at the base. This causes the collector to produce an amplified current, lighting up the bulb. If the power to the base is disconnected, the transistor is cut off, and the bulb goes out. This allows the base to control the conducting state of the transistor, serving as a switch.



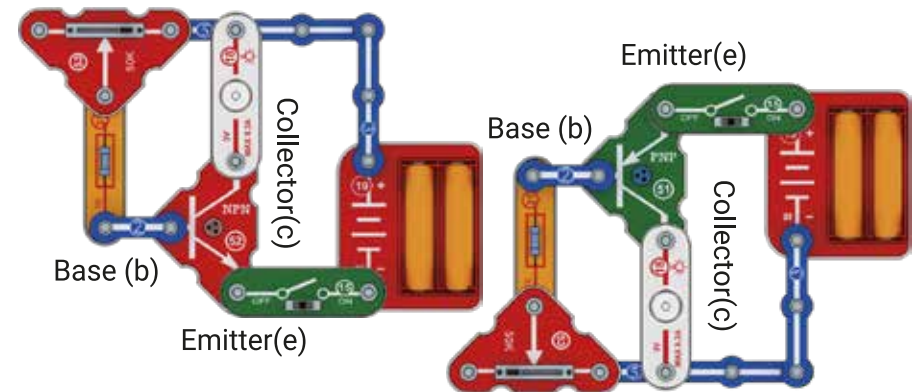
NPN "Base" needs to be connected to the positive power

PNP "Base" needs to be connected to the negative power



3. AMPLIFICATION ROLE OF TRANSISTORS

By inserting a variable resistor into the base circuit of the transistor, you can adjust the base current. Changes in the base current will also alter the collector current, thereby changing the brightness of the bulb. This is because the collector current (I_c) is equal to the amplification factor times the base current (I_b), serving an amplification role.



The collector current (I_c) =
Fixed amplification factor * Base current (I_b)

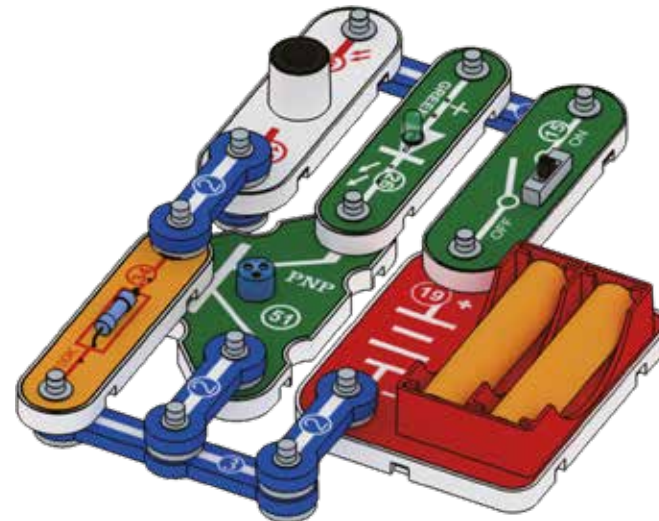
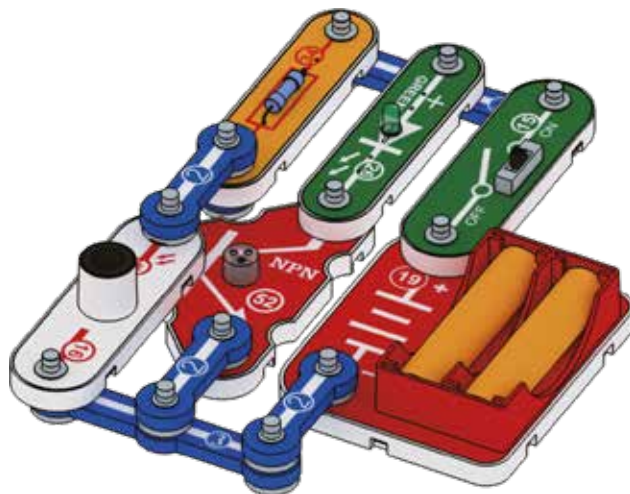
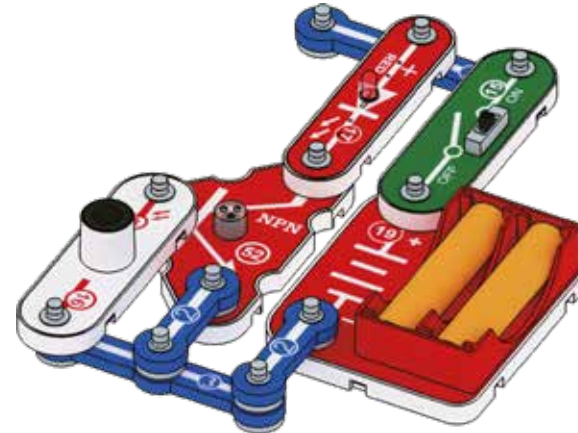
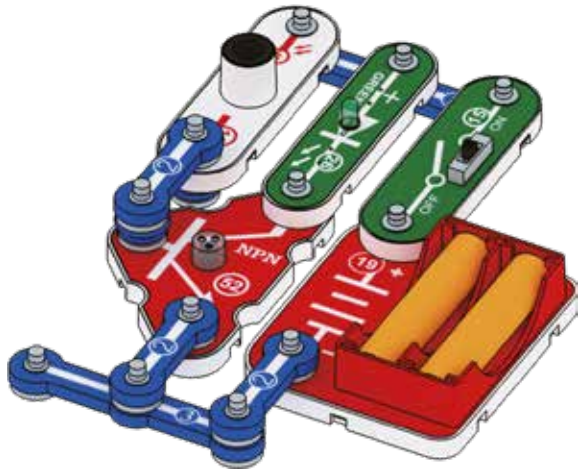
Each transistor has a fixed amplification factor



4. PHOTO-CONTROLLED TRANSISTOR SERIES (1-20)

- 1 Turn on the switch 15, and the LED lights up or goes out depending on the presence or absence of light.

You can replace 17, 26 with 9, 18, 27.

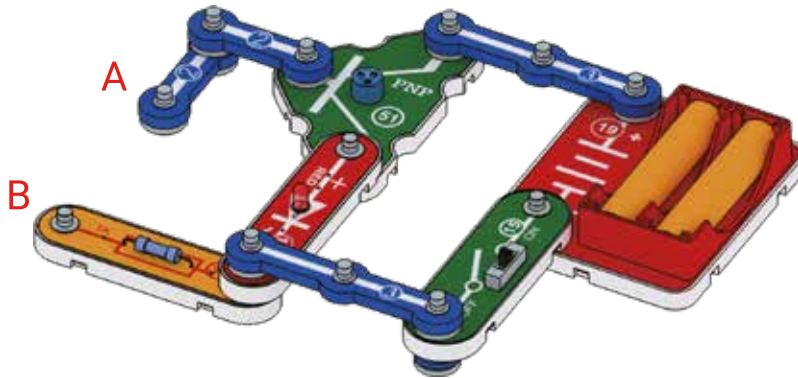




5. CONDUCTOR TESTER

- 1 Turn on the switch 15, and connect various materials between terminals A and B.

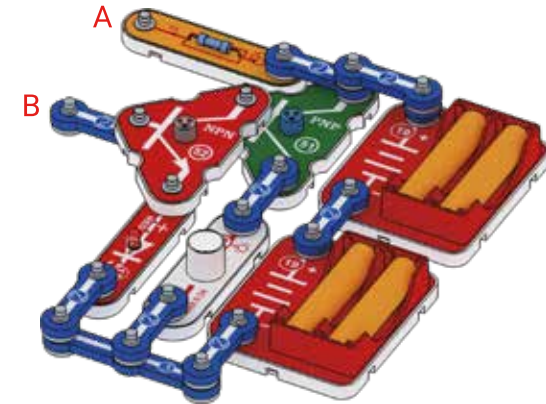
If the material is a conductor, the LED will light up.



6. TOUCH-CONTROLLED LIGHT

- 1 Gently touch terminals A and B, and LED 17 lights up, while bulb 27 dims slightly.

The larger the contact area between your finger and the button, the brighter bulb 27 will be.



7. STATIC ELECTRICITY DETECTOR

- 1 Swap the positions of the LED and the light bulb, and bring an object charged with static electricity close to point A.
- 2 The LED lights up, but the bulb does not.

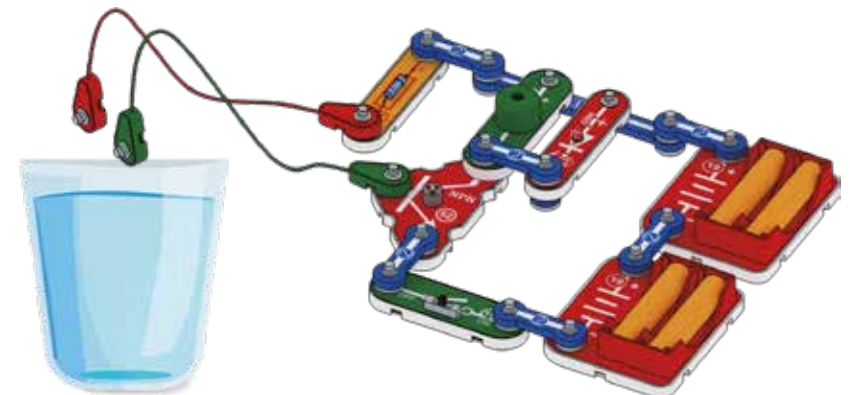


8. WATER LEVEL ALARM

- 1 Turn on the switch 15, and place the red and green wires into a cup of water.
- 2 If both make contact with the water, the buzzer and the LED will activate. It can be used as a water level alarm.

Principle explanation

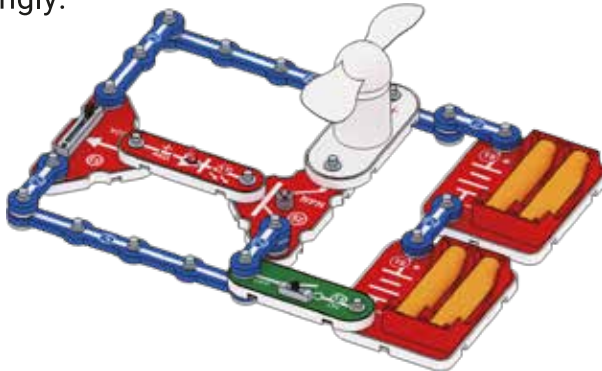
People are conductors with a certain resistance. When connected in a circuit, they just meet a certain base current, causing the circuit to conduct, and the light bulb lights up.





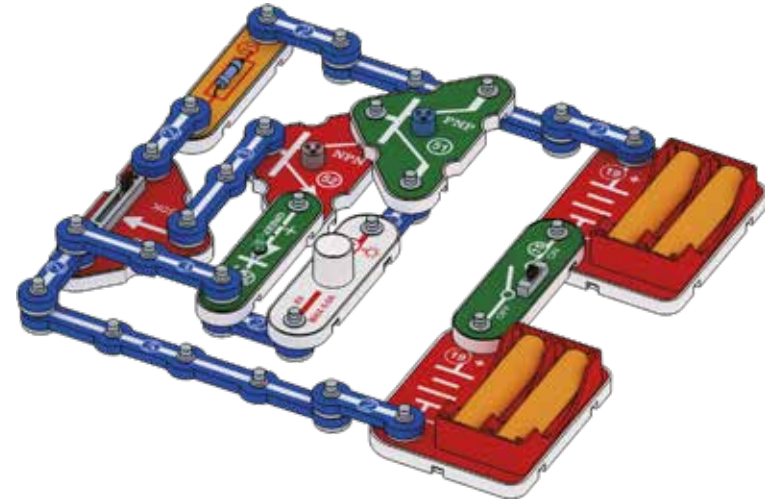
9. TRANSISTOR SPEED CONTROL (1-2)

- 1 Turn on the switch 15, and by adjusting the handle of the variable resistor 53, you can change the current at the base of the transistor, thereby controlling the current flowing through the colorful fan, causing the fan's speed to change, and the brightness of the red LED will also vary accordingly.



10. TRANSISTOR LIGHT DIMMING (1-12)

- 1 Turn on the switch 15, and by adjusting the variable resistor 53, you can change the current at the base of the transistor, which in turn controls the current flowing through the light bulb, causing the light's brightness to change.



11. TRANSISTOR SPEED CONTROL (1-2)

- 1 Turn on the switch 15, and by adjusting the handle of the variable resistor 53, you can change the current at the base of the transistor, thereby controlling the current flowing through the colorful fan, causing the fan's speed to change, and the brightness of the red LED will also vary accordingly.



Principle explanation

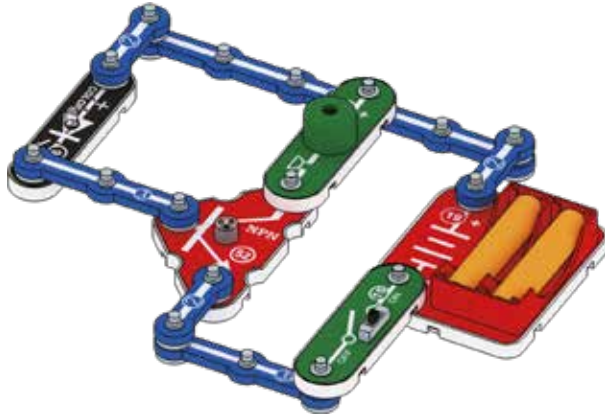
Adjusting the resistance value of the variable resistor 53, when the resistance is lower, it can change the size of the current entering the base of the transistor, thus controlling the amount of current flowing through the light bulb or fan.



12. COLORFUL LED CONTROLS BUZZER SOUND (1-3)

- 1 Turn on the switch 15, while the colorful LED flashes, the buzzer also sounds at the frequency of the LED's flashes.

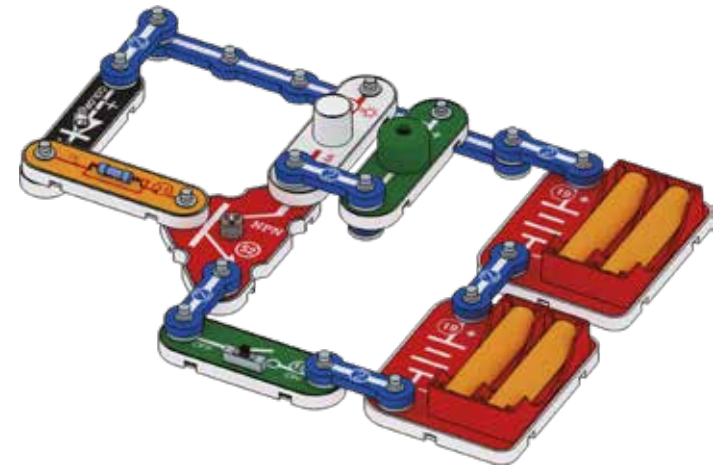
You can replace H1 with 17 or 26.



13. COLORFUL LED CONTROLS BUZZER AND LIGHT IN PARALLEL (1-9)

- 1 Turn on the switch 15, as the colorful LED flashes, the buzzer and the light bulb also sound and flash at the frequency of the LED's flashes.

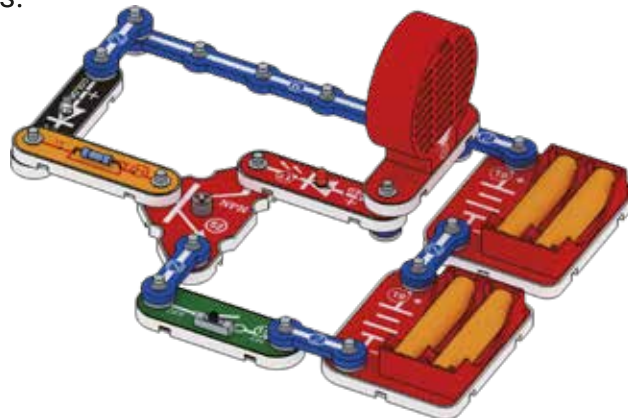
You can replace H1 with 20, or replace 18 with 17, 26, 27, 87, offering a total of 8 combinations.



14. COLORFUL LED CONTROLS BUZZER AND LIGHT IN PARALLEL (1-9)

- 1 Turn on the switch 15, as the colorful LED flashes, the speaker and the red LED also sound and flash at the frequency of the LED's flashes.

You can replace 20 with H1, or replace 17 with 18, 26, 27, 87, offering a total of 8 combinations.





15. AUTOMATIC STREET LIGHT

- 1 Turn on the switch 15, and by blocking the light to the photoresistor with your hand, adjust the variable resistor to control the brightness of the bulb, making it just light up.
- 2 When you release your hand, if the ambient light is as dim as it was when you blocked the light, the bulb will light up again.



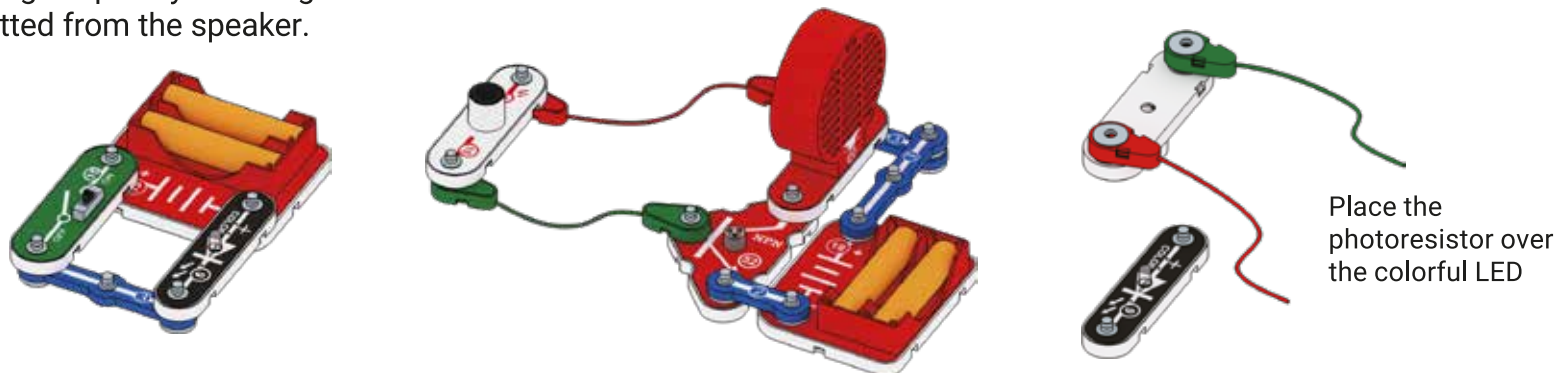
16. AUTOMATIC DESK LAMP

- 1 Replace bulb 27 with a flexible desk lamp, and operate in the same way as the automatic street light.



17. LIGHT TO SOUND CONVERSION

- 1 Turn on the switch 15, and place the photoresistor 16 over the colorful LED, so the flashing frequency of the light will be converted into a sound signal emitted from the speaker.



The LED converts electricity into flashing light.

The photoresistor receives the light signal and turns it into an electrical signal.

The transistor amplifies the electrical signal.

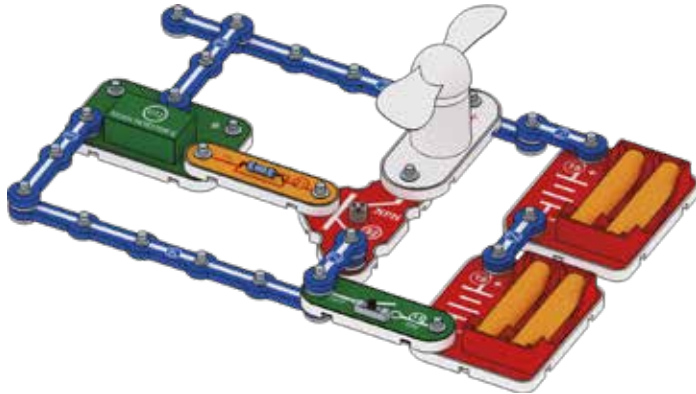
The speaker transforms the electrical signal into a sound signal.



18. TOUCH TO START COLORFUL FAN (1-4)

- 1 Refer to previous experiments, there are four ways to control the start of the colorful fan by touch.

You can replace component 71 with 24 to adapt to different circuit configurations.



20. OTHER WAYS TO TOUCH AND LIGHT UP THE BULB (1-20)

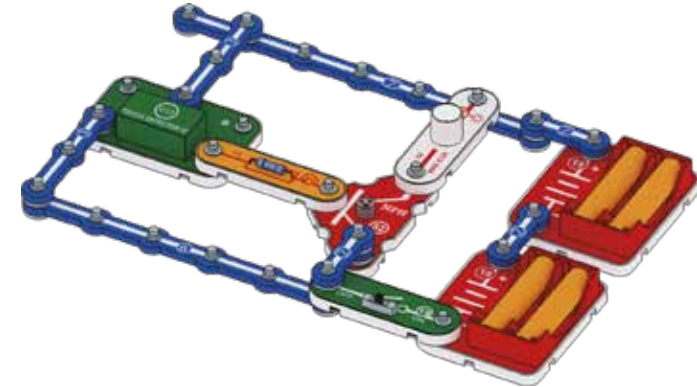
- 1 You can replace bulb 27 with 9, 17, 18, 26, 87, and combine them with the four touch modes of the touch chip, resulting in a total of 20 different ways to play.



19. TOUCH TO LIGHT UP THE BULB

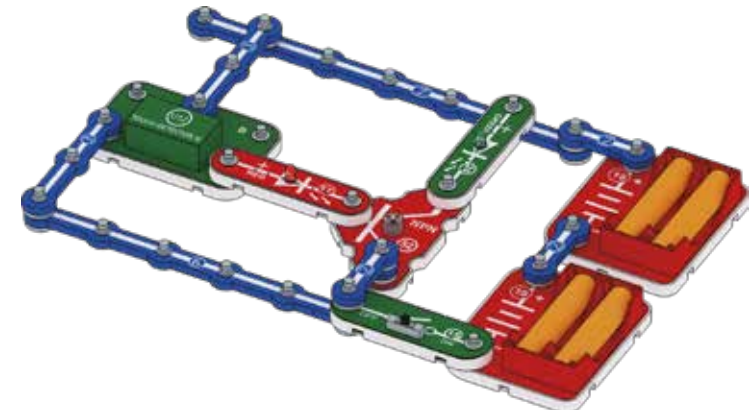
- 1 Turn on the switch 15, and you can light up bulb 27 by touching the chip U12.

You can use different modes from the mode table mentioned earlier to light up the bulb



21. TOUCH TO LIGHT UP DUAL LEDS (1)

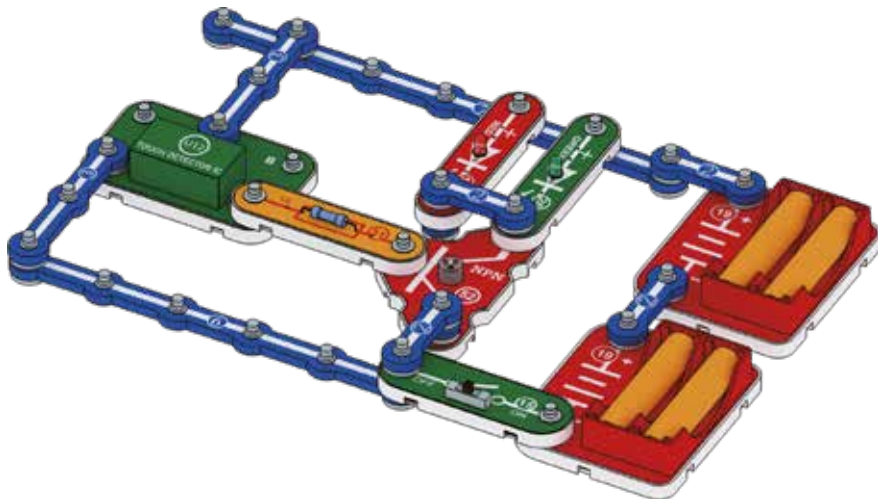
- 1 Turn on the switch 15, and touch the chip U12 to light up two LEDs at the same time.
- 2 You can replace LED 26 with 9, 18, 24, 27, 71, 87, H1 to achieve different circuit effects.





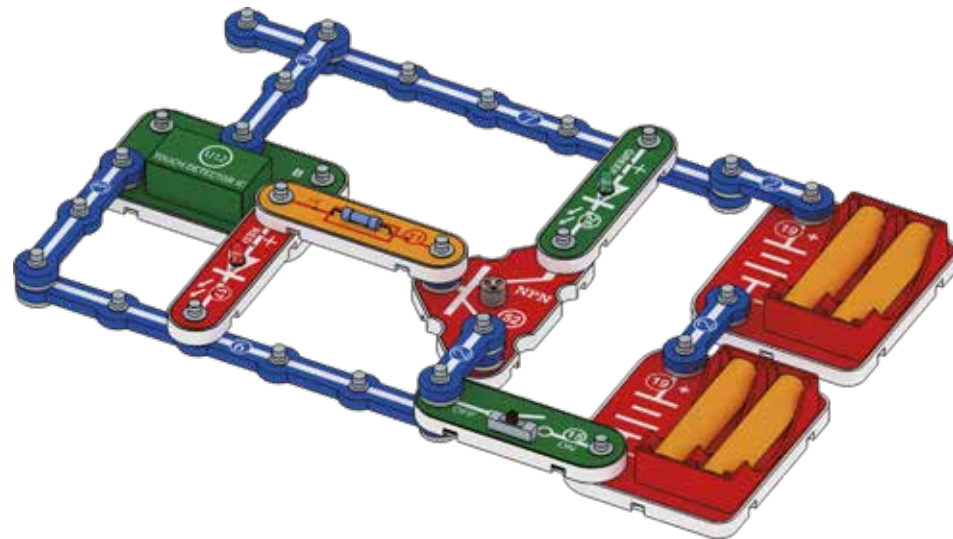
22. TOUCH TO LIGHT UP DUAL LEDs (2)

- 1 Touch the chip U12, and two LEDs light up simultaneously.



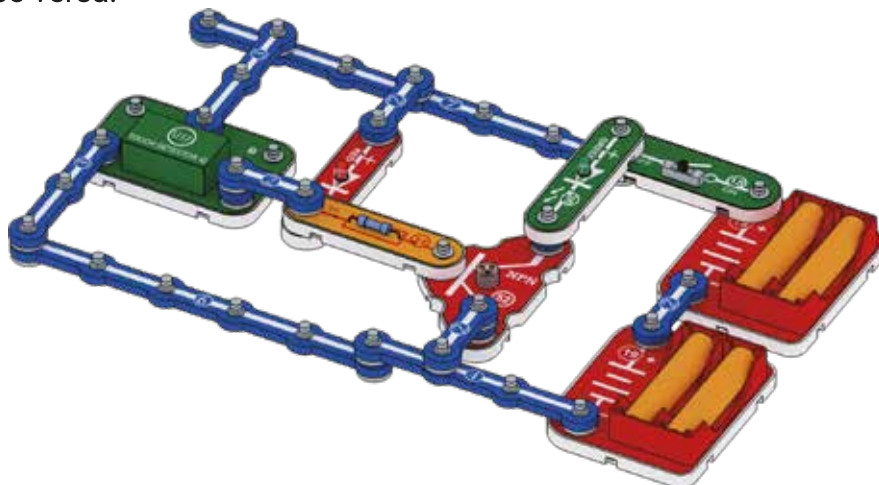
23. TOUCH TO LIGHT UP DUAL LEDs (3)

- 1 Touch the chip U12, and two LEDs light up simultaneously.



24. TOUCH TO REVERSE LIGHT UP LEDs

- 1 Touch the chip U12, and the two LEDs will light up in reverse, meaning if the first LED lights up, the second LED will go out, and vice versa.



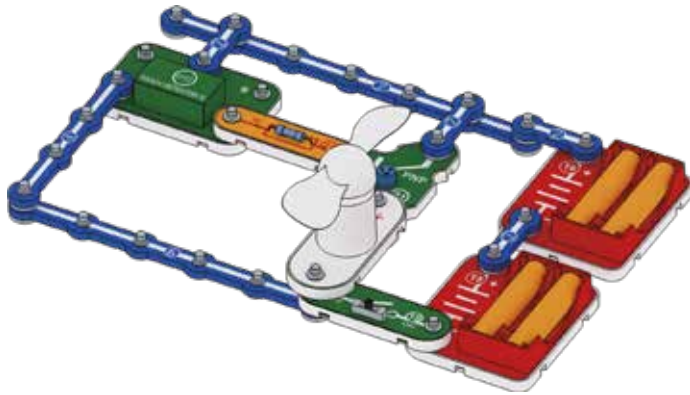


25. TOUCH TO START UP COLORFUL FAN (PNP TRANSISTOR TYPE)

- 1 Turn on the switch 15, and the colorful fan 71 starts.

Touch the chip U12, and the colorful fan stops.

This experiment can be used to compare the differences between the PNP transistor mentioned earlier and the NPN type transistor. You can replace 71 with 17, 18, 24, 26, 27, 87.

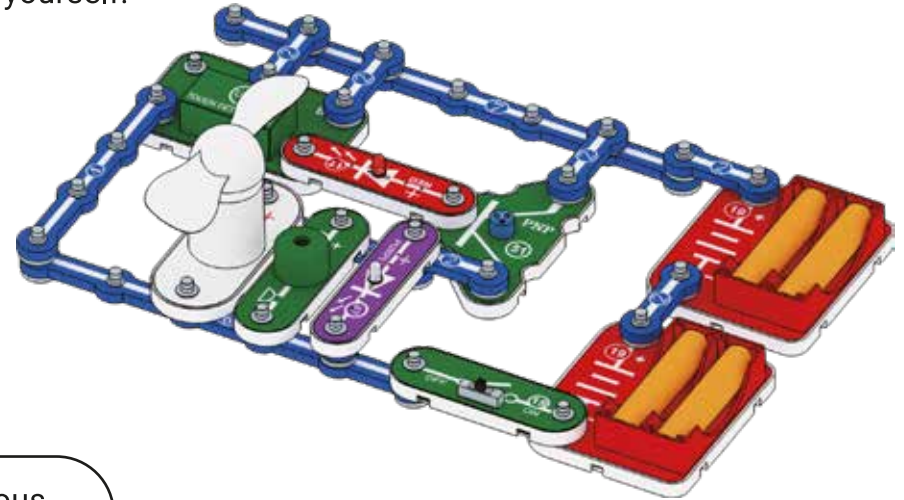


Referring to the previous NPN type transistor circuit, you can double the number of ways to play.



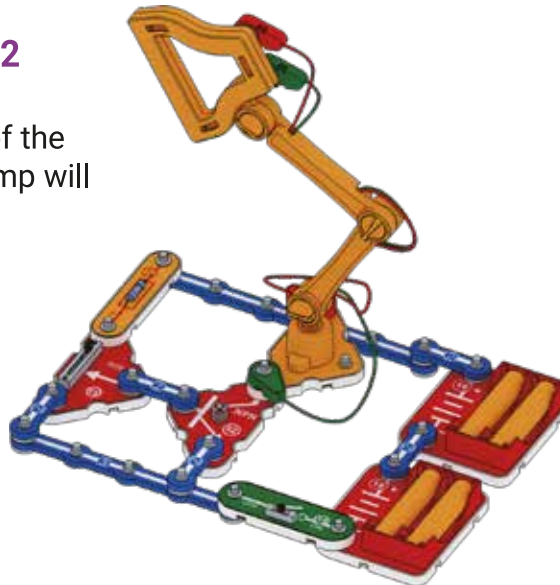
26. TOUCH TO START MULTIPLE APPLIANCES

- 1 Refer to the previous circuits and try out the effects for yourself.



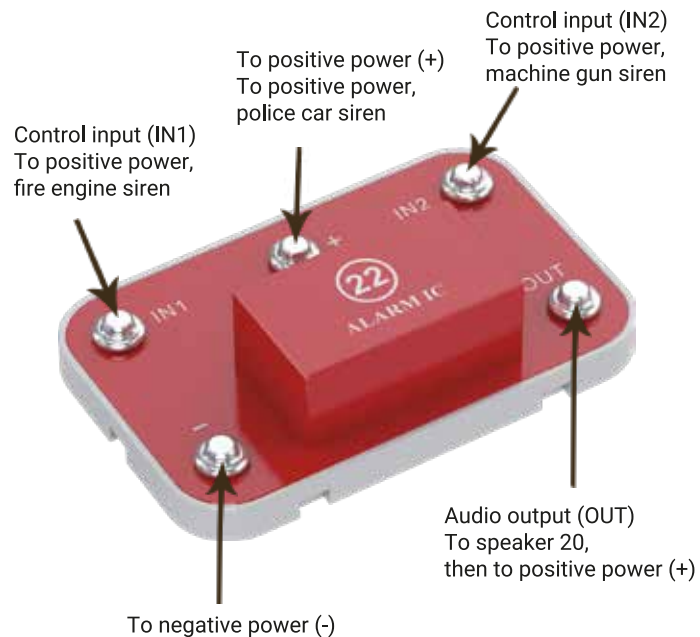
27. ADJUSTABLE BRIGHTNESS DESK LAMP 2

- 1 Turn on the switch 15, and slowly slide the handle of the variable resistor 53 from bottom to top, the desk lamp will gradually become brighter.



PART INTRODUCTION

The alarm integrated circuit is a collection of four different alarm sounds in one integrated circuit. By connecting some additional electronic components externally, and simply assembling the power supply and speaker, you can play different alarm sounds.



1. POLICE CAR SIREN

1

Turn on the switch 15, and the speaker 20 emits a police car siren.



2. FIRE ENGINE SIREN

1

On the basis of the police car siren, connect terminals A B to emit a fire engine siren from speaker 20.



3. MACHINE GUN SIREN

1

On the basis of the police car siren, connect terminals C D to make speaker 20 emit a machine gun siren.



4. AMBULANCE SIREN

1

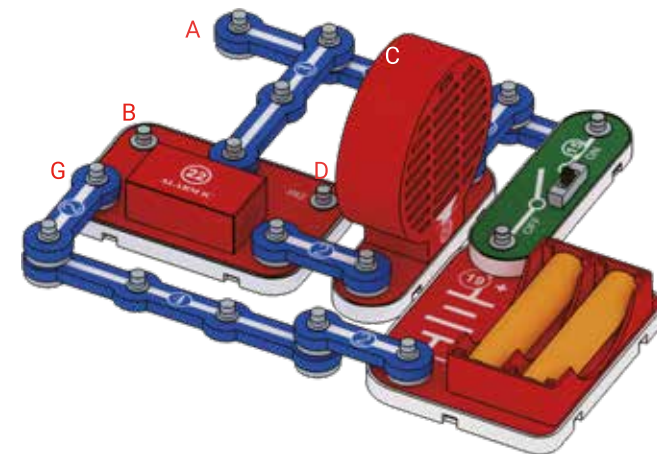
On the basis of the police car siren, connect terminals B G to make speaker 20 emit an ambulance siren.



5. WHOOP SIREN

1

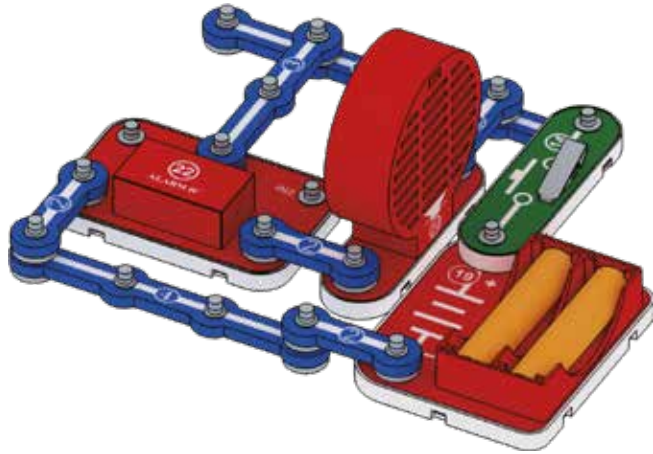
On the basis of the police car siren, connect terminals B D to make speaker 20 emit a whoop siren.





6. KEY-CONTROLLED ALARM CIRCUIT (1-5)

- 1 Press tact switch 14 can produce an alarm sound, with a total of 5 different sounds as referenced earlier.



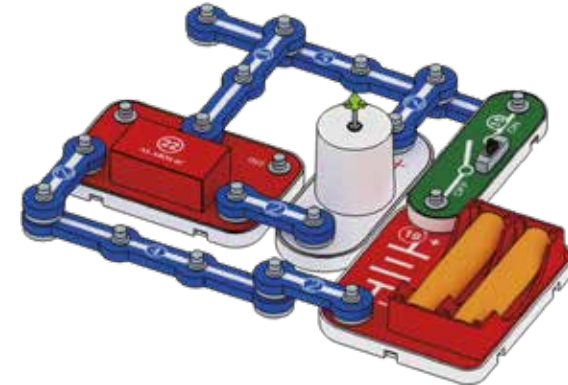
You can also connect components 9, 17, 18, 24, 26, 27, 71, 87, H1, L4 to the output end (OUT) of the alarm integrated circuit, and then connect them in parallel or series, with various combinations waiting for you to implement.



7. MOTOR SIREN (1-10)

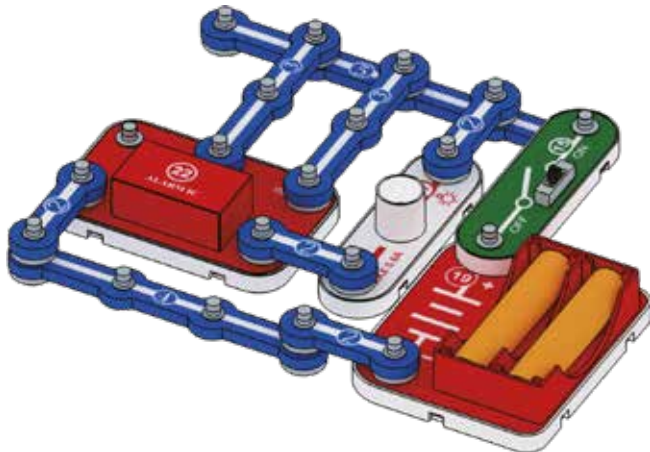
- 1 Turn on the switch 15, motor 24 can emit a relatively quiet police car siren, with a total of 5 different sounds as referenced earlier.

You can replace motor 24 with 71.



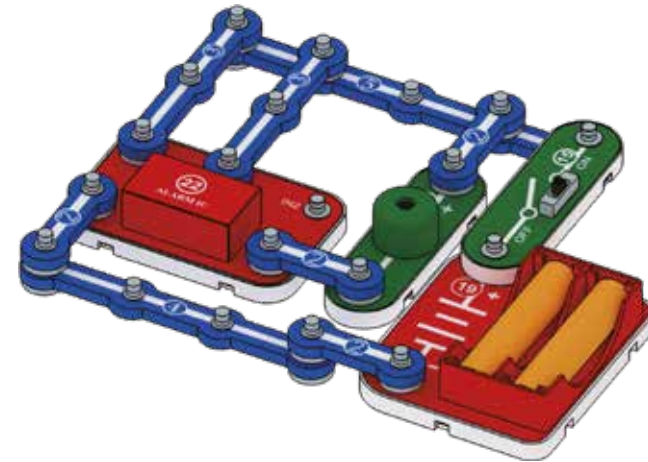
8. FLASHING LIGHT (1-30)

- 1 Turn on the switch 15, and bulb 18 flashes.
- You can replace bulb 18 with 9, 17, 26, 27, 87.



9. VARIABLE SIREN (1-5)

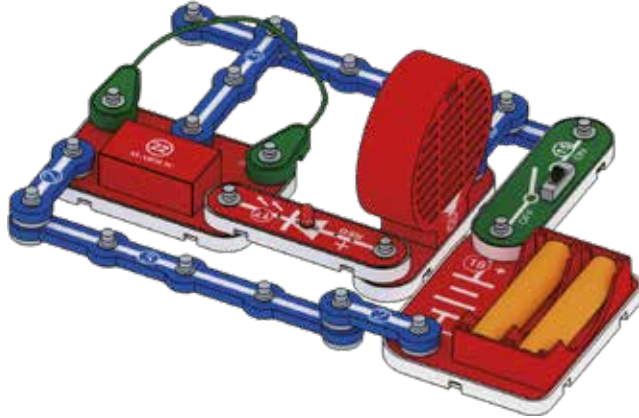
- 1 Turn on the switch 15, and buzzer H1 emits a variable-pitched fire engine siren, with a total of 5 different sounds as referenced earlier.





10. SERIES SOUND AND LIGHT ALARM (1-5)

- 1 Turn on the switch 15, speaker 20 emits a whoop siren while the red LED flashes, with a total of 5 different sounds as referenced earlier.

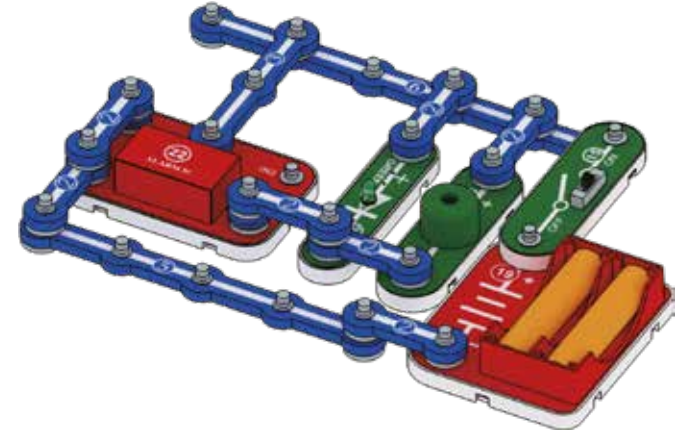


You can also connect components 9, 17, 18, 24, 26, 27, 71, 87, H1, L4 to the output end (OUT) of the alarm integrated circuit, and then connect them in parallel or series, with various combinations waiting for you to implement.



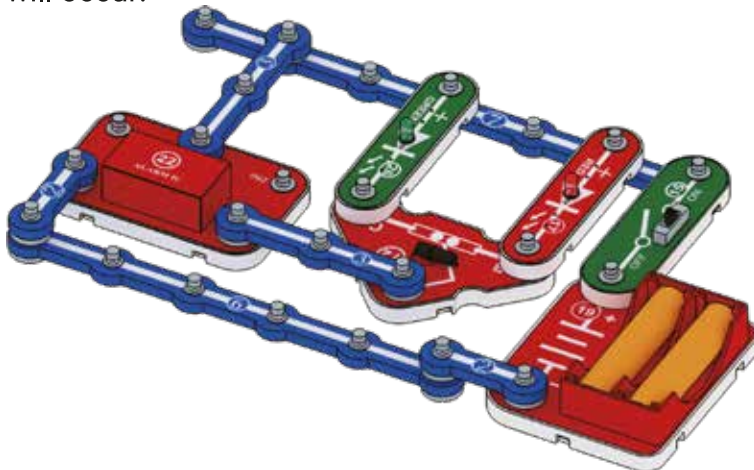
11. PARALLEL SOUND AND LIGHT ALARM (1-5)

- 1 Turn on the switch 15, buzzer H1 emits an ambulance siren while the green LED flashes, with a total of 5 different sounds as referenced earlier.



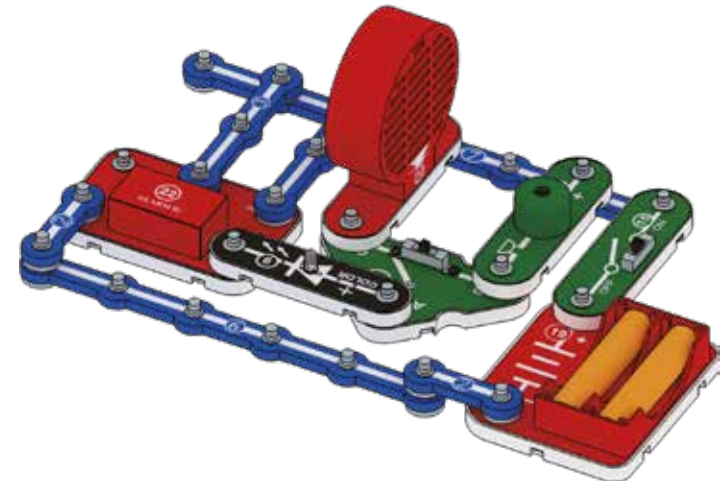
12. GRAVITY SWITCH OUTPUT EFFECT

- 1 Turn on the switch 15, hold the entire circuit in your hand, when the gravity switch tilts towards end B or C, different effects will occur.



13. SPDT SWITCH SWITCHES OUTPUT EFFECT (1)

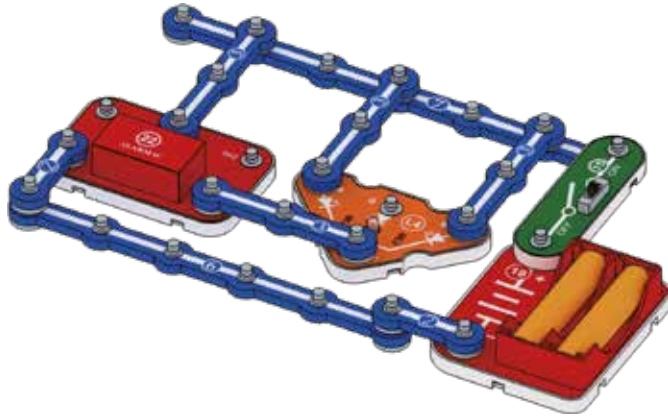
- 1 Turn on the switch 15, when the single pole, double throw switch is thrown to B or C, different effects will occur.





14. FLASHING RGB LED (1-35)

- 1 Turn on the switch 15, and the RGB LED flashes, emitting light.

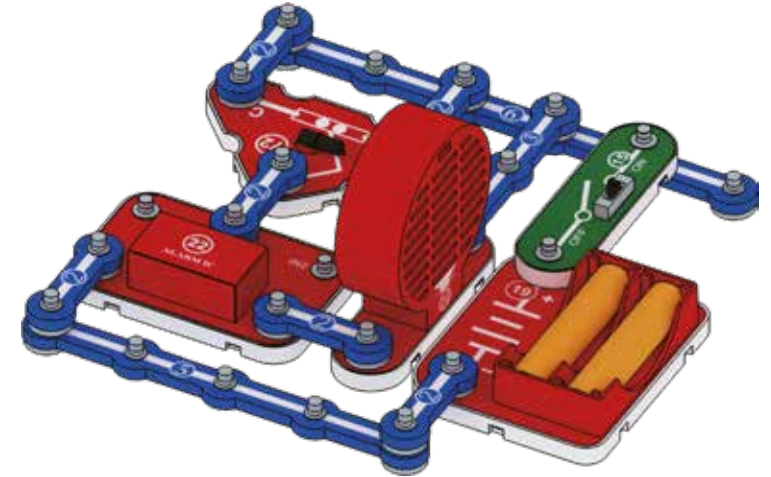


You can replace 17 or H1 with 9, 18, 24, 26, 27, 87, L4, or connect them in parallel or series, with various combinations waiting for you to implement.



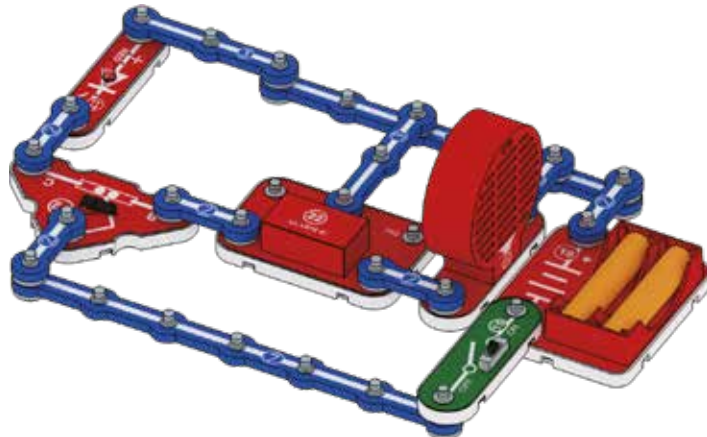
15. GRAVITY ALARM SOUND

- 1 Turn on the switch 15, hold the entire circuit in your hand, when tilted towards end B or C, the police car siren will sound.



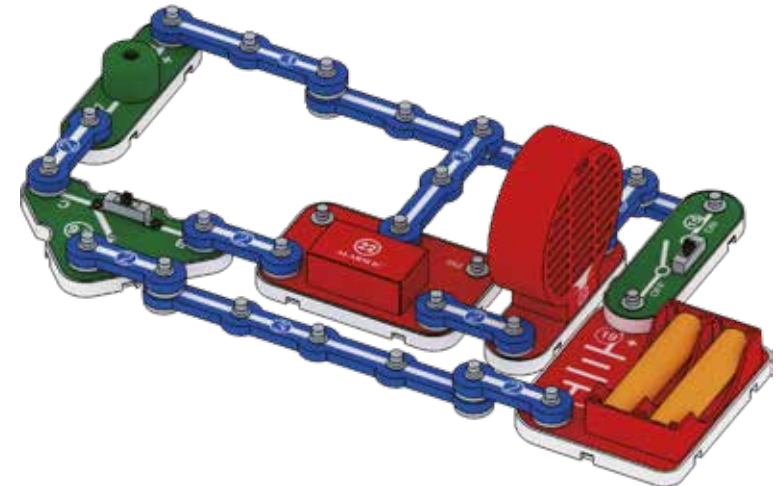
16. GRAVITY SENSOR SWITCH ALARM SOUND (1)

- 1 Turn on the switch 15, hold the entire circuit in your hand, when tilted towards C, the red LED lights up, when tilted towards B, the police car siren sounds.



17. SPDT SWITCH SWITCHES ALARM SOUND (2)

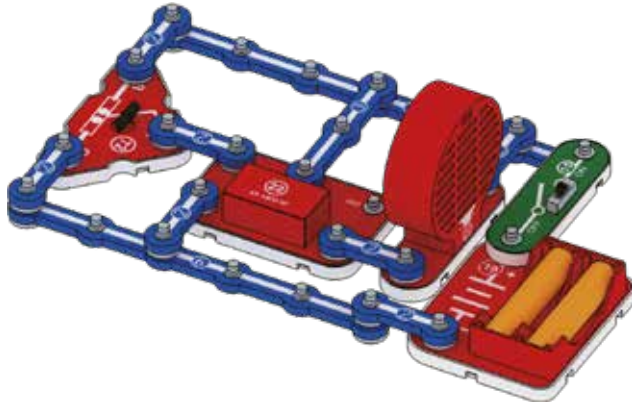
- 1 Turn on the switch 15, when the single pole, double throw switch is thrown to C, the buzzer sounds, when thrown to B, the police car siren sounds.





18. GRAVITY SWITCH ALARM SOUND (2)

- 1 Turn on the switch 15, when the gravity switch 72 is in a balanced state, it emits a police car siren, when tilted towards B, it emits a fire engine siren; when tilted towards C, it emits an ambulance siren.

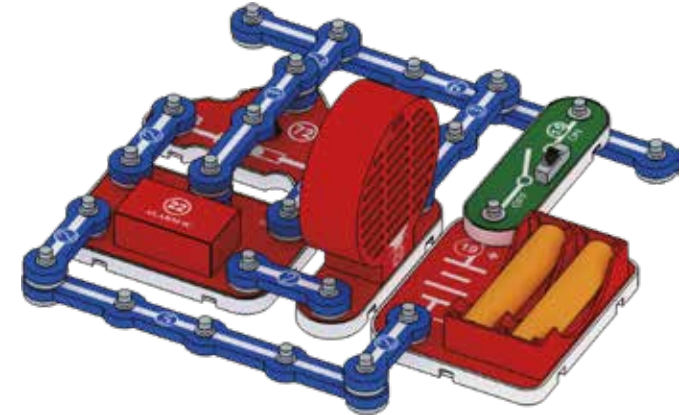


You can also connect components 9, 17, 18, 24, 26, 27, 71, 87, H1, L4 to the output end (OUT) of the alarm integrated circuit, and then connect them in parallel or series, with various combinations waiting for you to implement.



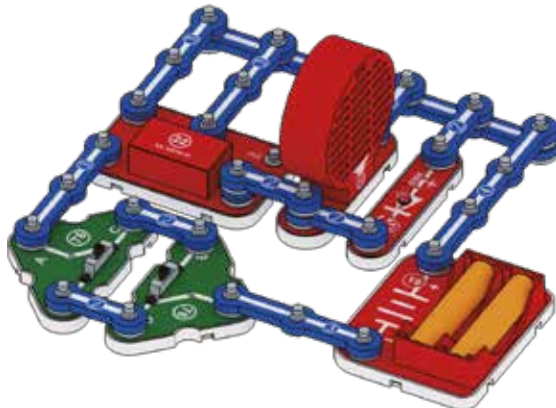
19. GRAVITY SWITCH ALARM SOUND (3)

- 1 Turn on the switch 15, when the gravity switch 72 is in a balanced state, it emits a police car siren, when tilted towards B, it emits a fire engine siren; when tilted towards C, it emits a machine gun siren.



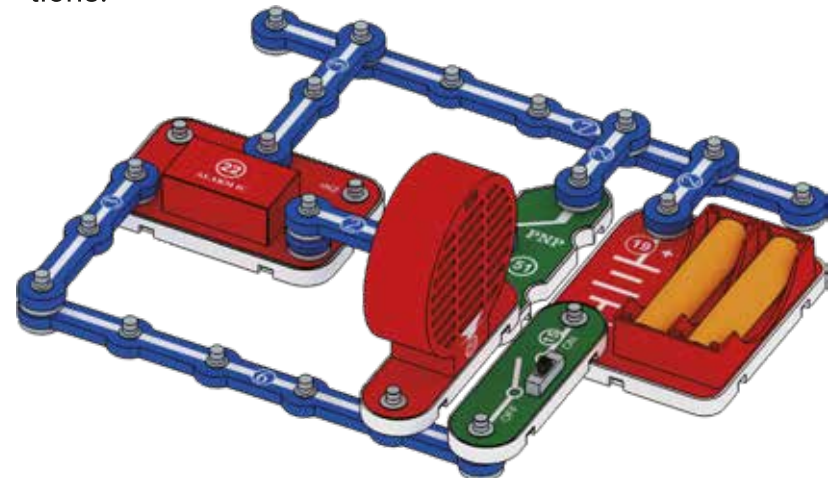
20. TWO SPDT SWITCH SWITCHES CONTROL ALARM SOUND

- 1 When the fire engine siren sounds, you can use any switch to turn it off; when the fire engine siren stops, you can use any switch to turn it on. Refer to the previous SPDT switch circuit for more combinations.



21. TRANSISTOR AMPLIFIED ALARM SOUND

- 1 Turn on the switch 15, the alarm sound emitted by speaker 20 is significantly louder than the previous combinations.

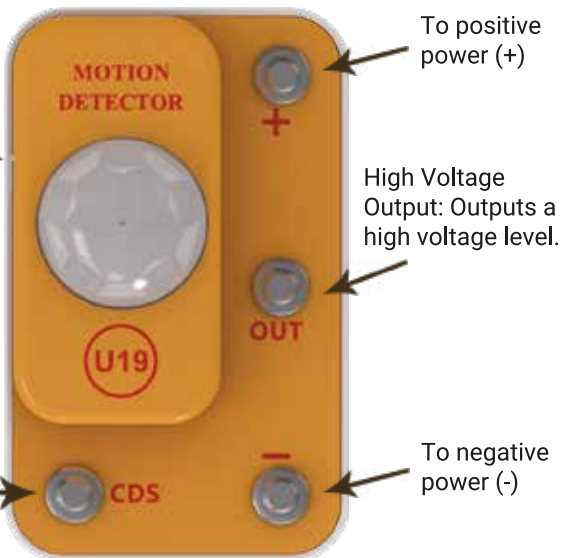


PART INTRODUCTION

Pyroelectric Infrared Sensor, also known as a motion detector, is a device specifically designed to detect human movement.

Delay Adjustment: Turn the knob clockwise to increase the delay, and counterclockwise to decrease it (0.5s-3min).

Photoresistor Connection: After connecting the photoresistor, it will not sense in daylight or when the light is strong.



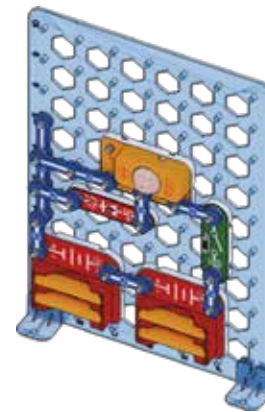
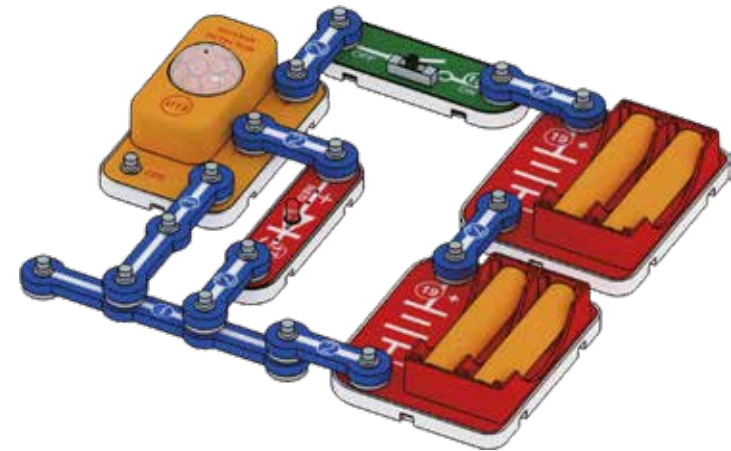
Principle of Pyroelectric Infrared Sensor

Objects above absolute zero degrees (0K or -273°C) emit infrared radiation, and the human body, with a normal body temperature of about 37°C, emits infrared radiation with a wavelength of about 10 micrometers (μm). A lens focuses the infrared radiation onto the sensor, converting it into an electrical signal.



1. MOTION DETECTOR FUNCTION

- 1 Turn on the switch 15, wait for one minute for the human sensor to enter the working state, then place it facing an area with movement. When someone passes in front of it, the red LED lights up, and after a delay, it goes out.

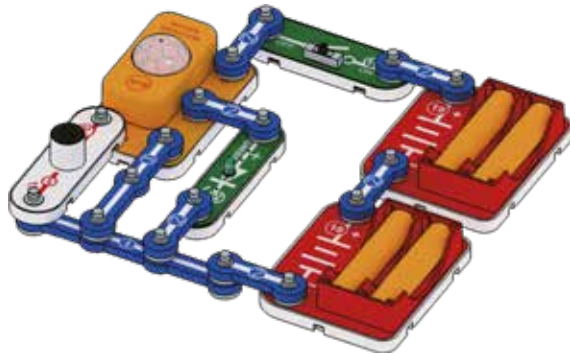


Use two 3D base to stand up the base grid and position the motion detector towards the area to be detected.



2. MOTION DETECTOR WITH NIGHTTIME ACTIVATION

- 1 Turn on the switch 15, follow the same operations as mentioned earlier, and with the photoresistor connected, wait until nighttime or when the light is relatively dim. The motion detector will activate only when the photoresistor does not sense any light.

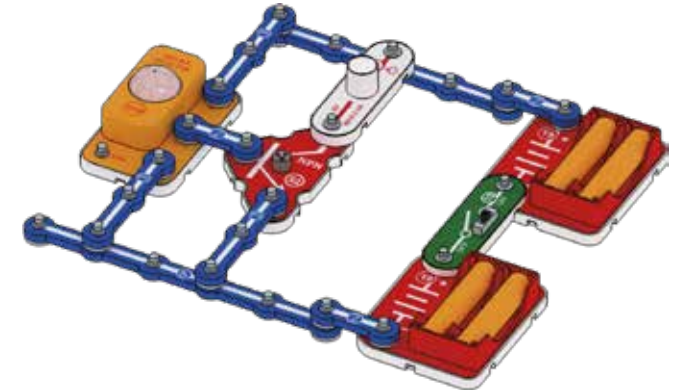


You can also connect components such as 9, 17, 18, 24, 26, 27, 71, 87, H1, and L4 to the collector end of the NPN transistor, and then connect them in parallel or series, with various combinations waiting for you to implement.



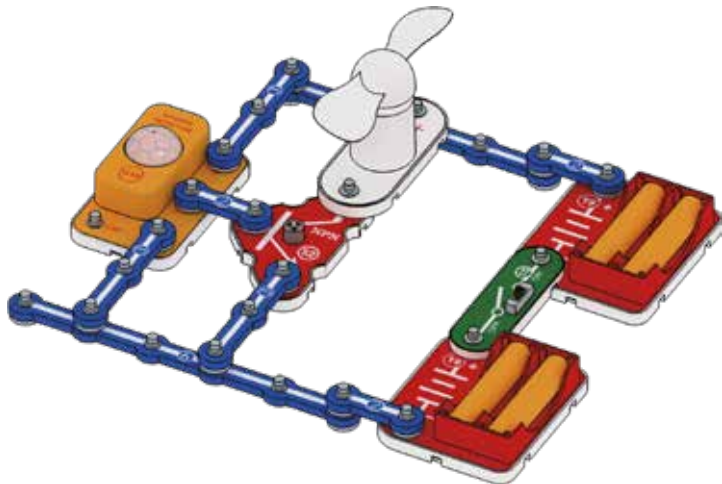
3. MOTION DETECTOR WITH TRANSISTOR AMPLIFICATION

- 1 Connect the NPN transistor to the output terminal U19 to achieve a current amplification effect, enabling the circuit to drive various appliances including those labeled 18, 24, 27, 71, and others. Other operations are the same as mentioned above.



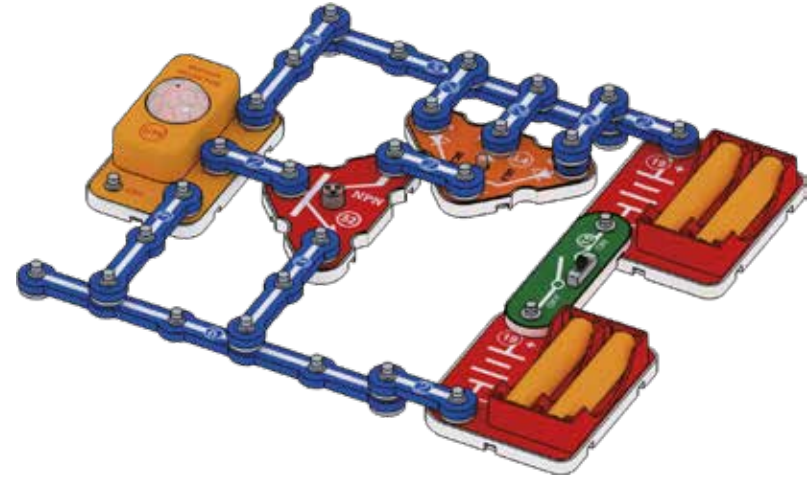
4. MOTION DETECTOR WITH COLORFUL FAN

- 1 The operation is the same as mentioned above.



5. MOTION DETECTOR WITH RGB LED

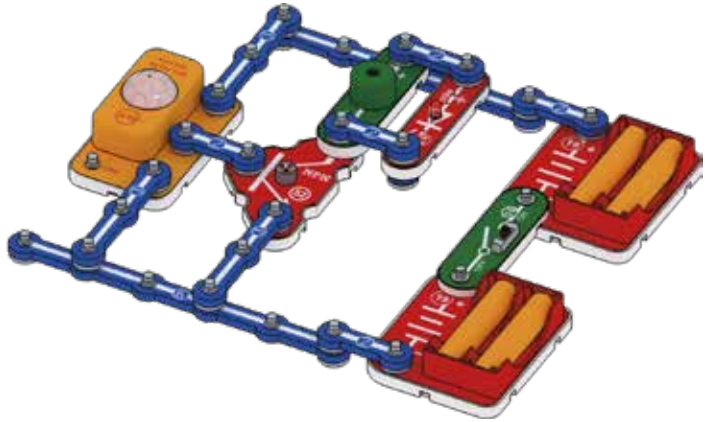
- 1 The operation is the same as mentioned above.





6. MOTION DETECTOR WITH APPLIANCES IN PARALLEL

- 1 The operation is the same as mentioned above.

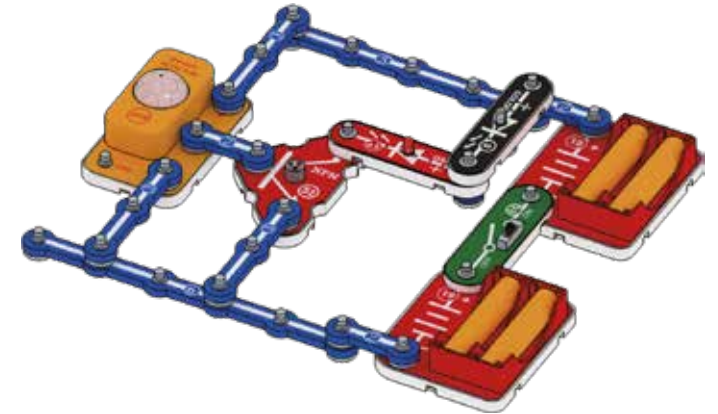


You can also connect components such as 9, 17, 18, 24, 26, 27, 71, 87, H1, and L4 to the collector end of the NPN transistor, and then connect them in parallel or series, with various combinations waiting for you to implement.



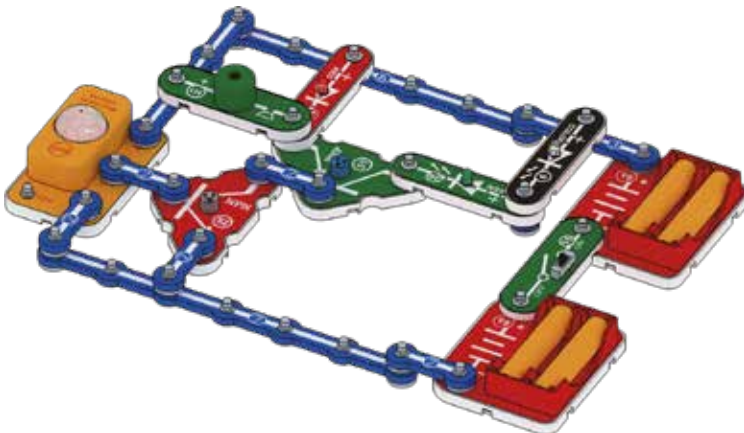
7. MOTION DETECTOR WITH APPLIANCES IN SERIES

- 1 The operation is the same as mentioned above.



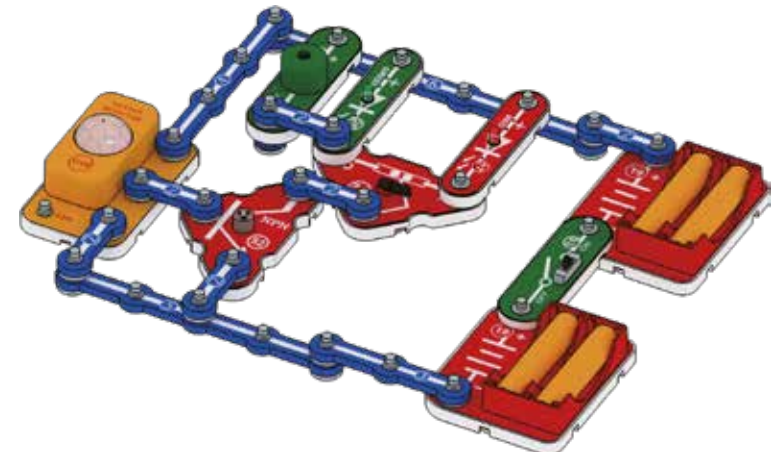
8. MOTION DETECTOR WITH SPDT SWITCH FOR APPLIANCES SWITCHING

- 1 By throwing the single pole, double throw switch to the B or C position, different appliances can be activated.



9. MOTION DETECTOR WITH BALL SWITCH FOR APPLIANCES SWITCHING

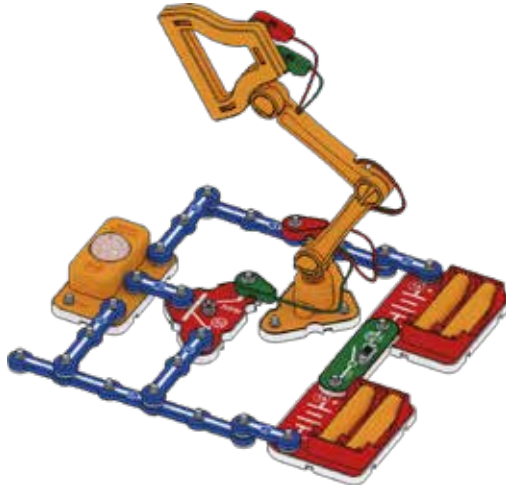
- 1 Tilt the ball switch towards the B or C end to activate different appliances.





10. MOTION DETECTOR WITH FLEXIBLE DESK LAMP

- 1 The operation is the same as mentioned above; when someone moves, the flexible desk lamp will light up.

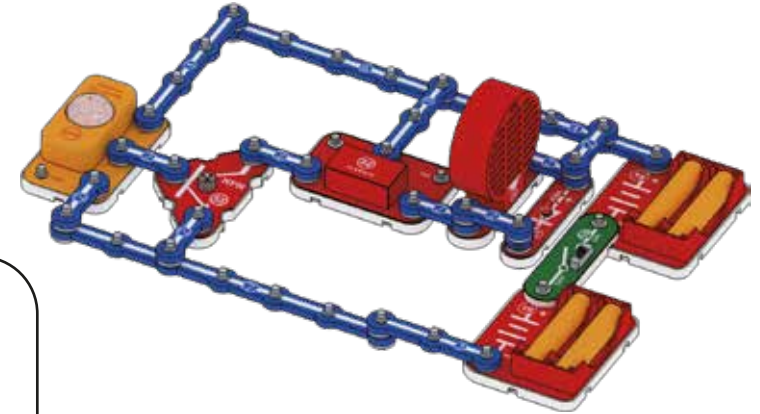


You can also connect components such as 9, 17, 18, 24, 26, 27, 71, 87, H1, and L4 to the collector end of the NPN transistor, and then connect them in parallel or series, with various combinations waiting for you to implement.



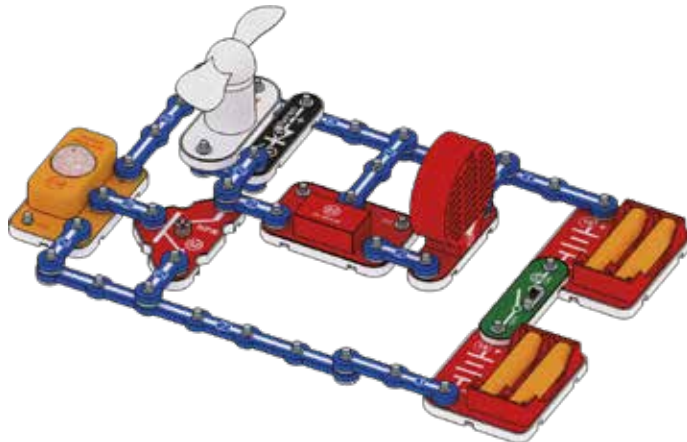
11. MOTION DETECTOR WITH ALARM SOUND

- 1 The operation is the same as mentioned above; when someone moves, the alarm sound will go off.



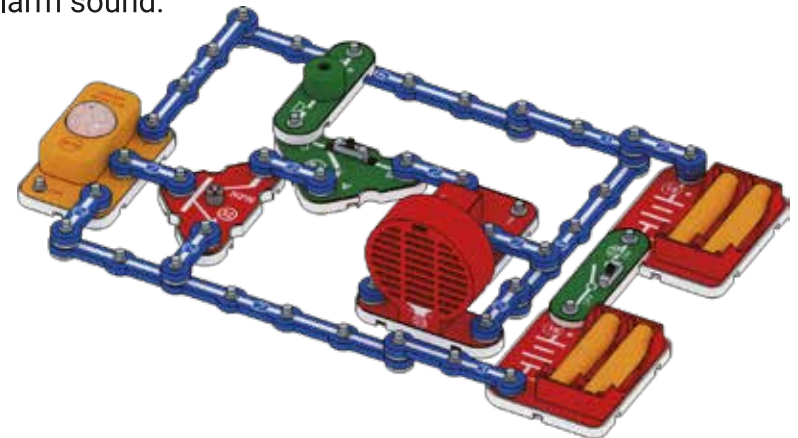
12. MOTION DETECTOR WITH ALARM SOUND AND COLORFUL FAN IN PARALLEL

- 1 The operation is the same as mentioned above; when someone moves, both the alarm sound and the colorful fan will start up simultaneously.



13. MOTION DETECTOR WITH SOUND SWITCHING

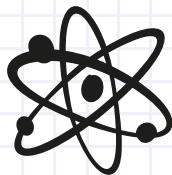
- 1 By switching the single pole, double throw switch to the B or C position, you can toggle between the buzzer sound and the alarm sound.



PARTS LOCATION COMPARSION CHART



PLAYING WITH ELECTRONICS



LEARNING CIRCUIT KNOWLEDGE