

## KNS130

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# USER MANUAL

## 1. Introduction



### To all residents of the European Union

#### Important environmental information about this product

This symbol on the device or the package indicates that disposal of the device after its lifecycle could harm the environment. Do not dispose of the unit (or batteries) as unsorted municipal waste; it should be taken to a specialized company for recycling. This device should be returned to your distributor or to a local recycling service. Respect the local environmental rules.

**If in doubt, contact your local waste disposal authorities.**

Thank you for choosing Velleman! Please read the manual thoroughly before bringing this device into service. If the device was damaged in transit, do not install or use it and contact your dealer.

## 2. Safety Instructions



Read and understand this manual and all safety signs before using this appliance.



Choking hazard due to small parts. Not for children under 3 years.

# 8+

Recommended age: +.

- This product is intended for use for educational purposes in schools and other pedagogical contents under the surveillance of an adult instructor, such as science equipment.
- Protect from rain, moisture, splashing and dripping liquids, shocks and abuse, extreme heat and dust.

## 3. Warning

Adult supervision and assistance is required.

This unit is only for use by children aged 8 years and older.

Not suitable for children under age 3 years old due to small part(s) and component(s) – CHOKING HAZARD FROM INGESTION.

Read and follow all instructions in the manual before use.

This toy contains small parts and functional sharp points on components. Keep away from children under age 3 years.

2 x AA size batteries are required (not included).

Please retain the information and this manual for future reference.

Instructions for parents are included and have to be observed.

Do not use close to the ear! Misuse may cause damage to hearing.

## 4. Caution

Before setting up any experiment, please double check and make sure all wiring connections you have made are correct before inserting the batteries and switching on the unit, as failure may result in damage to components or circuit board unit.

When experiment is finished, make sure the batteries are disconnected and switch off the unit before you clear away the wires.

Do not apply any components or parts to the experiment other than those provided with this kit.

The toy is not to be connected to more than recommended number of power supplies.

Hair entanglement may result if the child's head is too close to the motorized unit of this toy. This toy contains functional sharp points on component leads and wires, requiring care when handling.

## **5. General Guidelines**

- Refer to the Velleman® Service and Quality Warranty on the last pages of this manual.
- All modifications of the device are forbidden for safety reasons. Damage caused by user modifications to the device is not covered by the warranty.
- Only use the device for its intended purpose. Using the device in an unauthorised way will void the warranty.
- Damage caused by disregard of certain guidelines in this manual is not covered by the warranty and the dealer will not accept responsibility for any ensuing defects or problems.
- Nor Velleman group nv nor its dealers can be held responsible for any damage (extraordinary, incidental or indirect) – of any nature (financial, physical...) arising from the possession, use or failure of this product.
- Keep this manual for future reference.

## **6. Product description**

We take pleasure to welcome you to try out this ready-to-use electronic circuit kit suitable for children of 8 years old and up. "You'll be amazed" to find what you can learn as the experiment is a realistic concept of electronics and electricity. It will definitely enable you to learn about the necessary electronic components, circuits, and theories as well as the basic electronics principles – electricity, voltage, current, resistance, magnetism, other electrical circuit and theory.

It is alright if you have no knowledge about electronics and do not fully understand how all the experiments work. Once you get started you will be able to build your understanding through experimenting and maybe trying out some interesting experiments on your own.

This electronic circuit kit contains more than 50 experiments, and it is smartly designed that the main circuit board unit has all the relevant electronic components included. All you have to do is simply connect the wires according to the wiring sequence of each experiment and follow the steps one by one. Once connected the circuit will activate and function.

Remember this is not a one-time experiment. The more you spend on building the experiments the better knowledge you will gain. You will never get bored but totally engaged as you will discover more new exciting experiments for a few years to come.

### **EXPERIMENTS**

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50. Darkness activated spinning LED light
51. Light control spinning LED light

## 7. Glossary

**Amplifier** - An electronic circuit that amplifies the signal that is sent to it. The amplifying component can be a transistor, vacuum tube or appropriate magnetic device.

**Battery** - A source of energy. It contains chemicals which will undergo chemical reaction to produce electricity when a circuit is connected.

**Capacitance** - A measurement of the capacity of a capacitor for storing electric charge.

**Capacitor** - A device consists of two conductors that are separated by an insulator. It is designed for storing electrical charge or as a filter in a circuit.

**IC (Integrated Circuit)** - A small electronic device made of semiconductor material and is used for a variety of devices, including microprocessors, electronic equipment and automobiles.

**Light Sensor** - There are different types of light sensor. The one used here is a phototransistor. When light falls on it, it is like a switch connected and so current is allowed to pass through it.

**Diode** - A device used in electric circuitry to allow an electric current to flow in single direction and block it in the reverse direction.

**Microphone** - A device converts sound into an electrical signal.

**Motor** - A device converts electrical energy to mechanical motion.

**LED (Light Emitting Diode)** - A diode emits light when current is passing through it.

**Resistance** - A measurement of the degree to which an object opposes an electric current through it.

**Resistor** - A device designed for possessing resistance.

**Speaker** - A device that changes electrical signals into sound.

**Switch** - A device for opening and closing power source to a circuit.

**Transistor** - A semi-conductor device that amplifies a signal and opens or closes a circuit.

**Truth Table** – It is a mathematical table used to logically compute the values of logical explication and as a decision procedure.

**Variable Resistor** – A kind of resistor and a device of adjustable resistance in the electronic / electrical circuit.

**Wire** - A conductor that conducts electricity. Connecting a wire is like providing a path that allows electricity to flow through.

**Reed-switch:** This is a magnetic switch which contains metal reeds inside. When a magnet is close to it, the attractive force will cause the reeds to come together. Thus they will be in contact and the path is connected

**Touch plate:** It is a plate with two parts of conducting surfaces. The two surfaces are not connected but with a little gap between them. Electricity cannot flow through because of the little gap. When touched by a finger, or dripped with a water droplet, then the little gap is filled and electricity can flow through it (though the resistance is quite large because the resistance of water is quite large)

**Buzzer:** A device that can produce simple sound

**SCR:** A silicon-controlled rectifier, or SCR, is like a traffic cop for electricity in electronic devices. It allows the flow of electricity in one direction, acting like a gate that opens and closes. It's a special kind of switch that helps control the power and make sure everything runs smoothly.

## 8. Battery Information

Use 2 x 1.5V AA size batteries (not included).

For best performance, always use fresh batteries and remove batteries when not in use.

Batteries must be inserted with the correct polarity.

Non-rechargeable batteries are not to be recharged.

Re-chargeable batteries are only to be charged under adult supervision.

Re-chargeable batteries are to be removed from the toy before being charged.

Different types of batteries or new and used batteries are not to be mixed.

Exhausted batteries are to be removed from the toy.

The supply terminals are not to be short-circuited.

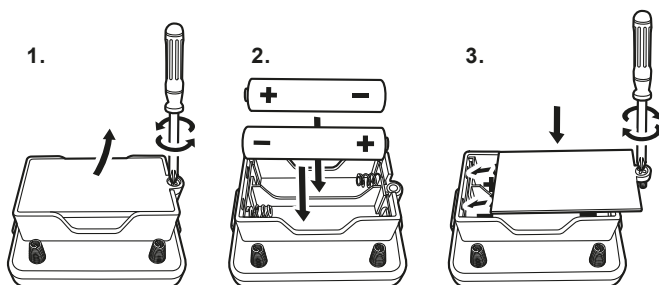
Only batteries of the same or equivalent types are to be used.

Do not dispose of the batteries in fire.

Do not mix old and new batteries.

Do not mix alkaline, carbon zinc and re-chargeable batteries.

To insert batteries please unscrew battery cover with a screw driver. Insert the required batteries in accordance with battery polarity with + and – ends in the right position and then fix screw on the battery cover to close the battery compartment case.



## 9. Wiring sequence and connection

Ensure all wires are correctly connected to the numbered spring terminals of the main circuit board unit as stated wiring sequence of each experiment. Bend the spring terminal over and insert the exposed shiny conductor part of wire into spring terminal. Make sure the wire is securely connected to spring terminal.

For example if the wiring sequence is 4-33, 1-10-32-35, 2-12, then connect a wire between spring terminal 4 and 33; and then connect a wire between spring terminal 1 and 10, and a wire between spring terminal 10 and 32, and a wire between spring terminal 32 and 35; and finally connect a wire between

spring terminal 2 and 12. This is an example for reference only, not an exact circuit connection in the experiment.

If the circuit does not work, you can check the wire and spring terminal connection whether it is not well connected or insulated plastic part of a wire is inserted to spring terminal.

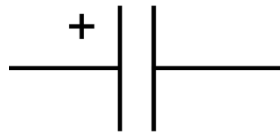
## 10. Component characteristic

In this experiment kit, you will learn basic circuit theory, characteristic of capacitor, IC (Integrated Circuit), LED (Light Emitting Diode), light sensor, resistor and transistor. You can learn that when transistor and capacitor work together, various light and sound effects can be made in different circuit connections.

**Capacitor** is a device consists of two conductors that are separated by an insulator. It is designed for storing electrical charge or as a filter in a circuit. It is a commonly used component in electronic and electrical circuits as an energy storage device or as a filter device to filter out electronic noisy or useless frequency signals. There are various types of capacitor which are designed for different electronic / electrical circuit applications.

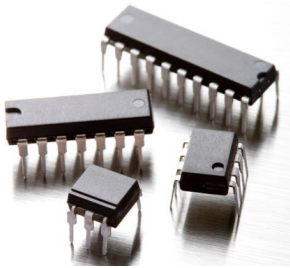


Electrolytic Capacitor



Circuit symbol

**IC (Integrated Circuit)** is a small electronic device made of semiconductors and is used for a variety of devices, including microprocessors, electronic equipment and automobiles. IC is made by a large number of transistors into a "chip" (silicon). It is now a critical and commonly used component in a wide variety of applications from toys, household products to state-of-the-art equipment.

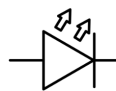


Integrated Circuit

**LED (Light Emitting Diode)** is a diode which emits light when electric current passes through it. LED has various light colors which depend on what kind of semi-conducting materials are used. It is a commonly used device in household and vehicle lighting appliance.



LED (Light Emitting Diode)

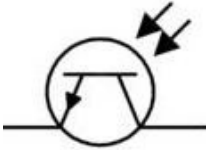


anode

Cathode

Circuit symbol

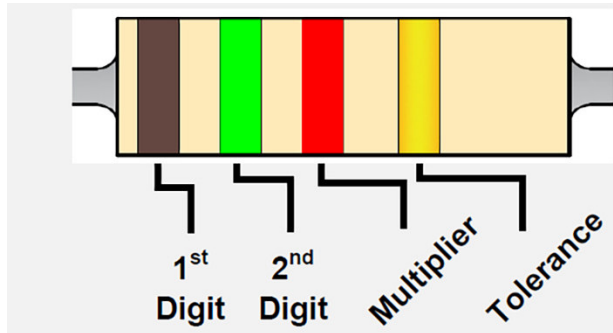
**Light Sensor** is a device that reacts to light. There are different types of light sensor. The one used here is a phototransistor. When there is no light, electric current cannot pass through it. And therefore it is like a switch that is switched off. When there is light falling on it, electric current can pass through it. It is then like a switch that is switched on. This way a light control circuit can be made.



Circuit symbol

**Resistor** uses different color rings to represent the value (resistance). The 1st and 2nd rings represent the digit. The 3rd ring represents the multiplier as table shown. The 4th ring represents tolerance that means the precision of the resistance. Example: The color rings are Brown, Red, Brown and Gold which represents resistance is 120 ohm, tolerance 5% ( $\Omega$ ).

Color Identification Code



Color	1st	2nd	3 <sup>rd</sup> - multiplier	Tolerance
Black	0	0	x 1	
Brown	1	1	x 10	
Red	2	2	x 100	
Orange	3	3	x 1000	
Yellow	4	4	x 10000	
Green	5	5	x 100000	
Blue	6	6	x 1000000	
Purple	7	7		
Grey	8	8		
White	9	9		
Brown				+/- 1%
Red				+/- 2%
Gold			x 0.1	+/- 5%
Silver			x 0.01	+/- 10%

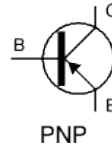
**Transistor** is a semi-conductor device that is used to amplify a signal and to open or close it in a circuit. There are two types of transistors, namely **NPN** and **PNP**, with similar circuit symbol. The transistor is a fundamental device commonly used in the modern electronic equipment. It has the fastest response and accurate action as amplifier and switching device, and can act as an individual device / component or as a part of IC (Integrated Circuit). IC is built of over a thousand to million transistors.



Transistor



NPN



PNP

Circuit symbol

If you have already read the above information and would like to understand more about electric circuit knowledge as well as how useful the components can be, then let's carry out the following experiments.

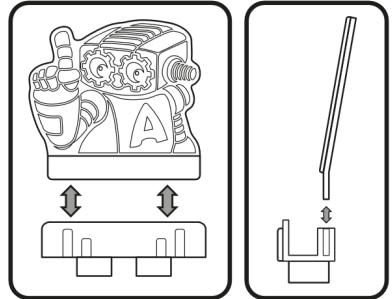
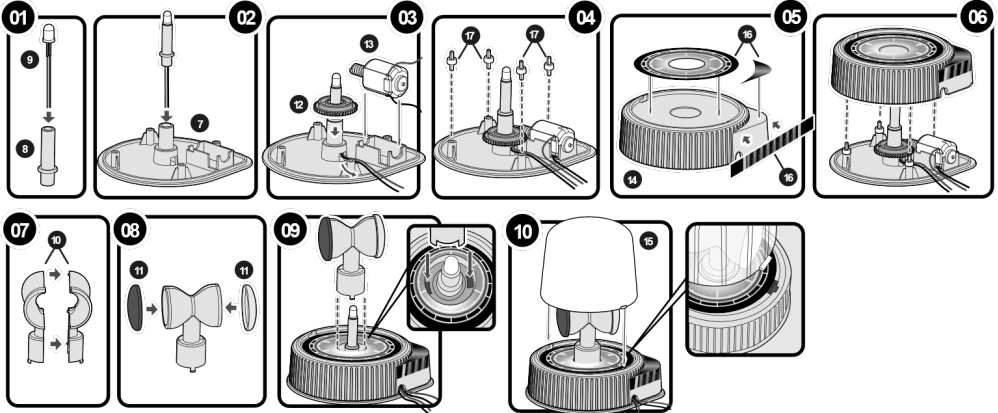
**The motor** is a device that produces rotary motion when electricity is provided. As an analogy, the battery is like a pump that pumps water through the pipes (wires). When a circuit is connected, electricity can flow through it. The electricity flowing is called a current. A current is the flow of electric charges. The amount of a current is the amount of electric charge flowing in the wire in a second. Another common term we often heard about electricity is the voltage. Voltage is referring to the electric energy per unit charge. It is the electric energy of each unit amount of electric charge carries.

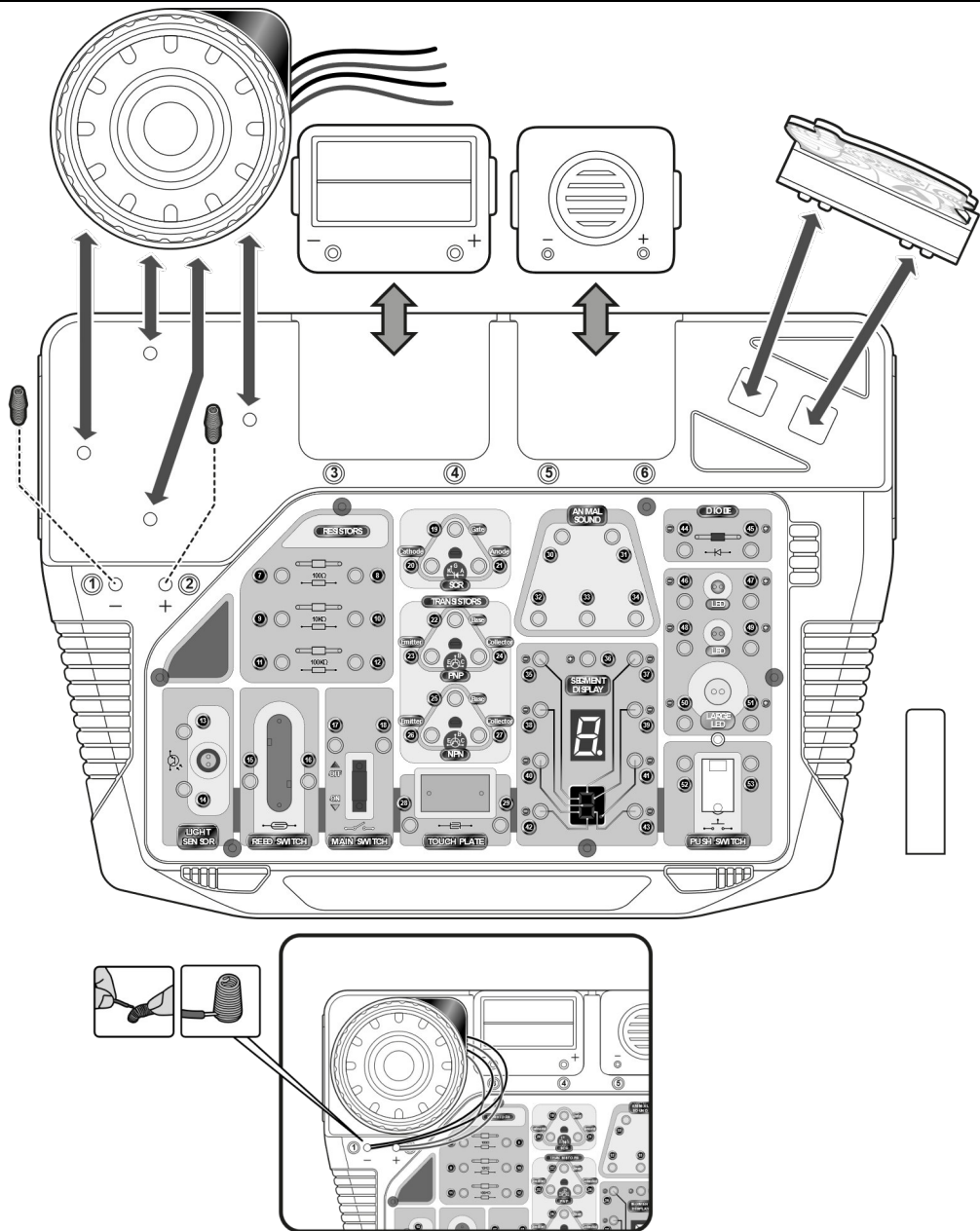




## 11. Assembling

Spinning LED light:



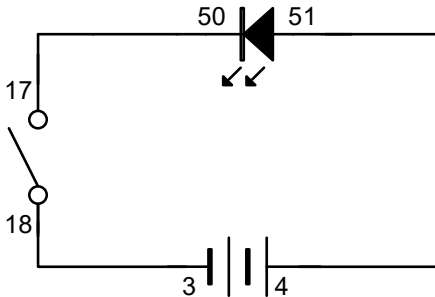


## 12. Experiments

### 12.1 Simple LED circuit

Wiring Sequence

4-51, 50-17, 18-3



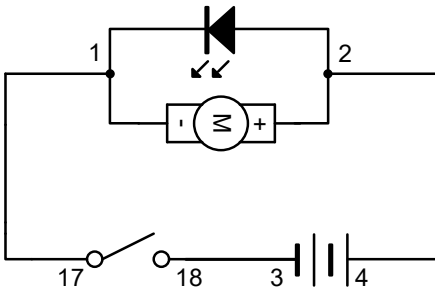
Complete all wiring connections as indicated in the sequence. By switching ON, the LED will light up. By switching OFF, the LED will extinguish.

You can change to use another LED yourself. Simply look at the circuit diagram, and connect to another LED in the same way. Just don't mix up the positive (+) and negative (-) pole. Otherwise the LED will not light up.

### 12.2 Spinning LED light

Wiring Sequence

4-2, 1-17, 18-3

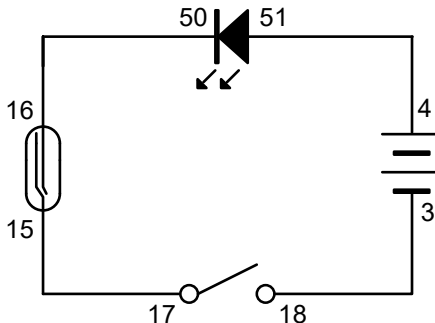


Complete all wiring connections as indicated in the sequence. Switch on the main switch. The spinning LED will light up and spin!

### 12.3 Function of the reed switch

Wiring Sequence

4-51, 50-16, 15-17, 18-3

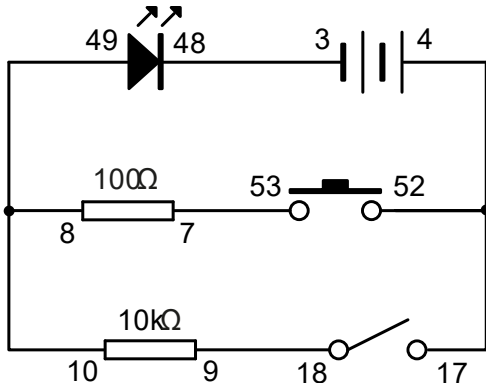


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Access the reed switch with the magnetic pole. The LED will light up as the circuit is connected. Move away the magnetic pole, and the circuit will be disconnected, and the LED will be off.

## 12.4 Demonstration of resistance and current

Wiring Sequence

48-3, 4-52-17, 18-9, 10-49-8, 7-53

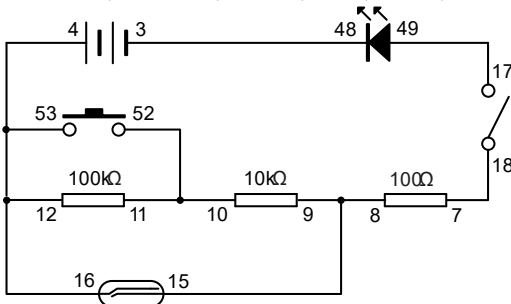


Complete all wiring connections as indicated in the sequence. Switch on the main switch. The LED will light up dimly. Switch off the main switch to turn it off. Now press the push switch. The LED will light up more brightly. This is because the path of the main switch has a resistor of larger resistance. So the current through this path will be less, and as a result the LED will be less bright. On the other hand, the path of the push switch has a resistor of smaller resistance. So the current through this path will be more, and the LED will be brighter.

## 12.5 Resistors in series connection

Wiring Sequence

4-12-16-53, 52-11-10, 9-15-8, 7-18, 17-49, 48-3

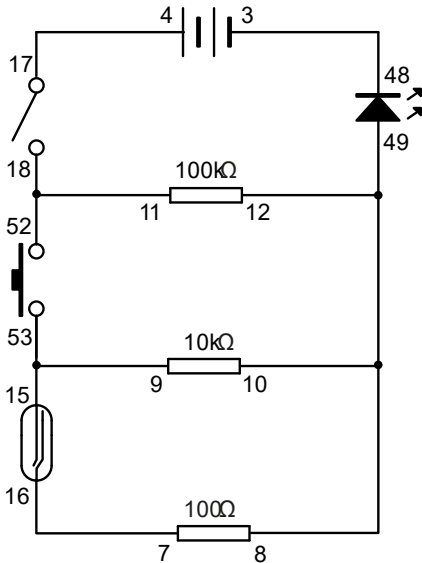


Complete all wiring connections as indicated in the sequence. Switch on the main switch. The electric current from the batteries will have to pass through 3 resistors, and therefore the LED will light up very dimly, or apparently not light up at all. Press the push switch. This time, the current will have to pass through 2 resistors only, so the LED will light up brighter than before. Access the reed switch with the magnetic pole. This time, the current will have to pass through 1 resistor only, so the LED will light up even more brightly. As an analogy, a resistor is like an obstacle. The fewer obstacles are there in the circuit, the more current can flow through.

## 12.6 Resistors in parallel connection

Wiring Sequence

4-17, 18-11-52, 53-9-15, 16-7, 8-10-12-49, 48-3

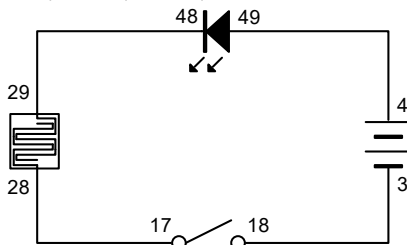


Complete all wiring connections as indicated in the sequence. Switch on the main switch. The electric current from the batteries will pass through the  $100\text{k}\Omega$  resistor to light up the LED. The LED will light up very dimly, or apparently not light up at all. Press the push switch. Now one more path is available. Though there is a  $10\text{k}\Omega$  resistor in this path, this is still an extra path for the current to flow through. Therefore more current will flow through the LED and make it light up more brightly! Do not release the push switch. Access the reed switch with the magnetic pole. Now one more extra path is also available! There are total 3 paths for the current to flow through now and so the LED will light up brightly! Though this time there are also 3 resistors in the circuit, the LED lights up brightly. The resistors are in parallel connection so this causes a different result.

## 12.7 Function of the touch plate

Wiring Sequence

4-49, 48-29, 28-17, 18-3

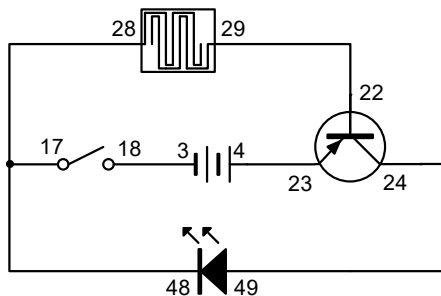


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Dampen your finger with water and touch the touch plate. The LED will light up very dimly. This indicates water has a large resistance and so only a small amount of electric current is able to pass through. If you put a drop of salt water onto the touch plate, the LED will light up more brightly! This is because salt water is a better conductor than plain water, and thus more current can pass through.

## 12.8 A simple demonstration of a function of the PNP transistor

Wiring Sequence

4-23, 24-49, 22-29, 28-48-17, 18-3

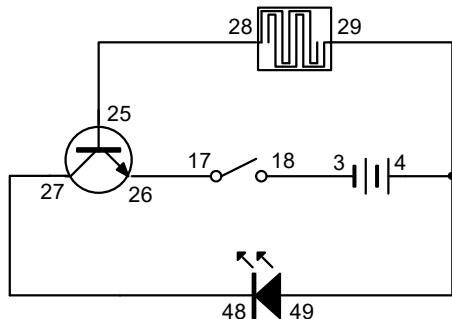


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Dampen your finger with water and touch the touch plate. Through only a very little amount of electric current flows through the touch plate (as shown in the last experiment), the LED is switched on brightly! It is because in this circuit, the PNP transistor is the real gateway to the LED, and the touch plate is only acting as a switch for opening the gateway! When the upper part of the circuit is not connected, no current is flowing through the "Emitter" to the "Base" of the transistor. So the gateway of the "Emitter" to the "Collector" is shut. When you touch the touch plate, the upper circuit is connected; a very small amount of current passes through the "Emitter" to the "Base", and then the gateway of the "Emitter" to the "Collector" is opened! Electric current from the battery can then flow through the transistor to the LED, and therefore the LED will light up brightly!

## 12.9 A simple demonstration of the function of the NPN transistor

Wiring Sequence

28-25, 26-17, 18-3, 4-29-49, 48-27

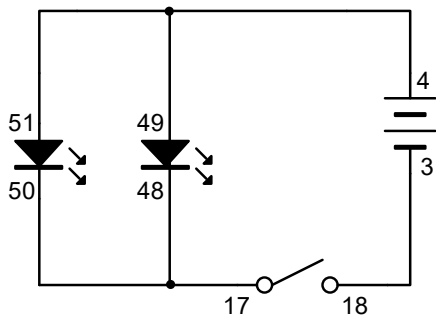


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Touch the touch plate. Through only a very little amount of electric current flows through the touch plate (as shown in the last experiment), the LED is switched on brightly! This is pretty much the same as the case of the PNP transistor. It is just the polarities of the transistor that are reversed.

## 12.10 Two LEDs in parallel connection

Wiring Sequence

4-49-51, 50-48-17, 18-3

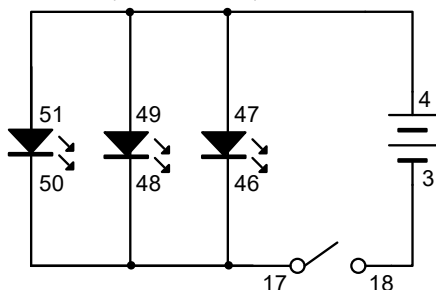


Complete all wiring connections as indicated in the sequence. By switching ON, both LEDs will light up. By switching OFF, both LEDs will extinguish.

### 12.11 Three LEDs in parallel connection

Wiring Sequence

4-47-49-51, 50-48-46-17, 18-3

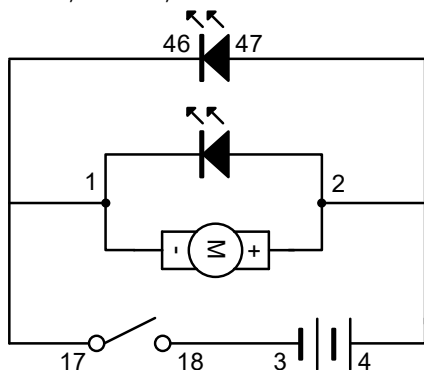


Complete all wiring connections as indicated in the sequence. By switching ON, three LEDs will light up. By switching OFF, All three LEDs will extinguish.

### 12.12 LED and spinning LED with a single switch

Wiring Sequence

4-2-47, 46-1-17, 18-3

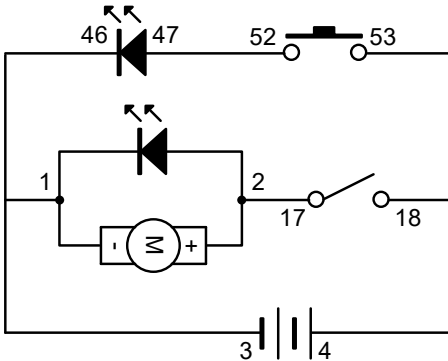


Complete all wiring connections as indicated in the sequence. Switch on the main switch. The LED will light up and the spinning LED light will be on. When you switch off the main switch, both devices will be off at the same time.

### 12.13 LED and spinning LED with separate switches

Wiring Sequence

4-18-53, 17-2, 52-47, 46-1-3

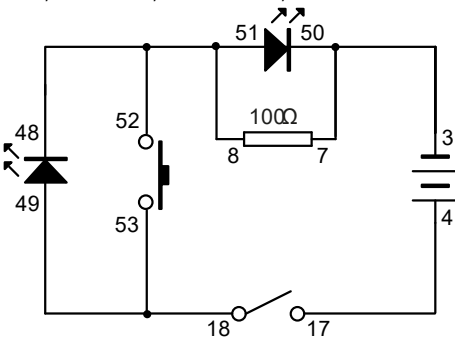


Complete all wiring connections as indicated in the sequence. If you switch on the main switch, the spinning LED light will be on. If you press the push switch, the LED will light up. They are controlled by separate switches so you can turn them on and off individually.

### 12.14 Basic circuit operation of LED

Wiring Sequence

4-17, 18-49-53, 52-48-51-8, 7-50-3



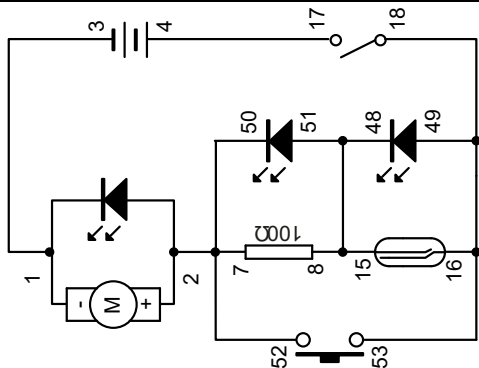
Complete all wiring connections as indicated in the sequence. Switch on the main switch. You will see that the small LED will light up but the large LED will not. When you press the push switch, you will see the large LED will light up but the small LED will be turned off.

### 12.15 Spinning LED light in advance circuit operation of LEDs

Wiring Sequence

4-17, 18-49-53-16, 15-48-51-8, 7-50-52-2, 1-3



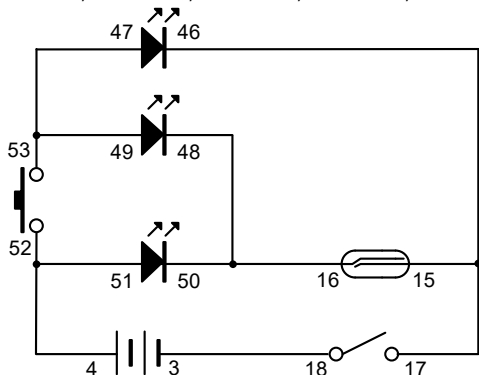


Complete all wiring connections as indicated in the sequence. Switch on the main switch. You will see that the blue LED will light up but the other LEDs will not light up. When you access the reed switch with the magnetic pole, the blue LED will be off and now only the yellow LED will light up. Press the push switch. This time only the spinning LED will be on!

### 12.16 LEDs Combination

Wiring Sequence

4-52-51, 50-16-48, 49-53-47, 46-15-17, 18-3

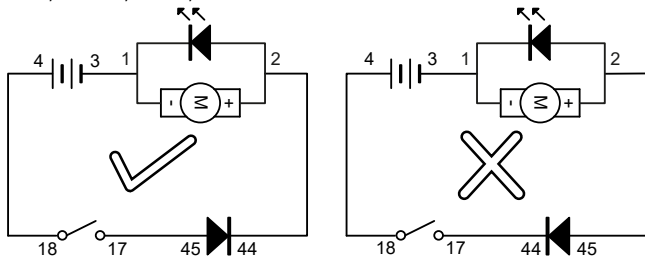


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Pressing the push switch, or accessing the reed switch with the magnetic pole, or doing both at the same time will lead to different LED performances!

### 12.17 Function of a diode

Wiring Sequence

4-18, 17-45, 44-2, 1-3

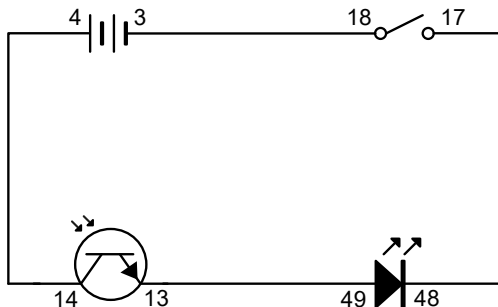


Complete all wiring connections as indicated in the sequence. Switch on the main switch. The motor will spin. If you reverse the connection polarity of the diode by changing the wiring connection a bit, 17 connect to 44 and 2 connect to 45, then this time you will find that the circuit does not work. This is because the diode does not allow current to follow through it in a reverse direction. Therefore the circuit does not work this time.

### 12.18 A simple demonstration of the light sensor

Wiring Sequence

4-14, 13-49, 48-17, 18-3

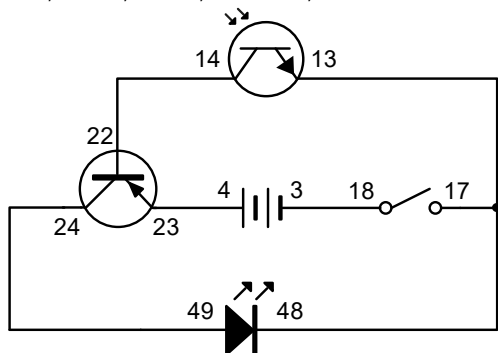


Complete all wiring connections as indicated in the sequence. Switch on the main switch. You may notice that the LED lights up very dimly. This indicates only a very small amount of current is flowing through it. It depends on the intensity of light falling onto the light sensor. If you perform this experiment in a darker place, the LED may not light up at all. If you use a torch to shine on the light sensor, you can see that the LED light up brightly. This is because when there is more light, more current will be able to pass through the light sensor and light up the LED.

### 12.19 A practical example: Light triggered LED

Wiring Sequence

4-23, 22-14, 24-49, 48-13-17, 18-3

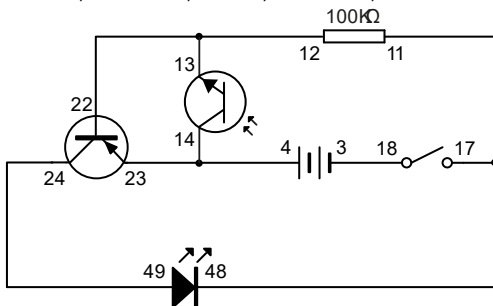


Complete all wiring connections as indicated in the sequence. Switch on the main switch. This time, even with a small amount of light, the LED will light up brightly! It is because in this circuit, the PNP transistor is the real gateway to the LED, and the light sensor is only acting as a switch for opening the gateway! When the upper part of the circuit is not connected, no current is flowing through the "Emitter" to the "Base" of the transistor. So the gateway of the "Emitter" to the "Collector" is shut. When light falls on the light sensor, the upper circuit is connected; a very small amount of current passes through the "Emitter" to the "Base", and then the gateway of the "Emitter" to the "Collector" is opened! Electric current from the battery can then flow through the transistor to the LED, and therefore the LED will light up brightly! This circuit makes the light sensor to become a sensitive switch to detect light.

## 12.20 A practical example: Darkness triggered LED

Wiring Sequence

4-14-23, 22-13-12, 24-49, 48-11-17, 18-3

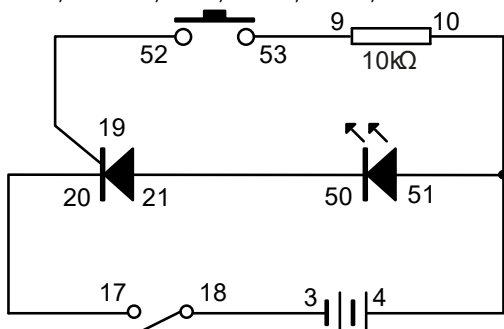


Complete all wiring connections as indicated in the sequence. Switch on the main switch. If you are in a room with bright light, then the LED will not be on. When you cover the light sensor, the LED will light up. This means the LED is switch on by darkness instead of light!

## 12.21 Demonstration of a simple function of SCR

Wiring Sequence

21-50, 51-4-10, 9-53, 52-19, 20-17, 18-3

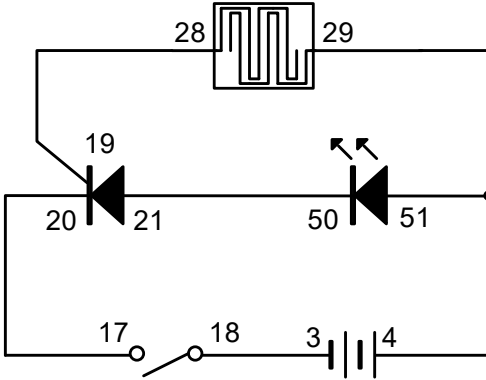


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Nothing happens. And then press the push switch without releasing it. The upper part of the circuit is connected and thus current can flow through the gate (G) and cathode (K) of the SCR as it is a complete circuit. This is like opening the gate of the SCR. And the main current can flow through the anode (A) and the cathode (K), which lights up the LED. Release the push switch. The LED will still continue to glow! This is because the "gate" is already opened by the initial current from the upper circuit and therefore the main current will continue to flow through the SCR. Therefore if you want to switch off the LED, you will have to switch off the main switch.

## 12.22 A practical example of SCR

Wiring Sequence

21-50, 51-4-29, 28-19, 20-17, 18-3

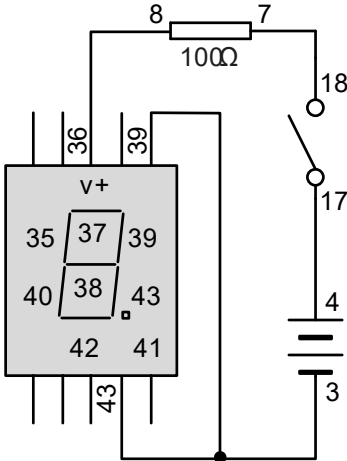


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Nothing happens. When there is a drop of water on the touch plate, the LED will light up. Even the touch plate is dried after that, the LED will still continue to glow, as the gate of the SCR has been opened. Base on this principle, you can set up a monitor to indicate that if the tide has ever reached a certain height, or if there is any rain during the period that you are out of home for a trip, or if something has ever got wet..... etc.

### 12.23 Digital segment LED displaying "1"

Wiring Sequence

4-17, 18-7, 8-36, 3-39-43

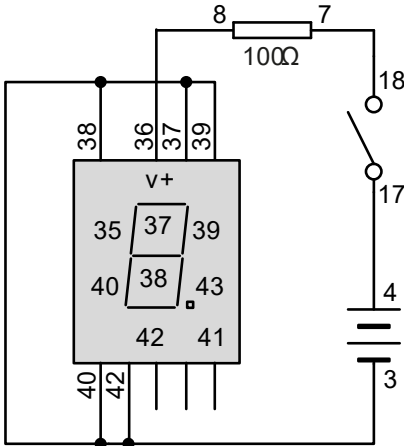


Complete all wiring connections as indicated in the sequence. By switching ON, the digital segment LED will display "1".

### 12.24 Digital segment LED displaying "2"

Wiring Sequence

4-17, 18-7, 8-36, 3-37-38-39-40-42

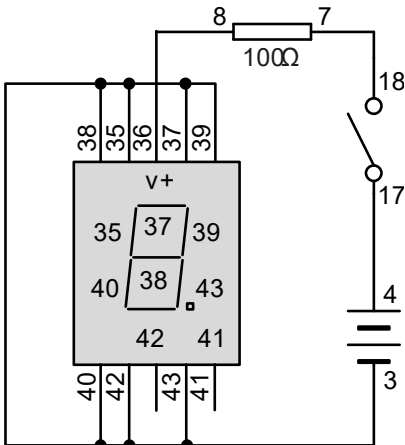


Complete all wiring connections as indicated in the sequence. By switching ON, the digital segment LED will display "2".

### 12.25 Digital segment LED displaying "8"

Wiring Sequence

4-17, 18-7, 8-36, 3-35-37-38-39-40-42-43

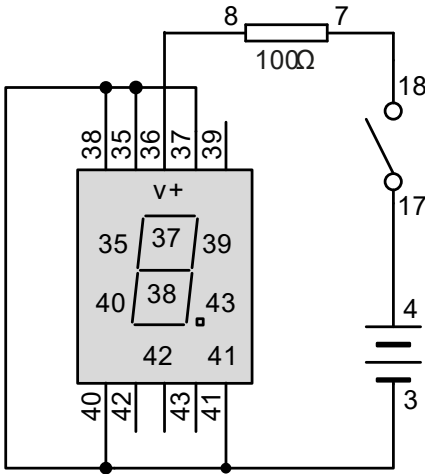


Complete all wiring connections as indicated in the sequence. By switching ON, the digital segment LED will display "8".

### 12.26 Digital segment LED displaying "F."

Wiring Sequence

4-17, 18-7, 8-36, 3-35-37-38-40-41

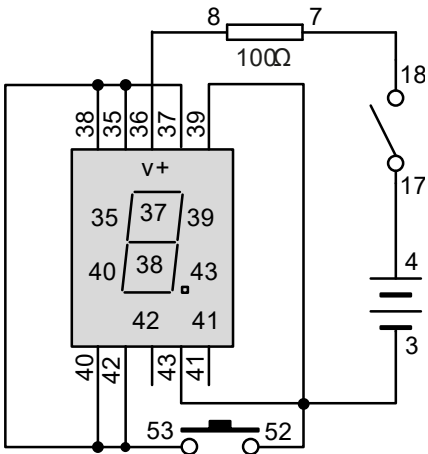


Complete all wiring connections as indicated in the sequence. By switching ON, the digital segment LED will display "F".

### 12.27 Digital segment LED switching between "1" and "8"

Wiring Sequence

4-17, 18-7, 8-36, 3-39-43-52, 53-35-37-38-40-42

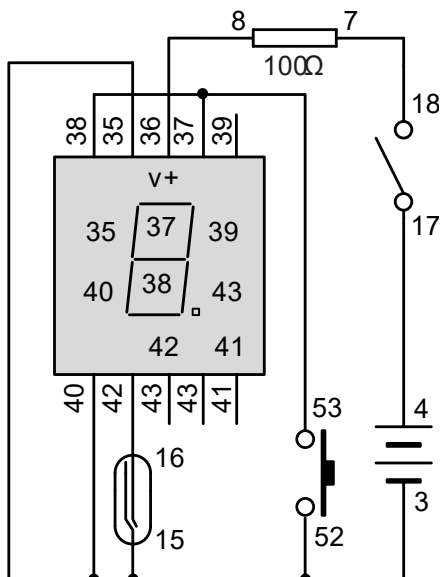


Complete all wiring connections as indicated in the sequence. Switch on the main switch. The digital segment LED will display "1". By pressing the push switch, the digital segment LED will display "8".

### 12.28 Digital segment LED switching among "I", "L", "F" and "E"

Wiring Sequence

4-17, 18-7, 8-36, 35-40-15-3-52, 53-37-38, 42-16

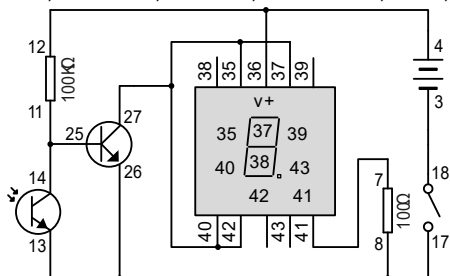


Complete all wiring connections as indicated in the sequence. Switch on the main switch. The digital segment LED will display "I". If you access the reed switch with the magnetic pole, the digital segment LED will display "L"; or if you press the push switch, the digital segment LED will display "F". And if you activate both switches at the same time, it will display "E".

### 12.29 Light control seven-segment LED display – C (Dark Type)

Wiring Sequence

3-18, 11-25-14, 4-36-12, 13-17-26-8, 7-41, 27-35-37-40-42

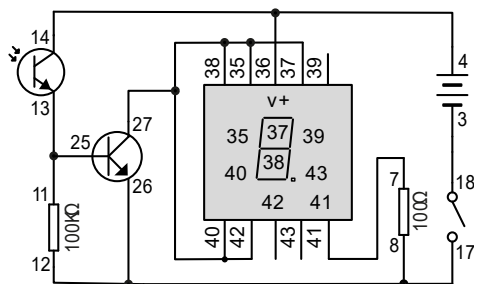


Complete all wiring connections as indicated in the sequence. Switch on the main switch. If there is enough light in the room, then only the power indicator on display lights up. Cover the light sensor and the display will show letter C. If you uncover the light sensor, the letter C will disappear..

### 12.30 Light control seven-segment LED display – E (Light Type)

Wiring Sequence

3-18, 41-7, 17-26-12-8, 11-13-25, 4-36-14, 27-35-38-37-40-42

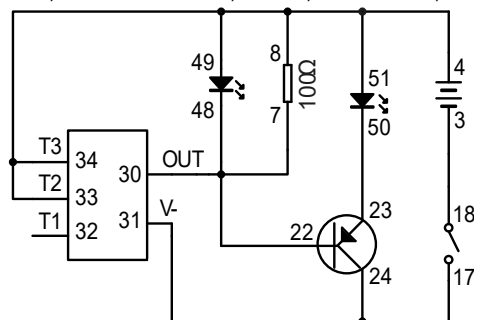


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Then power indicator will light up and letter E will show on display. When you cover the light sensor, only the power indicator will light up on display. If you uncover the light sensor, then letter E will light up again.

### 12.31 Flashing LEDs

Wiring Sequence

3-18, 8-4-51-49-33-34, 50-23, 7-22-30-48, 17-24-31

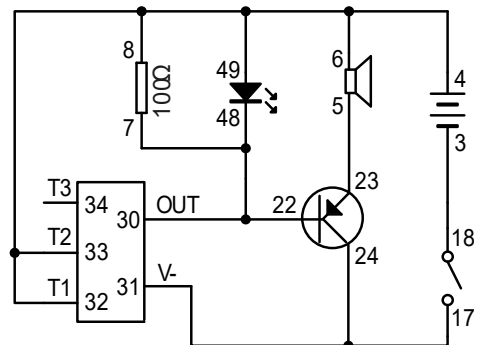


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Then the LEDs will flash.

### 12.32 Dog barking sound with flashing LED

Wiring Sequence

3-18, 4-6-8-32-33-49, 5-23, 7-22-30-48, 17-24-31



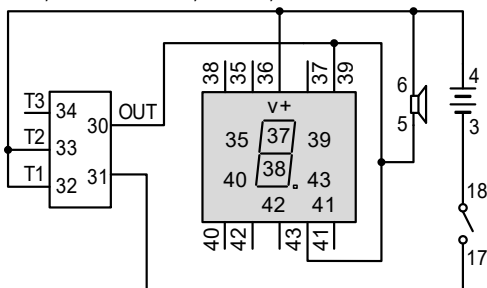
Complete all wiring connections as indicated in the sequence. Switch on the main switch. The speaker will produce dog barking sound and the LED will flash to the rhythm of it.



### 12.33 Dog barking sound and flashing digit "1"

Wiring Sequence

3-18, 4-6-36-32-33, 17-31, 30-39-43-5

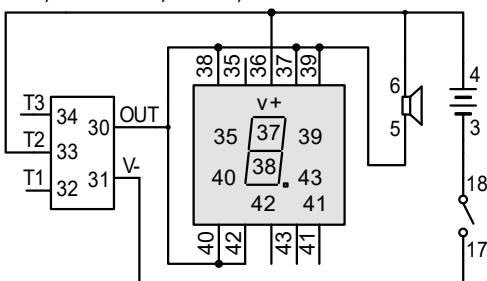


Complete all wiring connections as indicated in the sequence. By switching ON, the speaker will produce dog barking sound. The display screen will also display digit "1" and flash to the rhythm of it.

### 12.34 Rooster crowing sound and flashing digit "2"

Wiring Sequence

3-18, 4-6-36-33, 17-31, 5-30-37-38-39-40-42

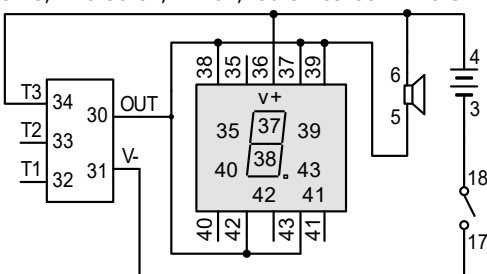


Complete all wiring connections as indicated in the sequence. By switching ON, the speaker will produce rooster crowing sound. The display screen will also display digit "2" and flash to the rhythm of it.

### 12.35 Cat meowing sound and flashing digit "3"

Wiring Sequence

3-18, 4-6-36-34, 17-31, 30-37-39-38-42-43-5

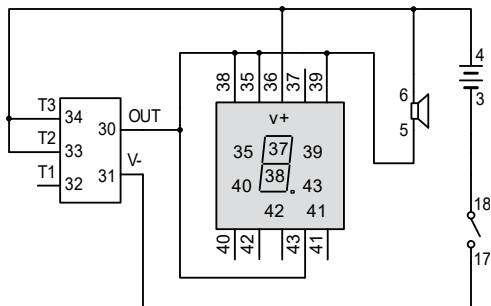


Complete all wiring connections as indicated in the sequence. By switching ON, the speaker will produce cat meowing sound. The display screen will also display digit "3" and flash to the rhythm of it.

### 12.36 Horse neighing sound and flashing digit "4"

Wiring Sequence

3-18, 4-36-33-34-6, 17-31, 30-35-38-39-43-5

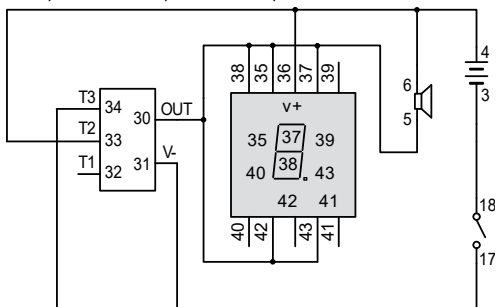


Complete all wiring connections as indicated in the sequence. By switching ON, the speaker will produce horse neighing sound. The display screen will also display digit "4" and flash to the rhythm of it.

**12.37 Bird chirping sound and flashing digit "5"**

Wiring Sequence

3-18, 4-6-36-33, 17-31-34, 5-30-35-37-38-42-43

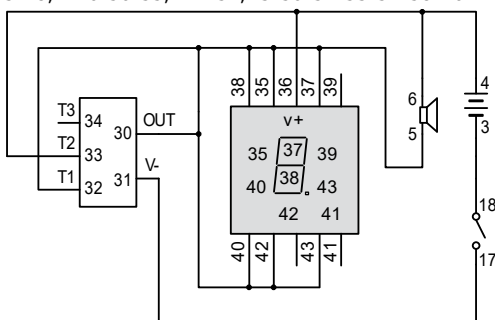


Complete all wiring connections as indicated in the sequence. By switching ON, the speaker will produce bird chirping sound. The display screen will also display digit "5" and flash to the rhythm of it.

**12.38 Duck quacking sound and flashing digit "6"**

Wiring Sequence

3-18, 4-6-36-33, 17-31, 5-30-32-35-37-38-40-42-43



Complete all wiring connections as indicated in the sequence. By switching ON, the speaker will produce duck quacking sound. The display screen will also display digit "6" and flash to the rhythm of it.

**12.39 Sheep baaing sound and flashing digit "7"**

Wiring Sequence

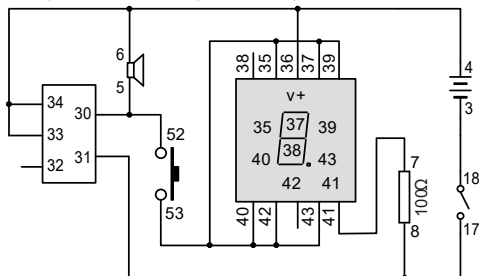
3-18, 4-6-36, 17-31, 5-30-32-37-39-43



## 12.42 Manual control horse neighing sound with push switch control flashing digit "0"

### Wiring Sequence

3-18, 4-6-36-34-33, 5-30-52, 53-40-42-43-35-37-39, 41-7, 8-31-17

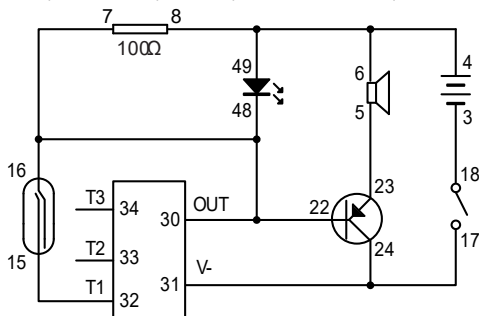


Complete all wiring connections as indicated in the sequence. By switching ON, the speaker will produce horse neighing sound, and the dot at the bottom right corner of the display screen will light up. And then by pressing the push switch without releasing it, digit 0 will light up and flash to the rhythm of the horse neighing sound.

## 12.43 Magnet control sheep baaing sound with flashing LED

### Wiring Sequence

3-18, 17-24-31, 32-15, 16-7-30-22-48, 49-8-6-4, 5-23

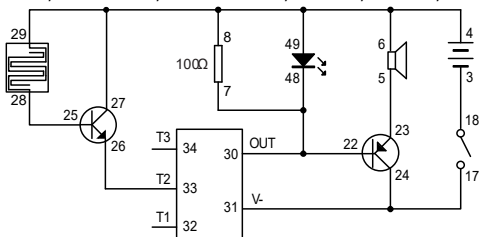


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Access the reed switch with the magnetic pole. The speaker will produce sheep baaing sound and the LED will flash to the rhythm of the sheep baaing sound.

## 12.44 Touch control rooster crowing sound with flashing LED

### Wiring Sequence

3-18, 17-24-31, 30-7-22-48, 33-26, 28-25, 23-5, 29-27-8-49-6-4

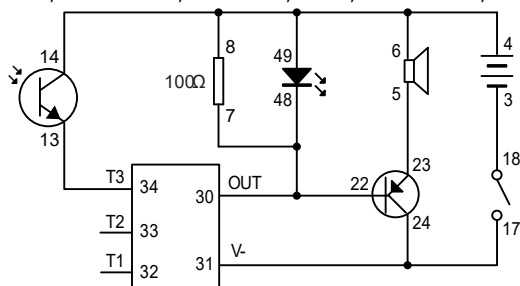


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Use your finger to touch the touch plate. The speaker will produce rooster crowing sound and the LED will flash to the rhythm of it. Note that if there is no response, you may have to dampen your finger and try again.

## 12.45 Light control cat meowing sound with flashing LED

Wiring Sequence

5-23, 22-48-7-30, 31-24-17, 18-3, 4-6-8-49-14, 13-34

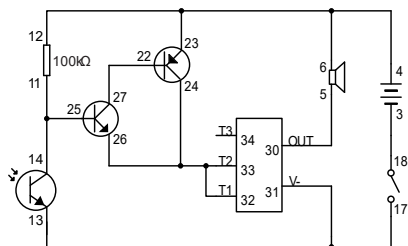


Complete all wiring connections as indicated in the sequence. Switch on the main switch. When there is light shone on the light sensor, the speaker will produce cat meowing sound and the LED will flash to the rhythm of it.

## 12.46 Darkness activated dog barking sound

Wiring Sequence

3-18, 4-6-23-12, 5-30, 17-31-13, 24-26-33-32, 22-27, 11-14-25

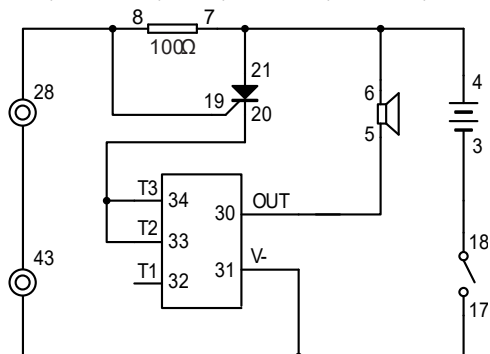


Complete all wiring connections as indicated in the sequence. Switch on the main switch and cover the light sensor completely. Then you can hear dog barking sound coming from the speaker. Once you uncover the light sensor, the dog barking sound will stop.

## 12.47 Security alarm based on wiring disconnection

Wiring Sequence

3-18, 17-43-31, 30-5, 4-6-21-7, 8-28-19, 20-33-34, 28-43

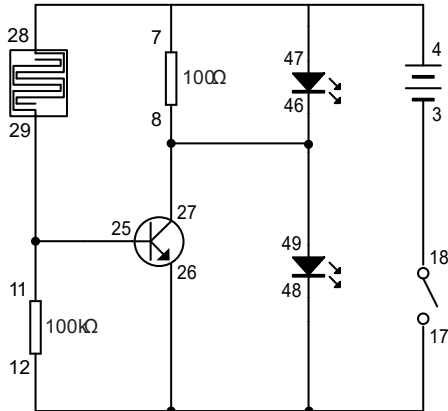


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Nothing happens. Then when you disconnect the wire connecting spring 28 to 43, the speaker will produce horse neighing sound! This circuit can be used as an alarm system. For example, when somebody trips on the alarm string, horse neighing sound will warn you of a trespasser!

### 12.48 Water level LED alarm

Wiring Sequence

3-18, 4-7-28-47, 17-48-12-26, 8-27-49-46, 11-29-25

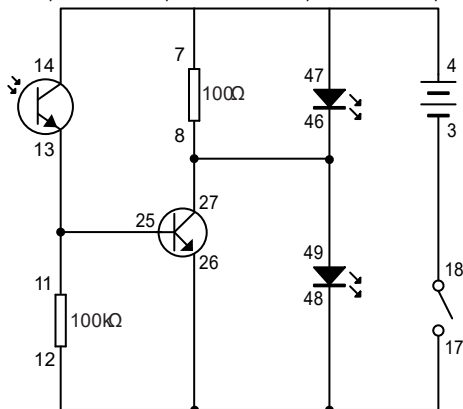


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Drop a drop of water on the touch-plate. Then the multi-color LED will light up and the blue LED will extinguish. Wipe the water off the touch-plate. Then the blue LED will light up and the multi-color LED will extinguish. This principle can be used for water-level warning. Have a similar circuit at the place where the water level is needed to be supervised. When the water-level is beyond warning level, the multi-color LED will light up, and the blue LED will extinguish. When the water level is below warning level, the multi-color LED will extinguish and the blue LED will light up.

### 12.49 Light intensity indicator

Wiring Sequence

3-18, 4-7-14-47, 17-12-26-48, 8-27-46-49, 11-13-25



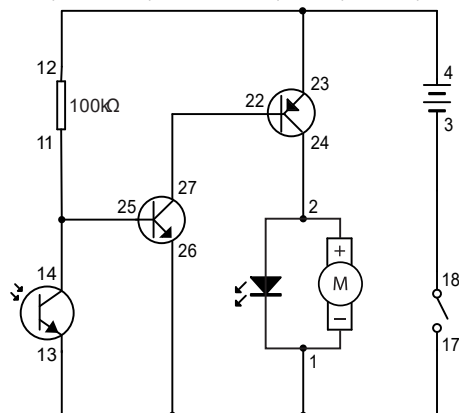
Complete all wiring connections as indicated in the sequence. Switch on the main switch. When there is light shining on the light sensor, the multi-color LED will light up, but the blue LED will not. Cover the light sensor completely. Since no light is shining on it, the multi-color LED will extinguish and the blue

LED will light up. When there is nothing covering the light sensor, the multi-color LED will light up and the blue LED will extinguish again. This can be used as a light intensity indicator.

### 12.50 Darkness activated spinning LED light

Wiring Sequence

3-18, 4-23-12, 26-17-1-13, 24-2, 22-27, 11-14-25

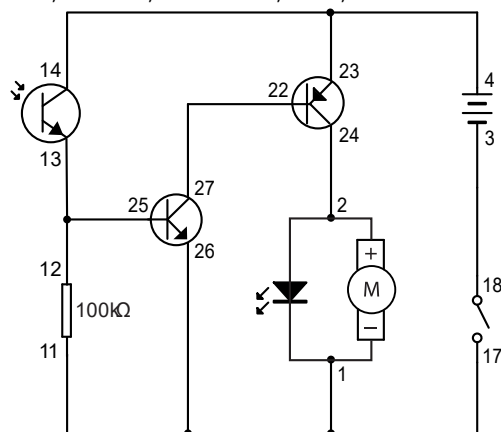


Complete all wiring connections as indicated in the sequence. Switch on the main switch. Cover the light sensor, and the spinning LED will be on. Uncover the light sensor, and then the spinning LED will turn off.

### 12.51 Light control spinning LED light

Wiring Sequence

3-18, 4-23-14, 26-17-1-11, 24-2, 22-27, 12-13-25



Complete all wiring connections as indicated in the sequence. Switch on the main switch, and then the spinning LED will be on. When the light sensor is covered, the spinning LED will be off. Light is the switch of the spinning LED in this circuit.

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