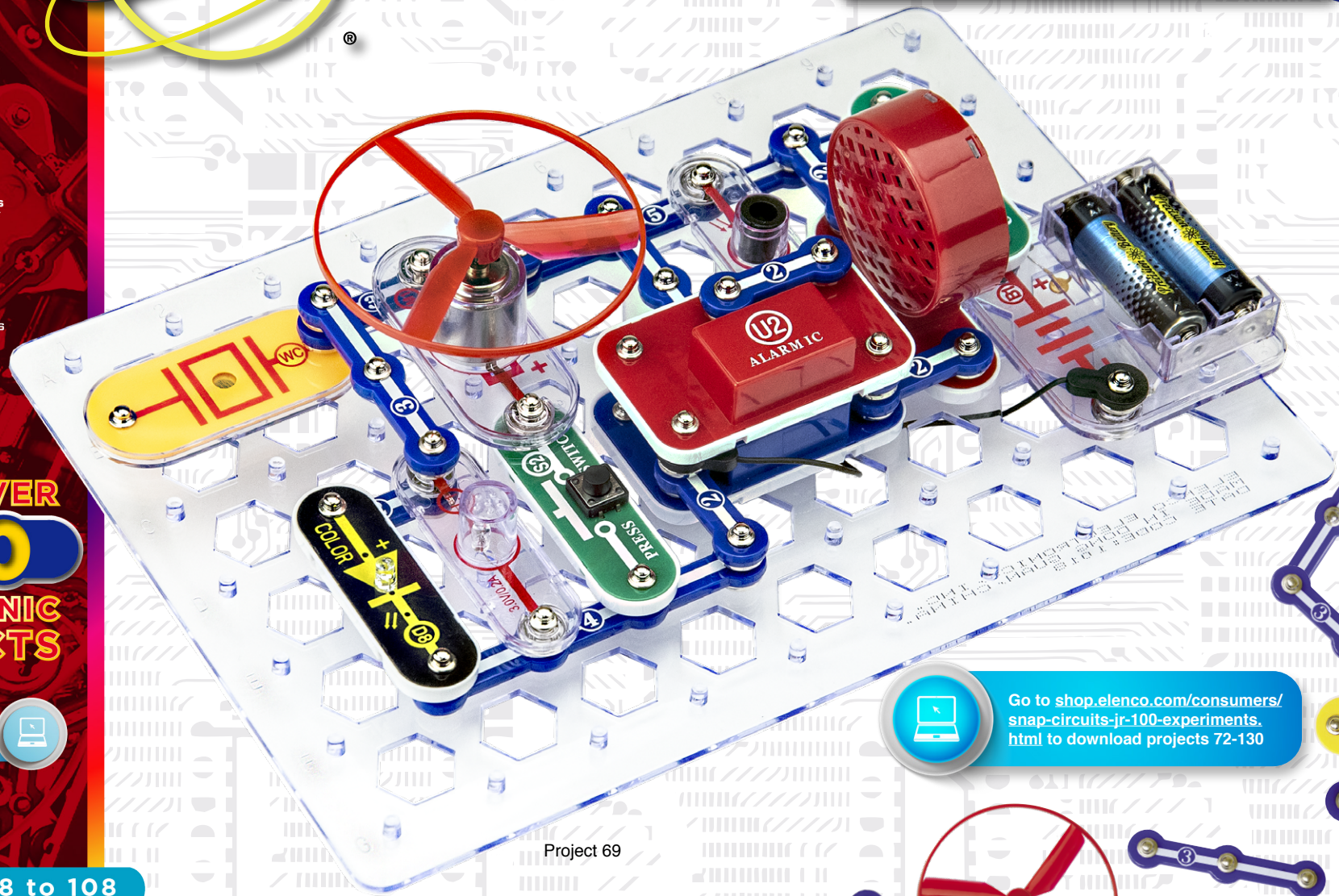
SNAP CIRCUITS®

ELENCO®

SNAP CIRCUITS® JUNIOR

Simply Snap Together!

Makes learning electronics a snap!



LEARN THE FUNDAMENTALS OF ELECTRICITY

ACTIVATE AERIAL STUNTS

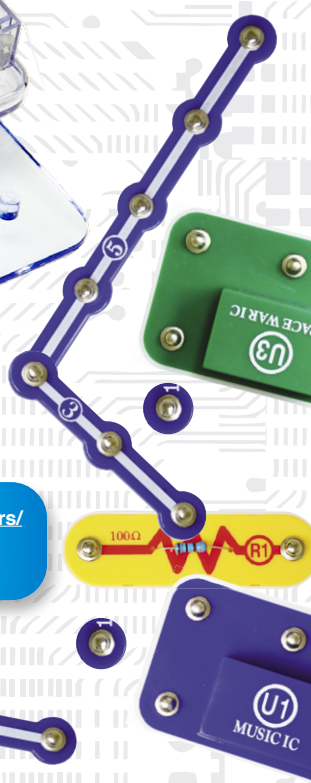
FUN SOUNDS

BUILD OVER 100 ELECTRONIC PROJECTS

PRINTED Projects 70

30+ ONLINE Projects

Go to shop.elenco.com/consumers/snap-circuits-jr-100-experiments.html to download projects 72-130



Project 69

AGES 8 to 108

Two (2) "AA" batteries required

ELENCO®
Learn by doing.®

753113
Patent # 7144255 I SOURCE CODE:SC-100V1

Table of Contents

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WARNING FOR ALL PROJECTS WITH A ⚠ SYMBOL - Moving parts. Do not touch the motor or fan during operation. Do not lean over the motor. Do not launch the fan at people, animals, or objects. Eye protection is recommended.

WARNING: SHOCK HAZARD - Never connect Snap Circuits® to the electrical outlets in your home in any way!

WARNING: CHOKING HAZARD - Small parts. Not for children under 3 years.

Conforms to all applicable U.S. government requirements and CAN ICES-3 (B)/NMB-3 (B).

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 snapped.
4. Try replacing the batteries.
5. If the motor spins but does not balance the fan, check the black plastic piece with three prongs on the motor shaft. Be sure that it is at the top of the shaft.

Elenco® 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 8 to determine which ones need replacing.

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.

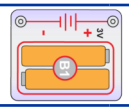
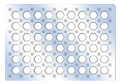
Never modify your parts, as doing so may disable important safety features in them, and could put your child at risk of injury.

⚠ 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 mix old and new batteries.
- Do not connect batteries or battery holders in parallel.
- 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.

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 (800) 533-2441 or e-mail us at: help@elenco.com. Customer Service • 150 Carpenter Ave. • Wheeling, IL 60090 U.S.A.

Qty.	ID	Name	Symbol	Part #	Qty.	ID	Name	Symbol	Part #
❒ 3		1-Snap Wire		6SC01	❒ 1		Motor		6SCM1
❒ 5		2-Snap Wire		6SC02	❒ 1		Fan		6SCM1F
❒ 3		3-Snap Wire		6SC03	❒ 1		Photoresistor		6SCRP
❒ 1		4-Snap Wire		6SC04	❒ 1		Slide Switch		6SCS1
❒ 1		5-Snap Wire		6SC05	❒ 1		Press Switch		6SCS2
❒ 1		Battery Holder - uses 2 1.5V type AA (not Included)		6SCB1	❒ 1		Speaker		6SCSP
❒ 1		Base Grid (11.0” x 7.7”)		6SCBG	❒ 1		Music Integrated Circuit		6SCU1
❒ 1		Color LED		6SCD8	❒ 1		Alarm Integrated Circuit		6SCU2
❒ 1		Jumper Wire (Black)		6SCJ1	❒ 1		Space War Integrated Circuit		6SCU3
❒ 1		Jumper Wire (Red)		6SCJ2	❒ 1		Whistle Chip		6SCWC
❒ 1		3V Lamp		6SCL1	**You may order additional / replacement parts at our website: www.elenco.com/replacement-parts**				

How To Use It

Snap Circuits® uses building blocks with snaps to build the different electrical and electronic circuits in the projects. Each block has a function: there are switch blocks, lamp blocks, battery blocks, different length wire blocks, etc. These blocks are in different colors and have numbers on them so that you can easily identify them. The circuit you will build is shown in color and with numbers, identifying the blocks that you will use and snap together to form a circuit.

For Example:

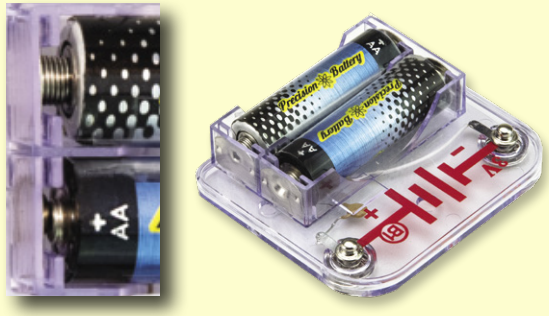
This is the switch block which is green and has the marking (S2) on it as shown in the drawings. Please note that the drawing doesn't reflect the real switch block exactly (it is missing the ON and OFF markings), but gives you the general idea of which part is being used in the circuit.

This is a wire block which is blue and comes in different wire lengths. This one has the number (2), (3), (4), or (5) on it depending on the length of the wire connection required.

This is a 1-snap wire that is used as a spacer or for interconnection between different layers.

To build each circuit, you have a power source block number (B1) that needs two (2) "AA" batteries (not included with the Snap Circuits® kit).

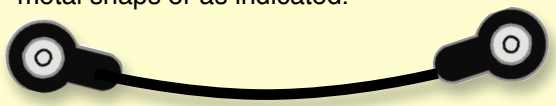
When installing a battery, be sure the spring is compressed straight back, and not bent up, down, or to one side. Battery installation should be supervised by an adult.



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 snap into. You do not need this base to build your circuits, but it does help in keeping your circuit together neatly. The base has rows labeled A-G and columns labeled 1-10.

Next to each part in every circuit drawing is a small number in black. This tells you which level the component is placed at. Place all parts on level 1 first, then all of the parts on level 2, then all of the parts on level 3, etc.

Some circuits use the jumper wires to make unusual connections. Just clip them to the metal snaps or as indicated.



Usually when the motor (M1) is used, the fan will usually be placed on it. On top of the motor shaft is a black plastic piece (the motor top) with three little tabs. Lay the fan on the black piece so the slots in its bottom "fall into place" around the three tabs in the motor top. If not placed properly, the fan will fall off when the motor starts to spin.

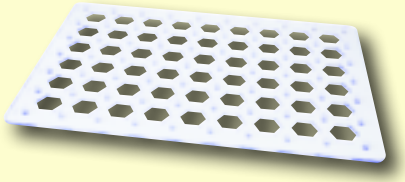
Note: While building circuits, be careful not to accidentally make a direct connection across the battery holder (a "short circuit"), as this may damage and/or quickly drain the batteries.

About Your Snap Circuits® Parts

(Part designs are subject to change without notice).

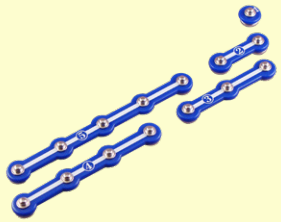
BASE GRID

The **base grid** is a platform for mounting parts and wires. It functions like the printed circuit boards used in most electronic products, or like how the walls are used for mounting the electrical wiring in your home.



SNAP WIRES & JUMPER WIRES

The blue **snap wires** are wires used to connect 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 red and black **jumper wires** make flexible connections for times when using the snap wires would be difficult. They also are used to make connections off the base grid.

Wires transport electricity just like pipes are used to transport water. The colorful plastic coating protects them and prevents electricity from getting in or out.

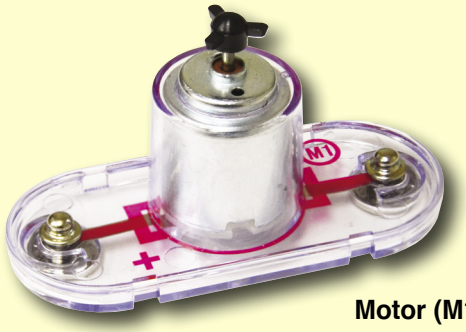
BATTERY HOLDER

The **batteries (B1)** 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.

Battery Holder (B1)

MOTOR

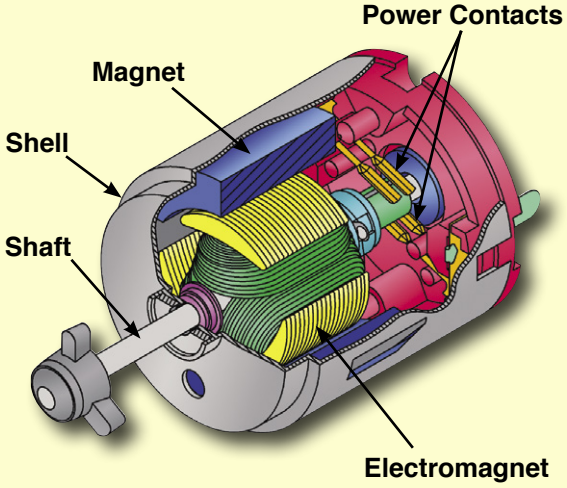
The **motor (M1)** converts electricity into mechanical motion. An electric current in the motor will turn the shaft and the motor blades, and the fan blade if it is on the motor.



Motor (M1)

Fan

How does electricity turn the shaft in the motor? The answer is magnetism. 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 is a coil of wire with many loops wrapped around metal plates. This is called an electromagnet. If a large electric current flows through the loops, it will turn ordinary metal into a magnet. The motor shell also has a magnet on it. When electricity flows through the electromagnet, it repels from the magnet on the motor shell and the shaft spins. If the fan is on the motor shaft, then its blades will create airflow.



About Your Snap Circuits® Parts

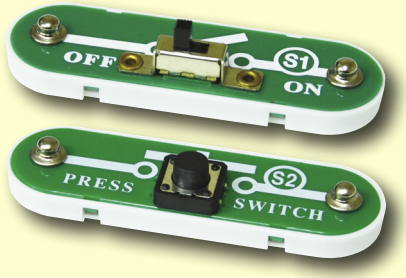
COLOR LED

The color LED (D8) is a light emitting diode, 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 for red, about 2.0V for green, and about 3.0V for blue); brightness then increases. The color LED contains red, green, and blue LEDs, with a micro-circuit controlling then. A high current will burn out an LED, so the color LED has an internal resistor to protect it.

Color LED (D8)

SLIDE & PRESS SWITCHES

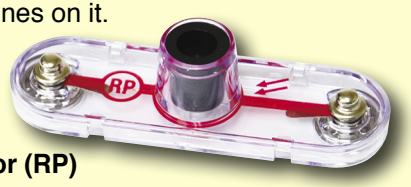
The **slide & press switches (S1 & S2)** connect (pressed or "ON") or disconnect (not pressed or "OFF") the wires in a circuit. When ON they have no effect on circuit performance. Switches turn on electricity just like a faucet turns on water from a pipe.



Slide & Press Switches (S1 & S2)

PHOTORESISTOR

Resistors "resist" the flow of electricity and are used to control or limit the current in a circuit. The **photoresistor (RP)** is a light-sensitive resistor, its value changes from nearly infinite in total darkness to about 1,000Ω when a bright light shines on it.



Photoresistor (RP)

SPEAKER

The **speaker (SP)** converts electricity into sound by making mechanical vibrations. These vibrations create variations in air pressure, which travel across the room. You "hear" sound when your ears feel these air pressure variations.

Speaker (SP)

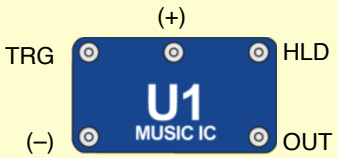
WHISTLE CHIP

The **whistle chip (WC)** contains two thin plates. When an electrical signal is applied across them they will stretch slightly in an effort to separate (like two magnets opposing each other), when the signal is removed they come back together. If the electrical signal applied across them is changing quickly, then the plates will vibrate. These vibrations create variations in air pressure that your ears feel just like sound from a speaker.

Whistle chip (WC)

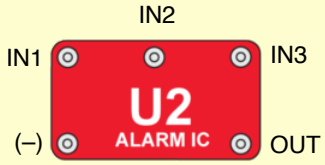
ELECTRONIC MODULES

The **music, alarm, and space war ICs (U1, U2, and U3)** contain 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. Schematics for them are available at www.elenco.com/FAQs.



Music IC:
(+) - power from batteries
(–) - power return to batteries
OUT - output connection
HLD - hold control input
TRG - trigger control input

Music for a few seconds on power-up, then hold HLD to (+) power or touch TRG to (+) power to resume music.



Alarm IC:
IN1, IN2, IN3 - control inputs
(–) - power return to batteries
OUT - output connection

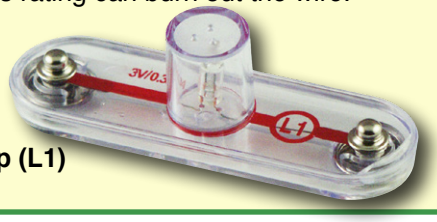
Connect control inputs to (+) power to make five alarm sounds, see projects 21-24 for configurations.

Space War IC:
(+) - power from batteries
(–) - power return to batteries
OUT - output connection
IN1, IN2 - control inputs

Connect each control input to (–) power to sequence through 8 sounds.

LAMP

A light bulb, such as in the **3V lamp (L1)**, contains a special thin high-resistance wire. When a lot of electricity flows through, this wire gets so hot it glows bright. Voltages above the bulb's rating can burn out the wire.



Lamp (L1)

Introduction to Electricity

What is electricity? Nobody really knows. We only know how to produce it, understand its properties, and how to control it. Electricity is the movement of sub-atomic charged particles (called **electrons**) through a material due to electrical pressure across the material, such as from a battery.

Power sources, such as batteries, push electricity through a circuit, like a pump pushes water through pipes. Wires carry electricity, like pipes carry water. Devices like LEDs, motors, and speakers use the energy in electricity to do things. Switches and transistors control the flow of electricity like valves and faucets control water. Resistors limit the flow of electricity.

The electrical pressure exerted by a battery or other power source is called **voltage** and is measured in **volts** (V). Notice the "+" and "–" signs on the battery; these indicate which direction the battery will "pump" the electricity.

The **electric current** is a measure of how fast electricity is flowing in a wire, just as the water current describes how fast water is flowing in a pipe. It is expressed in **amperes** (A) or **milliamps** (mA, 1/1000 of an ampere).

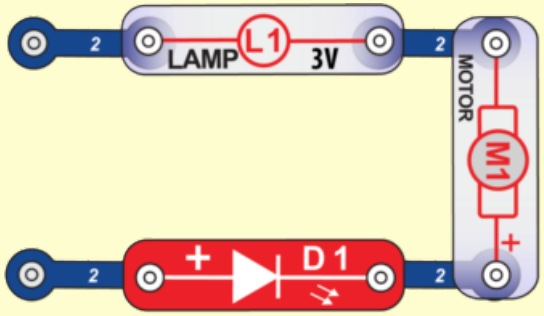
The "**power**" of electricity is a measure of how fast energy is moving through a wire. It is a combination of the voltage and current (Power = Voltage x Current). It is expressed in **watts** (W).

The **resistance** of a component or circuit represents how much it resists the electrical pressure (voltage) and limits the flow of electric current. The relationship is Voltage = Current x Resistance. When the resistance increases, less current flows. Resistance is measured in **ohms** (Ω), or **kilo ohms** (kΩ, 1000 ohms).

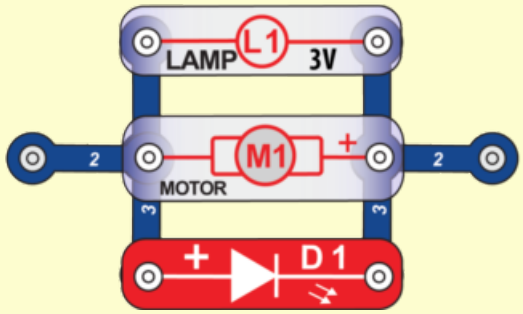
Nearly all of the electricity used in our world is produced at enormous generators driven by steam or water pressure. Wires are used to efficiently transport this energy to homes and businesses where it is used. Motors convert the electricity back into mechanical form to drive machinery and appliances. The most important aspect of electricity in our society is that it allows energy to be easily transported over distances.

Note that "distances" includes not just large distances but also tiny distances. Try to imagine a plumbing structure of the same complexity as the circuitry inside a portable radio - it would have to be large because we can't make water pipes so small. Electricity allows complex designs to be made very small.

There are two ways of arranging parts in a circuit, in series or in parallel. Here are examples:



Series Circuit



Parallel Circuit

Placing components in series increases the resistance; highest value dominates. Placing components in parallel decreases the resistance; lowest value dominates.

The parts within these series and parallel sub-circuits may be arranged in different ways without changing what the circuit does. Large circuits are made of combinations of smaller series and parallel circuits.

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 a resistor, 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 ICs using configurations given in the projects, incorrectly doing so may damage them. **Elenco® is not responsible for parts damaged due to incorrect wiring.**

Here are some important guidelines:

ALWAYS **USE EYE PROTECTION WHEN EXPERIMENTING ON YOUR OWN.**

ALWAYS include at least one component that will limit the current through a circuit, such as the speaker, lamp, whistle chip, ICs (which must be connected properly), motor, photoresistor, or resistor.

ALWAYS use the LED and switches in conjunction with other components that will limit the current through them. Failure to do so will create a short circuit and/or damage those parts.

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

ALWAYS check your wiring before turning on a circuit.

ALWAYS connect ICs using configurations given in the projects or as per the connection descriptions for the parts.

NEVER connect to an electrical outlet in your home in any way.

NEVER leave a circuit unattended when it is turned on.

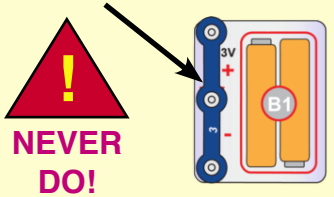
NEVER touch the motor when it is spinning at high speed.

For all of the projects given in this book, the parts may be arranged in different ways without changing the circuit. For example, the order of parts connected in series or in parallel does not matter — what matters is how combinations of these sub-circuits are arranged together.

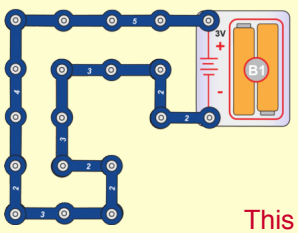
Warning to Snap Circuits® owners: Do not connect additional voltage sources from other sets, or you may damage your parts. Contact ELENCO® if you have questions or need guidance.

Examples of SHORT CIRCUITS - NEVER DO THESE!!!

Placing a 3-snap wire directly across the batteries is a SHORT CIRCUIT.



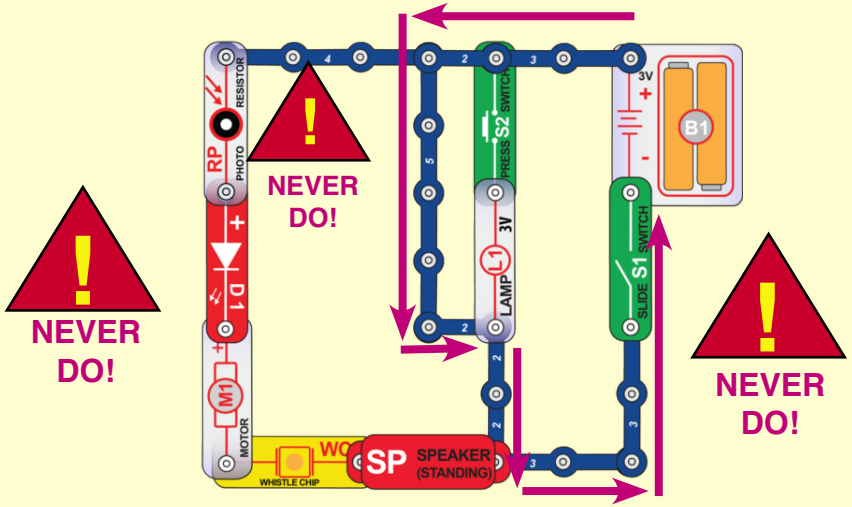
NEVER DO!



NEVER DO!

This is also a SHORT CIRCUIT.

When the slide 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.



NEVER DO!

NEVER DO!

NEVER DO!

You are encouraged to tell us about new circuits you create. If they are unique, we will post them with your name and state on our website at www.elenco.com/for-makers. Send your suggestions to Elenco®: elenco@elenco.com.

Elenco® provides a circuit designer so that you can make your own Snap Circuits® drawings. This Microsoft® Word document can be downloaded from www.elenco.com/for-makers.

WARNING: SHOCK HAZARD - Never connect Snap Circuits® to the electrical outlets in your home in any way!

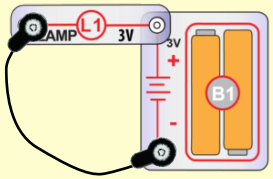
Advanced Troubleshooting (Adult supervision recommended)

Elenco® is not responsible for parts damaged due to incorrect wiring.

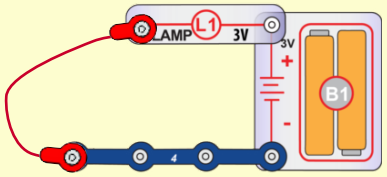
If you suspect you have damaged parts, you can follow this procedure to systematically determine which ones need replacing:

1. **3V lamp (L1), motor (M1), speaker (SP), color LED (D8), and battery holder (B1):** Place batteries in holder. Place the 3V lamp directly across the battery holder, it should light. Do the same with the motor (motor + to battery +), it should spin to the right at high speed. Next place the LED across the battery holder (LED "+" to battery "+"), the LED should light and change colors. Now "tap" the speaker across the battery holder contacts, you should hear static as it touches. If none work, then replace your batteries and repeat, if still bad then the battery holder is damaged.

2. **Jumper wires:** Use this mini-circuit to test each jumper wire, the lamp should light.



3. **Snap wires:** Use this mini-circuit to test each of the snap wires, one at a time. The lamp should light.



4. **Slide switch (S1) and Press switch (S2):** Build project 1, if the lamp (L1) doesn't light then the slide switch is bad. Replace the slide switch with the press switch to test it.

5. **Alarm IC (U2):** Build project 21, you should hear a siren. Projects 22-24 should make different siren sounds.

6. **Whistle chip (WC):** Build project 29, you should hear sound from the whistle chip.

7. **Music IC (U1):** Build project 8, but initially leave out the whistle chip (WC). Turn on the slide switch (S1), music plays for a while and stops. Once the music stops push the press switch (S2), the music should play as long as you hold it down. Now add the whistle chip and tap it, the sound should resume for a while.

8. **Space war IC (U3) and photoresistor (RP):** Build project 6, both switches (S1 and S2) should change the sound. Then replace the slide switch with the photoresistor, waving your hand over it should change the sound.

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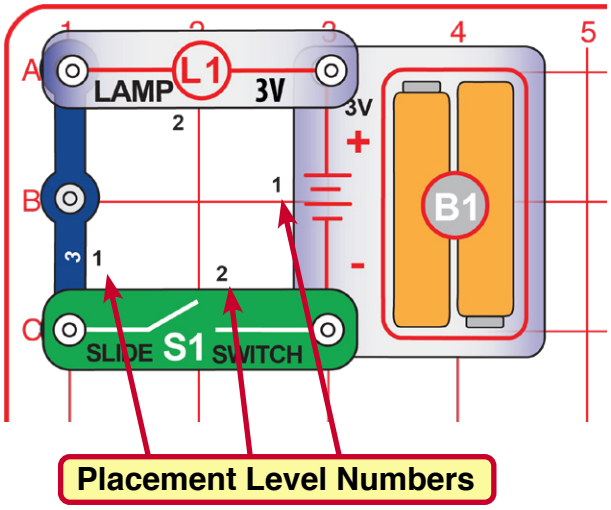
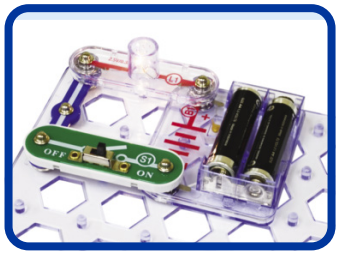
Website: www.elenco.com

You may order additional / replacement parts at: www.elenco.com/replacement-parts/

☐ Project 1





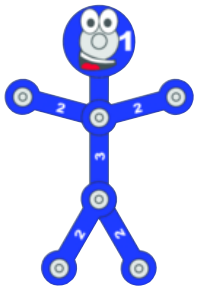
Electric Light

Snap Circuits® uses electronic blocks that snap onto a clear plastic grid to build different circuits. These blocks have different colors and numbers on them so that you can easily identify them.

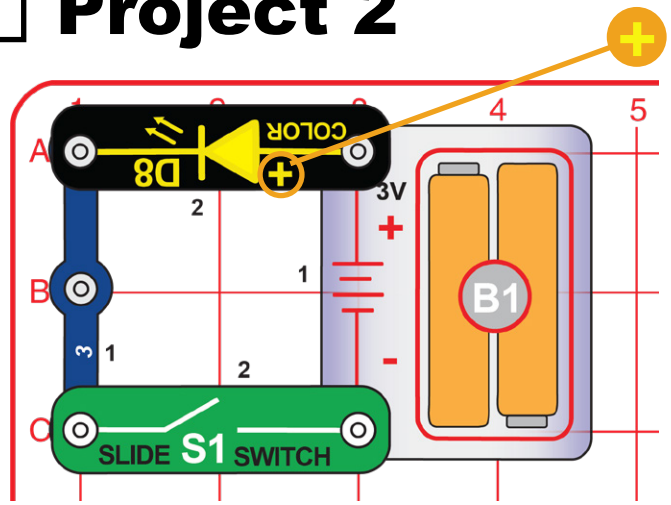
Build the circuit shown on the left by placing all the parts with a black **1** next to them on the board first. Then, assemble parts marked with a **2**. Install two (2) "AA" batteries (not included) into the battery holder (B1). **When installing a battery, be sure the spring is compressed straight back, and not bent up, down, or to one side. Battery installation should be supervised by an adult.**

Turn on the slide switch (S1), and the lamp (L1) lights.

Snappy says when you turn on the slide switch, electricity flows from the batteries through the lamp and back to the battery through the switch. If the switch is off, the flow of electricity is blocked, and the lamp won't light.



☐ Project 2



Color Light

Replace the lamp (L1) in the preceding circuit with the color LED (D8). Turn on the slide switch (S1) and enjoy the light show from the color LED (D8). For best effects dim the room lights.

☐ Project 3 Light Controlled Light

Use the same circuit, but replace the 3-snap wire with the photoresistor (RP). Vary the amount of light shining on the photoresistor to change the brightness of the color LED.

The photoresistor (RP) uses light to control electric current. Parts like this are used in a number of ways that affect our lives. For example, you may have streetlights in your neighborhood that turn on when it starts getting dark and turn off in the morning.

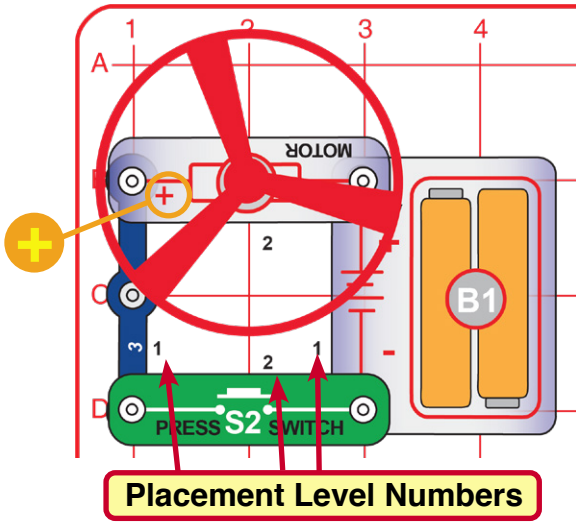
The color LED actually contains separate red, green, and blue lights, with a micro-circuit controlling them.

LEDs have a "+" side, because they only work in one direction. LEDs can be damaged by high current, so your color LED has an internal resistor to protect it.

LEDs are increasingly replacing incandescent lamps for room lighting because they are more efficient, using less electricity to make light.

☐ Project 4

Flying Saucer



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

The air is being blown down through the blade and the motor rotation locks the fan on the shaft. When the motor is turned off, the blade unlocks from the shaft and is free to act as a propeller and fly through the air. If speed of rotation is too slow, the fan will remain on the motor shaft because it does not have enough lift to propel it.

Build the circuit shown on the left by placing all the parts with a black **1** next to them on the board first. Then, assemble parts marked with a **2**. New alkaline batteries are recommended.

Push the press switch (S2) until the motor reaches full speed, then release it. The fan blade should rise and float through the air like a flying saucer. Be careful not to look directly down on fan blade when it is spinning. If the fan doesn't fly off, then press the switch several times rapidly when it is at full speed.

☐ Project 5 Fan

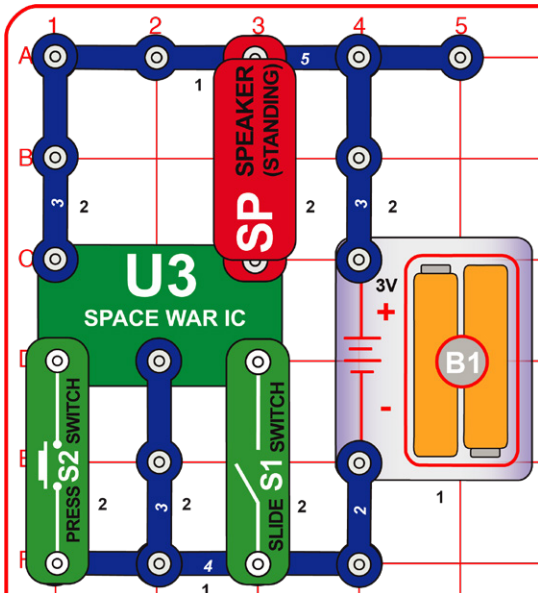
Use the same circuit, but reverse the position of the motor (M1). Push the press switch (S2) to spin the motor and fan.

With Fan circuit, the blade is blowing air upward; place your hand a short distance above the motor and you should be able to feel it.

In this project electrical power was changed into mechanical power. Motors like this one are used in battery powered equipment requiring rotary motion, such as a cordless drill, electric toothbrush, and toys. An electric motor is much easier to control than gas or diesel engines.

☐ Project 6

Space War



The upper-right snap of the space war IC is like an electrical gate, opening and closing quickly to let small bursts of electric current flow in. The bursts of electric current also flow through the speaker (which produces sound). The space war IC produces the different sounds by adjusting the pattern of two separate current bursts through the speaker.

Build the circuit shown on the left, which uses the space war integrated circuit (U3). Activate it by flipping the slide switch (S1) or pressing the press switch (S2); do both several times and in combination. You will hear an exciting range of sounds, as if a space war is raging!

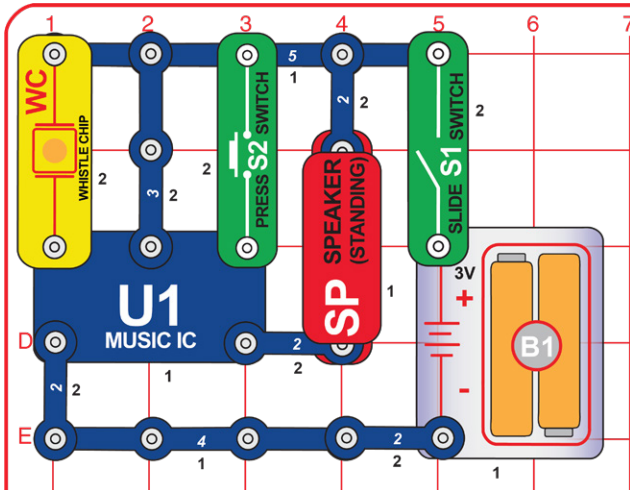
☐ Project 7 Photo Space War

Use the preceding circuit, but replace the slide switch (S1) with the photoresistor (RP). Cover and uncover the photoresistor to change the sound.

Like the other integrated circuits, the space war IC is a super-miniaturized electronic circuit that can play a variety of cool sounds stored in it by using just a few extra components.

In movie studios, technicians are paid to insert these sounds at the precise instant a gun is fired.

☐ Project 8



Meet the Music IC

Build the circuit shown and turn on the slide switch (S1). A tune plays for a short time and then stops. Push the press switch (S2) and music plays until you release S2. Tap on the whistle chip (WC) to re-start the music; the music may also start if you blow on the whistle chip or clap near it.

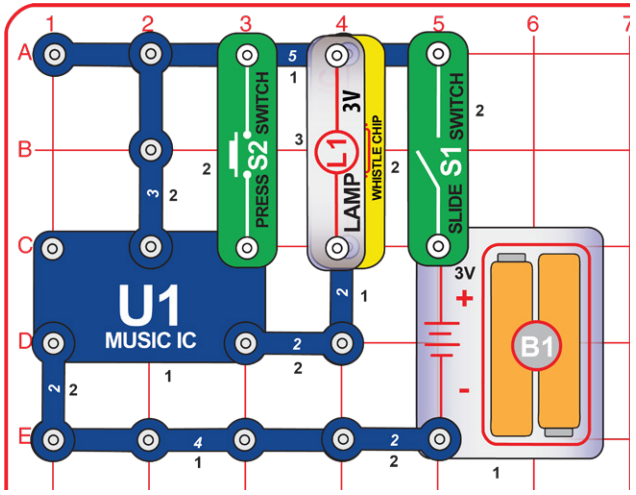
☐ Project 9 Spin the Music

Use the preceding circuit, but replace the whistle chip with the motor (M1, "+" side up or down, omit the fan). Spin the motor top with your finger to re-start the music.

☐ Project 10 Light Controlled Music

Use either of the preceding circuits, but replace the press switch with the photoresistor (RP). After the start-up tune finishes, the music continues if there is light on the photoresistor.

☐ Project 11



Whistle Music

Build the circuit shown and turn on the slide switch (S1). A tune plays for a short time and then stops. Push the press switch (S2) and music plays until you release S2. You can replace the press switch with a 3-snap wire to make the music play continuously.

☐ Project 12 Funky Whistle Music

Use the preceding circuit, but replace the lamp (L1) with the color LED (D8 "+" on top). The circuit works the same way but the light and sound are different.

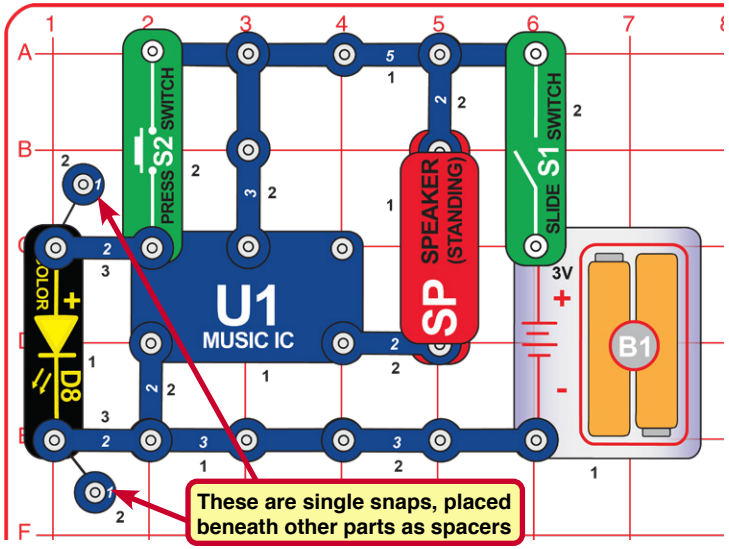
☐ Project 13 Light Whistle Music

Use the preceding circuit, but replace either the press switch or the color LED with the photoresistor (RP). After the start-up tune finishes, the music continues if there is light on the photoresistor.

☐ Project 14 Spin Whistle Music

Use the project 11 circuit, but replace the lamp with the motor (M1, "+" on top) and fan, and replace the press switch with a 3-snap wire. The fan speed changes a little as the sound changes.

☐ Project 15



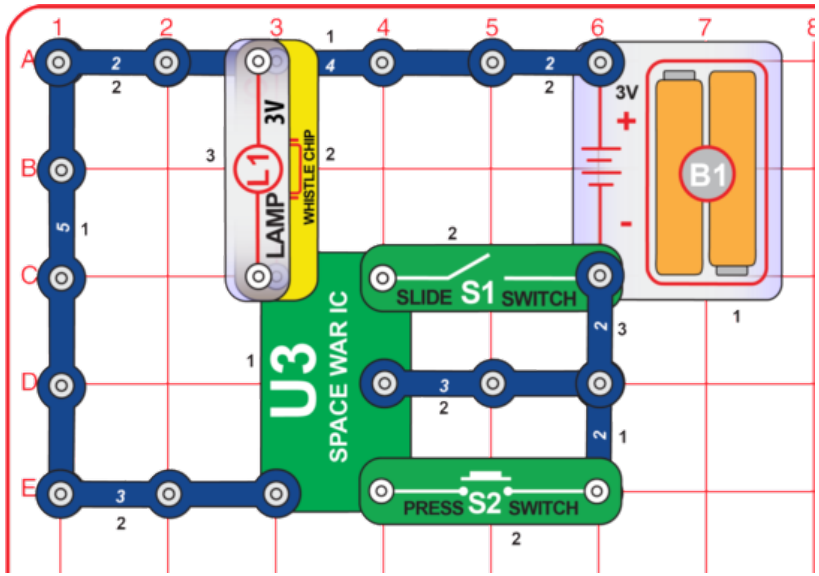
Musical Doorbell

Turn on the slide switch (S1). A tune plays for a sort time and then stops. When there is no sound, push the press switch (S2) to play a tune. The press switch acts like a musical doorbell.

Musical integrated circuits are used to entertain young children in many of the toys and chairs made to hold infants. If the music is replaced with words, the child can also learn while they are entertained. Because of great advances in miniaturization, many songs are stored in a circuit no bigger than a pinhead.

The lower-right snap of the music IC is like an electrical gate, opening and closing quickly to let small bursts of electric current flow in. The bursts of electric current also flow through the speaker (which produces sound). The music IC produces the tune by adjusting the pattern of current bursts through the speaker.

☐ Project 16



Whistle Space War

Build the circuit as shown. Turn on the slide switch (S1) or push the press switch (S2); do both several times and in combination. You will hear an exciting range of sounds, a little different from project 6 and not as loud.

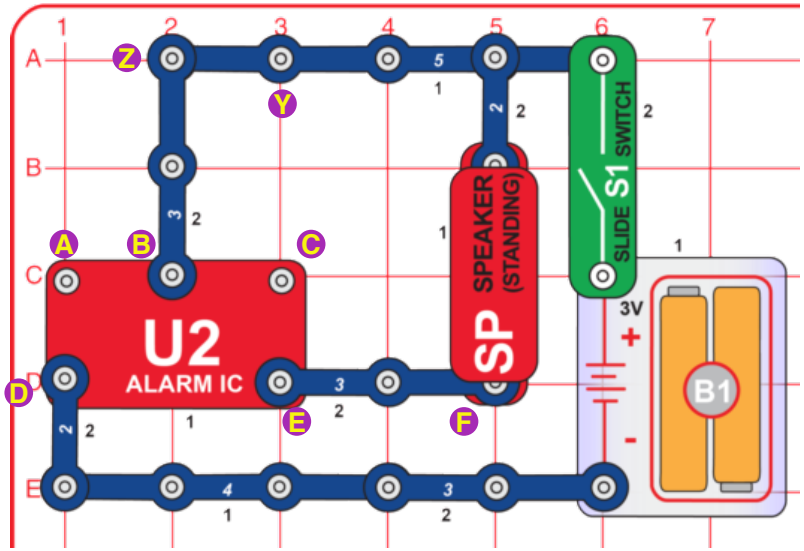
☐ **Project 17 Funky Whistle Space War**
Use the preceding circuit, but replace the lamp (L1) with the color LED (D8 "+" on top). The sound is a little different now.

☐ **Project 18 Spinning Whistle Space War**
Use the preceding circuit, but replace the color LED with the motor (M1, "+" on top) and fan. Use the switches to change the sound, the fan spins on some sounds.

☐ **Project 19 Light Controlled Whistle Space War**
Use the preceding circuit, but replace the motor with the photoresistor (RP). Vary the amount of light shining on the photoresistor to change the sound volume.

☐ **Project 20 Light Whistle Space War**
Use any of the project 16-18 circuits, but replace the slide switch with the photoresistor (RP). Cover and uncover the photoresistor or press S2 to change the sound.

☐ Project 21



The lower-right snap of the alarm IC (U2) is like an electrical gate, opening and closing quickly to let small bursts of electric current flow in. The bursts of electric current also flow through the speaker (which produces sound). The alarm IC produces different siren sounds by adjusting the pattern of current bursts through the speaker.

Siren

Turn on the slide switch (S1) and a siren sounds.

☐ **Project 22 Machine Gun**
Use the preceding circuit, but add a connection between the points marked B & C using a 1-snap wire and a 2-snap wire, or a jumper wire. Now it sounds like a machine gun.

☐ **Project 23 Fire Engine**
Use the preceding circuit, but remove the connection between B & C, and add a connection between A & B. Now it sounds like a fire engine.

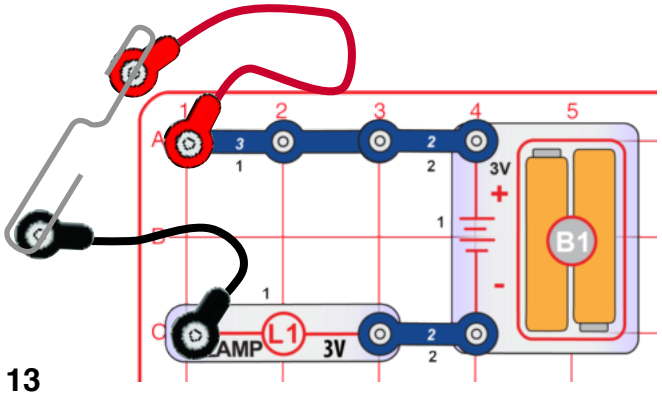
☐ **Project 24 European Siren**
Use the preceding circuit, but remove the connection between A & B, and add a connection between A & D. Now it sounds like a European siren.

☐ **Project 25 Light Siren Changer**
Use the project 21 circuit, but add the photoresistor (RP) between Y & C. Cover and uncover the photoresistor to change the sound.

☐ **Project 26 Light Siren**
Use the project 21 circuit, but replace the 3-snap wire at Z & B with the photoresistor (RP). A siren sounds when there is light on the photoresistor.

☐ **Project 27 Softer Siren**
Use any of the preceding circuits, but replace the 3-snap wire between E & F with the color LED (D8, "+" on left). The sound is not as loud, but LED does not light. If you flip the color LED so its "+" is on the right, the LED lights but you can barely hear the sound. A protection resistor inside D8 is causing most of the sound reduction.

☐ Project 28



Materials that have low resistance to the flow of electricity are called conductors, and materials that have high electrical resistance are called insulators.

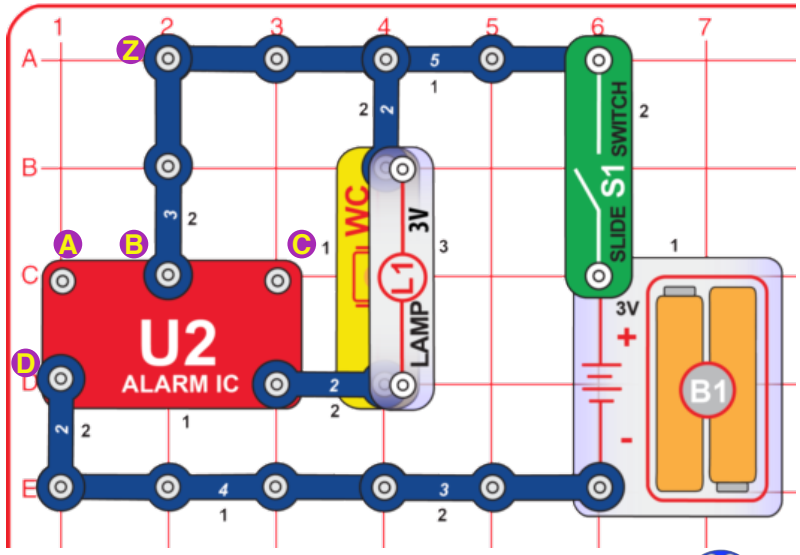
Conduction Detector

Build the circuit as shown. When you place a metal paper clip across the snaps on the red & black wires as shown in the drawing, current flows from the batteries (B1) through the paperclip, through the lamp (L1), and back to the battery. The paper clip completes the circuit and can current flow through the lamp.

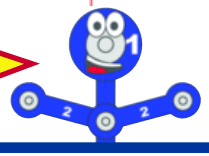
Now replace the metal paperclip with other materials in your home, and see if the lamp lights. This circuit can be used to see if a material like plastic is a good conductor of electricity, or a poor conductor of it.

You may replace the lamp with the color LED (D8, "+" on left).

☐ Project 29



The resistance of the lamp, color LED, photoresistor, or motor is used to adjust the sound from the whistle chip.



Soft Siren

Turn on the slide switch (S1) and a siren sounds.

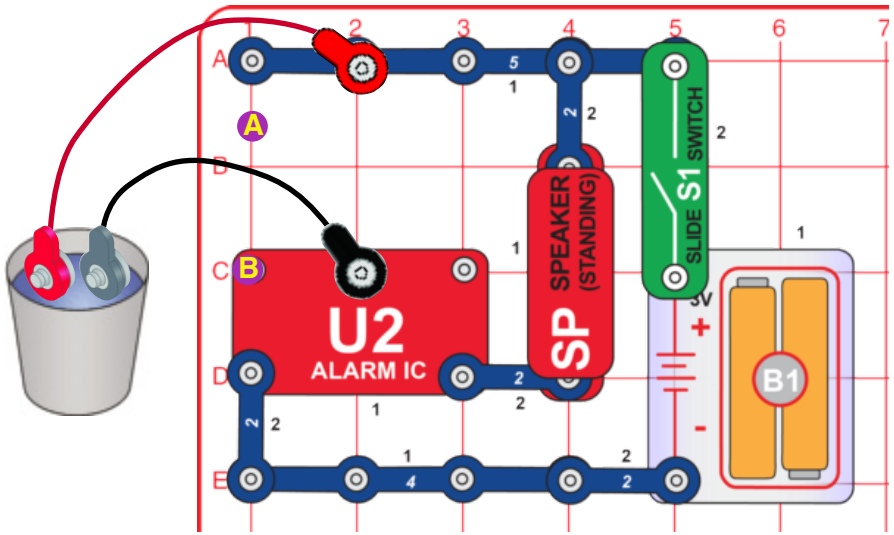
☐ **Project 30 Soft Sirens**
Use the preceding circuit, but add a connection between the points marked A & B, B & C, or A & D using a 1-snap wire and a 2-snap wire, or a jumper wire.

☐ **Project 31 Funky Siren**
Use either of the preceding circuits, but replace the lamp (L1) with the color LED (D8 "+" on top). The sound changes a little as the color LED changes colors.

☐ **Project 32 Light Adjusted Siren**
Use the projects 29 or 30 circuits, but replace the lamp (L1) with the photoresistor (RP). Vary the amount of light shining on the photoresistor to change the sound volume.

☐ **Project 33 Siren & Fan**
Use the project 30 circuits, but replace the lamp (L1) with the motor (M1, "+" on top) and fan. The fan speed changes as the sound changes, especially with the Machine Gun sound.

☐ Project 34



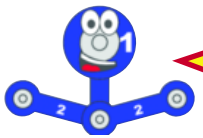
Water Alarm

Build the circuit shown but initially leave the jumper wires outside the cup. Turn on the slide switch (S1); nothing happens. Place the jumper wires into a cup of water and an alarm sounds!

You could use longer wires and lay them on your basement floor, if your basement floods during a storm, then this circuit will sound an alarm.

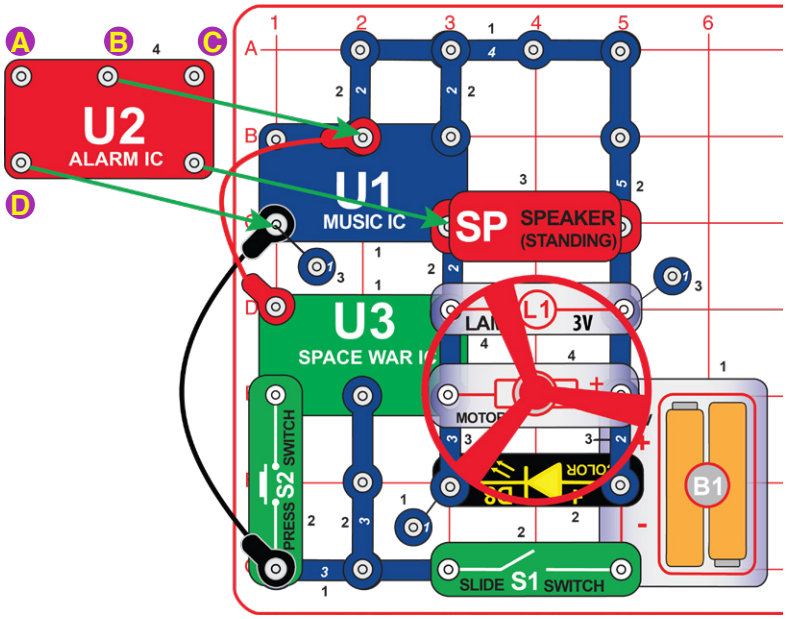
Don't drink any water used here.

☐ **Project 35 Salt Water Alarm**
Add salt to the water and the tone of the alarm is louder and faster, telling you that salt is in the water you detected.



Normal tap water has some electrical resistance, but much less than air. Adding salt to water lowers its resistance.

☐ Project 36



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

Symphony

Build the circuit as shown. Note that the color LED (D8) does not snap on the battery holder (B1), but is secured by the 2-snap wire on level 3.

Turn on the slide switch (S1); you hear sounds from the music & alarm ICs (U1 & U2), the color LED (D8) & lamp (L1) light, and the motor spins the fan. Push the press switch (S2) several times to add sounds from the space war IC (U3).

☐ Project 37 Photo Symphony

Use the preceding circuit, but replace the press switch (S2) with the photoresistor (RP). Cover and uncover the photoresistor to change some of the sounds.

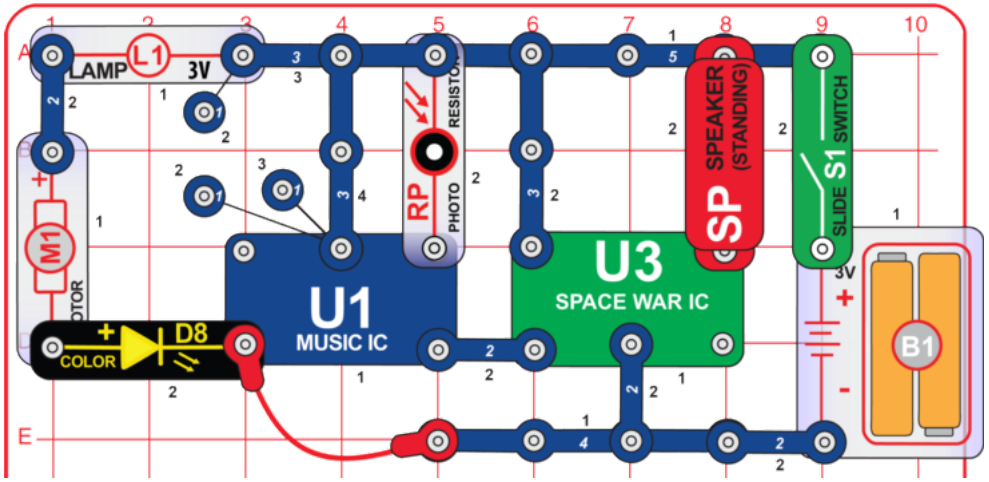
☐ Project 38 Whistle Symphony

Use any of the preceding circuits, but replace the speaker (SP) with the whistle chip (WC).

☐ Project 39 Sirens Symphony

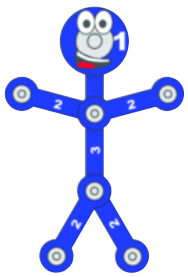
Use any of the preceding circuits, but add a 2-snap wire across points A & B, B & C, or A & D.

☐ Project 40



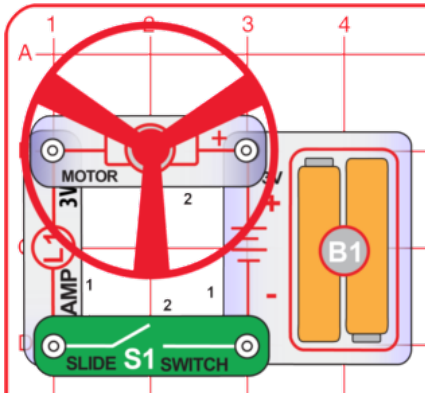
Using Parts as Conductors

Turn on the slide switch (S1). The color LED (D8) lights and you hear space war sounds. For a short time the sound is continuous but then you can stop the sound by covering the photoresistor (RP), or change the sound by covering and uncovering the photoresistor. You can also replace the photoresistor with the press switch (S2).



Note that the color LED (D8) lights, but the lamp (L1) does not light and the motor (M1) does not spin. Electricity is flowing through the lamp and motor, but not enough to turn them on. So in this circuit they are acting like 3-snap wires. You could replace L1 or M1 with a 3-snap and the circuit would work the same.

☐ Project 41



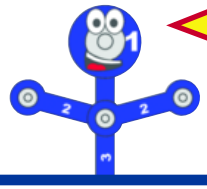
WARNING: Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor.

Lamp & Fan in Series

Turn on the slide switch (S1). The lamp (L1) lights and the motor (M1) spins the fan. Notice how the lamp gets a little less bright as the motor speeds up.

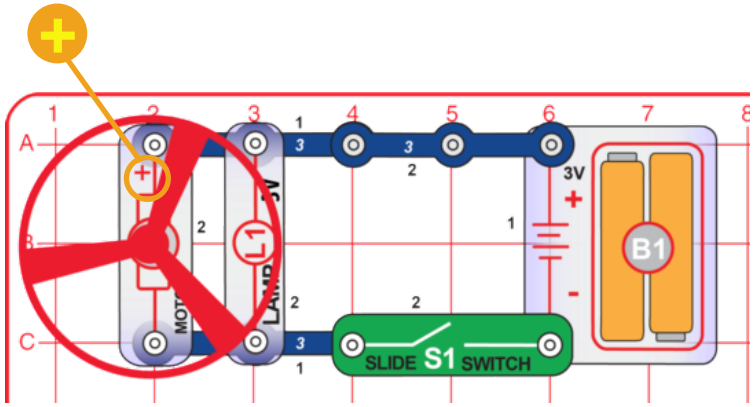
☐ Project 42 Light Dimmer

Use the preceding circuit, but remove the fan from the motor (M1). Turn on the slide switch (S1), and watch how the lamp (L1) lights initially, but gets dimmer as the motor speeds up. Next, turn off the circuit and hold the motor top with your fingers so it can't spin, then turn on the switch and see how bright the lamp is.



The faster the motor is spinning, the less electricity it needs. The more electricity flows, the brighter the lamp gets. The motor needs the most electricity when it starts up, making the lamp brightest. Without the fan, the motor can spin fast and needs little electricity, making the lamp dim.

☐ Project 43

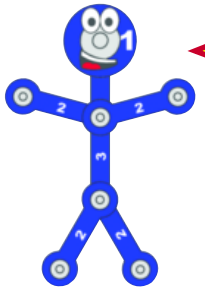


WARNING: Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor.

Lamp & Fan in Parallel

Turn on the slide switch (S1). The lamp (L1) lights and the motor (M1) spins the fan.

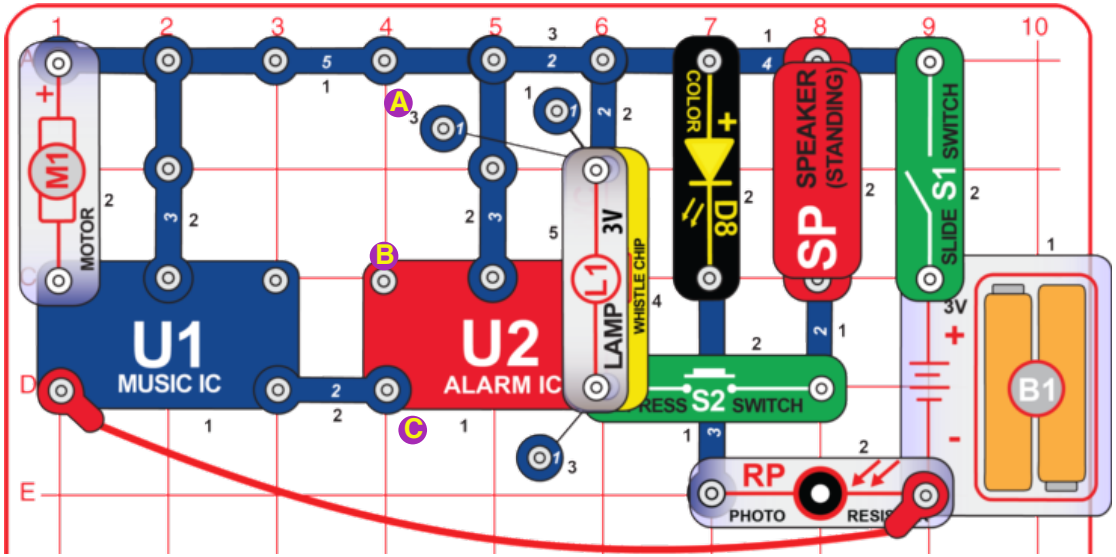
Compare this circuit to the circuit in project 41, and also try removing the fan as done in project 42. Notice how the lamp brightness is not affected by the motor speed, and the motor starts a little faster.



Here the motor and lamp are connected in parallel. Each has its own path to the batteries, so they don't affect each other.

An advantage of connecting parts in parallel is that if one of them burns out, the other will still work. The switch is connected in series with both the lamp and motor, so if it breaks, nothing will work. Electricity flows out of the batteries, through either the motor or lamp, then back to the batteries through the switch.

☐ Project 44

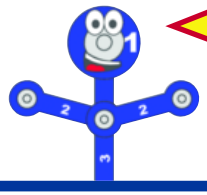


Motor Controlled Sound & Light

Turn on the slide switch (S1). You hear a siren for a few seconds, then it stops. Spin the motor (M1) top with your fingers to re-start the sound. Push the press switch (S2) to make the sound louder. The color LED lights if there is bright light on the photoresistor (RP).

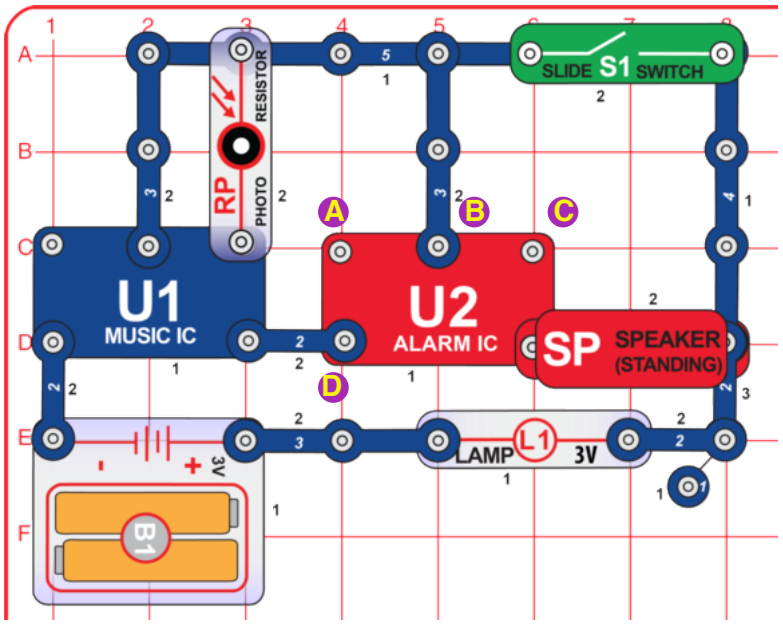
☐ Project 45 Motor Sounds & Light

Change the siren sound by adding the black jumper wire across points A & B or B & C.



When you spin the motor shaft the energy of the spinning shaft produces a small electrical voltage. This voltage is used to activate the music IC (U1), which controls the alarm IC (U2).

☐ Project 46



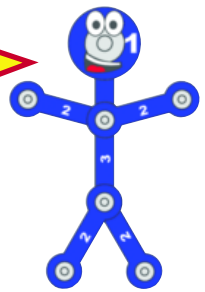
Shine On Siren

Cover the photoresistor (RP) and turn on the switch (S1). A siren is heard for a while and stops, then you can control it by covering or uncovering the photoresistor. The lamp (L1) is used here as a 3-snap wire, and will not light.

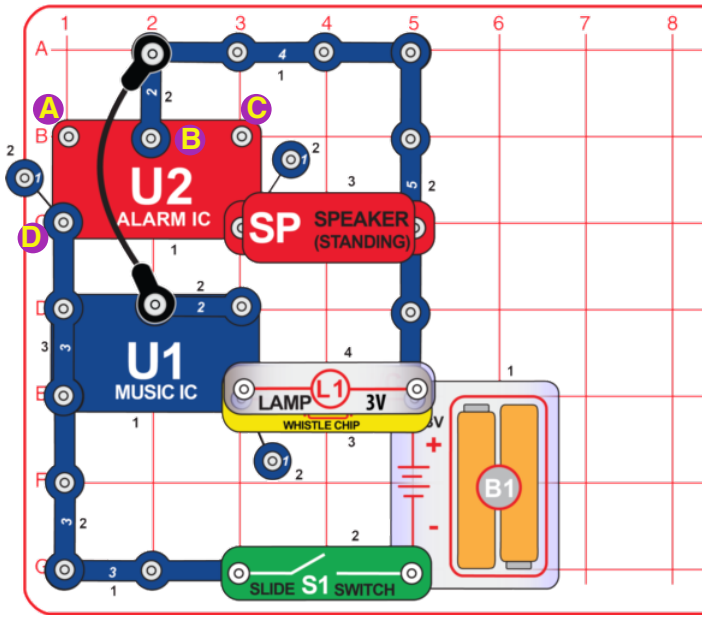
☐ Project 47 Shine On Sirens

Use the preceding circuit, but add a connection between the points marked A & B, B & C, or A & D using a 1-snap and a 2-snap, or a jumper wire. Now it sounds like a machine gun.

This circuit demonstrates how sounds can be synchronized to light patterns through the photoresistor.



☐ Project 48



Loud & Soft Tunes

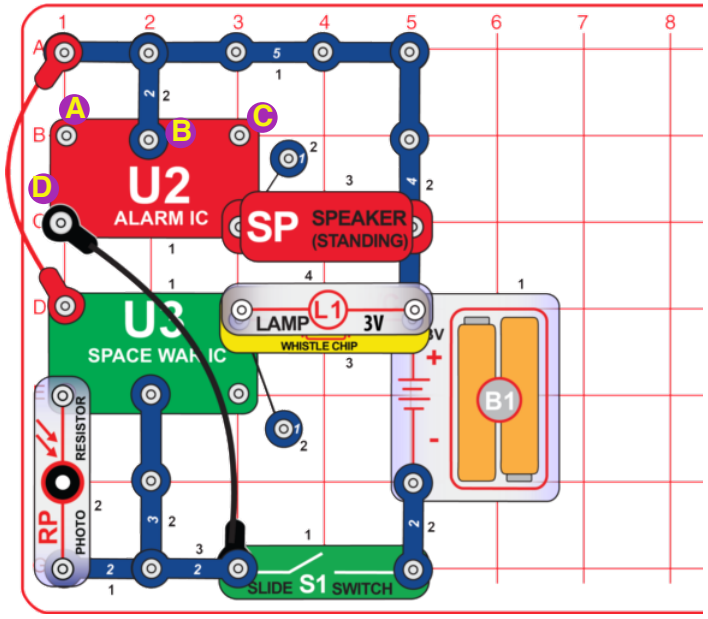
Build the circuit shown. Turn on the slide switch (S1). The siren is louder than the music.

☐ **Project 49 Loud & Soft Tunes (II)**
Use the preceding circuit, but connect points A & B, B & C, or A & D using a jumper wire.

☐ **Project 50 Loud & Soft Tunes (III)**
Use any of the preceding circuits, but swap the locations of the speaker (SP) and whistle chip (WC)/lamp (L1).

☐ **Project 51 Loud & Soft Tunes (IV)**
Use any of the preceding circuits, but replace the lamp (L1) with the color LED (D8 “+” on right).

☐ Project 52

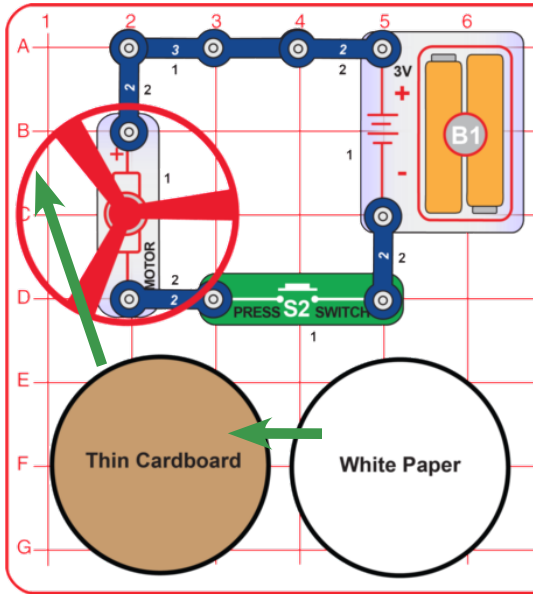


Loud & Soft Sounds

Build the circuit shown. Turn on the slide switch (S1), and cover and uncover the photoresistor (RP) several times. The siren is louder than the space war sounds.

☐ **Project 53 More Loud & Soft Sounds**
Use the preceding circuit, but connect points A & B, B & C, or A & D using a 2-snap wire and a 1-snap wire.

Project 54



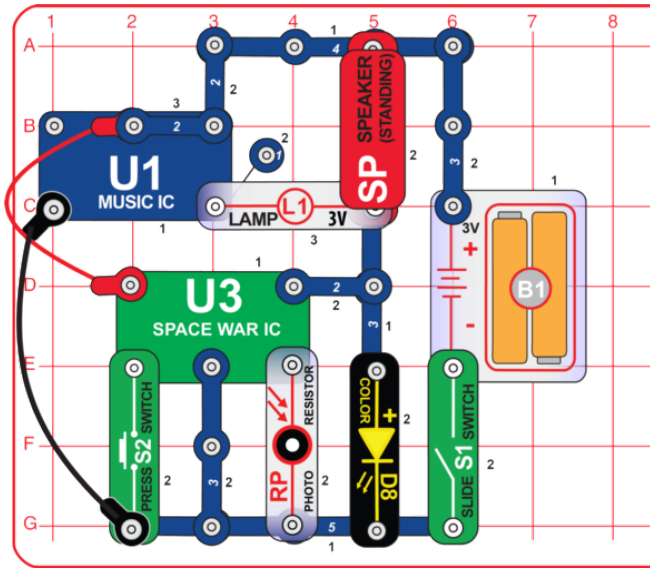
Spin Draw

Setup: Cut out a circular piece of thin cardboard from the back of an old spiral notebook or note pad. Use the fan blade as a guide. Place the fan on the cardboard and trace around it with a pencil or pen. Cut the cardboard out with scissors and tape it to the fan blade. Do the same thing with a piece of white paper, but tape the paper on top of the cardboard so it can be removed easily later.

Drawing: To make a ring drawing obtain some thin and thick marking pens as drawing tools. Spin the paper by pressing and holding press switch (S2) down. Press the marker on the paper to form rings. To make spiral drawings, release press switch (S2) and as the motor approaches a slow speed move the marker from the inside outward quickly.

Change the colors often and avoid using too much black to get hypnotic effects. Another method is to make colorful shapes on the disc then spin the disc and watch them blend into each other. When certain speeds are reached under fluorescent lights without electronic ballasts, the strobe principle shown in another project will produce strange effects and backward movement. Make a wheel with different colored spokes to see this strange effect. Adding more spokes and removing spokes will give different effects at different motor speeds.

Project 55

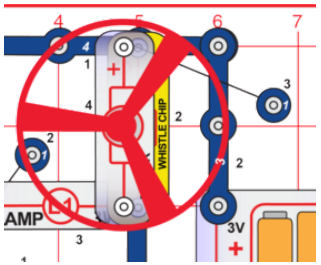


Crazy Combo

Build the circuit shown. Turn it on, press the press switch (S2) several times or cover and uncover the photoresistor (RP) to hear all the sound combinations. S2 may only work when RP is covered.

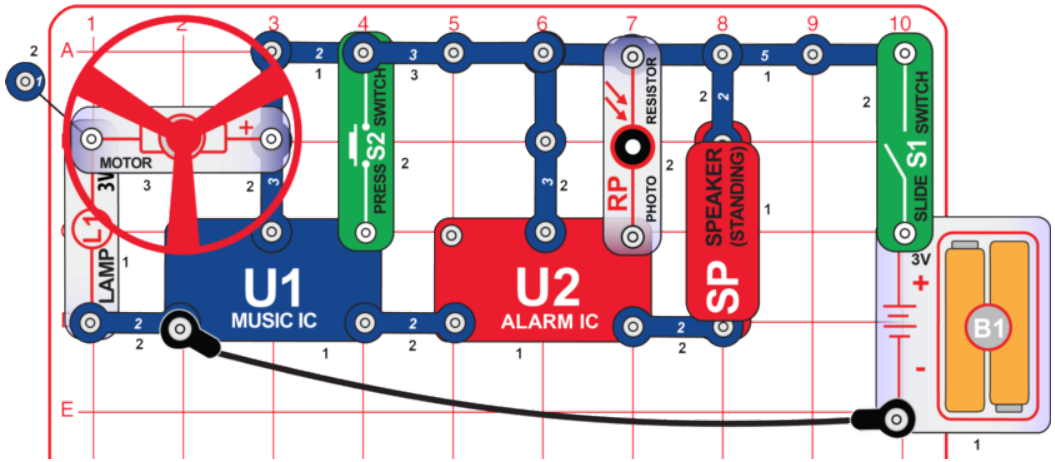
Project 56 Whistle Crazy Combo

Use the preceding circuit but replace the speaker (SP) with the whistle chip (WC), a 1-snap wire, and the motor (M1) and fan, as shown.



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

☐ Project 57



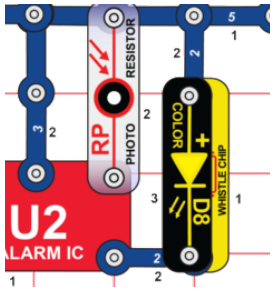
WARNING: Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor.

Fun with the Alarm IC

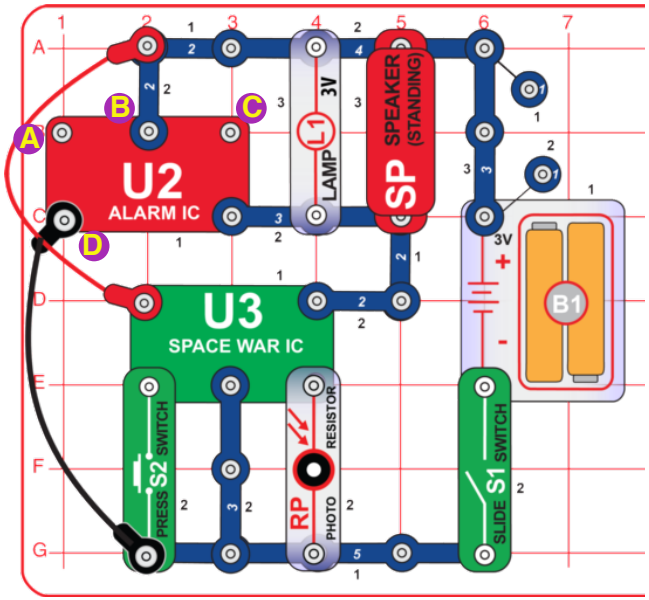
Place the fan on the motor (M1) and turn on the slide switch (S1). The lamp (L1) lights, the motor spins, and you hear a machine gun sound (with very faint music in background). Cover the photoresistor (RP) with your hand and the sound becomes a siren. After a while the sound will stop, hold down the press switch (S2) and the sound resumes.

☐ Project 58 Whistle Fun

Use the preceding circuit but replace the speaker (SP) with the whistle chip (WC) and color LED (D8), as shown.



☐ Project 59



Nifty Noises

Build the circuit shown. Turn on the slide switch (S1), press the press switch (S2) several times, and cover and uncover the photoresistor (RP) to hear all the sound combinations. S2 may only work when RP is covered.

☐ Project 60 Nifty Noises (II)

Use the preceding circuit, but add a connection between the points marked A & B, B & C, or A & D using a 1-snap and a 2-snap. The sound is different now.

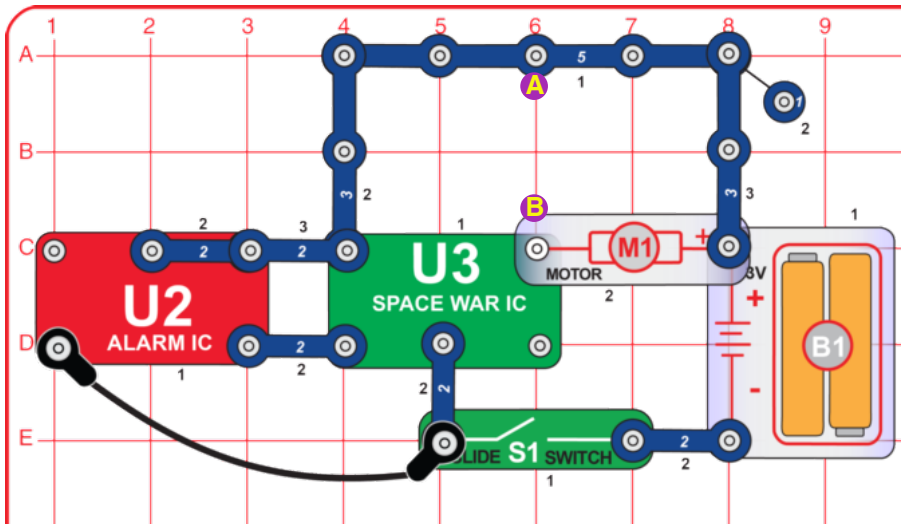
☐ Project 61 Nifty Noises (III)

Use any of the preceding circuits but replace the lamp withe the color LED (D8, “+” on right). The LED lights and the sound is different.

☐ Project 62 Nifty Noises (IV)

Use any of the preceding circuits, but replace the speaker (SP) with the whistle chip (WC). The sound is not as loud now.

☐ Project 63



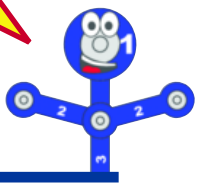
Singing Motor

Do not place the fan on the motor (M1). Turn on the switch and the motor spins (you may need to give it a push with your finger to get it started). The sounds from the IC are used to drive the motor. Because the motor uses magnets and a coil of wire similar to a speaker, you may even hear the space war sounds coming faintly from the motor.

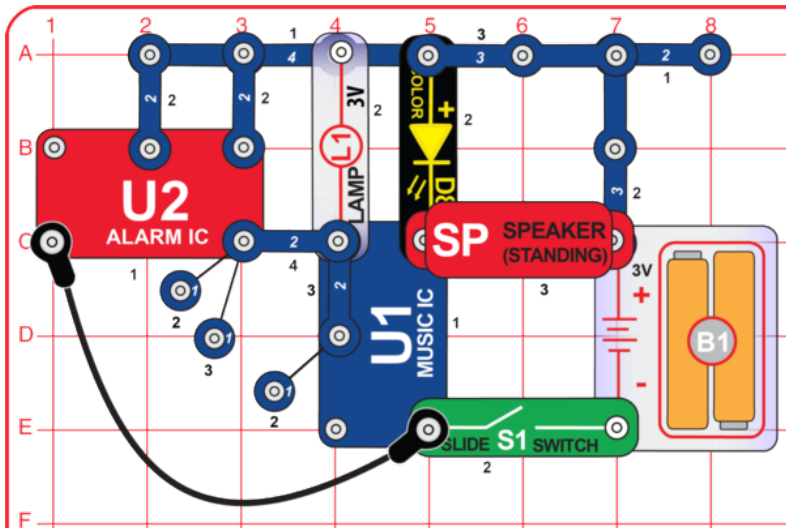
☐ **Project 64 Singing Motor (II)**
Use the same circuit, but add the color LED (D8, "+" on top) across points A & B using a 1-snap wire.

☐ **Project 65 Singing Motor (III)**
Use the same circuit, but replace the color LED with the lamp (L1).

The motor has a coil and a magnet similar to the speaker. An electrical signal in the coil creates a magnetic field, which makes the shaft spin. Normally the motor is used with a stable electrical signal, but in this project it is used with a changing signal from the space war IC. This creates mechanical vibrations, which create air pressure variations that sound like the speaker does, though not as efficiently.



☐ Project 66



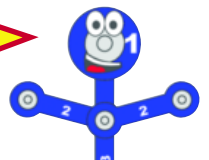
Periodic Sounds

Build the circuit shown on the left and turn it on. The lamp (L1) alternates between being on and off, the color LED (D8) flashes at intervals, while the speaker (SP) alternates between two musical tones. It is as if someone is flipping a switch, but at a very consistent rate. Periodic signals like this are very important in electronics.

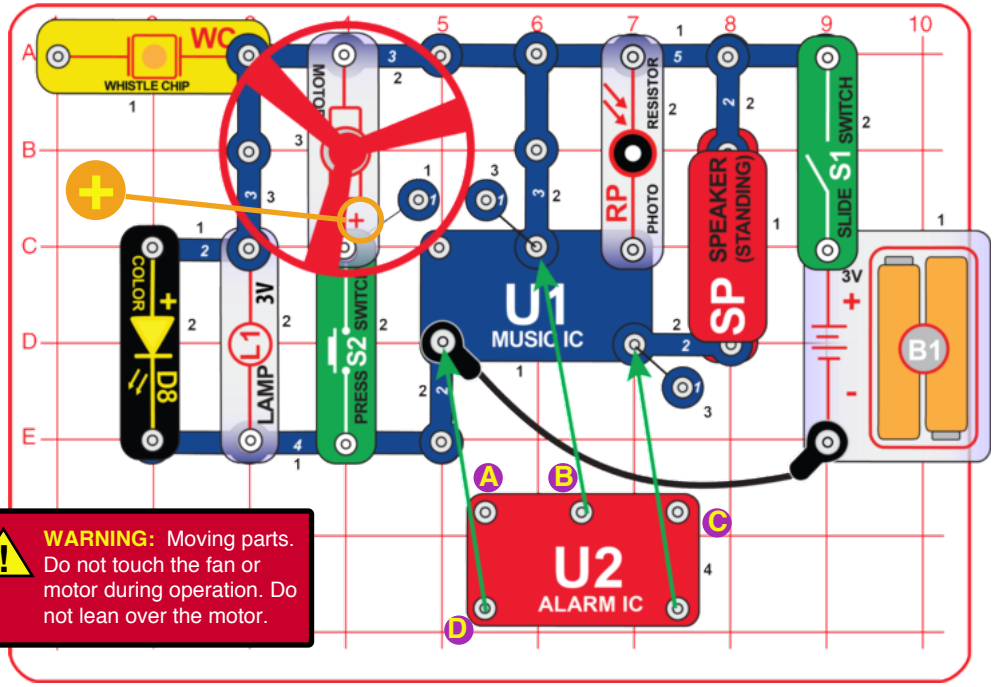
☐ **Project 67 Double Blinking Flashlight**
Use the same circuit but remove the speaker.

☐ **Project 68 Periodic Sounds (II)**
Use the project 66 circuit but swap the locations of the speaker and lamp. The sound and light patterns are different now.

Periodic electrical signals are used for things like flashing lights or to indicate batteries are low.



☐ Project 69



Super Circuit

Turn on the slide switch (S1) to make sound and lights. Some of the sound may stop after a few seconds unless there is light on the photoresistor (RP).

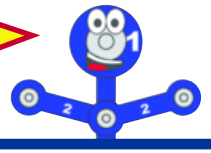
Push the press switch (S2) until the motor reaches full speed, then release it. The fan blade should rise and float through the air like a flying saucer. Be careful not to look directly down on fan blade when it is spinning.

If the fan doesn't fly off, then press the switch several times rapidly when it is at full speed. The motor spins faster when the batteries are new. If you don't want the fan to fly off then reverse the orientation of the motor.

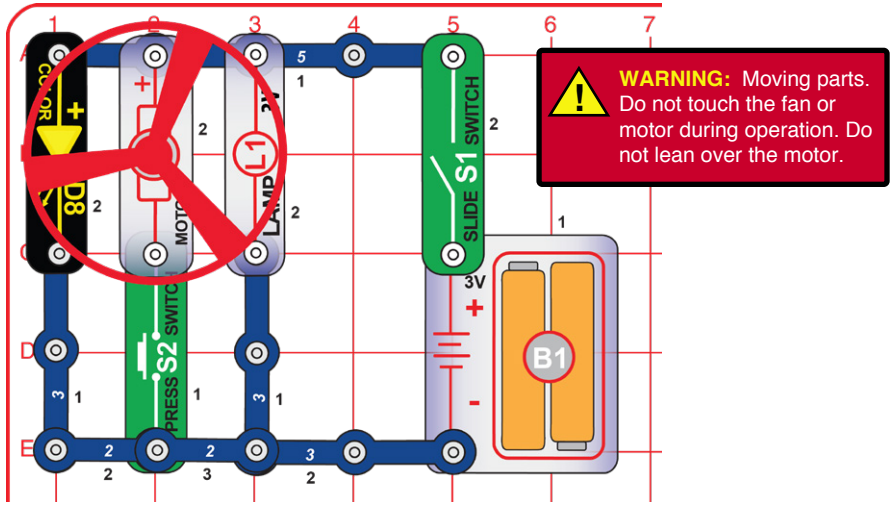
☐ Project 70 Sirens Super Circuit

Use any of the preceding circuits, but add a 2-snap wire across points A & B, B & C, or A & D.

This circuit is shown on the front of the Snap Circuits® Select box, use that picture to help in building it.



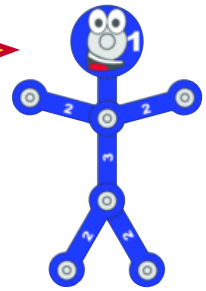
☐ Project 71



Light Spots

Position the fan so its blades are not directly over the photoresistor (RP). Turn on the slide switch (S1) and shine enough light on the photoresistor so that you hear a fire engine sound (and blocking light to the photoresistor should change the sound to a normal siren). Now push the press switch (S2) to spin the fan and change the sound.

As the fan blades cross over the photoresistor they block light to it for short intervals. The photresistor controls the alarm IC(U2), and changes the siren it produces.



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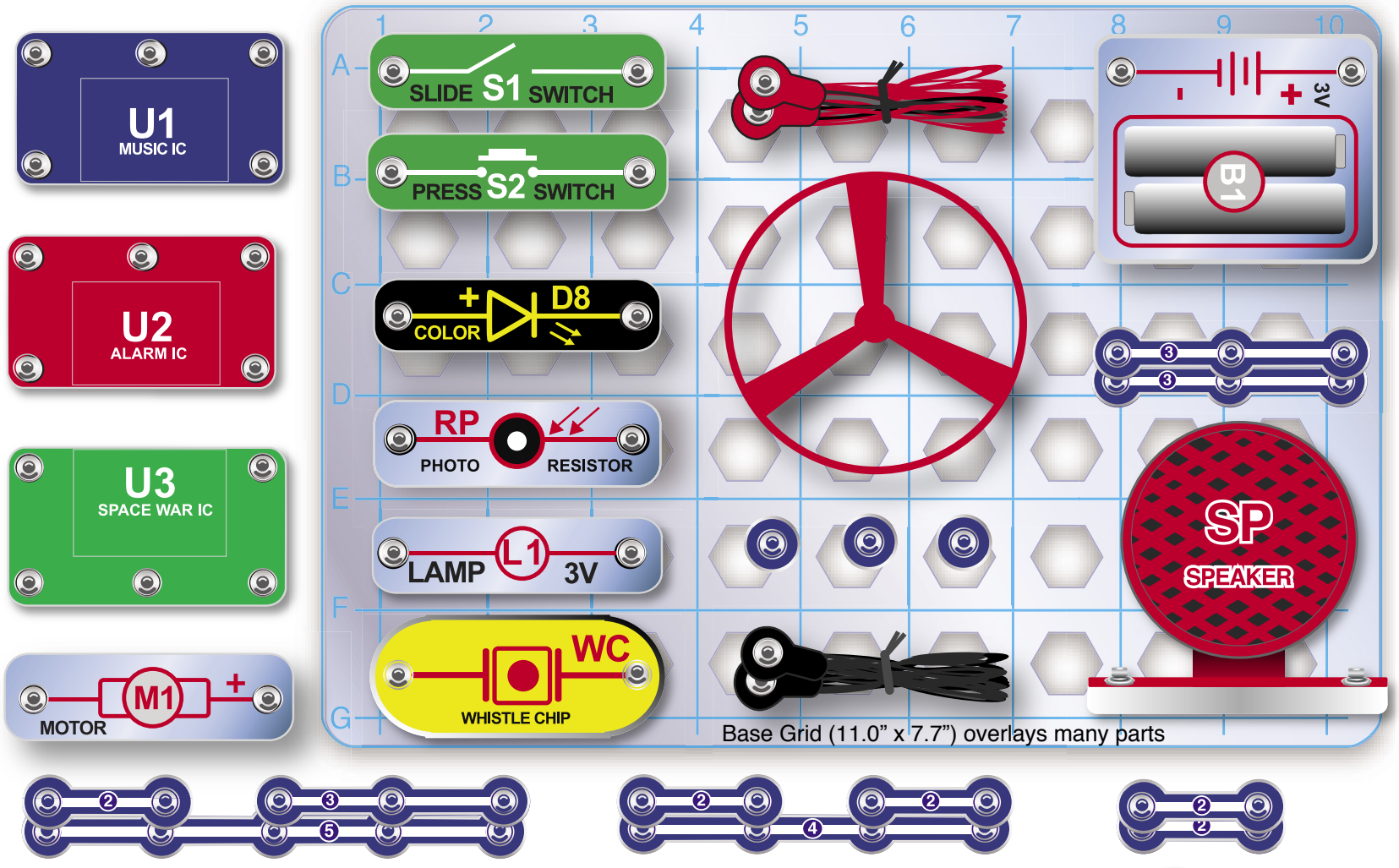
SC-100 Block Layout

Important: If any parts are missing or damaged, **DO NOT RETURN TO RETAILER**.
Call toll-free (800) 533-2441 or e-mail us at: help@elenco.com. Customer Service • 150 Carpenter Ave.
Wheeling, IL 60090 U.S.A **Note:** A complete parts list is on page 2 in this manual.

Parts layout may be different on some versions.



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