



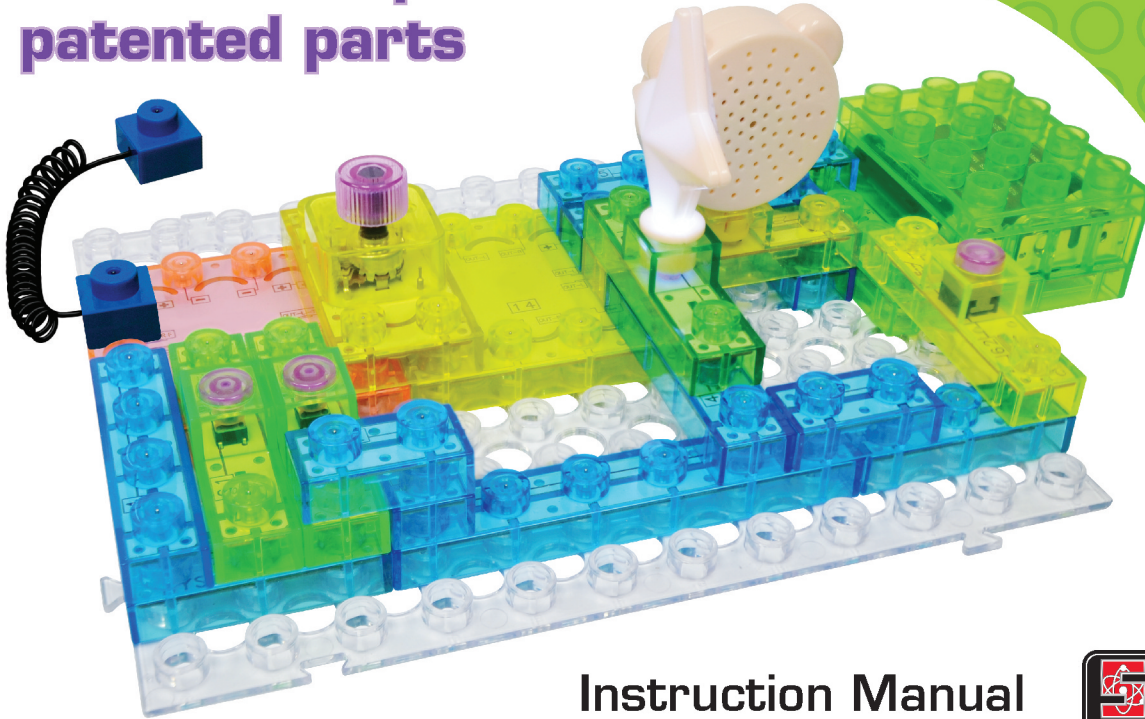
# CIRCUIT BUILDER™

# 120

Build  
**120**  
projects

Ages  
**8+**

Contains unique  
patented parts



Instruction Manual





# CIRCUIT BUILDER 120™



## **WARNING: SHOCK HAZARD**

Never connect E-Blox® Circuit Builder to the electrical outlets in your home in any way!



## **WARNING:**

Only use the battery holder with the cover securely in place.



## **WARNING: CHOKING HAZARD**

Small parts. Not for children under 3 years.



## **WARNING: MOVING PARTS**

Do not touch the fan while it is spinning.

**WARNING:** Always check your wiring before turning on a circuit. Never leave a circuit unattended while the batteries are installed. Never connect additional batteries or any other power sources to your circuits. Discard any cracked or broken parts.

### **Adult Supervision:**

Because children's abilities vary so much, even with age groups, adults should exercise discretion as to which experiments are suitable and safe (the instructions should enable supervising adults to establish the experiment's suitability for the child). Make sure your child reads and follows all of the relevant instructions and safety procedures, and keeps them at hand for reference.

This product is intended for use by adults and children who have attained sufficient maturity to read and follow directions and warnings.

Never modify your parts, as doing so may disable important safety features in them, and could put your child at risk of injury.

**FCC Notice:** Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.





## Batteries:

- Use only 1.5V “AA” type, alkaline batteries (not included).
- Insert batteries with correct polarity.
- Non-rechargeable batteries should not be recharged.
- Rechargeable batteries should only be charged under adult supervision, and should not be recharged while in the product.
- Do not connect batteries or battery holders in parallel.
- Do not mix old and new batteries.
- Do not mix alkaline, standard (carbon-zinc), or rechargeable (nickel-cadmium) batteries.
- Remove batteries when they are used up.
- Do not short circuit the battery terminals.
- Never throw batteries in a fire or attempt to open its outer casing.
- Batteries are harmful if swallowed, so keep away from small children.

## Basic Troubleshooting

1. Most circuit problems are due to incorrect assembly, always double-check that your circuit exactly matches the drawing for it.
2. Be sure that parts with positive/negative markings are positioned as per the drawing.
3. Be sure that all connections are securely made.
4. Try replacing the batteries. **Note:** Rechargeable batteries do not work as well as alkaline batteries.

**E-Blox® is not responsible for parts damaged due to incorrect wiring.**

**Note:** If you suspect you have damaged parts, you can follow the Advanced Troubleshooting procedure on page 13 to help determine which ones need replacing.

# About Electricity

## 1. What is Electricity?



Q: So many things are connected to electricity, such as lamps, TVs, and air conditioners. Can you tell me what electricity is?



A: It can be defined as the movement of sub-atomic particles (with their electrical charges) through a material due to an electrical charge outside the material. There are some examples in our daily life, such as lightning and static electricity.



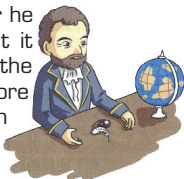
## 2. Who Discovered Electricity?



Q: Who discovered electricity?



A: I am going to tell you a story that can be traced back to at least 600 BCE. In ancient Greece, it was found that rubbing fur on amber cause an attraction between the two. This discovery is credited to the philosopher Thales of Miletus. One day, when he was polishing his amber at home, he found that a piece of fur was attracted by the amber after he put it on the desk. Then he split them, but it happened again. So he made record about the phenomenon. It was to be many centuries before anyone was able to connect this phenomenon with electricity and a century more before electrical current was put to practical use.



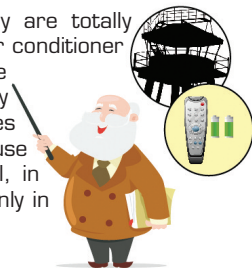
## 3. How to Categorize Electricity?



Q: Are we using the same electricity to power the air conditioner and the remote control?



A: Good question! Actually they are totally different. What we use in the air conditioner is called alternating current, because the flow of electric charge periodically reverses direction. All home appliances use alternating current; whereas, we use direct current in the remote control, in which the flow of electric charge is only in one direction.



## 4. Wireless



Q: My parents tell me that the weather report is transferred by the satellite, but I know it is impossible for us to connect a wire to outer space. How do we deliver these messages?



A: Wireless communication is the transfer of information between two or more points that are not connected by an electrical conductor. So scientists upload the information by wireless waves, so it can transfer to wherever they want.



# About Electricity

## 5. What did people do in electricity research?



Q: What did people do in electricity research after Miletus' discovery?



A: Dating back to the 18th century, Benjamin Franklin, a famous American scientist, proved that lightning was caused by electricity by describing an experiment in which an electrical conductor would be used to extract power from a thundercloud. In the experiment, he flew a kite with a metal key attached to it into a suitable cloud. The precise historical details are unclear, but he may have then retrieved the key and discharged electricity from it. By using the principles, he successfully invented the lightning rod. In 1799, the Italian scientist Alessandro Volta went on to create a "voltaic pile" consisting of alternating layers of copper and zinc separated by paper soaked in salt water. This generated a larger current and is credited as the first battery. In 1821, the English scientist Michael Faraday created the world's first electric motor, even though it was very simple. All the motors that we use today are based on that design. Ten years later, Faraday made another contribution to the world with his second crucial invention, the dynamo. In 1866, the first industrial dynamo was invented by a German named Siemens.



## 7. Application of Electricity



Q: All the home appliances don't work when a blackout happens. It is very inconvenient without electricity in life.



A: Absolutely! We need electricity a lot because it can either be used for cooking, watching TV, or transportation.



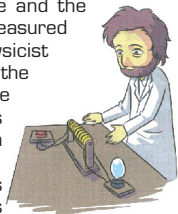
## 6. Unit of Electricity



Q: What is the unit for electricity?



A: Electricity has various related units of measure. Electrical current flow is measured in Amperes (Amps), which is named in honor of the famous French physician André-Marie Ampère and the contribution that he made. Electrical resistance is measured in Ohms, which is named after the German physicist George Ohm for his contributions. Electrical force, or the electrical difference of potential that would drive one ampere of current against one ohm of resistance, is measured in Volts, which is named after the Italian physicist Alessandro Volta for his contributions. Electrical power is measured in Watts, which is named after the famous Scottish inventor James Watt for his contributions.



## 8. What is Triboelectrification?



Q: I found it very interesting that a plastic ruler cannot attract any bits of paper, but when it is rubbed against hair several times it does.



A: Yes, that's it! This is the phenomenon of Triboelectrification. Rubbing glass with fur, or a comb through your hair, can build up triboelectricity. Most everyday static electricity is triboelectric. The polarity and strength of the charges produced differ according to the materials, surface roughness, temperature, strain, and other properties.



# About Electricity

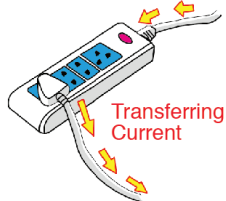
## 9. What is Current?



Q: What is current? Is that like water flow? Can it flow too?



A: Yeah, good question. Electric current can flow too, but it is totally different from water flow. Electric current is a flow of electric charge.



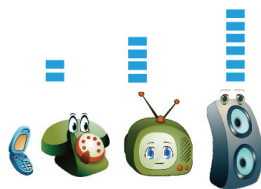
## 10. What is Voltage?



Q: What is voltage?



A: Voltage is equal to the work done per unit of charge against a static electric field to move the charge between two points. A voltage may represent either a source of energy (electromotive force), or lost, used, or stored energy (potential drop).



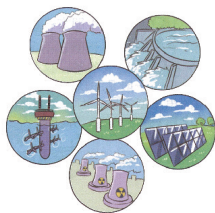
## 11. Electricity Generation



Q: How do they make electricity for daily use?



A: There are seven fundamental methods of directly transforming other forms of energy into electrical energy: fossil-fuel, biomass, hydro/tidal, wind, nuclear, mechanical power generation, and solar thermal energy. Certainly there will be more methods for electricity generation to be found, since the scientists are always researching.



## 12. Battery Recycling



Q: How do we recycle used batteries?



A: Battery recycling aims to reduce the number of batteries being disposed as municipal solid waste. Batteries contain a number of heavy metals and toxic chemicals and their dumping has raised concerns over soil contamination and water pollution. Most typical kinds of batteries can be recycled. However, some batteries are recycled more readily than others, such as lead-acid automotive batteries (nearly 90% are recycled) and Press Switch cells (because of the value and toxicity of their chemicals). Other types, such as alkaline and rechargeable, e.g., nickel-cadmium (Ni-Cd), nickel metal hydride (Ni-MH), lithium-ion (Li-ion) and nickel zinc (Ni-Zn), can also be recycled. So kids, please do something for battery recycling in our daily life from now on.

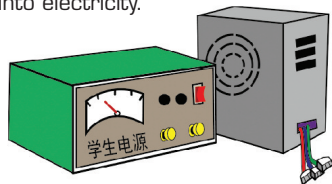




# About Electricity

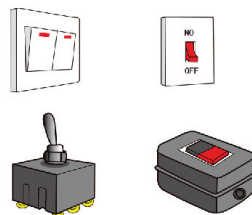
## 13. Power Supply

A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another. There are both DC (direct current) and AC (alternating current) power supplies. Batteries are a type of power supply in which chemical energy is converted into electricity.



## 14. Switch

A switch is a device that controls all the other components in the circuit. It is used for power connection and disconnection. A switch should be connected in series with the other functional components, otherwise, it will cause a short circuit.



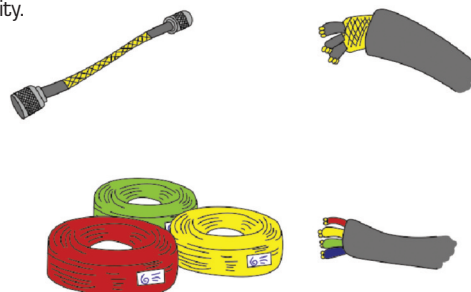
## 15. Home Appliances

Home appliances are electrical / mechanical machines which accomplish some home functions such as cooking or cleaning.



## 16. Wire

Wire is mainly used for connecting circuits and transferring electricity.

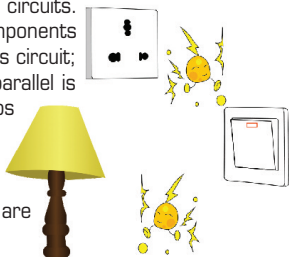


# About Electricity

## 17. Circuit

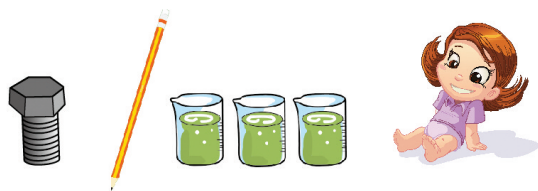
Like flowing water through a pipe, current is flowing through the circuit too. Electric circuits accomplish the transfer of current by connecting to a power supply, switch, and other functional components with wires. It can be mainly defined by series and parallel circuits.

A circuit composed solely of components connected in series is known as a series circuit; likewise, one connected completely in parallel is known as a parallel circuit. If two lamps are connected in the series circuit and one of them burns out, the other one cannot work. However, it will still work in the parallel circuit. All home circuits are parallel circuits to avoid interferences.



## 18. Conductor

A conductor is an object or type of material that allows the flow of electrical current in one or more directions. The conductivity varies for different materials. For example, metal, lead, acid, or alkali salt are good conductors. Humans are conductors too, so be careful around electricity.



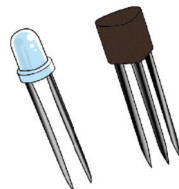
## 19. Insulator

A substance that resists electricity is called an insulator. Examples of insulators are glass, rubber, ceramics, and plastics. The plastic covers outside wires are commonly used insulators.




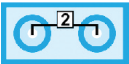


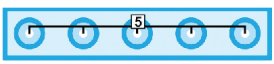
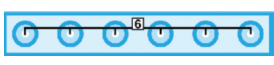

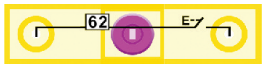

## 20. Semiconductor







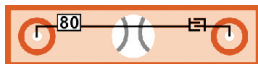
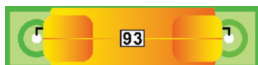
A semiconductor material has an electrical conductivity value falling between that of a conductor and an insulator, such as a diode or triode. The conductivity of semiconductor material can be easily affected by increasing temperature and flashing lights.





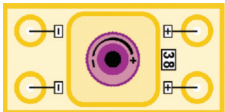




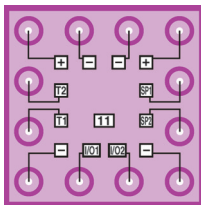
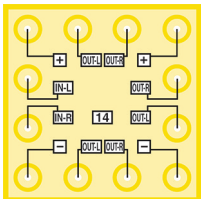
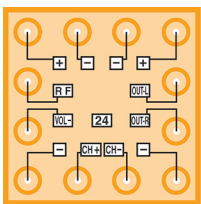
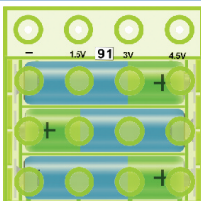
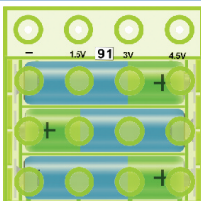
# Parts List (colors and styles may vary) Symbols and Numbers

**Important:** If any parts are missing or damaged, **DO NOT RETURN TO RETAILER.** Call toll-free (855) MY EBL0X (693-2569) or e-mail us at: [help@myeblox.com](mailto:help@myeblox.com). Customer Service: 880 Asbury Dr., Buffalo Grove, IL 60089 U.S.A.

Qty.	Name	Symbol	Part #
3	1-wire Block		6EB2X01
8	2-wire Block		6EB2X02
3	3-wire Block		6EB2X03
3	4-wire Block		6EB2X04
1	5-wire Block		6EB2X05
1	6-wire Block		6EB2X06
2	Press Switch		6EB2X61
1	Switch		6EB2X62
1	Lamp		6EB2X76

Qty.	Name	Symbol	Part #
1	LED		6EB2X70
1	Reed Switch		6EB2X83
1	Spring Wire		6EB2X09
1	Base Plate		6EB2X39
1	Motor Shaft Cap		6EB2X59
1	Motor Shaft		6EB2X64
1	Touch Plate		6EB2X80
1	Speaker		6EB2X93

Qty.	Name	Symbol	Part #
1	Magnet		6EB2X07
2	Plated E-Blox®		6EB2X101
1	Fan Blade		6EB2X60
1	Motor		6EB2X95
1	Volume		6EB2X38
2	Level Block		6EB2X100
2	Level Block		6EB2X200

Qty.	Name	Symbol	Part #
1	Three-in-One		6EB2X11
1	Power Amplifier		6EB2X14
1	FM Radio		6EB2X24
1	Battery Holder		6EB2X91
1	Battery Cover		6EB2X91C



# How to Use Your E-Blox® Circuit Builder™ Set

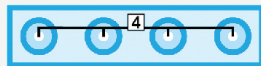
E-Blox® Circuit Builder™ parts contain a PC board with connectors so you can build the different electrical and electronic circuits in the projects. Each block has a function: there are switch blocks, a light block, battery block, wire blocks, etc. These blocks are different colors and have numbers on them so that you can easily identify them.

## For Example:

This is the press switch, it is green and has the marking 61 on it. The part symbols in this booklet may not exactly match the appearance of the actual parts, but will clearly identify them.



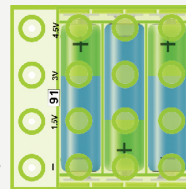
This is a wire block which comes in 6 different lengths. The part has the number 1, 2, 3, 4, 5, or 6 on it depending on the length of the wire connection required.



There are also 1-post and 2-post blocks that are used as a spacer or for interconnection between different layers.



You need a power source to build each circuit. The part is marked 91 and requires three (3) 1.5V "AA" batteries (not included). The four connections are marked -, 1.5V, 3V, and 4.5V.



A short circuit indicator LED lights if any of the outputs are shorted or under a high current draw.

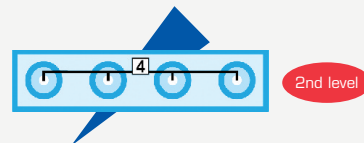
Only use the battery holder when the cover is securely in place.

Included is a special plated wire 1 block which allows you to connect to other E-Blox® series (see last page).



A large clear plastic base grid is included with this kit to help keep the circuit blocks properly spaced. You will see evenly spaced posts that the different blocks plug into.

Next to the assemble drawing may be a part with an arrow and red circle as shown below. This indicates that the part is installed below other parts and which level it is on.



## About Your E-Blox® Circuit Builder™ Parts

(Part designs are subject to change without notice).

The **base grid** functions like the printed circuit boards found in most electronic products. It is a platform for mounting parts and wire blocks (though the wires are usually “printed” on the board).

The blue **wire blocks** are just wires used to connect other components, they are used to transport electricity and do not affect circuit performance. They come in different lengths to allow orderly arrangement of connections on the base grid.

The **spring wire (9)** is two single blocks connected by a wire used to make unusual connections.

The **batteries (91)** produce an electrical voltage using a chemical reaction. This “voltage” can be thought of as electrical pressure, pushing electrical “current” through a circuit. This voltage is much lower and much safer than that used in your house wiring. Using more batteries increases the “pressure” and so more electricity flows.

The **switch (62)** connects (ON) or disconnects (OFF) the wires in a circuit.

The **press switch (61)** connects (pressed) or disconnects (not pressed) the wires in a circuit, just like the switch does.

A **reed switch (83)** is an electrical switch operated by an applied magnetic field. When exposed to a magnetic field, the switch closes (ON). When the magnetic field is removed the switch opens (OFF).

The blue **level blocks (100 & 200)** are non-conductive and just used as building blocks.

The **touch plate (80)** is a type of switch when both electrodes are touched together using your finger, shorts the two electrodes and a small amount of current flows, activating the circuit.

The **LED (70)** is a light emitting diode inside the star, and may be thought of as a special one-way light bulb. In the “forward” direction (indicated by the “arrow” in the symbol) electricity flows if the voltage exceeds a turn-on threshold (about 1.5V); brightness then increases. A high current will burn out the LED, so the current must be limited by other components in the circuit. LEDs block electricity in the “reverse” direction.

The **4.5V lamp (76)** contains a special wire (filament) that glows bright when a large electric current passes through it. Voltages above the bulb’s rating can burn out the wire.

The **motor (95)** converts electricity into mechanical motion. Electricity is closely related to magnetism, and an electric current flowing in a wire has a magnetic field similar to that of a very, very tiny magnet. Inside the motor are three coils of wire with many loops. If a large electric current flows through the loops, the magnetic effects become concentrated enough to move the coils. The motor has a magnet inside, so as the electricity moves the coils to align them with the permanent magnet, the shaft spins.

## More About Your E-Blox® Circuit Builder™ Parts

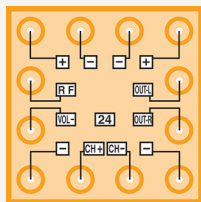
The **speaker (93)** converts electricity into sound. It does this by using the energy of a changing electrical signal to create mechanical vibrations (using a coil and magnet similar to that in the motor). These vibrations create variations in air pressure which travel across the room. You “hear” sound when your ears feel these air pressure variations.

The E-Blox® Circuit Builder™ **plated adaptor (101)** block is used to connect to other E-Blox® series.

The **volume (38)** block contains two 50kΩ resistors, adjustable from 200Ω to 50kΩ. In series with the center tap is a 200Ω resistor to limit the current.

Some types of electronic components can be super-miniaturized, allowing many thousands of parts to fit into an area smaller than your fingernail. These “integrated circuits” (ICs) are used in everything from simple electronic toys to the most advanced computers.

The **FM radio (24)** contains an integrated FM radio circuit. Refer to the figure below for the pin-out description:

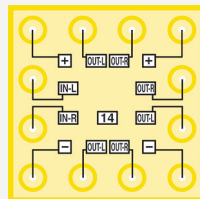


See project #116 for an example of proper connections.

### FM Radio:

- (+) - power from batteries
- (-) - power return to batteries
- RF - antenna input
- VOL - volume adjust connection
- CH+ - tune up
- CH- - tune down
- OUT-L - left channel output connection
- OUT-R - right channel output

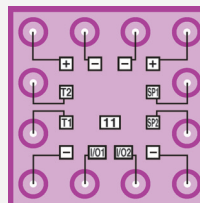
The **power amplifier IC (14)** block is a module containing an integrated circuit amplifier and supporting components that are always needed with it. A description of it is given here for those interested:



### Power Amplifier IC

- (+) - power from batteries
- (-) - power return to batteries
- OUT-L - left channel output connection
- OUT-R - right channel output
- IN-L - left channel input
- IN-R - right channel input

The **three-in-one (11)** block is a module containing specialized sound-generation ICs and other supporting components (resistors, capacitors, and transistors) that are always needed with them. This was done to simplify the connections you need to make to use them. The pin descriptions are given here for those interested; see the projects for connection examples:



### Three-in-One

- T1, T2 - control inputs
- SP1 - speaker - connection
- SP2 - speaker + connection
- I/O1 - music select
- I/O2 - space sound select
- (+) - power to batteries
- (-) - power return to batteries

## DOs and DON'Ts of Building Circuits

After building the circuits given in this booklet, you may wish to experiment on your own. Use the projects in this booklet as a guide, as many important design concepts are introduced throughout them. Every circuit will include a power source (the batteries), a resistance (which might be an LED, lamp, motor, integrated circuit, etc.), and wiring paths between them and back. **You must be careful not to create “short circuits” (very low-resistance paths across the batteries, see examples below) as this will damage components and/or quickly drain your batteries.** Only connect the parts using configurations given in the projects, incorrectly doing so may damage them. **E-Blox® is not responsible for parts damaged due to incorrect wiring.**

### *Here are some important guidelines:*

#### **DO USE EYE PROTECTION WHEN EXPERIMENTING ON YOUR OWN.**

**DO** include at least one component that will limit the current through a circuit, such as the speaker, lamp, LED, integrated circuits (ICs, which must be connected properly), or motor.

**DO** disconnect your batteries immediately and check your wiring if something appears to be getting hot.

**DO** check your wiring before turning on a circuit.

**DO** connect the IC using configurations given in the projects or as per the connection descriptions for the part.

**DON'T** connect to an electrical outlet in your home in any way.

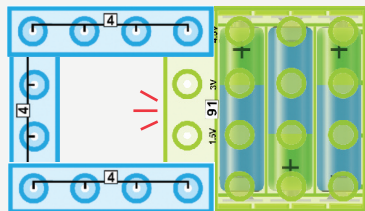
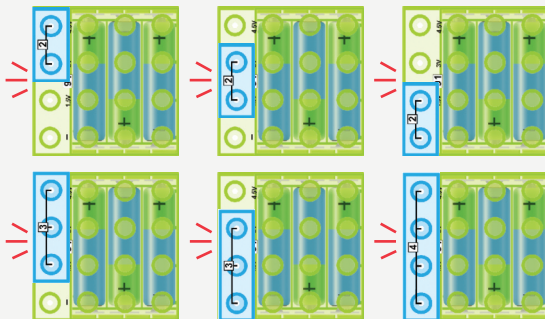
**DON'T** leave a circuit unattended when it is turned on.

**DON'T** touch the motor when it is spinning at high speed.

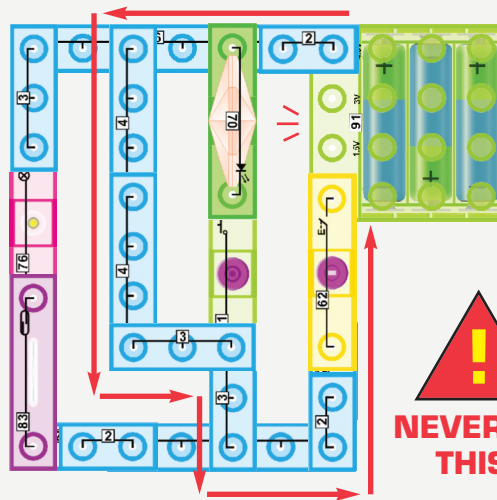


# Examples of SHORT CIRCUITS – NEVER DO THIS!

Placing a wire block directly across the battery holder is a SHORT CIRCUIT, indicated by a flashing LED in the battery holder.



When the switch (S1) is turned on, this large circuit has a SHORT CIRCUIT path (as shown by the arrows). The short circuit prevents any other portions of the circuit from ever working.



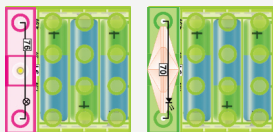
**WARNING: SHOCK HAZARD!** Never connect E-Blox® Circuit Builder™ to the electrical outlets in your home in any way!

## Advanced Troubleshooting (adult supervision recommended)

**E-Blox® is not responsible for parts damaged due to incorrect wiring.**

**If you suspect you have damaged parts, you can follow this procedure to systematically determine which ones need replacing:**

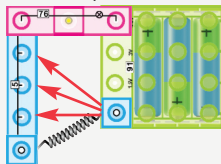
- 1. Lamp (76), LED (70), Battery Holder (91):** Place part directly across the battery holder as shown, it should light. If none work, then replace your batteries and repeat, if still bad then the battery holder is damaged. Make sure the LED is installed in the correct direction.



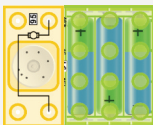
- 2. Wire Blocks (1-5), Spring Wire (9), and Speaker (95):** Use this mini-circuit to test each of the Wire Blocks and Speaker (95), one at a time. The lamp (76) should light if the part is functioning properly. Follow the steps below:

Spring Wire test - Build the circuit shown below. The lamp (76) should light.

Wire Block tests - Insert the Wire Blocks between the spring wire to lamp connection shown in the figure. The lamp should light.



Speaker test - Insert the speaker (95) between the spring wire to lamp connection shown in the figure. The speaker will not sound, but the lamp will light.



- 3. Motor (95):** Place the motor across the battery holder (95 at top) as shown; it should spin clockwise.

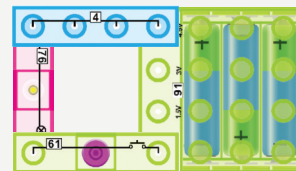
- 4. Switch (62), Press switch (61), Reed Switch (83), Touch Plate (80):** Use this circuit to test each switch and the touch plate (80). The lamp (76) should light. If the lamp doesn't light, then the switch is bad.

Switch - Up position the lamp off, Down position lamp on.

Press - Light when switch is pressed.

Reed - When you place the magnet on the switch the lamp should light.

Touch Plate - Wet your finger; when you touch the contacts, the lamp should light.



- 5. Three-In-One (11):** Siren & Machine Gun - Build project #49, you should hear a siren sound from the speaker.

Space Battle - Build project #52, you should hear a space battle sound from the speaker.

Music - Build project #47, you should hear a music from the speaker.

**E-Blox®**

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e-mail: [help@myeblox.com](mailto:help@myeblox.com) • Website: [www.myeblox.com](http://www.myeblox.com)

**You may order additional / replacement parts at:**  
**[www.pickabrick.com](http://www.pickabrick.com)**

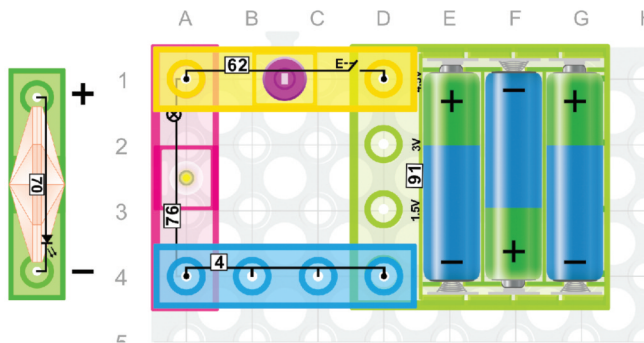
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## 1. Lamp Switch

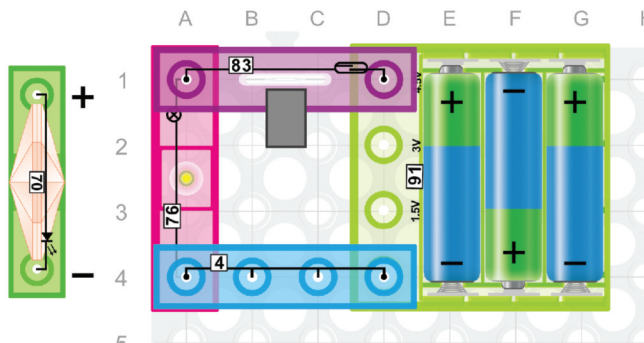
E-Blox® Circuit Builder™ uses electronic blocks that plug into a clear plastic grid to build different circuits. These blocks have different colors and numbers on them so that you can easily identify them.

Build the circuit shown on the left by placing all the parts that plug into the first layer base. Then, assemble the parts that connect to the secondary layer. Install three (3) “AA” batteries (not included) into the battery holder (91). **Secure the cover onto the battery holder before using it.**

Press the switch (62), the lamp (76) will turn on. Press it again, the lamp (76) will turn off.

## 2. LED Switch

Replace the lamp (76) with the LED (70), making sure it's in the correct direction. Press switch (62), the LED (70) will turn on. Press it again, the LED (70) will turn off.

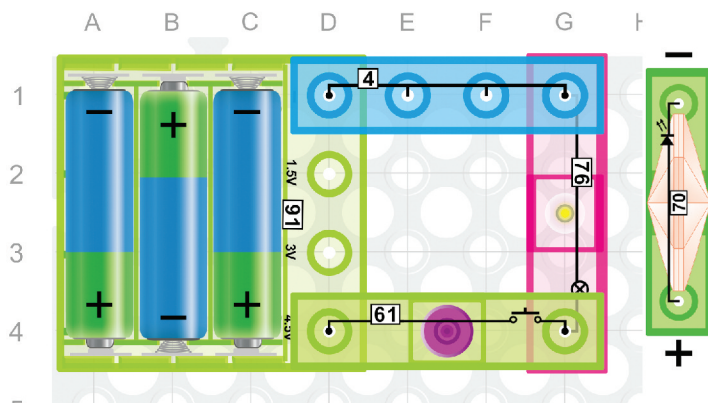


## 3. Magnetic Lamp

Put the magnet (7) near the reed switch (83), the lamp (76) will turn on. Move the magnet (7) away, the lamp (76) will turn off.

## 4. Magnet-controlled LED

Replace the lamp (76) with the LED (70), making sure it's in the correct direction. Put the magnet (7) near the reed switch (83), the LED (70) will turn on. Move the magnet (7) away, the lamp will turn off.

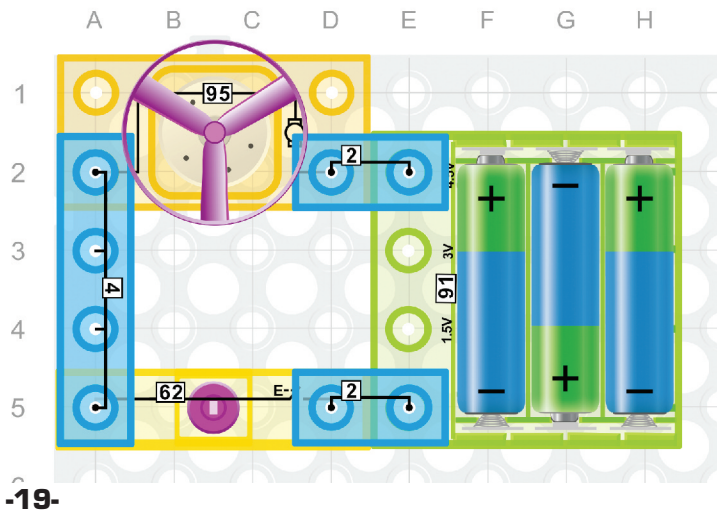


## 5. Press Switch-controlled Lamp

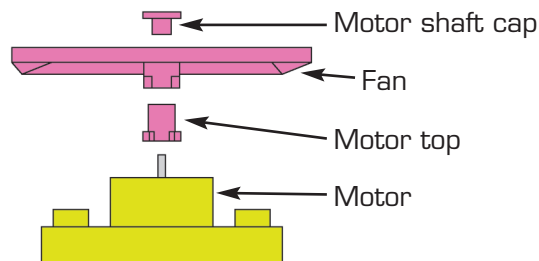
Press and hold the press switch (61), the lamp (76) will turn on. Release the press switch (61), the lamp (76) will turn off. Replace the lamp (76) with the LED (70), making sure the LED is in the correct direction, hold the press switch (61); LED (70) lights up. Release the press switch (61), LED (70) will turn off.

## 6. Switch-controlled Fan

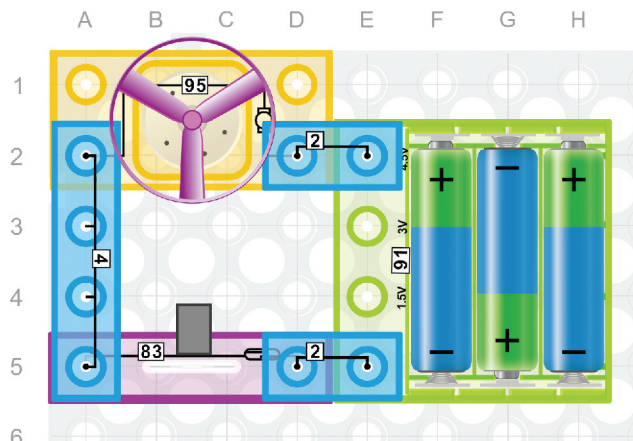
Assemble the fan by following the assembly diagram below. Then press the switch (62); the fan will start spinning.



### Fan Assembly



**WARNING:** Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor.

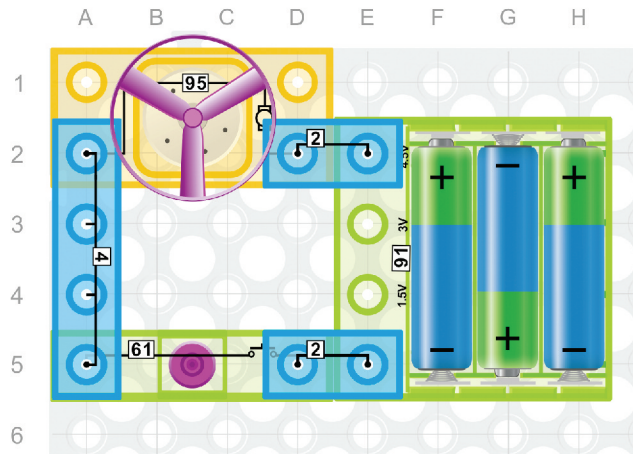


## 7. Magnet-controlled Fan

Put on the fan blade (60), move the magnet (7) near the reed switch (83), the fan will turn on. Remove the magnet (7), the fan will turn off.



**WARNING:** Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor.

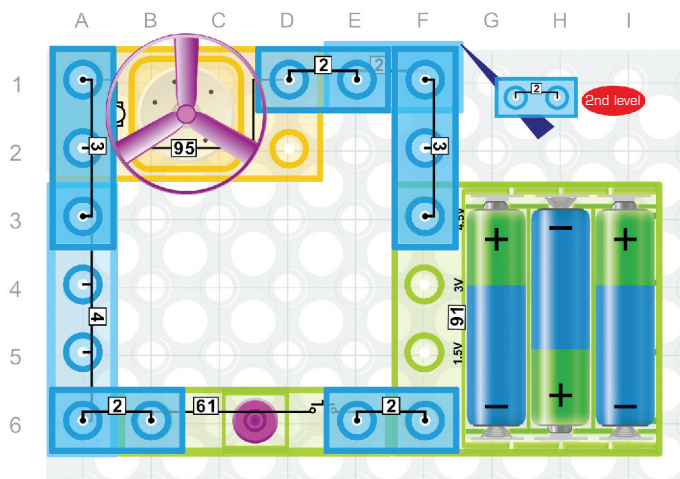


## 8. Press Switch-controlled Fan

Put on the fan blade (60), press and hold the press switch (61), then the fan will start spinning. Release the press switch (61), the fan will stop.



**WARNING:** Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor.



Reminder: Remove the shaft cap before using the flying saucer.

## 9. Press Switch-controlled Flying Saucer

First, take off the cap (59) that is on the fan blade (60). Build the circuit, then hold the press switch (61) until the motor (95) runs fast, then release the press switch (61) and you will see the flying saucer take off. (**Caution!** Never let it fly near your face!)

## 10. Switch-controlled Flying Saucer

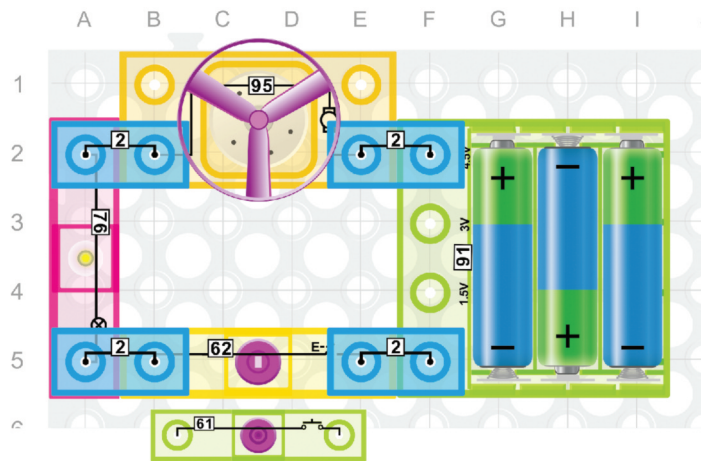
Replace the press switch (61) with the switch (62), put on the fan blade (60), then press the switch (62). Wait for the motor (95) to run fast. Press the switch (62) again, the flying saucer will take off.

## 11. Magnet-controlled Flying Saucer

Replace the press switch (61) with the reed switch (83), move the magnet (7) towards the reed switch (83). Wait for the motor (95) to start running. Move the magnet (7) away, then the flying saucer will take off.



**WARNING:** Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor.

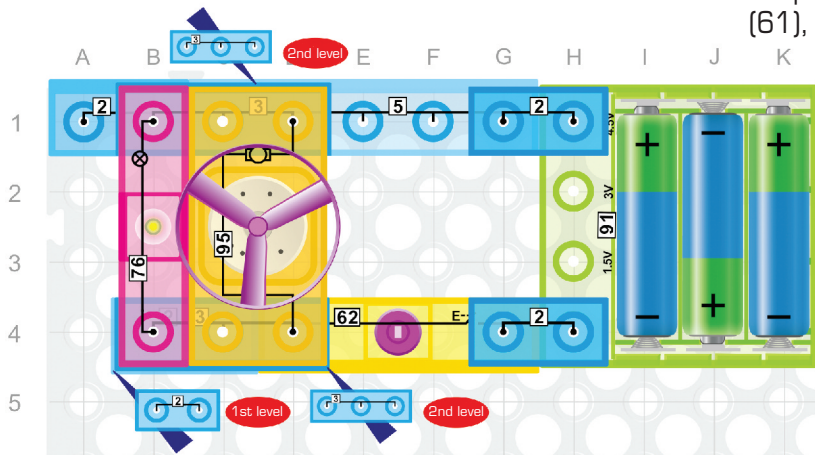


## 12. Switch-controlled Lamp and Motor Series Connection

First put on the fan blade (60), then press and hold the switch (62), the fan will start working and the lamp (76) turns on at the same time. Press the switch (62) again, the fan will stop and the lamp (76) will turn off.

## 13. Press Switch-controlled Lamp and Motor Series Connection

Replace the switch (62) with the press switch (61), put on the fan blade (60), then press and hold the press switch (61), the fan will start spinning and the lamp (76) will turn on too. Release the press switch (61), the fan will stop and the lamp (76) will turn off.

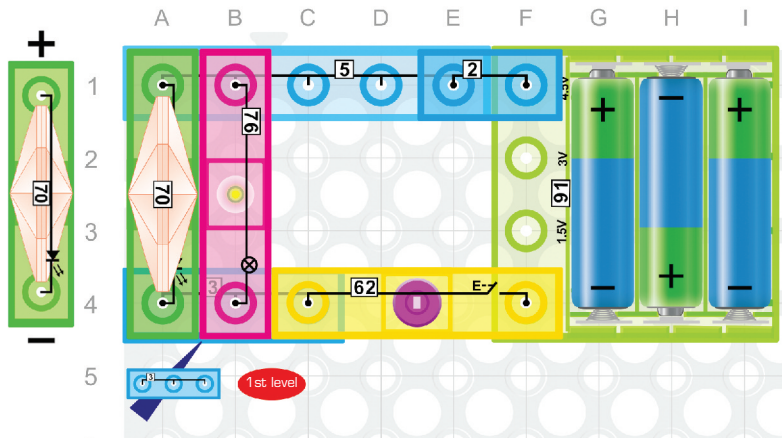


## 14. Switch-controlled Lamp & Motor Parallel Connection

Put on the fan blade (60), press the switch (62), the fan will start spinning, the lamp (76) will be on as well. Press the switch (62) again, the fan will stop, the lamp (76) will also turn off.

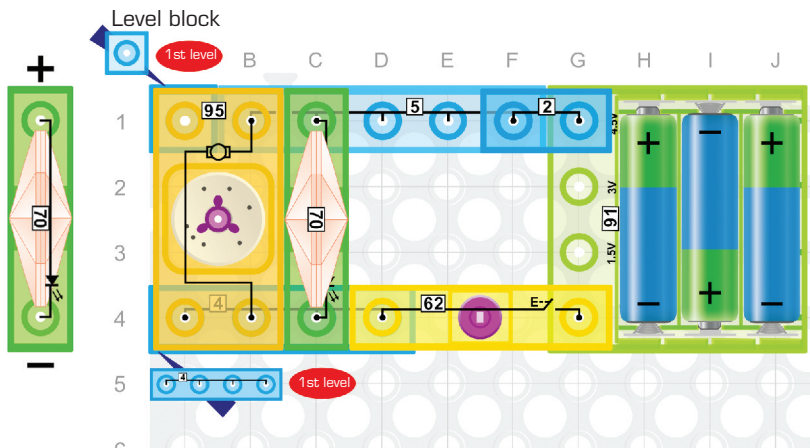


**WARNING:** Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor.



## 15. Switch-controlled LED & Lamp Parallel Connection

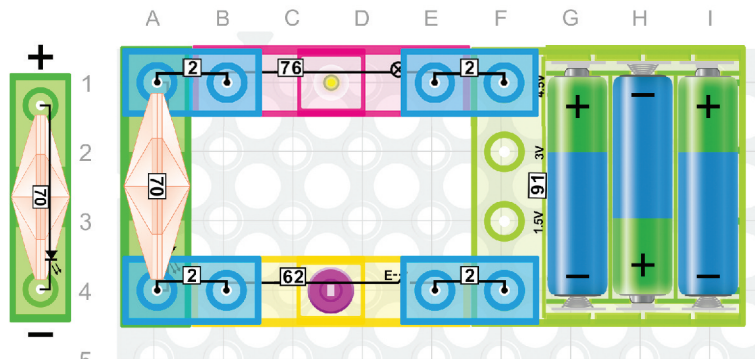
Press the switch (62), the LED (70) will light up with the lamp (76).



## 16. Switch-controlled Motor & LED Parallel Connection

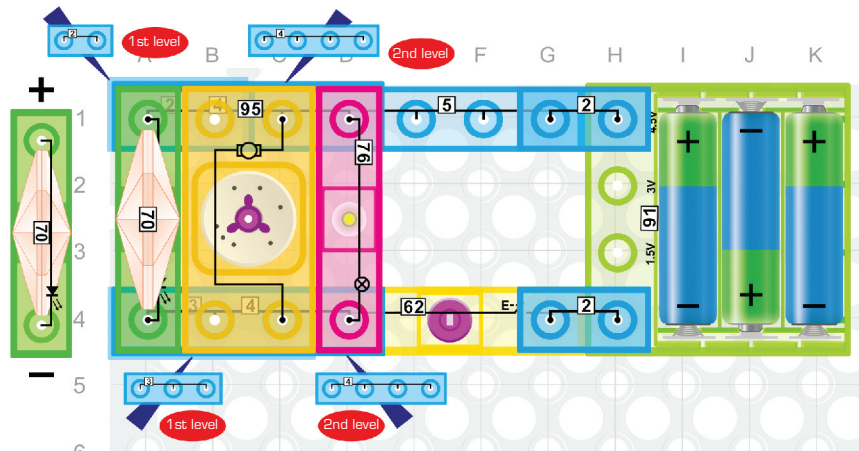
Press the switch (62), the LED (70) will light up, the motor (95) will start running.





## 17. Switch-controlled LED & Lamp Series Connection

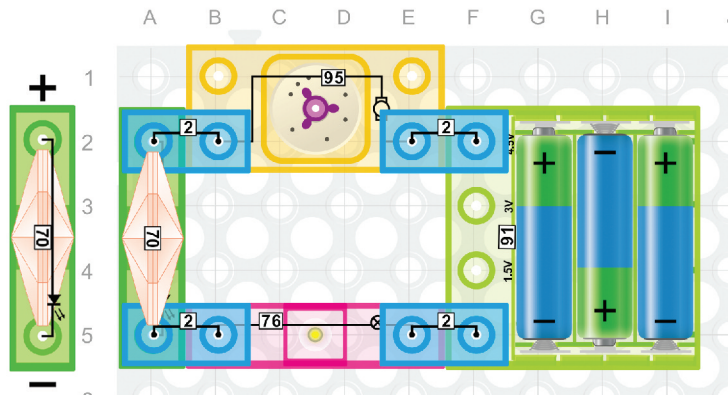
Press the switch (62). The LED (70) will light, but the lamp (76) will not light. The voltage drop across the LED (70) (at least 1.5 volts) reduces the voltage across the lamp (76), thus limiting the current flowing through the lamp (76) and preventing it from lighting.



## 18. Switch-controlled Lamp, LED, and Motor Parallel Connection

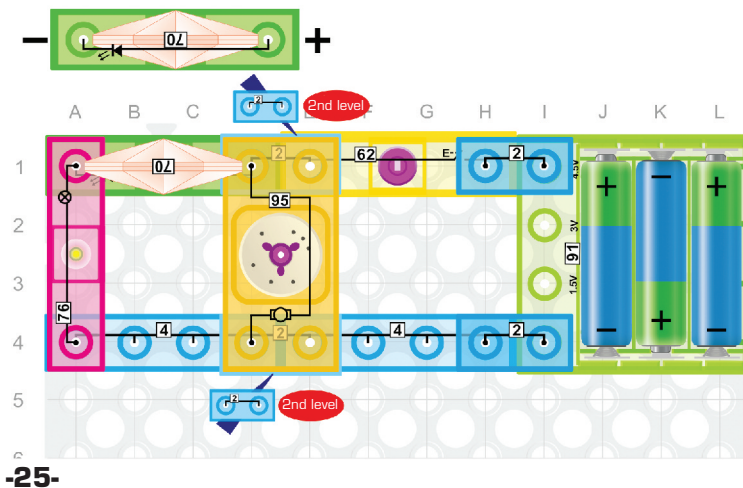
Press the switch (62), the LED (70) and the lamp (76) will light up. The motor (95) will also start running at the same time.





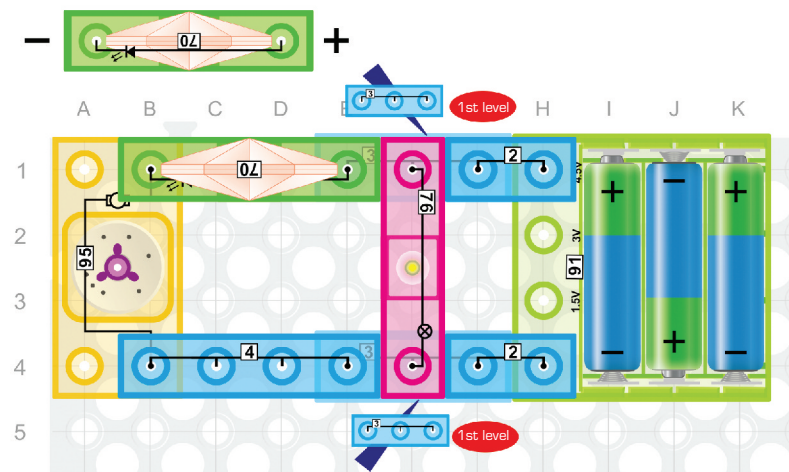
## 19. Lamp, LED, and Motor Series Connection

In this series connection, you will find that the LED (70) will light and the motor (95) will spin, but the lamp (76) is off. If the motor (95) does not spin, you may need to get it started by spinning the shaft with your finger. The lamp (76) is off because the voltage drop across the LED (70) and motor (at least 1.5 volts) reduces the voltage across the lamp (76), thus limiting the current through the lamp (76), preventing it from lighting.



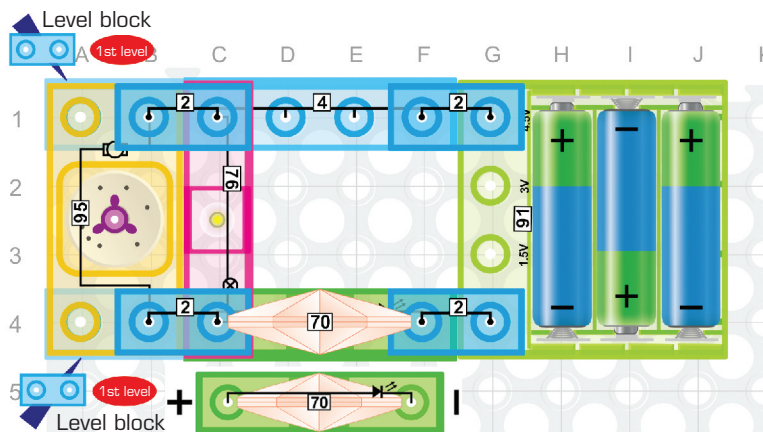
## 20. Switch-controlled Lamp, LED & Motor Series/Parallel Connection

Build the circuit, you will find that the motor (95) spins, the LED (70) lights, and the lamp (76) lights dimly. The lamp (76) is dim because it is connected with the LED (70) in a series circuit, and thus the voltage drop across the LED (70) (at least 1.5 volts) limits the current through the lamp (76), too low to light up the lamp (76).



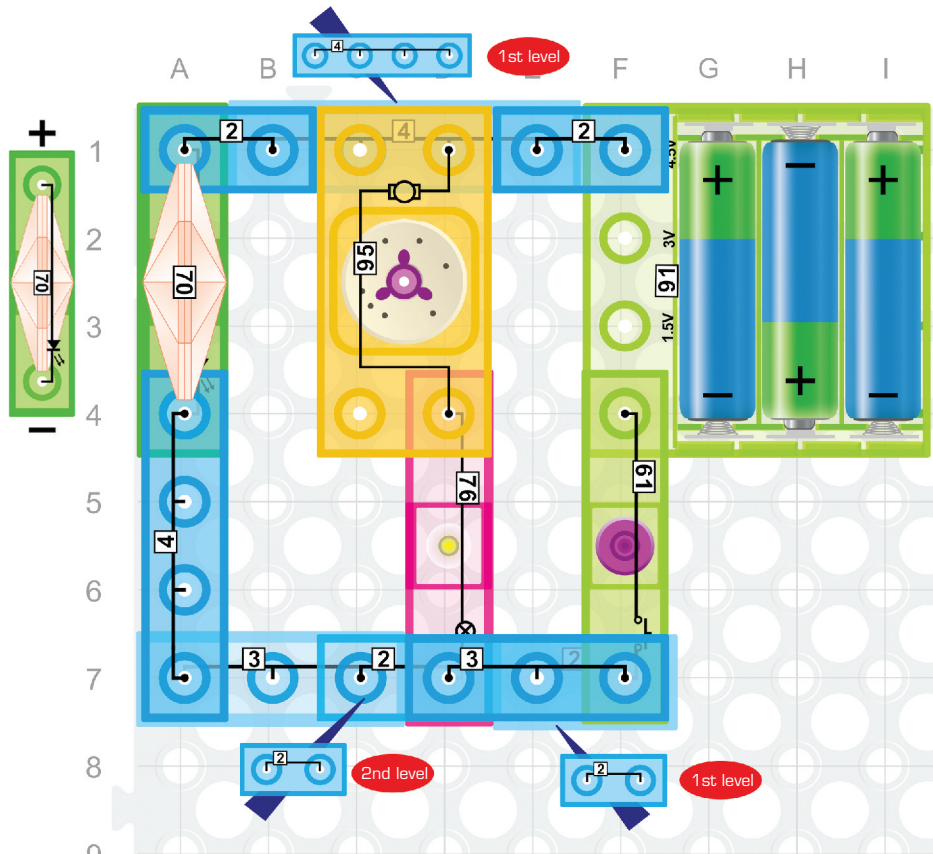
## 21. Lamp, LED and Motor Series-Parallel Connection (I)

Build the connection. The lamp (76) and the LED (70) will turn on, and the motor (95) will spin. If the motor does not spin, you may need to get it started by spinning the shaft with your finger. This is because the voltage drop across the LED (70) (at least 1.5 volts) reduces the voltage across the motor (95), limiting the current flowing through the motor (95) and which makes it more difficult to start the motor spinning (like in project 19). The lamp (76) lights because it is in parallel with the motor (95) & LED (70).



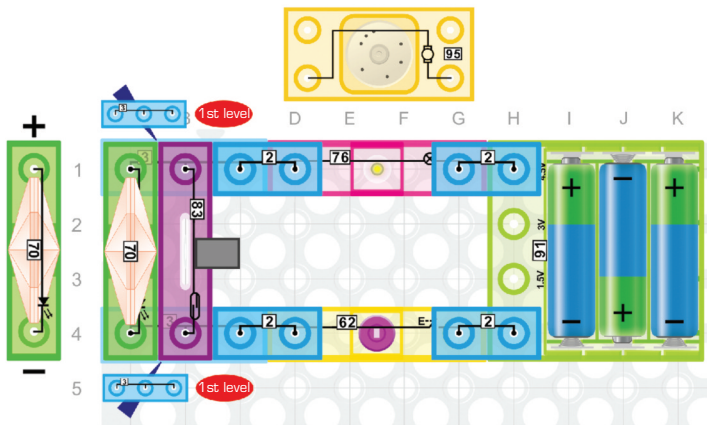
## 22. Lamp, LED, and Motor Series-Parallel Connection (II)

Build the circuit, you will find that the LED (70) lights and the motor (95) spins very slowly, but the lamp (76) does not light. If the motor does not spin, you may need to get it started by spinning the shaft with your finger. This is because the lamp (76) and motor (95) are each connected in series with the LED (70), and voltage drop across the LED (at least 1.5 volts) reduces the voltage across the motor (95) and lamp (76), limiting the current flowing through the motor (95), making it more difficult for the motor to start spinning and limiting the current through the lamp (76), preventing it from lighting.



## 23. Press Switch-controlled Lamp, LED and Motor Series-Parallel Connection

Build the circuit, press and hold the press switch (61), the LED (70) will light, the lamp (76) will light dimly and the motor (95) will spin at the same time.

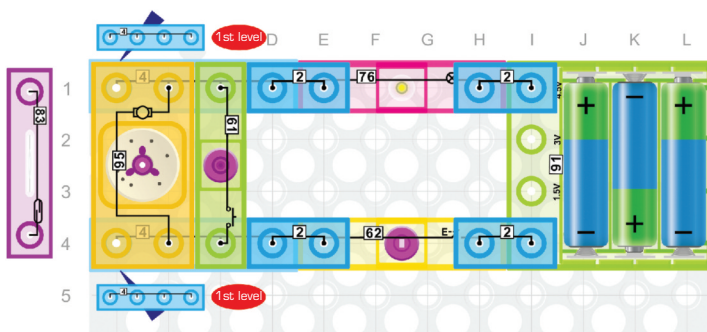


## 24. Light Up the Lamp and the LED in Turns

Press the switch (62), the LED (70) will turn on. When you move the magnet (7) towards the reed switch (83), the lamp (76) will turn on and the LED (70) will stop working.

## 25. Power the Motor and LED in Turns

Replace the lamp (76) with the motor (95), press the switch (62), the LED (70) will turn on. When you move the magnet (7) towards the reed switch (83), the motor (95) will turn on and the LED (70) will stop working.



## 26. Adjustable Brightness of the Lamp

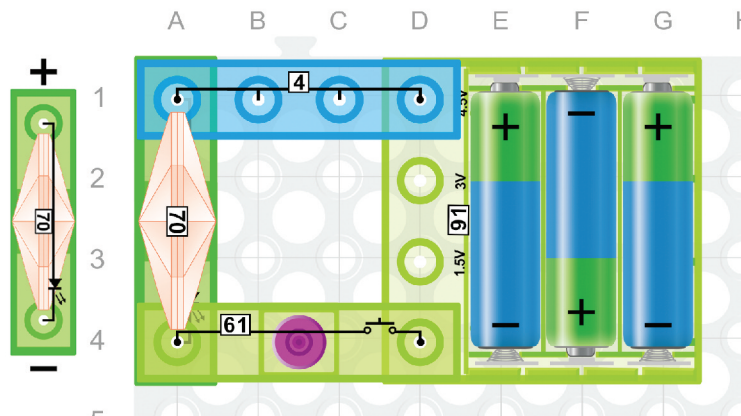
Press the switch (62), the lamp (76) will turn on dimly, the motor (95) will turn on at the same time. Press the press switch (61), the motor (95) will stop while the lamp (76) will become brighter.

## 27. Magnetic-controlled Brightness of the Lamp

Replace the press switch (61) with the reed switch (83). By using the magnet (7), you can control the brightness of the lamp (76).

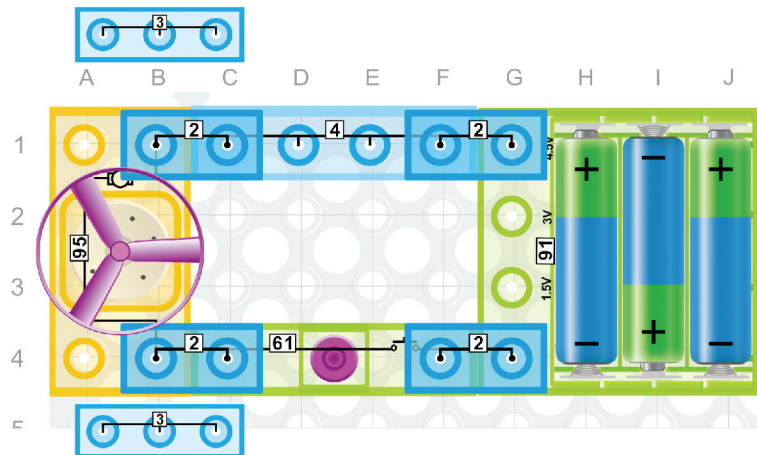






### 31. Simple Telegram Training Simulator

Press and hold the press switch (61), the LED (70) will blink. This can be used as a telegram typing simulator.

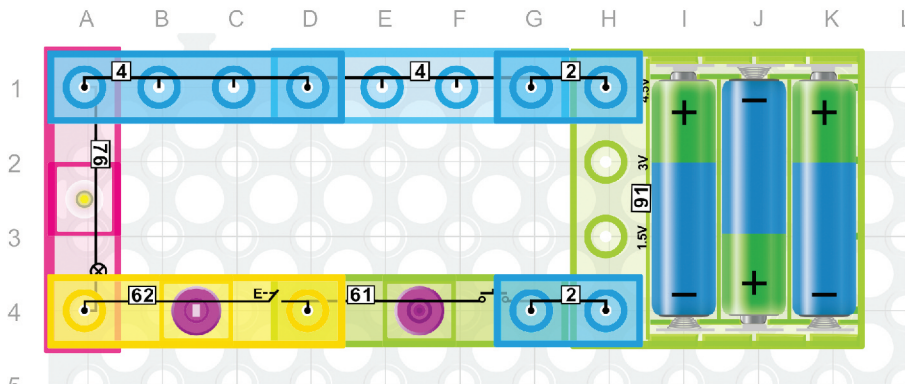


### 32. Reverse-controlled Circuit of Motor

Press and hold the press switch (61), the fan blade (60) will spin counterclockwise. Release the press switch (61), the motor (95) will stop. Then put the motor (95) in backwards. Press and hold the press switch (61), the fan blade (60) will spin clockwise and fly off when you release the press switch. **Note:** Use the 3-wire blocks to connect the motor (95) backwards.

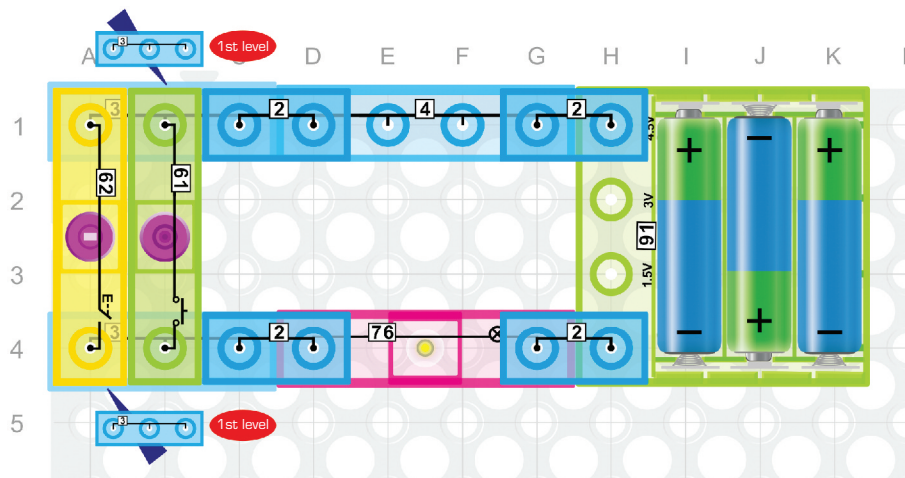


**WARNING:** Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor.



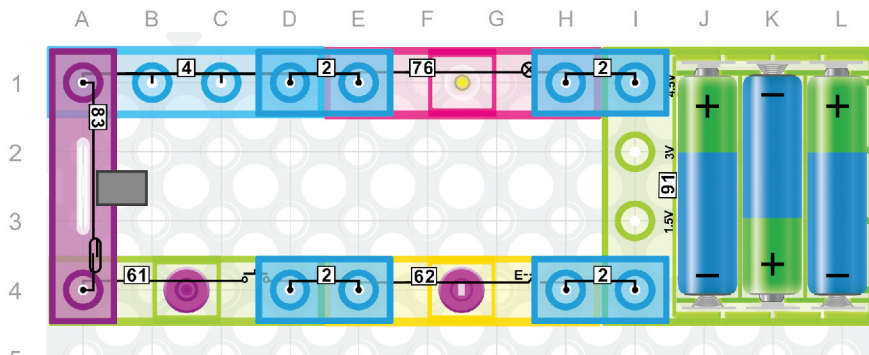
### 33. Double Switch Series Connection Controlling Lamp

Build the circuit, press the switch (62), then press and hold the press switch (61), the lamp (76) will be on. Or you can press these two switches at the same time, the lamp (76) will turn on as well.



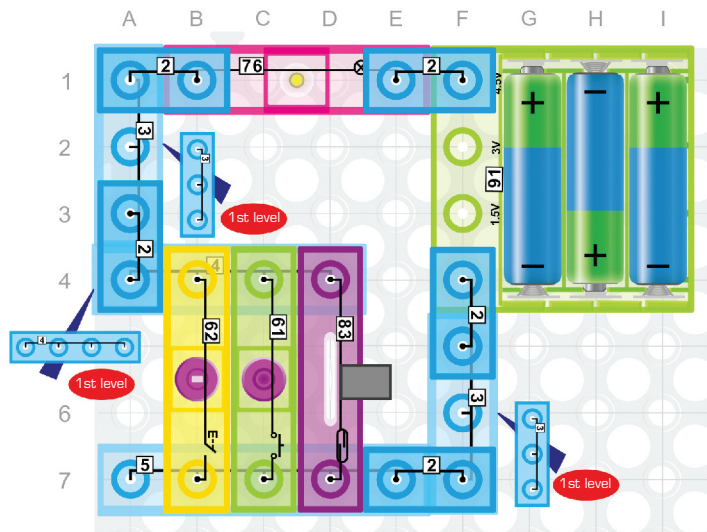
### 34. Double Switch Parallel Connection Controlling Lamp

Either press the switch (62) or press and hold the press switch (61) to light up the lamp (76). However, if you want to turn off the lamp (76) you should release the press switch (61) and turn off the switch (62) by putting it in the up position.



### 35. Triple Switch Series Connection Controlling Lamp

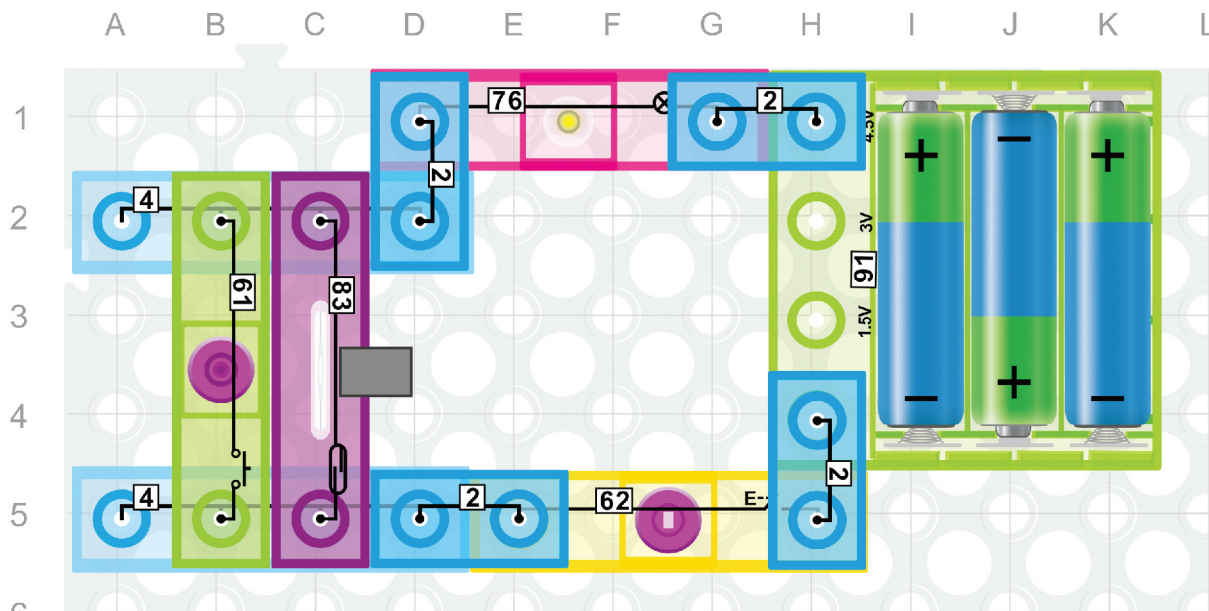
Build the circuit, press the switch (62), hold the press switch (61), then move the magnet (7) towards the reed switch (83). The lamp (76) will turn on.



### 36. Triple Switch Parallel Connection Controlling Lamp

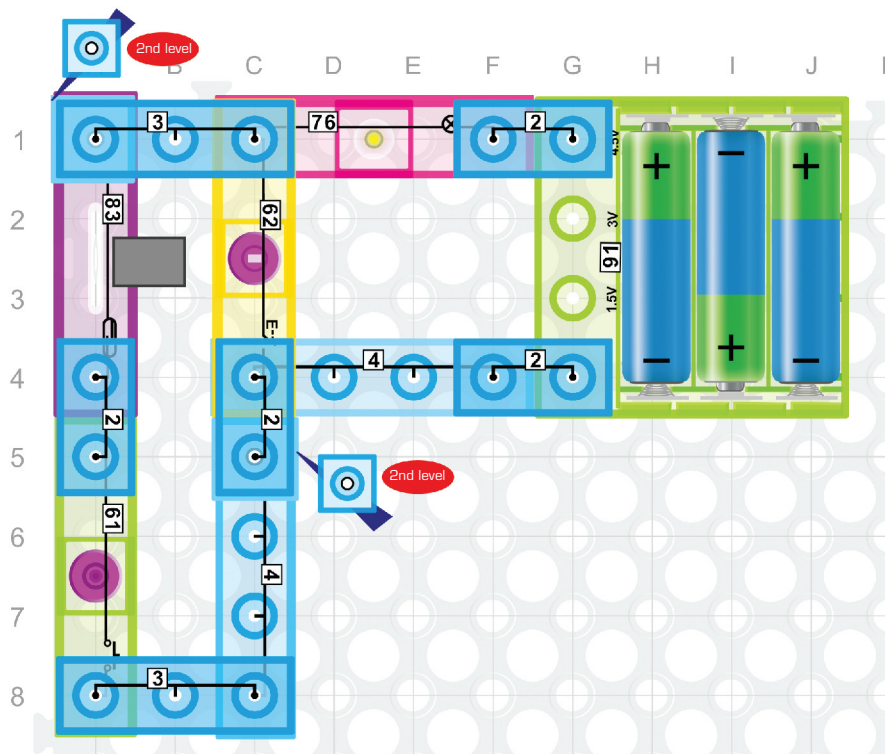
Build the circuit, either press the switch (62), or hold the press switch (61), or move the magnet (7) towards the reed switch (83). The lamp (76) will light up. If you want to turn off the lamp (76), all of the switches must be turned off.





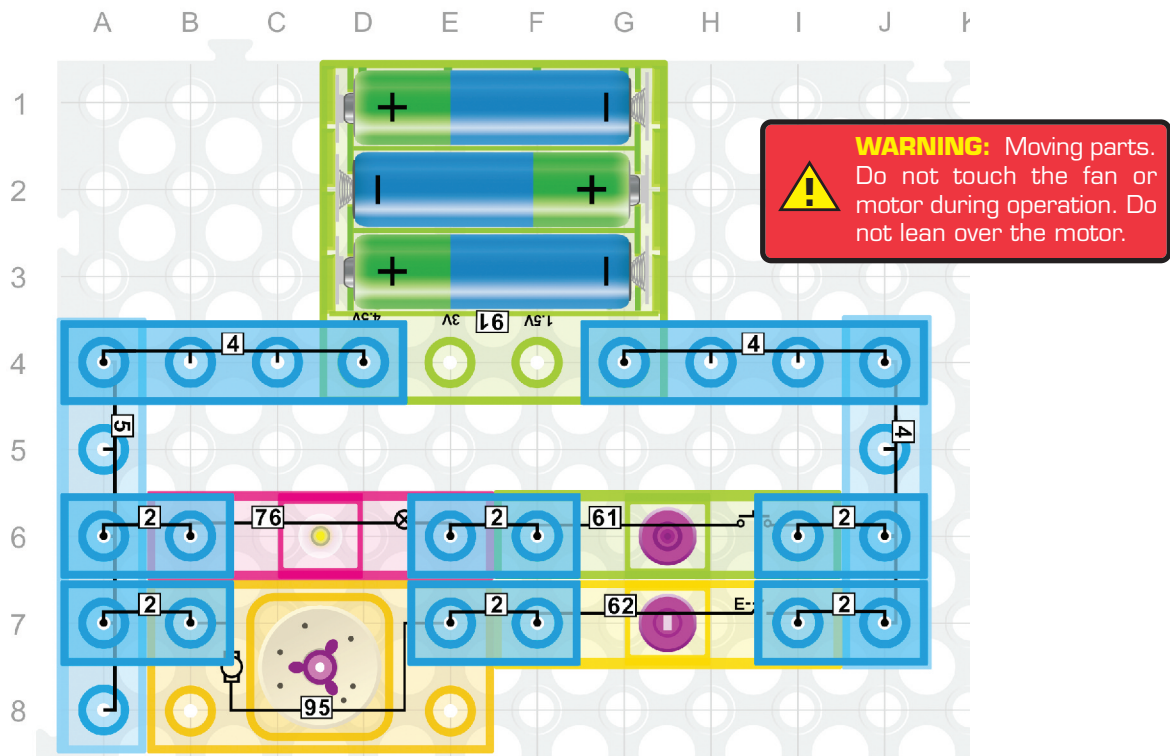
### 37. Triple Switch Series-Parallel Connection (I) controlling Lamp

In the circuit, the lamp (76) cannot turn on by just pressing the switch (62). If you press the switch (62) and press and hold the press switch (61), then the lamp (76) will light up. Or if you press the switch (62) and move the magnet (7) towards the reed switch (83), then the lamp (76) will light up. If you want to turn off the lamp (76) you should release the press switch (61) and move the magnet away from the reed switch (83). Or you can just turn off the main switch (62).



### 38. Triple Switch Series-Parallel Connection (II) Controlling Lamp

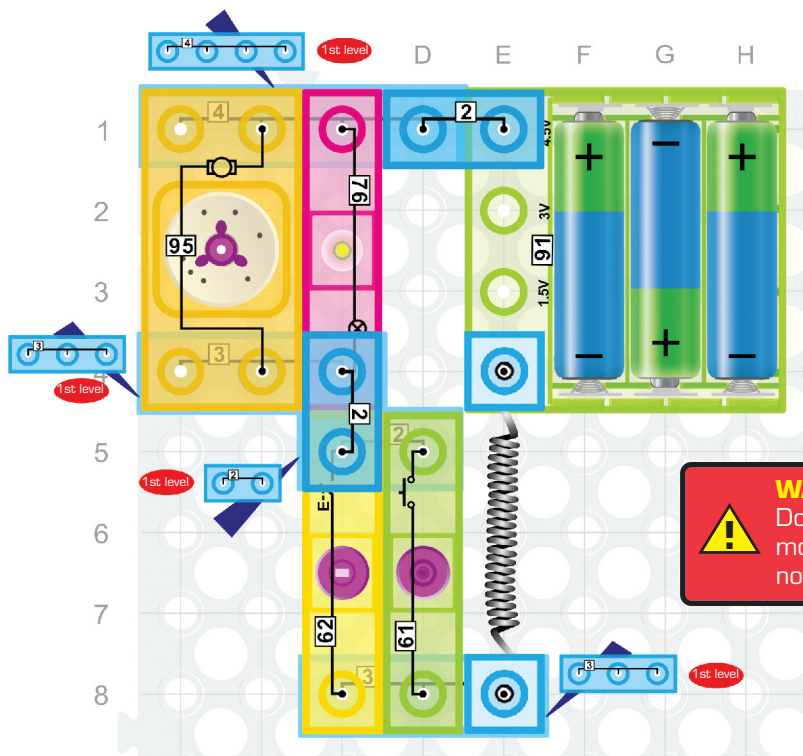
There are two ways to light up the lamp (76) in this circuit. You can either press the switch (62), or place the magnet next to the reed switch (83) and hold the press switch (61) at the same time.



### 39. Individually Switch-controlled Electrical Appliances

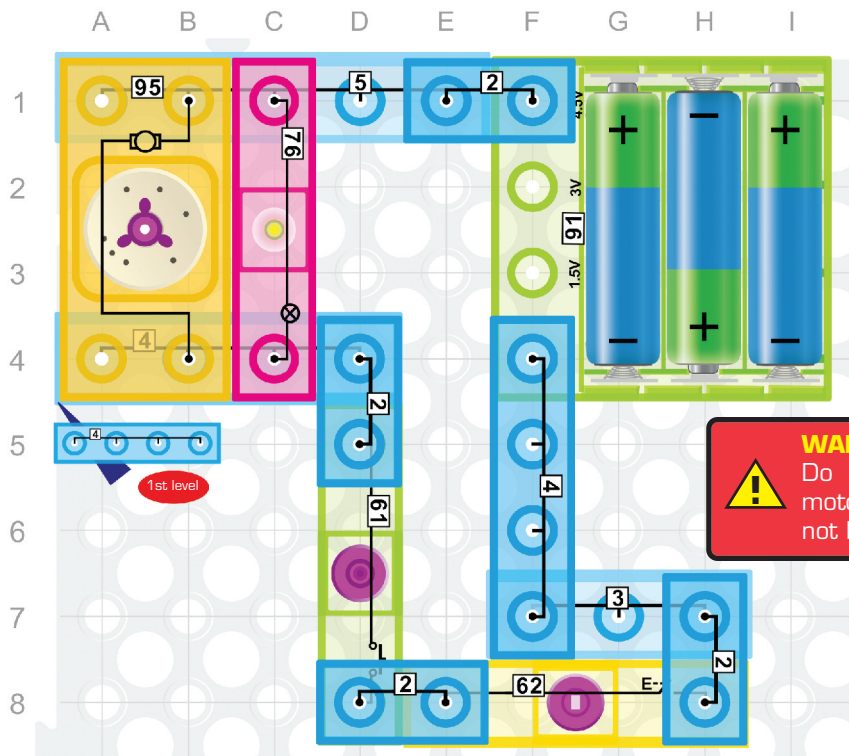
Press the switch (62), the motor (95) will start running. Press the switch (62) again, the motor (95) will stop. Press and hold the press switch (61), the lamp (76) will turn on. Release the press switch (61) and the lamp (76) will turn off.





#### 41. Double Switch Parallel Connection controlling Parallel Electrical Appliances

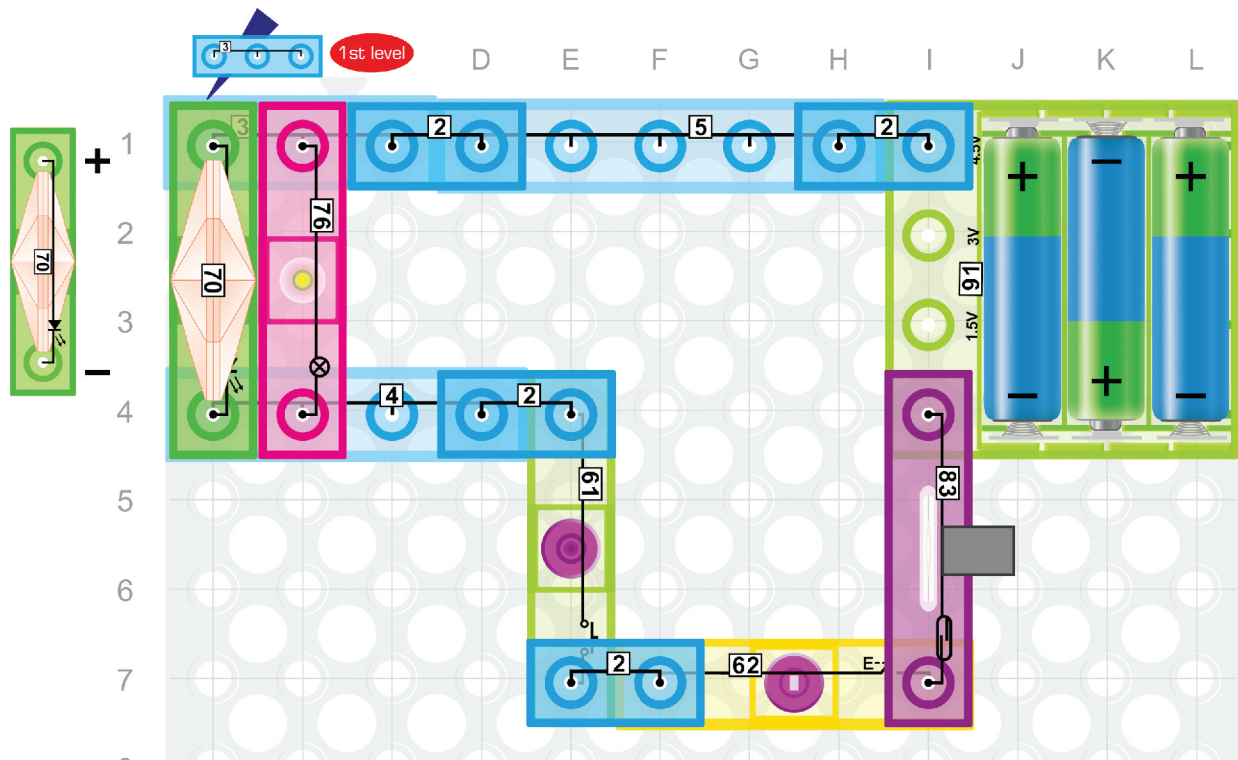
Press either the press switch (61) or the switch (62) to turn on the lamp (76) and the motor (95). If you want to turn off the lamp (76) or turn off the motor (95), release the press switch (61) and make sure the switch (62) is in the UP position.



## 42. Double Switch Series Connection controlling Parallel Electrical Appliances

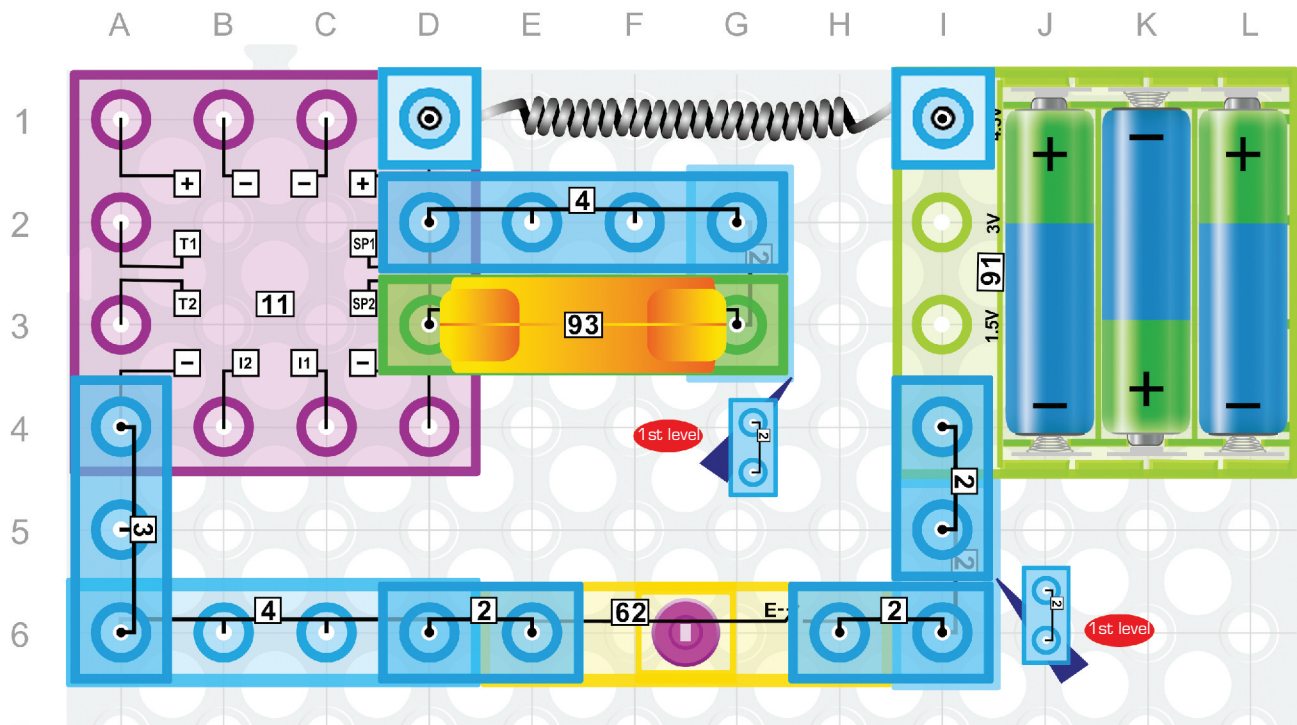
In the paralleled connection, to start the motor (95) and lamp (76), press the switch (62) and hold the press switch (61) at the same time. Or press the switch (62) first, then hold the press switch (61). The motor (95) and the lamp (76) will turn on.





### 43. Triple Switch Series Connection controlling Lamp & LED Parallel Connection

In the circuit, to turn on the lamp (76) and the LED (70), press the switch (62) first, then hold the press switch (61), finally move the magnet (7) towards the reed switch (83). In the paralleled circuit, even if the lamp (76) or LED (70) is broken, the other one can still work.

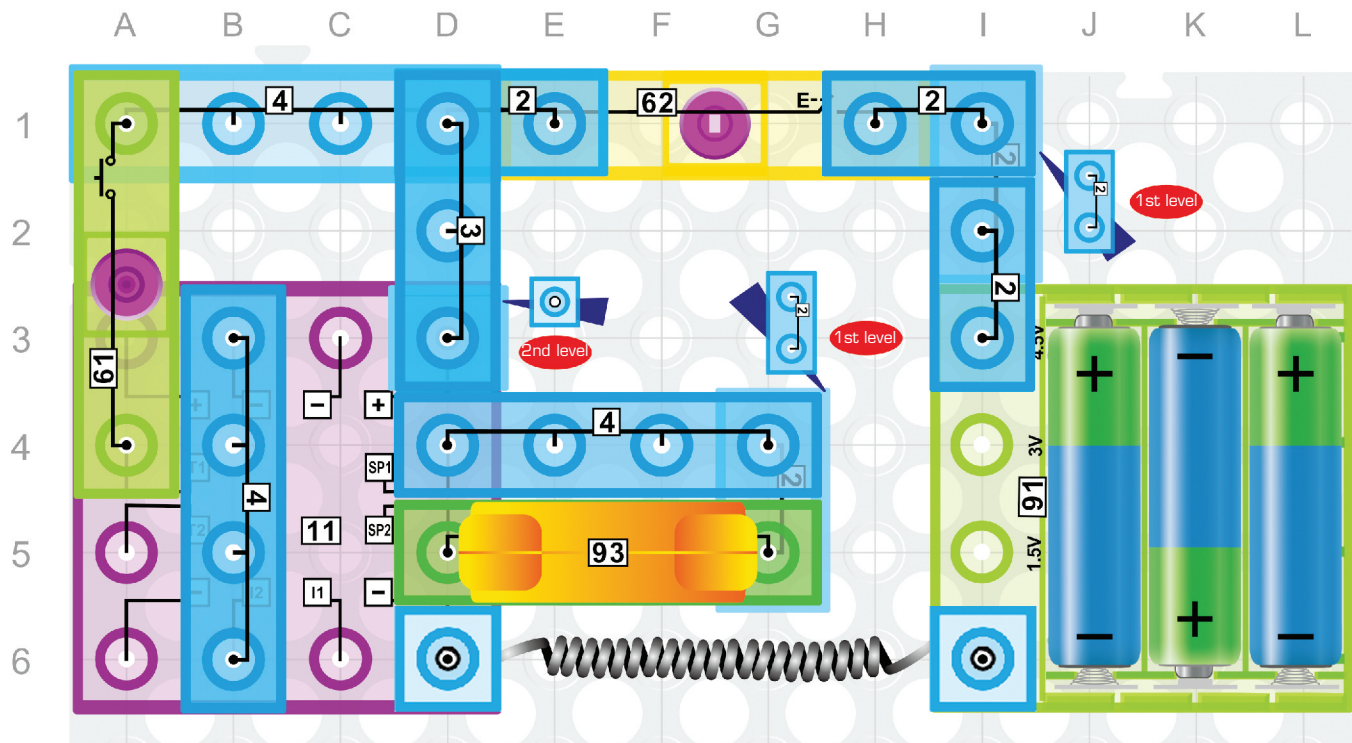


#### 44. Siren

Press the switch (62), you will hear the siren from the speaker (93).

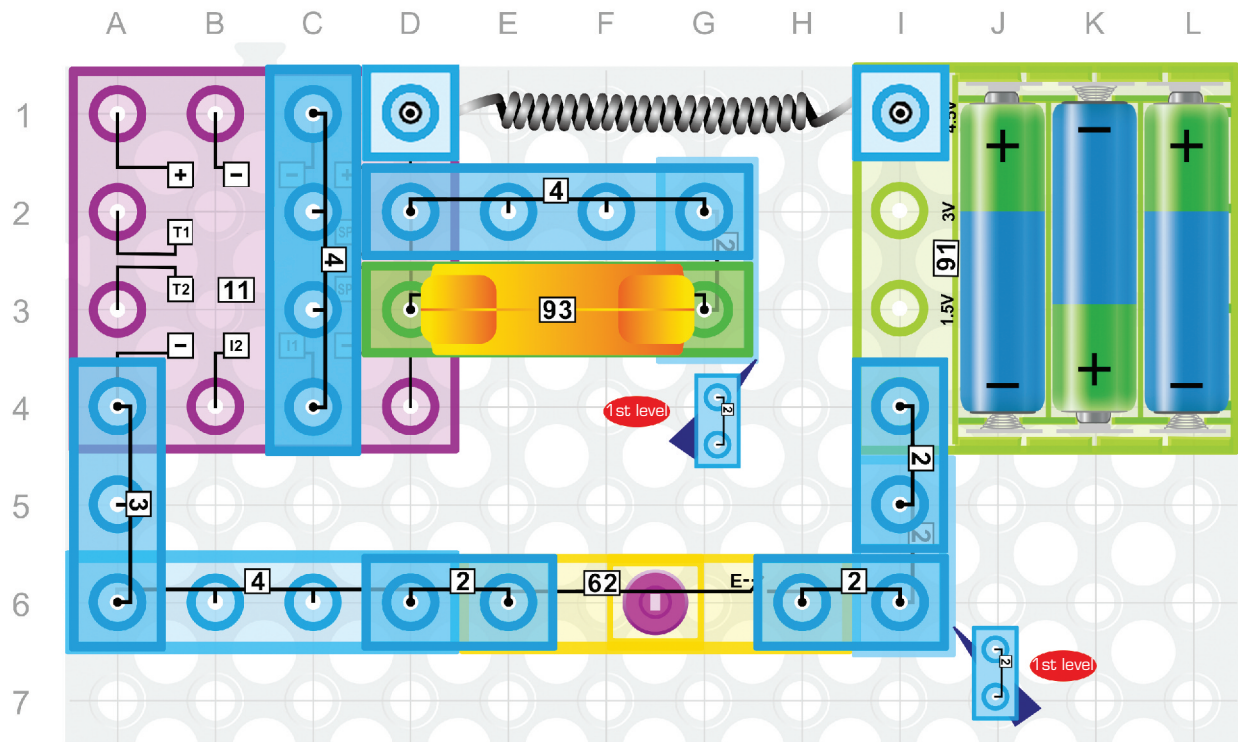






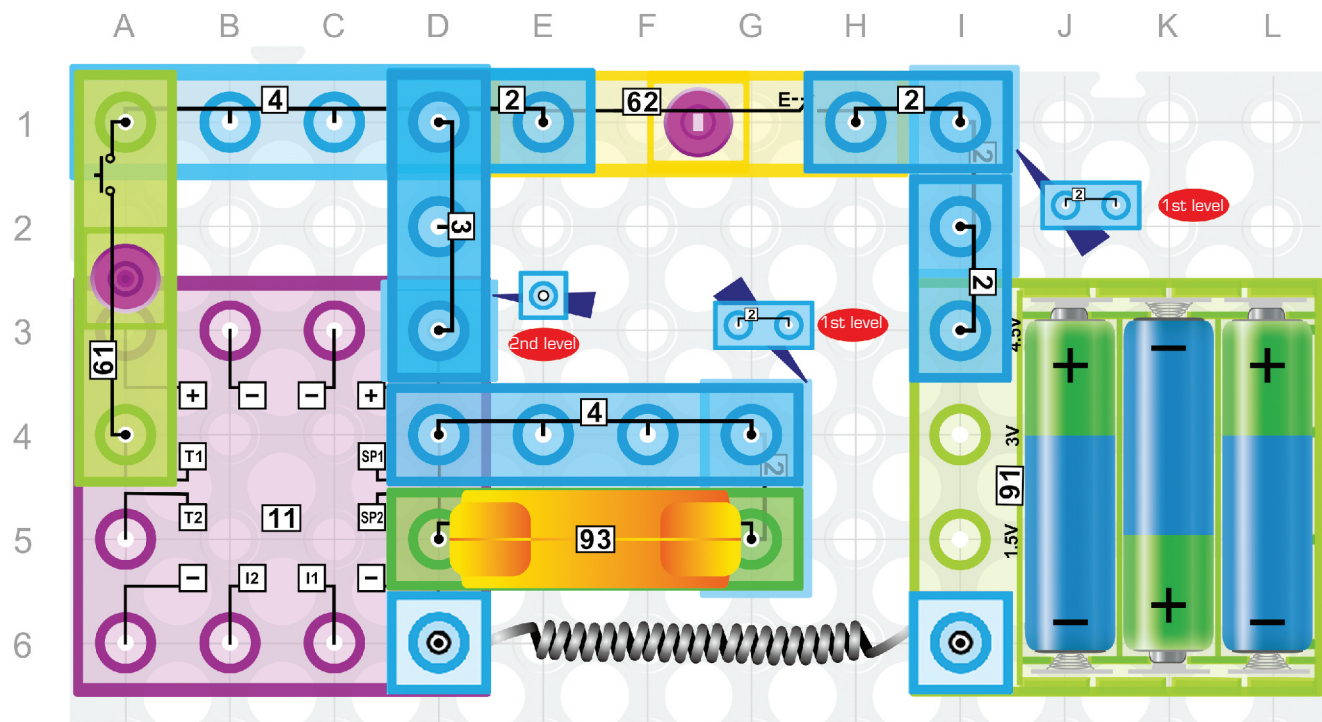
## 46. Space Battle Sounds

Press the switch (62), you will hear the space battle sounds from the speaker (93). Hold the press switch (61) and now you can hear other sounds.



## 47. Music

Press the switch (62), you will hear some music from the speaker (93).



## 48. Emergency Fire Siren

Press the switch (62), you will hear the siren from the speaker (93). When you press the press switch (61) you will hear a fire siren.

Press the switch (62), you will hear the siren from the speaker (93). Then touch the touch plate (80) several times, you will hear the gun sounds. Hold the touch plate (80), you will hear machine gun sounds. You may need to lick your fingers to make the touch plate (80) function properly.

Press the switch (62), you will hear the siren from the speaker (93). Next press and hold the press switch (61), now you will hear the Fire Siren.

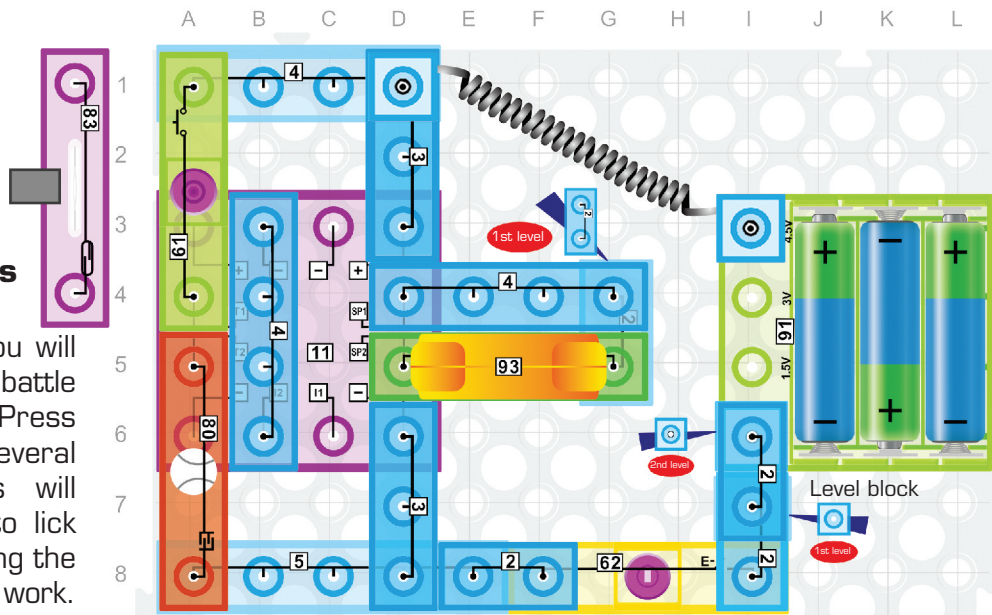
Replace the press switch (61) with the reed switch (83). Move the magnet (7) towards the reed switch (83), you will hear the fire siren.





## 52. Press Switch-controlled Sounds of Space Battle

Press the switch (62), you will hear the sounds of space battle from the speaker (93). Press the press switch (61) several times and the sounds will change. You may need to lick your fingers before touching the touch plate (80) to make it work.



## 53. Touch-controlled Sounds of Space Battle

Press the switch (62), you will hear the sounds of space battle from the speaker (93). Touch the Touch Plate (80) several times and the sounds will change. You may need to lick your fingers before touching the touch plate to make it work.

## 54. Magnet-controlled Sounds of Space Battle

Replace the press switch (61) with the reed switch (83), press the switch (62). You will hear the sounds of space battle from the speaker (93). Then move the magnet (7) towards the reed switch (83) several times, the sounds will change.

**Controlled**

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## 56. Press Switch-controlled Music Player

Press the switch [62], you will hear some music from the speaker [93]. Hold the press switch [61] and the music will restart.

Press the switch (62), now the music is on. Touch the touch plate (80), the music will restart. You may need to lick your fingers to make the touch plate (80) function properly.

Replace the press switch (61) with the reed switch (83), then press the switch (62). You will hear some music from the speaker (93). Move the magnet (7) towards the reed switch (83), the music will restart. Move the magnet (7) away, the music will stop playing. Put the magnet (7) on the reed switch (83), the music will start again.

## 59. Siren with Light Warning

Press the switch (62), the siren will be heard from the speaker (93). At the same time, you can see the light warning in the LED (70).

## 60. Touch-controlled Machine Gun Sounds & Light Warning

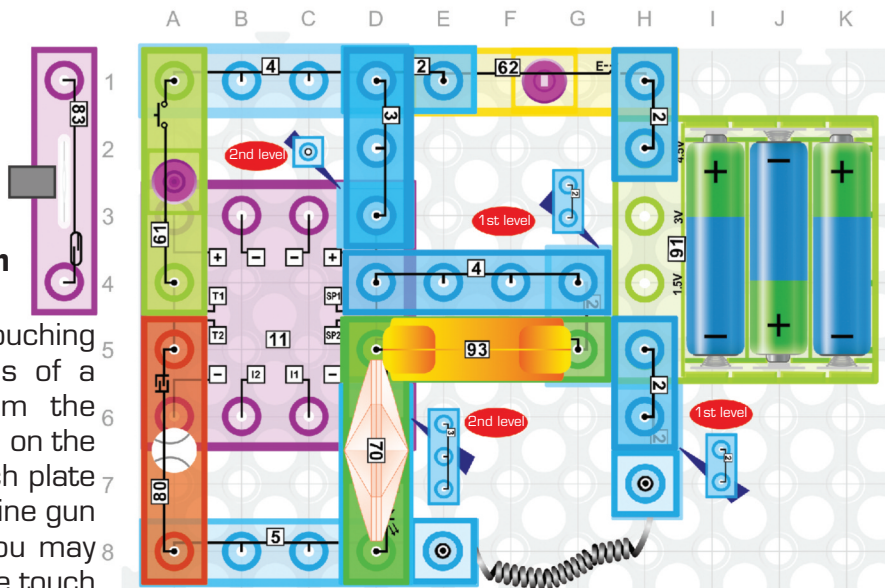
Press the switch (62), and keep touching the touch plate (80), the sounds of a machine gun will be heard from the speaker (93), with the light warning on the LED (70). Press tightly on the touch plate (80), now you will hear some machine gun sounds from the speaker (93). You may need to lick your fingers to make the touch plate (80) function properly.

## 61. Press Switch-controlled Fire Siren & Light Warning

Press the switch (62) and keep pressing the Press Switch (61). The sounds of a fire siren will be heard from the speaker (93), with the light warning on the LED (70).

## 62. Magnet-controlled Fire Siren & Light Warning

Replace the press switch (61) with the reed switch (83), press the switch (62), now you can hear the siren from the speaker (93) with the light warning on the LED (70). Move the magnet (7) towards the reed switch (83), now the fire siren is on.





Build the circuit, press the switch (62), the sounds of space battle will turn on with the light warning on the LED (70). Then press the press switch (61) many times, the sounds will change.



Press the switch (62), you will hear the sounds of space battle from the speaker (93) with the light warning on the LED (70). Then touch the touch plate (80) several times, the sounds will change. You may need to lick your fingers to make the touch plate (80) function properly.

Replace the press switch (61) with the reed switch (83), press the switch (62), you will hear sounds of space battle from the speaker (93) with the light warning on the LED (70). Then keep moving the magnet (7) towards the reed switch (83), the sounds will change.

## 66. Music and Light Warning

Build the circuit, press the switch (62), you will hear music from the speaker (93) with the light warning.

## 67. Press Switch-controlled Music and Light Warning

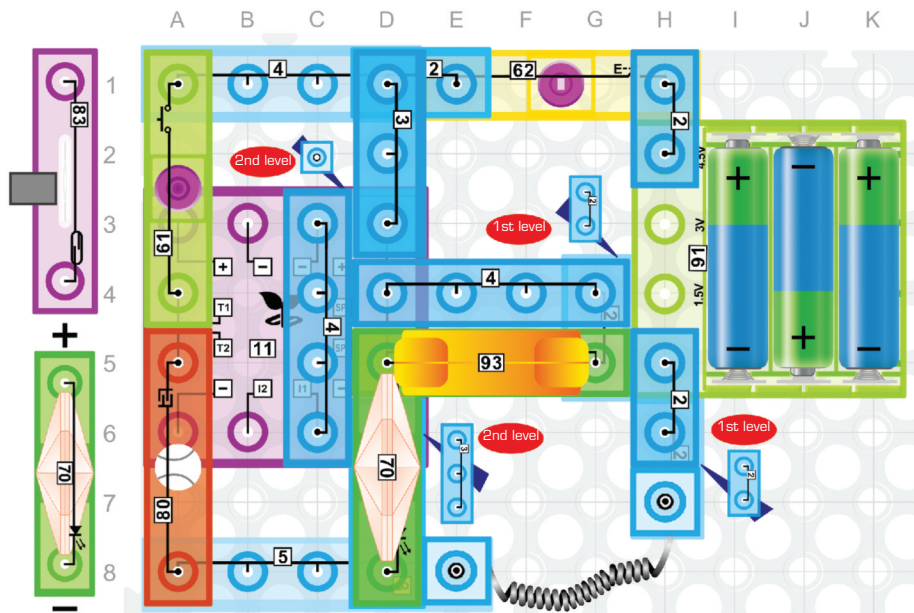
Press the switch (62), the music will turn on with the light warning on the LED (70). Hold the press switch (61) and the music will be restarted.

## 68. Touch-controlled Music and Light Warning

Press the switch (62), the music will turn on with the light warning on the LED (70). Touch the touch plate (80), the music will be restarted. You may need to lick your fingers to make the touch plate (80) function properly.

## 69. Magnet-controlled Music and Light Warning

Replace the press switch (61) with the reed switch (83) then press the switch (62), you will hear music from the speaker (93) while the light warning is on the LED (70). Move the magnet (7) towards the reed switch (83), the music will be restarted. Move the magnet (7) away, the music will turn off.



## 70. Siren in Low Volume and Light

Build the circuit, press the switch (62), you will hear the siren in a low volume from the speaker (93) with the flashing light on the LED (70).

## 71. Touch-controlled Sounds of Gun with Low Volume and Light

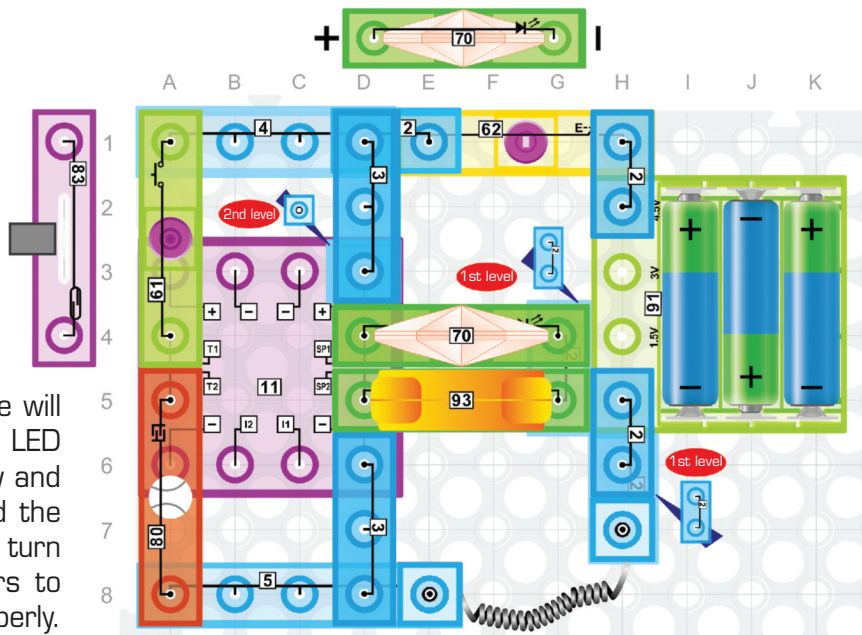
Press the switch (62), you will hear a siren in a low volume, touch the touch plate (80), gun sounds in a low volume will be heard with the flashing light on the LED (70). Press the touch plate (80) tightly and it will turn on. Release your hand and the sounds will stop and the LED (70) will turn off. You may need to lick your fingers to make the touch plate (80) function properly.

## 72. Press Switch-controlled Fire Siren in Low Volume and Light

In the circuit, press the switch (62), you will hear the siren in low volume from the speaker (93). Press the press switch (61), now you will hear a fire siren in low volume with the flashing light on the LED (70).

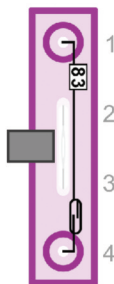
## 73. Magnet-controlled Fire Siren in Low Volume and Light

Replace the press switch (61) with the reed switch (83), then press the switch (62). You will hear the siren in a low volume from the speaker (93) while the light turns on from the LED (70). Move the magnet (7) towards the reed switch (83), the fire siren will turn on in a low volume with the flashing LED (70).



## 74. Space Battle in Low Volume

Build the circuit, press the switch (62), you will hear the sounds of space battle in a low volume. You will also see the flashing light from the LED (70).



## 75. Press Switch-controlled Space Battle in Low Volume

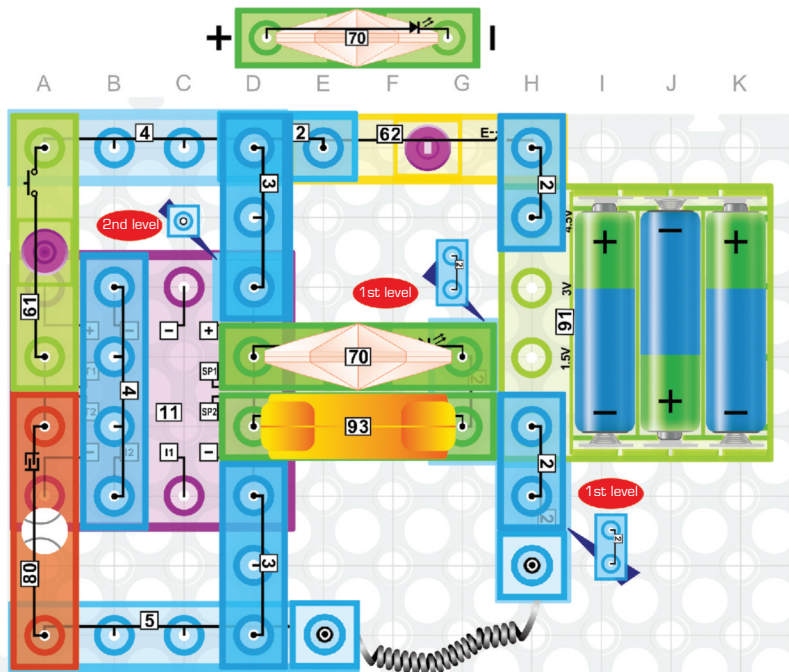
Press the switch (62), sounds of space battle will be heard in low volume from the speaker (93) with the flashing LED (70). Press the press switch (61) several times, the sound will change.

## 76. Touch-controlled Space Battle in Low Volume

Press the switch (62), sounds of space battle will be heard in low volume from the speaker (93) with a flashing light from the LED (70). Now touch the touch plate (80) several times, the sounds will change. You may need to lick your fingers to make the touch plate (80) function properly.

## 77. Magnet-controlled Space Battle in Low Volume

Replace the press switch (61) with the reed switch (83), press the switch (62) and you will hear the sounds of space battle in low volume. Move the magnet (7) towards the reed switch (83) several times, the sounds will change.



## 78. Music in Low Volume

Build the circuit, press the switch (62), you will hear some music in low volume from the speaker (93), with the flashing light on the LED (70).

## 79. Press Switch-controlled Music in Low Volume

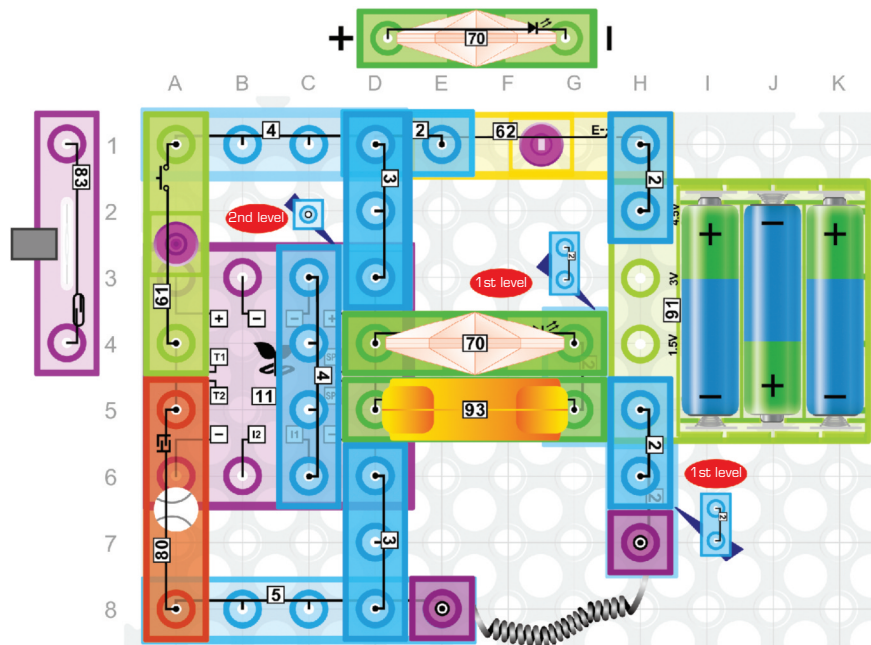
Press the switch (62), you will hear music in a low volume playing from the speaker (93) with the flashing light on the LED (70). Now keep pressing the press switch (61), you will hear music again with the flashing light on the LED (70).

## 80. Magnet-controlled Music in Low Volume

Replace the press switch (61) with the reed switch (83), then press the switch (62). You will hear music in a low volume playing from the speaker (93) while the light is on from the LED (70). Move the magnet (7) towards the reed switch (83), the music will be restarted. Move it away and the music will turn off.

## 81. Touch-controlled Music in Low Volume

Press the switch (62), you will hear the music play in a low volume from the speaker (93). Then touch the touch plate (80) the music will be restarted and the light will turn on from the LED (70). You may need to lick your fingers to make the touch plate (80) function properly.



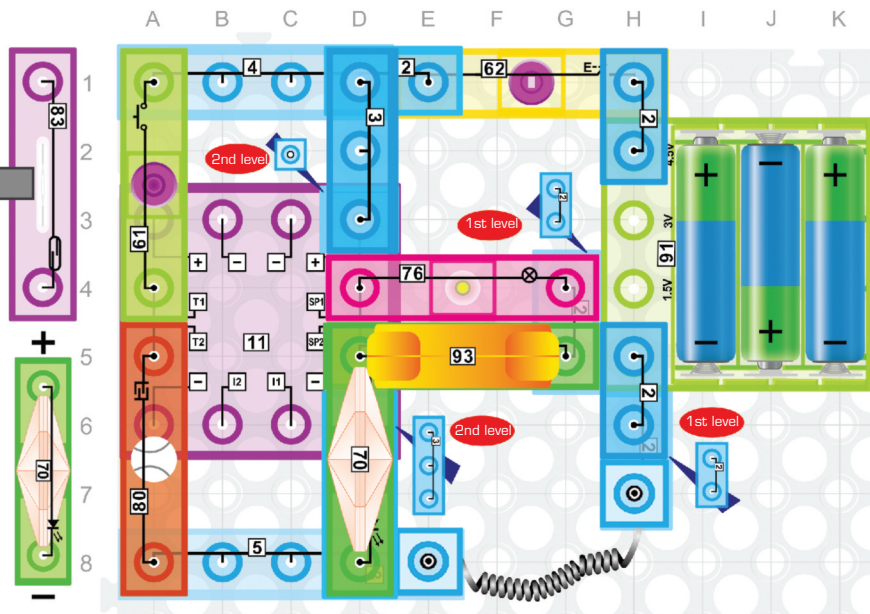


## 82. Siren with sound and Light in Medium Volume

Build the circuit, press the switch (62), you will hear the siren in a medium volume. Also the lamp (76) and flashing LED (70) are on.

## 83. Touch-controlled Gun Sounds in Medium Volume and Light

Press the switch (62), you will hear the siren in a medium volume from the speaker (93). Then keep touching the touch plate (80), you will hear the sounds of a gun in a medium volume. Then hold the touch plate (80) and you will hear the sounds of a machine gun. The lamp (76) and flashing LED (70) will also turn on at the same time. You may need to lick your fingers to make the touch plate (80) function properly.



## 84. Press Switch-controlled Fire Siren in Medium Volume and Light

Press the switch (62), you will hear the siren from the speaker (93). Then press the press switch (61), now you will hear the fire siren in a medium volume. The lamp (76) and flashing LED (70) turn on at the same time.

## 85. Magnet-controlled Fire Siren in Medium Volume and Light

Replace the press switch (61) with the reed switch (83), press the switch (62), you will hear the siren from the speaker (93). Move the magnet (7) towards the reed switch (83). You will now hear a fire siren in medium volume. The lamp (76) and flashing LED (70) are also on.

## 86. Space Battle in Medium Volume and Light

Build the circuit, press the switch (62), you will hear the sounds of space battle in medium volume, the lamp (76) and the flashing light on the LED (70) are on as well.

## 87. Press Switch-controlled Space Battle in Medium Volume and Light

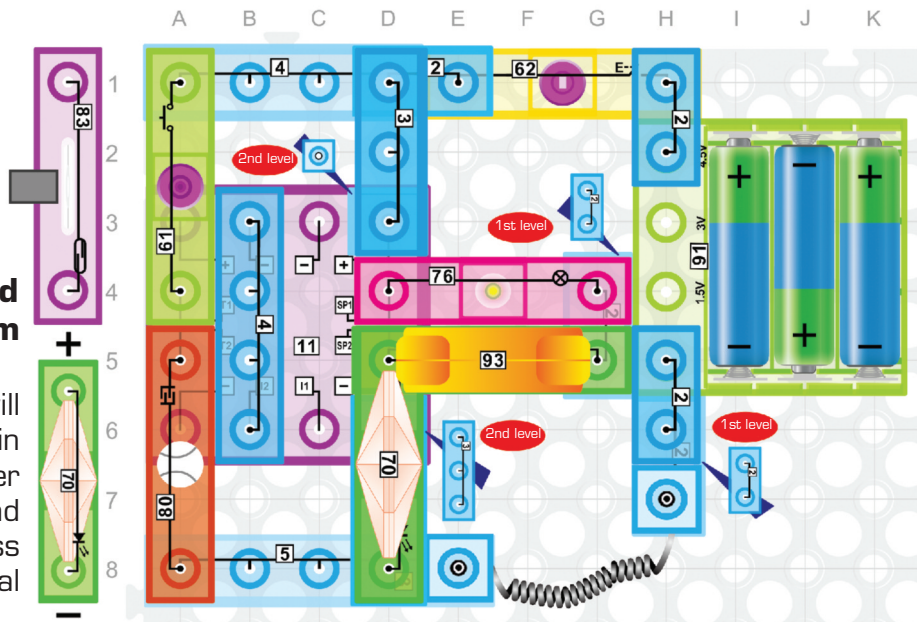
Press the switch (62), you will hear the sounds of space battle in medium volume from the speaker (93) with the lamp (76) and flashing LED (70) on as well. Press the press switch (61) several times and the sound will change.

## 88. Touch-controlled Space Battle in Medium Volume and Light

The switch (62) controls the sounds of space battle in medium volume, the lamp (76) and the LED (70). Press the switch (62) and they are all on. Touch the touch plate (80) and the sounds will change. You may need to lick your fingers to make the touch plate (80) function properly.

## 89. Magnet-controlled Space battle in Medium Volume and Light

Replace the press switch (61) with the reed switch (83), press the switch (62), you will hear sounds of space battle in medium volume from the speaker (93). Move the magnet (7) towards the reed switch (83) several times, the sound will change.



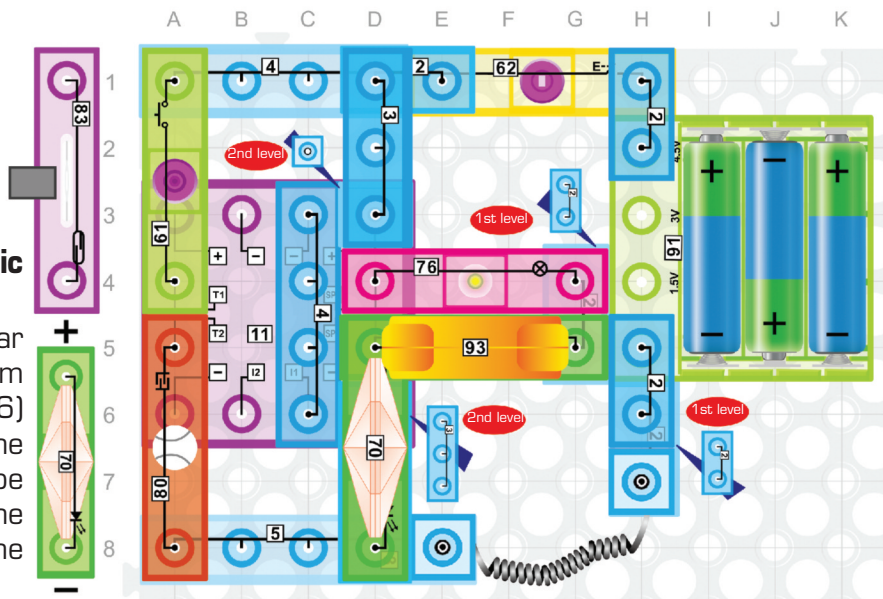


## 90. Music in Medium Volume and Light

Build the circuit, press the switch (62), you will hear some music in medium volume, the lamp (76) and LED (70) will be on as well.

## 91. Press Switch-controlled Music in Medium Volume and Light

Press the switch (62), you will hear some music in medium volume from the speaker (93) while the lamp (76) and flashing LED (70) are on. Press the press switch (61), the music will be stopped. Hold the press switch (61) the music will be restarted. Release the press switch (61) and it will turn off.



## 92. Magnet-controlled Music in Medium Volume and Light

Replace the press switch (61) with the reed switch (83), press the switch (62), you will hear some music in medium volume from the speaker (93) with the lamp (76) and flashing LED (70) on also. Instead of moving the magnet (7) towards the reed switch (83), put the magnet (7) on the reed switch (83) and do not move it. The music will restart.

## 93. Touch-controlled Music in Medium Volume and Light

Press the switch (62), you will hear some music in medium volume from the speaker (93). Then touch the touch plate (80) and the music will restart. The lamp (76) and flashing LED (70) are also on. You may need to lick your fingers to make the touch plate (80) function properly.

## 94. Steady Flashing Lamp

Build the circuit, press the switch (62), the lamp (76) will flash steadily.

## 95. Press Switch-controlled Flashing Lamp

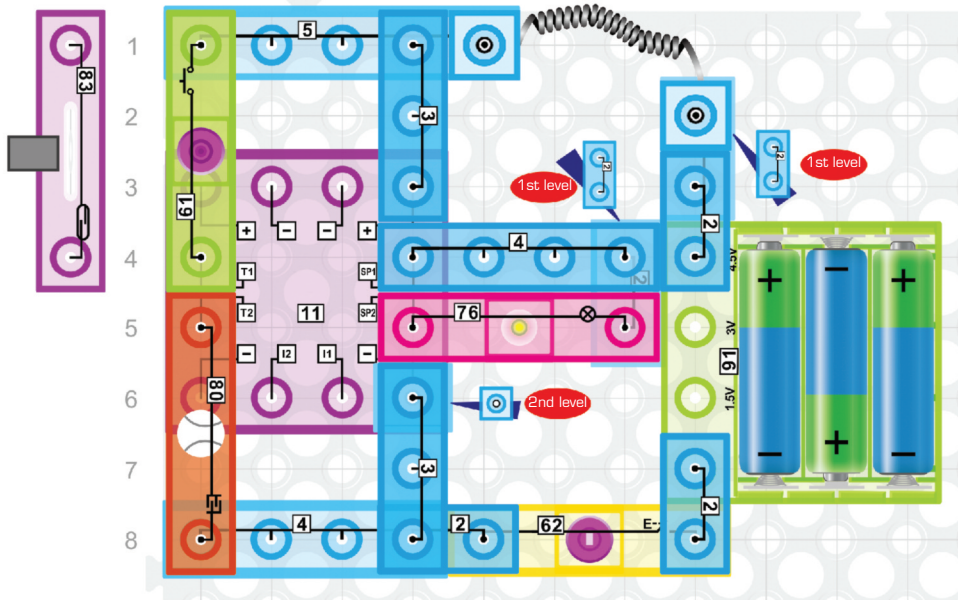
Press the switch (62), the lamp (76) will flash steadily. Press the touch plate (80) and the lamp (76) will go off. Press and hold the press switch (61) and the lamp (76) will come back on.

## 96. Touch-controlled Lamp

Press the switch (62), the lamp (76) will flash steadily. Press the touch plate (80) and the lamp (76) will turn off. Hold the touch plate (80) and the lamp (76) will flash quickly. You may need to lick your fingers to make the touch plate (80) function properly.

## 97. Magnet-controlled Flashing Lamp (Varied Speed)

Replace the press switch (61) with the reed switch (83) and press the switch (62), put the magnet (7) on the reed switch (83), the lamp (76) will turn on and flash quickly.





### 101. Slow Flashing Lamp

Build the circuit, press the switch (62), the lamp (76) will slowly flash.

### 102. Press Switch-controlled Slow Flashing Lamp

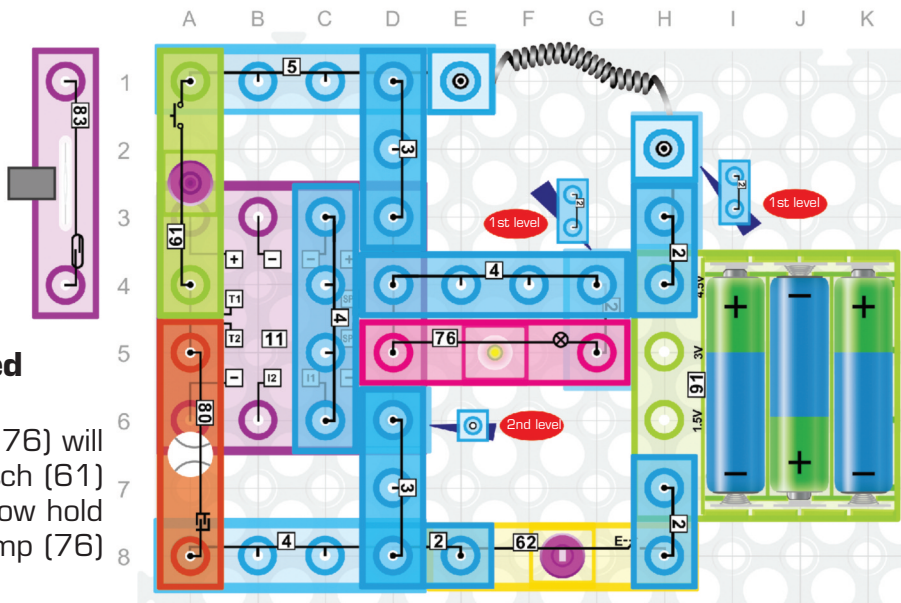
Press the switch (62), the lamp (76) will flash slowly. Press the press switch (61) and the lamp (76) will turn off. Now hold the press switch (61) and the lamp (76) will flash slowly again.

### 103. Touch-controlled Slow Flashing Lamp

Press the switch (62), the lamp (76) will flash slowly. Press the press switch (61) and the lamp (76) will go off. Touch the touch plate (80) and the lamp (76) will flash slowly again. You may need to lick your fingers to make the touch plate (80) function properly.

### 104. Magnet-controlled Slow Flashing Lamp

Replace the press switch (61) with the reed switch (83), press the switch (62), the lamp (76) will flash slowly. Move the magnet (7) towards the reed switch (83), the lamp (76) will turn off. Now put the magnet (7) on the reed switch (83) and do not move it. The lamp (76) will flash slowly, when you move the magnet (7) away, the lamp (76) will turn off.



A diagram of a vertical cable system. A grey rectangular weight is attached to the left end of a vertical cable. The cable passes through a purple rectangular frame. At the top of the frame, the cable is connected to a fixed support. At the bottom of the frame, the cable is connected to a spring. A small box with the number '8.3' is located on the cable between the weight and the spring.



Build the circuit, press the switch (62), the LED (70) will flash slowly. Press the press switch (61), the flashing speed and brightness of the LED (70) will change.

Press the switch (62), the LED (70) will flash slowly. Press the touch plate (80), the flashing speed and brightness of the LED (70) will be changed. You may need to lick your fingers to make the touch plate (80) function properly.

Replace the press switch (61) with the reed switch (83), press the switch (62), the LED (70) will flash slowly. Move the magnet (7) towards the reed switch (83) several times, the flashing speed and brightness of the LED (70) will be changed.





## 112. Slow Flashing LED

Build the circuit, press the switch (62), the LED (70) will flash slowly.

## 113. Press Switch-controlled Slow Flashing LED

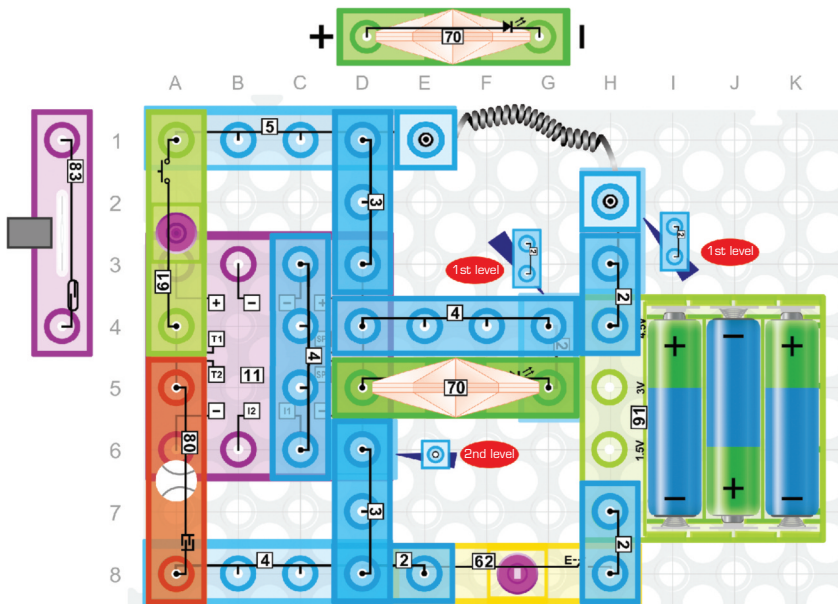
Press the switch (62), the LED (70) will flash slowly. Press the press switch (61) and the LED (70) will turn off. Now hold the press switch (61) and the LED (70) will flash slowly again.

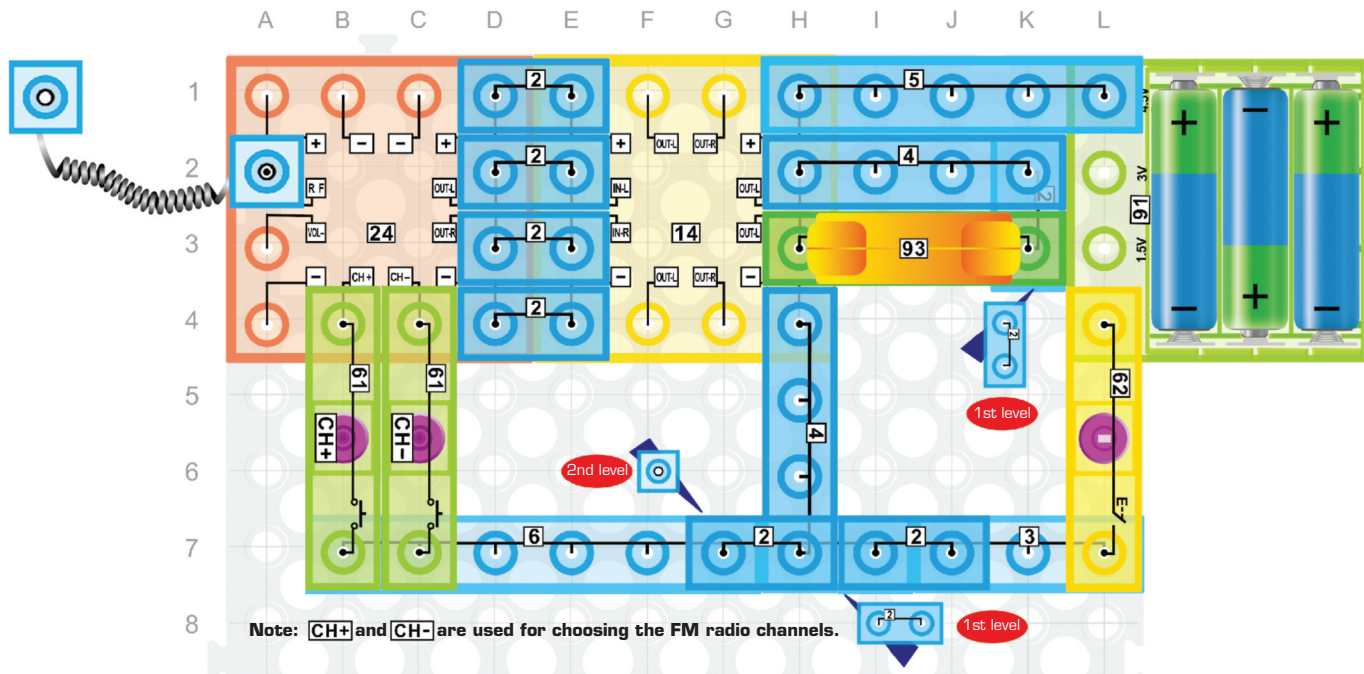
## 114. Touch-controlled Slow Flashing LED

Press the switch (62), the LED (70) will flash slowly. Press the press switch (61) and the LED (70) will go off. Touch the touch plate (80) and the LED (70) will flash slowly again. You may need to lick your fingers to make the touch plate (80) function properly.

## 115. Magnet-controlled Slow Flashing LED

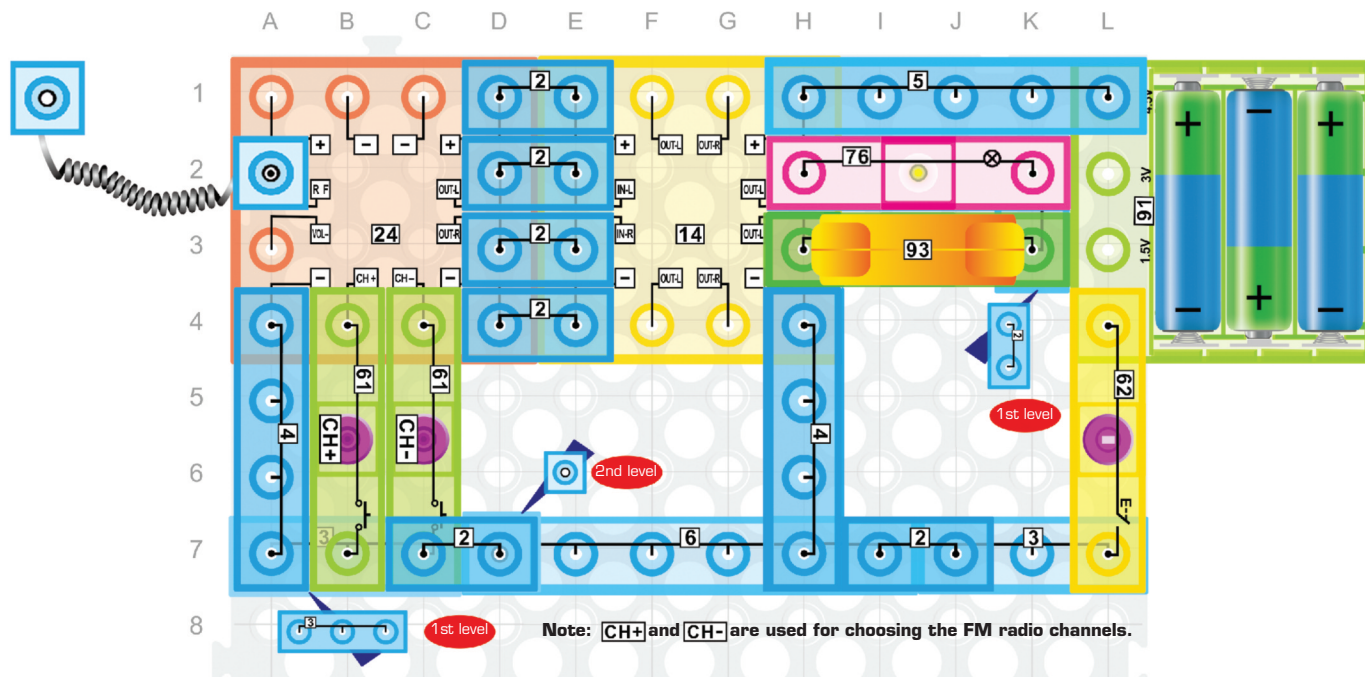
Replace the press switch (61) with the reed switch (83), then press the switch (62), the LED (70) will flash slowly. Move the magnet (7) towards the reed switch (83), the LED (70) will flash slowly too. When you move the magnet (7) away the LED (70) will turn off. Put the magnet (7) on the reed switch (83), the LED (70) will flash slowly again.





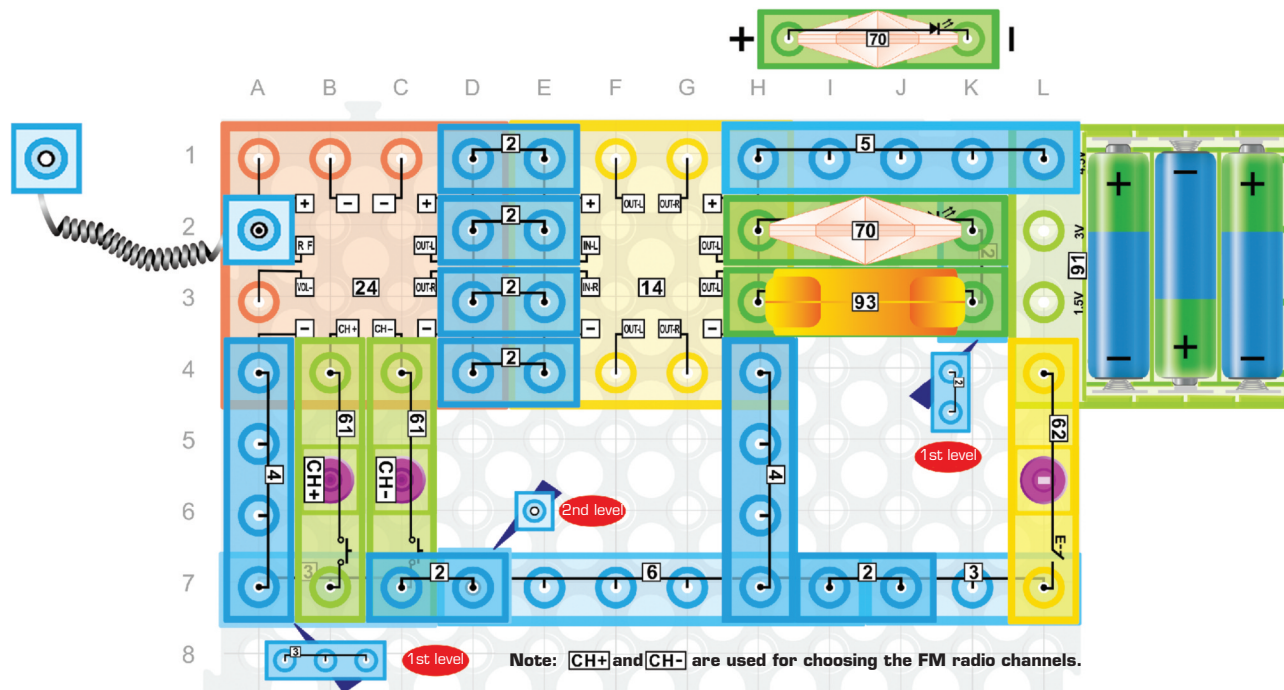
## 116. FM Radio

Build the circuit, press the switch (62), you will hear some FM radio stations from the speaker (93). Press the press switch (61), now you can choose the channels using CH+ and CH- press switches. For best FM reception, hold the open end of the spring wire in the air.



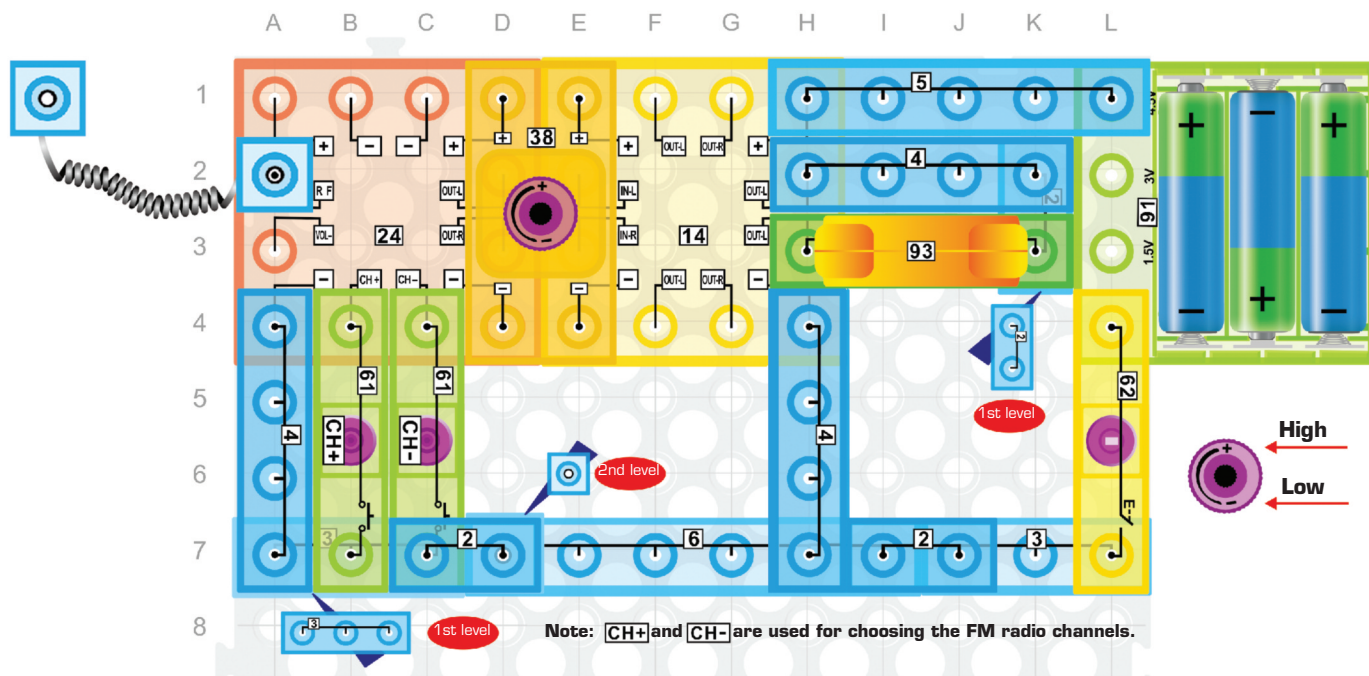
## 117. FM Radio in a Medium Volume

Build the circuit, press the switch (62), you will hear some FM radio stations from the speaker (93) in medium volume. The lamp (76) will light up, then press the press switch (61) to choose your channels you want. For best FM reception, hold the open end of the spring wire in the air.



## 118. FM Radio with Level Meter

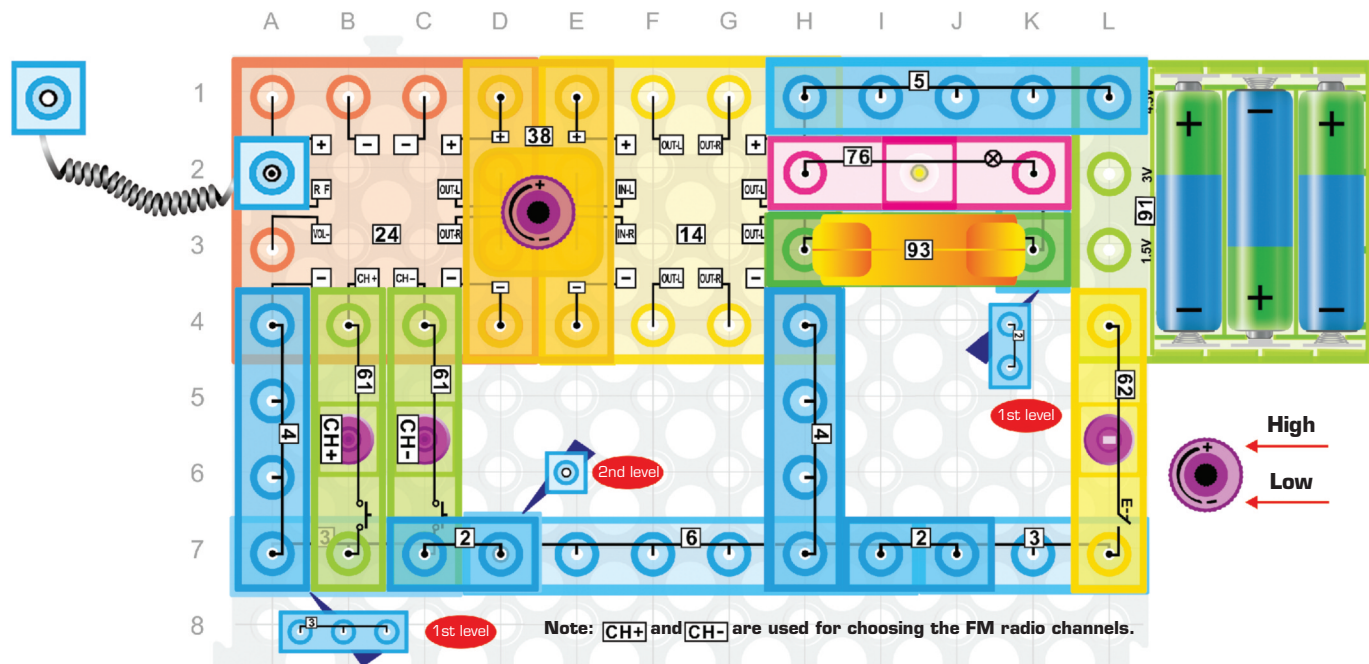
Build the circuit, press the switch (62), you will hear some FM radio stations from the speaker (93) in low volume. Press the press switch (61) to choose your channels you want. The brightness of the LED (70) will vary with the volume of the radio. For best FM reception, hold the open end of the spring wire in the air.



## 119. Adjustable Radio Volume

Build the circuit, press the switch (62), you will hear some FM radio stations from the speaker (93). Press the press switch (61) to choose your channels you want. You can also adjust the volume (38) by rotating the button. For best FM reception, hold the open end of the spring wire in the air.





## 120. Adjustable Radio Volume with Level Meter

Build the circuit, press the switch (62), you will hear some FM radio stations from the speaker (93) in medium volume. The lamp (76) will light up, then press the press switch (61) to choose your channels you want. You can also adjust the volume (38) by rotating the button, the brightness of the lamp (76) will vary with the volume. For best FM reception, hold the open end of the spring wire in the air.



## Your E-Blox® Circuit Builder™ is compatible with other E-Blox® products!

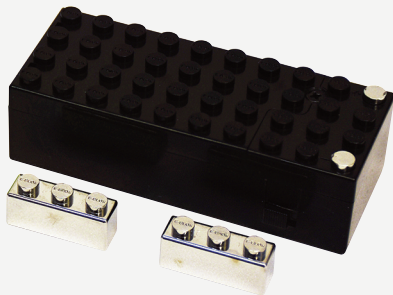
Your E-Blox® Circuit Builder™ kit includes two tin plated blocks (part # 6EB2X101) which allow you to connect to other E-Blox® sets. A simple demo circuit is shown on the right and the parts needed to build it are shown below.

LED Block (6EB2X70)

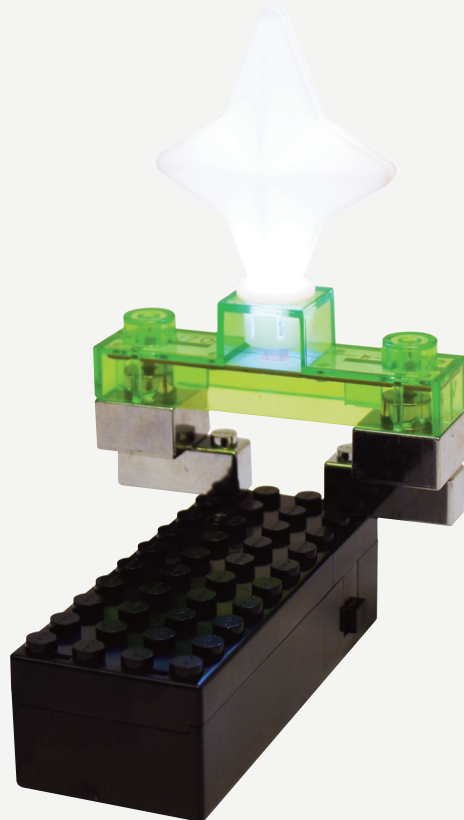


Plated blocks  
(6EB2X101)

Battery block (6EB3795)  
(from E-Blox® pARTS™  
Starter/Plus/Deluxe set)

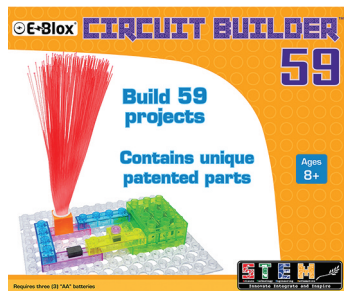


Plated 1x3 blocks (6EB3622Tin)  
(from E-Blox® pARTS™ Starter/Plus/Deluxe set)

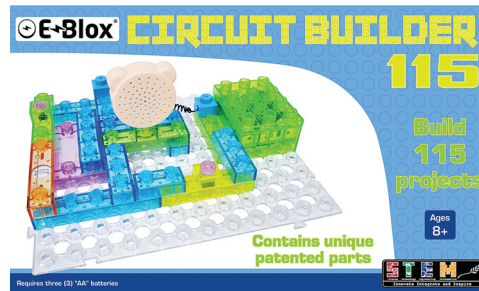


## Other E-Blox® Products

# CIRCUIT BUILDER™



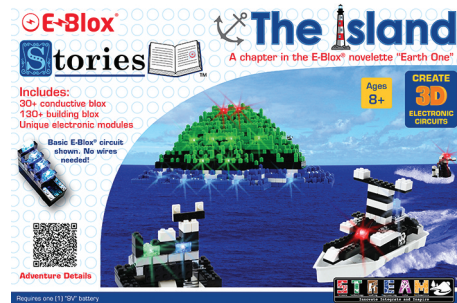
Build 59 projects with component parts including a motor, fiber optic tree, and reed switch.



Build 115 projects with component parts, including a speaker and three-in-one integrated circuit (IC).



Follow the adventures of Seymour and his robot Robyn as they investigate a mysterious light in the distant ocean horizon. The storybook includes QR codes that create an interactive learning environment using online resources. Models are built in several parts of the story, further enhancing the learning experience.



## Other E-Blox® Products



The **E-Blox® pARTS™** series utilizes our patented technology that allows you to build electrical circuits in three dimensions. Our tin plated blocks are safe to use thanks to a low current power supply (9V battery), our patented battery holder which will sound an alarm and shut down if a short circuit exists, and tin (just like the cans your food comes in). Let your imagination run wild as you create your own circuits integrated into whatever you are inspired to build. Perfect for budding scientists, technicians, engineers, artists, or mathematicians!



### STARTER

Contains six (6) LEDs.



### PLUS

Contains six (6) LEDs.



### DELUXE

Contains eight (8) LEDs.



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Visit us at: [www.myeblox.com](http://www.myeblox.com)

**U.S. Patents:** 8,221,182; 6,805,605; 62/328,692; PCT/US2010/060613;  
and other patents pending.

**International Patents:** 10842574.5 (EU); 2780580 (Canada); 326,340 (Mexico);  
ZL 201080056936.6 (China); HK1171711 (Hong Kong)

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