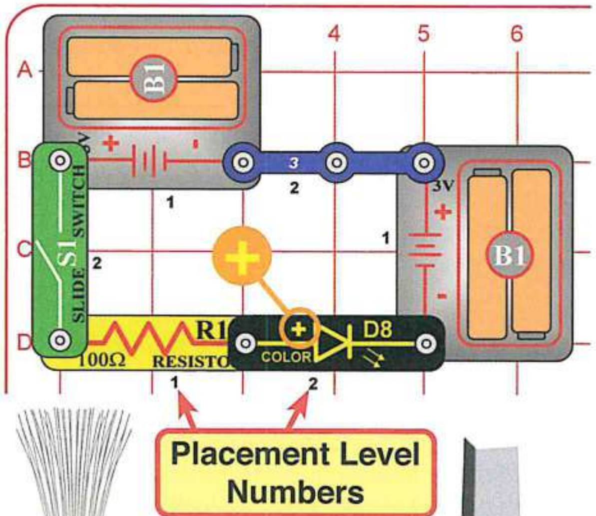
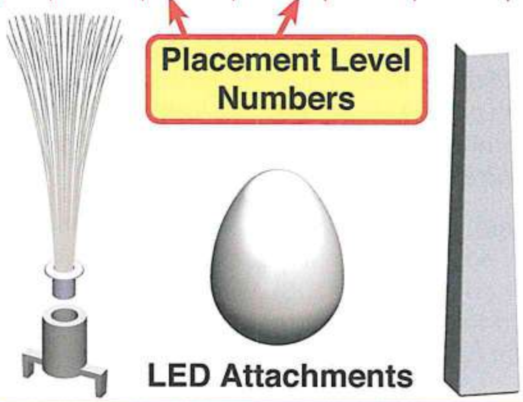
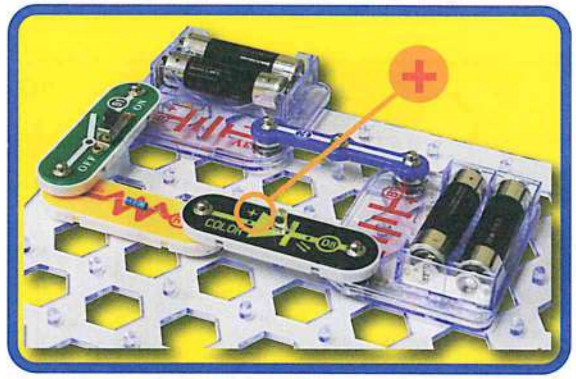
Project 1 Color Light





LED Attachments



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

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 each of the battery holders (B1) if you have not done so already.

Turn on the slide switch (S1), and enjoy the light show from the color LED (D8). For best effects, place one of the LED attachments (tower, egg, or fiber optic tree) on the color LED, and dim the room lights. The fiber optic tree must be used with its mounting base.

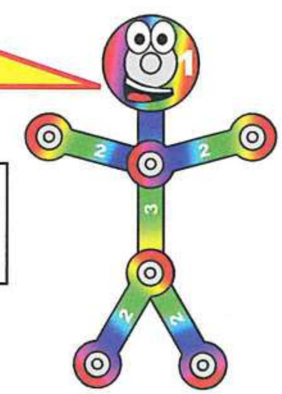
Project 2 White Light

The white LED produces very bright light. LEDs are this one are increasingly being used for home lighting and flashlights. They are more efficient than normal light bulbs.

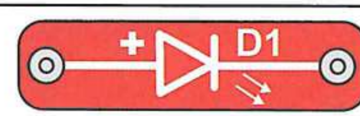
Use the circuit built in project 1, but replace the color LED (D8) with the white LED (D6). Try it with one of the LED attachments, and in a dark room.

Project 3 Red Light

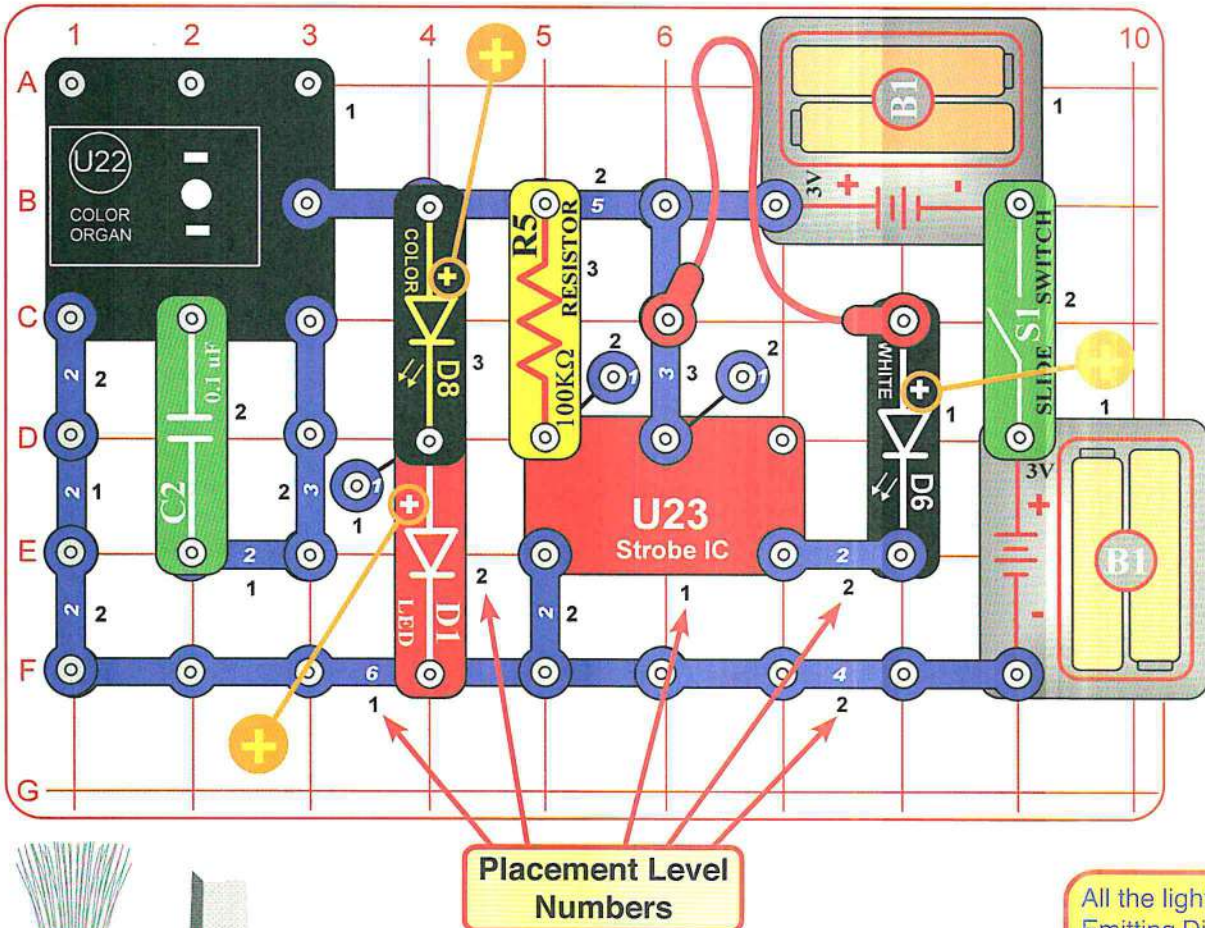
The red LED is not nearly as bright as the other LEDs. LEDs like this one are used as indicators in many products in your home. They are inexpensive, but don't produce much light.



Use the circuit built in project 2, but replace the white LED (D6) with the red LED (D1). Try it with one of the LED attachments, and in a dark room.



Project 4 Light Show

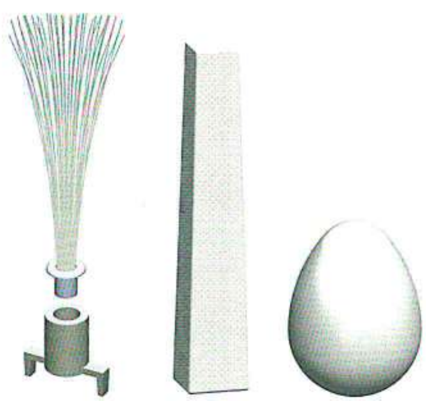


Snap Circuits® uses electronic blocks that snap onto a clear plastic grid to build different circuits. These blocks have different colors and numbers on them so that you can easily identify them.

Build the circuit shown above by placing all the parts with a black **1** next to them on the board first. Then, assemble parts marked with a **2**. Then, assemble parts marked with a **3**. Then, assemble parts marked with a **4** (just one end of the red jumper wire, in this circuit). Install two (2) "AA" batteries (not included) into each of the battery holders (B1) if you have not done so already.

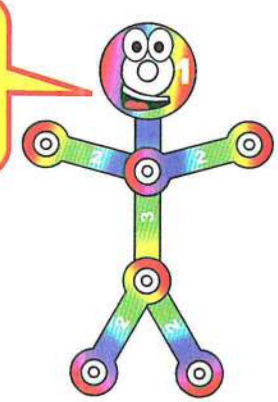
If desired, place any of the LED attachments (tower, egg, or fiber optic tree) on any of the LEDs (red (D1), color (D8), white (D6), or the LED on the color organ IC (U22). Note that the fiber optic tree requires its mounting base.

Turn on slide switch (S1) and enjoy the show!



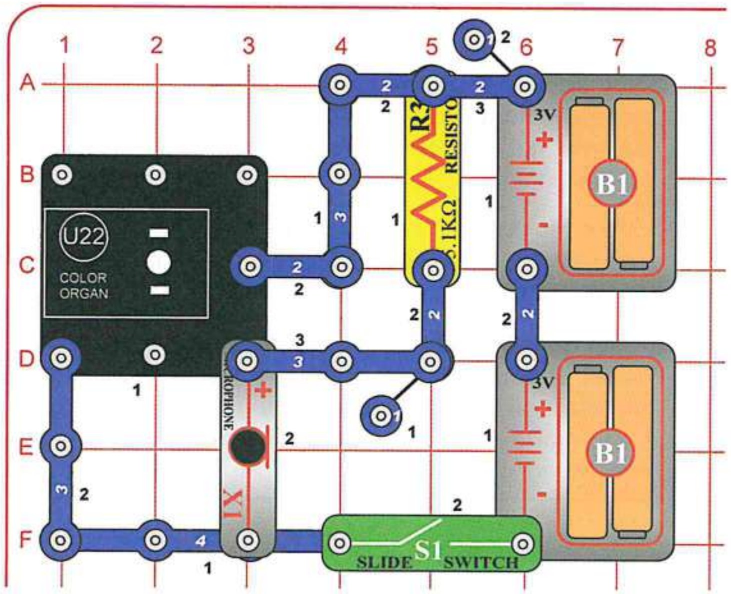
LED Attachments

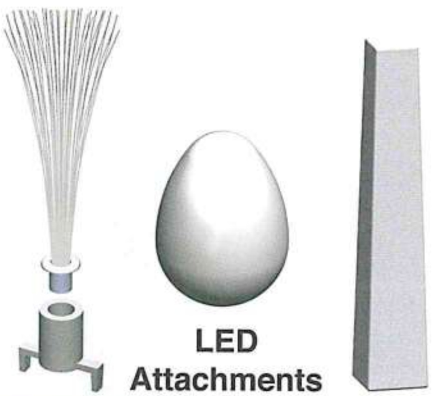
All the lights in this set are LEDs - Light Emitting Diodes. LEDs convert electrical energy into light; the color of the light emitted depends on the characteristics of the material used in them.



Project 5

Voice Light Show

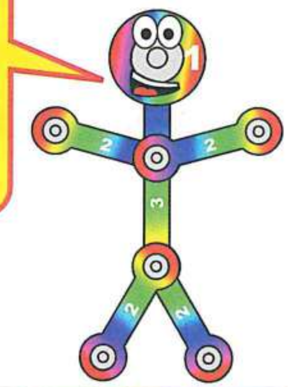




LED Attachments

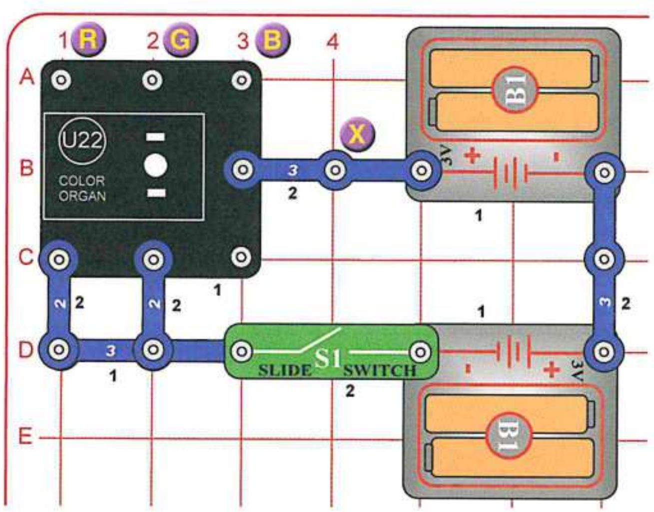
Build the circuit as shown, and place one of the LED attachments (tower, egg, or fiber optic tree) over the LED on the color organ (U22). Turn on the switch (S1) and talk. The color organ light will follow your voice, in tone and loudness.

How does it work? The microphone converts your voice to an electrical signal, which controls an electronic counter in the color organ. The counter controls a red-green-blue LED.



Project 6

Play the Color Organ

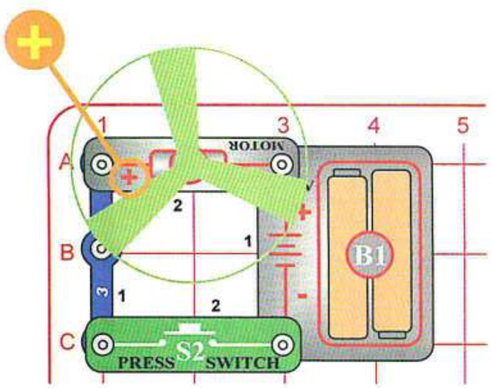


LED Attachments

Build the circuit as shown, and turn on the switch (S1). Place one of the LED attachments on the color organ (U22). Wet your fingers, and touch them between the point marked "X", and points marked "R", "G", or "B" in the drawing. Try X with every combination of R, G, and B, including touching them all at the same time.

The light in the color organ module is actually red, green, and blue LEDs together. The points marked R, G, and B control the light for those colors. Combining red and green makes yellow, green and blue makes cyan, red and blue makes purple, and combining all three colors makes white.

Project 7 Flying Saucer



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.

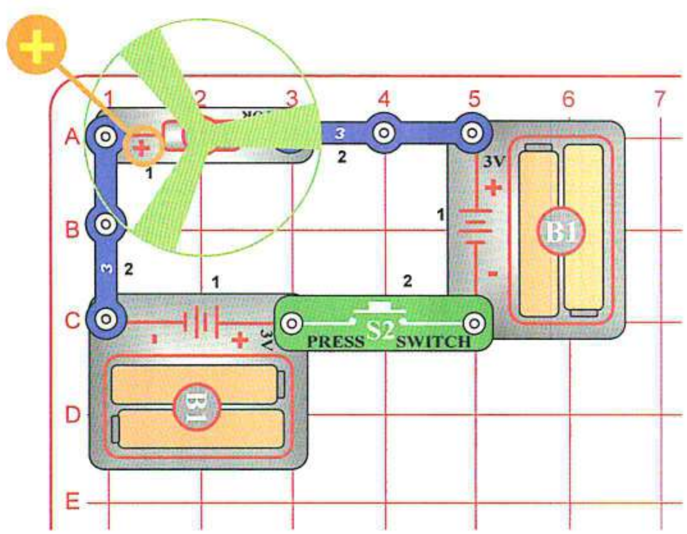
Push the press switch (S2) until the motor reaches full speed, then release it. The fan blade should rise and float through the air like a flying saucer. Be careful not to look directly down on fan blade when it is spinning.

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.

The glow fan will glow in the dark. It will glow best after absorbing sunlight for a while. The glow fan is made of plastic, so be careful not to let it get hot enough to melt. The glow looks best in a dimly lit room.

WARNING: Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor. Fan may not rise until switch is released.

Project 8 Super Flying Saucer



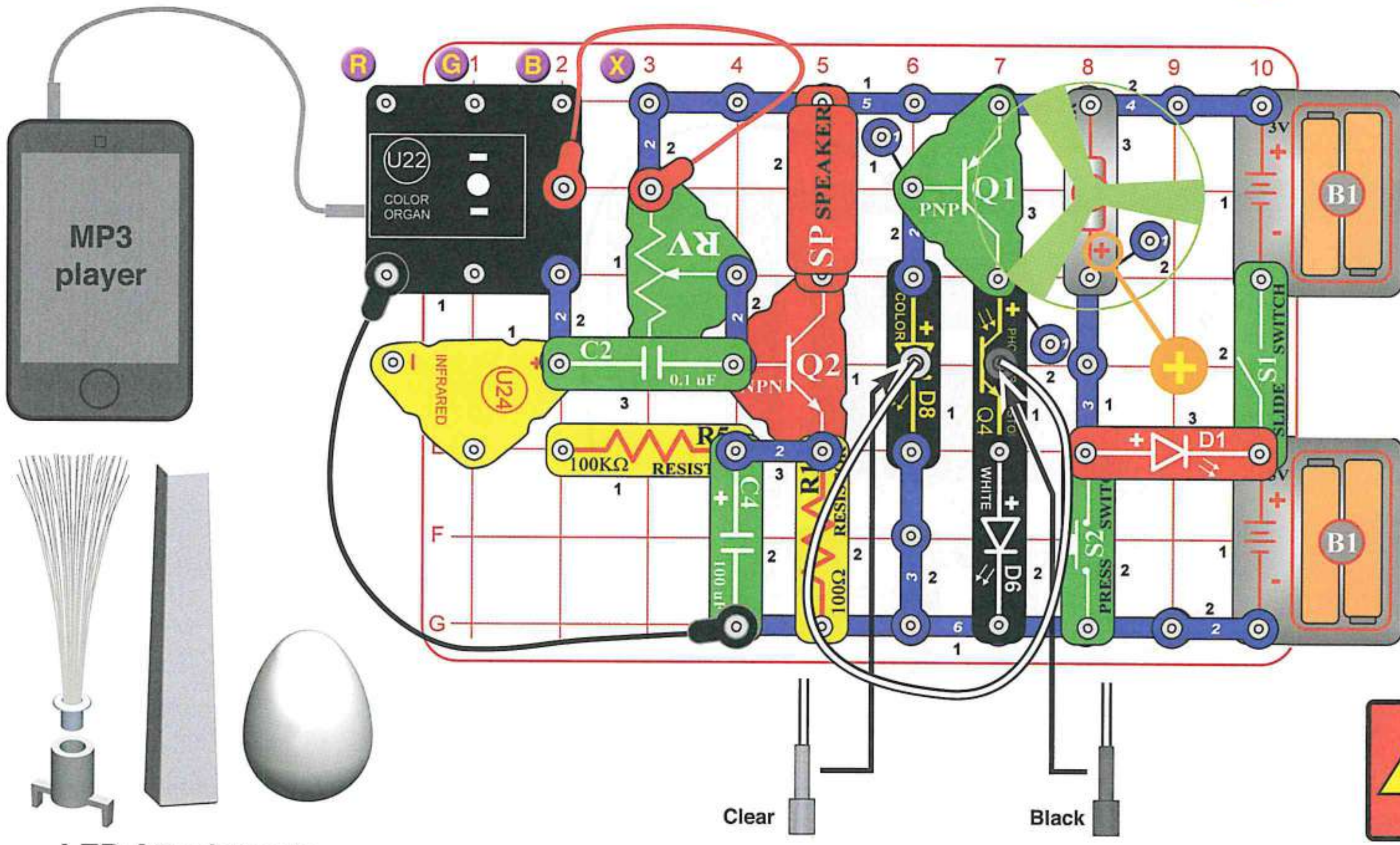
This circuit will make the fan spin faster and fly higher than the preceding circuit, making it easy to lose your fan.

WARNING: Elenco® Electronics Inc. is not responsible for lost or broken fans! You may purchase replacement fans at www.snapcircuits.net.

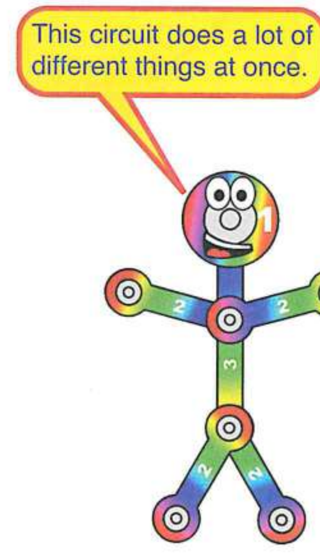
Push the press switch (S2) until the motor reaches full speed, then release it. The fan blade should rise and float through the air like a flying saucer. Be careful not to look directly down on fan blade when it is spinning.

WARNING: Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor. Fan may not rise until switch is released. Eye protection is recommended for this circuit.

Project 9 Big Circuit



LED Attachments



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

Build the circuit as shown. Place either the glow fan or the light fan on the motor (M1) shaft, so that it is stable on the little black piece. Place the clear fiber optic holder on the color LED (D8) and the black fiber optic holder on the phototransistor (Q4), then insert the fiber optic cable between them, but don't let it lay close to the fan on the motor. For best performance the fiber optic cable should stand straight up in the holders, without bending them. Connect a music device to the color organ (U22) as shown, and start music on it. For best effects, place one of the LED attachments over the light on the color organ.

Turn on slide switch (S1). Adjust the lever on the adjustable resistor (RV) and the volume control on your music device for best sound and light effects.

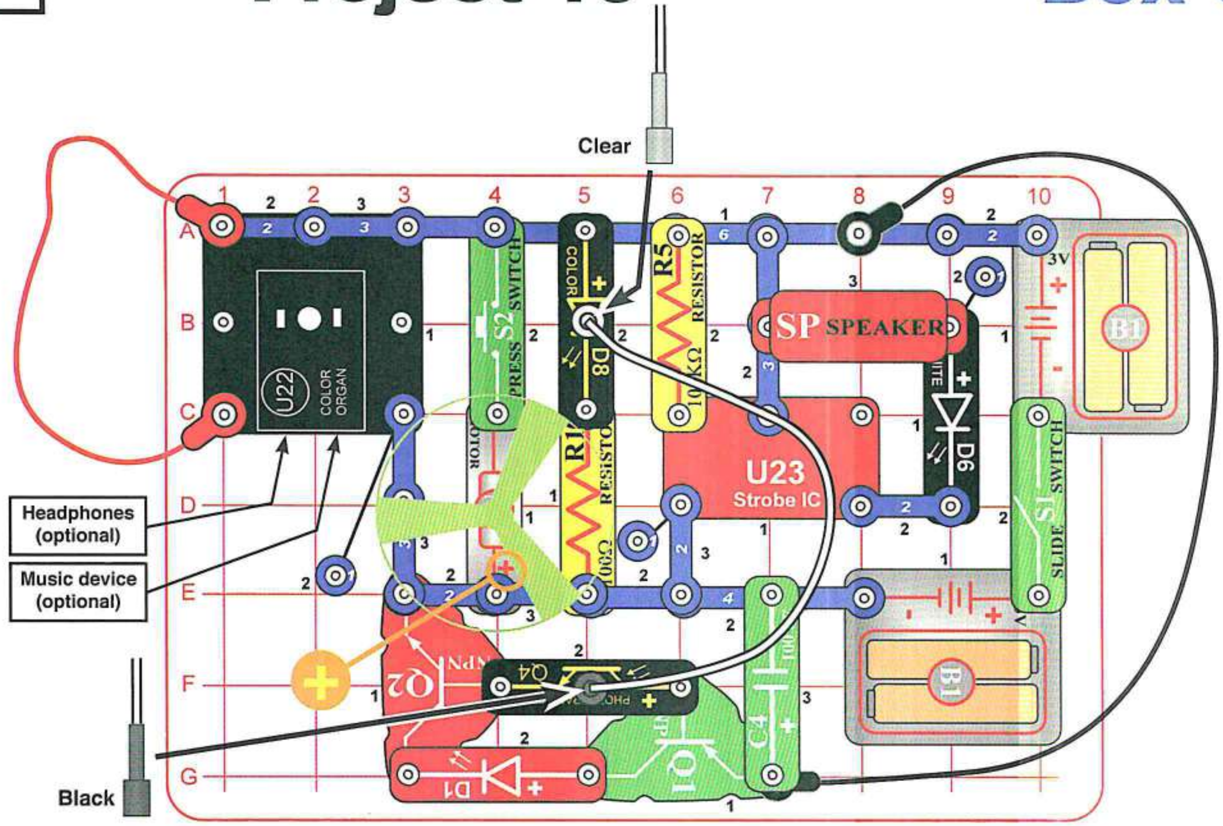
Push the press switch (S2) until the motor reaches full speed, then release it. The fan will rise into the air like a flying saucer.

"Playing the Color Organ": turn off or disconnect your music device. Wet your fingers, and touch them between the point marked "X", and "R", "G", or "B" in the drawing.

The infrared detector (U24) and 100kΩ resistor (R5) are only used to support the other components.

☐ Project 10

Box Cover Circuit



Build the circuit as shown. Place the glow fan on the motor (M1) shaft, so that it is stable on the little black piece. Place the clear fiber optic holder on the color LED (D8). and the black fiber optic holder on the phototransistor (Q4), then insert the fiber optic cable between them, but don't let it lay close to the fan on the motor. For best performance the fiber optic cable should stand straight up in the holders, without bending them. For best effects, place one of the LED attachments over the light on the color organ, and one on the color LED (D8).

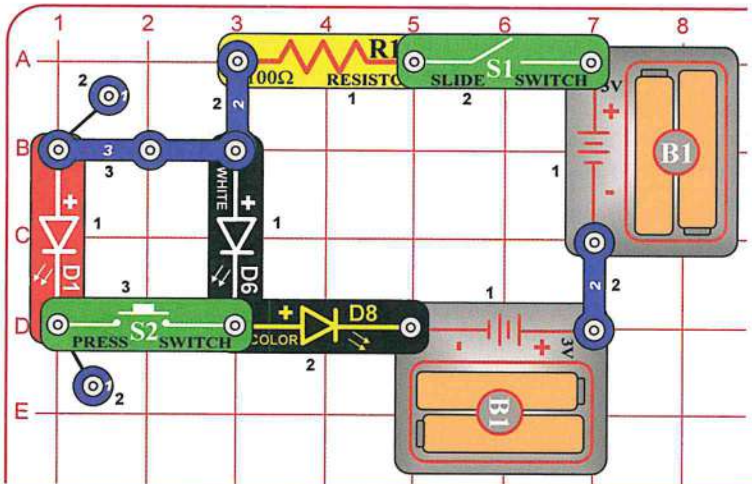
Optional: connect a music device to the color organ (U22) as shown, and start music on it (the color organ light will change to the music, but you will not hear it unless you also connect headphones).

Turn on slide switch (S1). A tone is hear from the speaker (SP), and all the lights (D1, D6, D8, and on U22) are on.

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

WARNING: Moving parts. Do not touch the fan or motor during operation. Do not lean over the motor. Fan may not rise until switch is released.

Project 11 — Blinking Colors



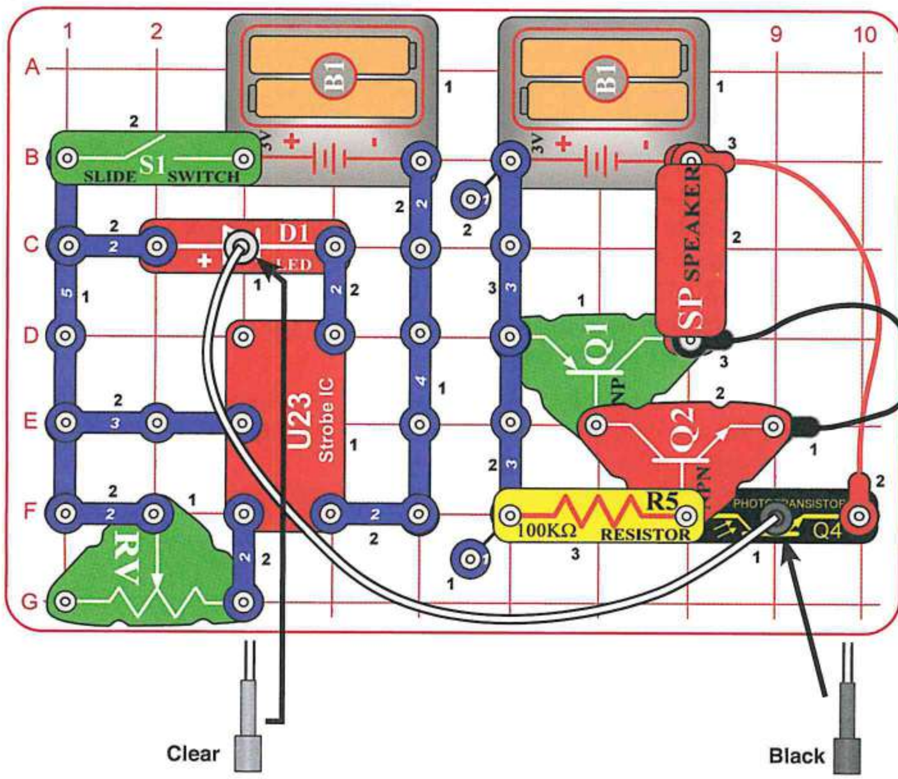
Red light is easier for LEDs to produce than white light. When the red and white LEDs are connected in parallel (which happens when S2 is pressed), the red LED will dominate because it turns on more easily.

Build the circuit as shown and turn on the slide switch (S1). The white and color LEDs (D6 & D8) are blinking.

Push the press switch (S2). Now the red LED (D1) is blinking but the white LED is off.

If you swap the locations of the red and white LEDs, then the red LED will be blinking and the white LED will be off, and pushing the press switch won't change anything.

Project 12 — Fiber Optics



Build the circuit as shown. Place the clear cable holder on the red LED (D1) and the black cable holder on the phototransistor (Q4), then place the fiber optic cable into the holders as far as it will go. For best performance the cable should stand straight up in the holders, without bending them.

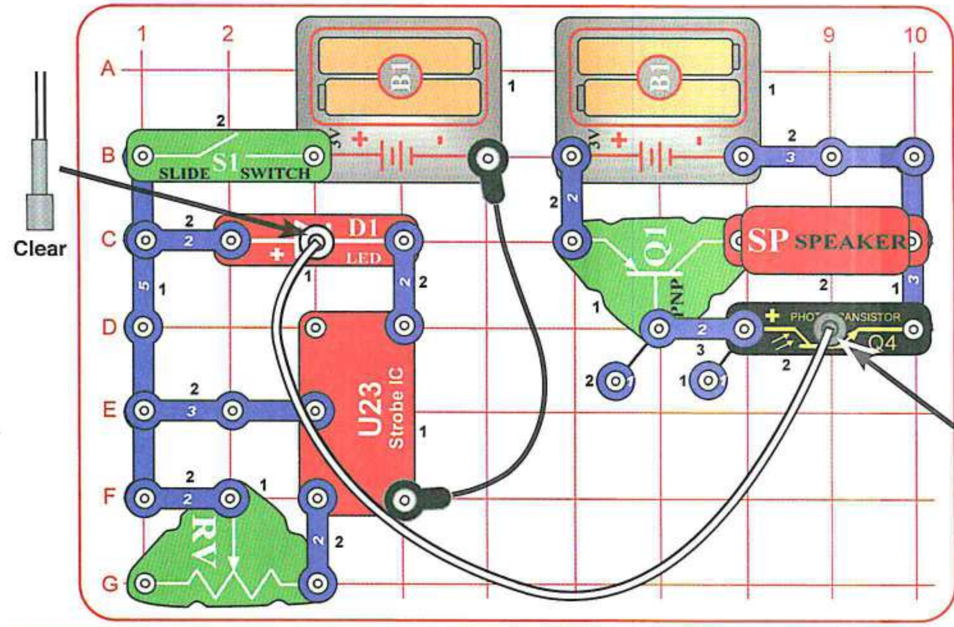
Turn on slide switch (S1) and move the lever on the adjustable resistor (RV) around. The sound from the speaker (SP) changes as you move the lever on RV.

This project is more exciting than it looks. The tone sounds produced by the strobe IC (U23) are played on the speaker (SP), even though there is no electrical connection between them.

The left half the circuit makes a coded light signal, which you see in the red LED (D1). The right half of the circuit decodes the light signal and plays it on the speaker. The fiber optic cable is used to transmit the light signal between the two sides of the circuit. There is no electrical connection between the left and right halves of the circuit, only a light connection using fiber optics! If your fiber optic cable was longer, the two halves of the circuit could be many miles apart.

This circuit is an example of using fiber optic cables for communication. Fiber optics allows information to be transmitted across great distances at very high speeds with very low distortion, by using light.

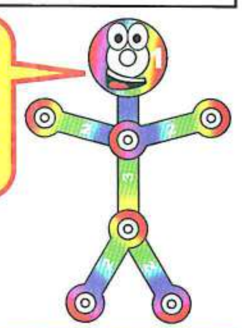
Project 13 — Tones Over Light



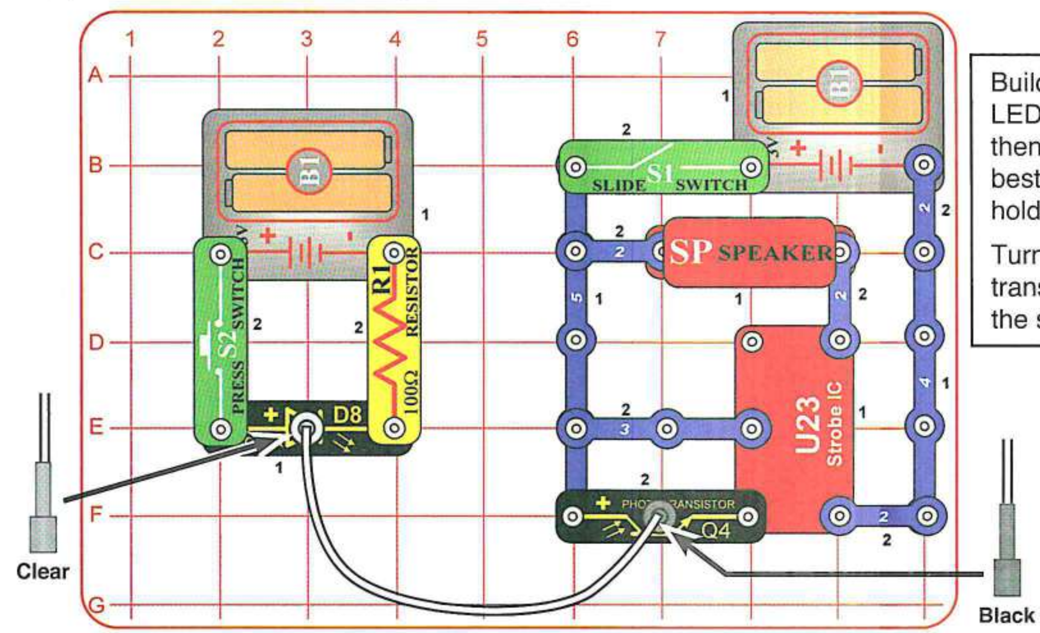
Build the circuit as shown. Place the clear cable holder on the red LED (D1) and the black cable holder on the phototransistor (Q4), then place the fiber optic cable into the holders as far as it will go. For best performance the fiber optic cable should stand straight up in the holders, without bending them.

Turn on the slide switch (S1) and move the lever on the adjustable resistor (RV) around. The sound from the speaker (SP) changes as you move the lever on RV.

This is similar to project 12 but not as loud. The project 12 circuit uses a two-transistor amplifier while this circuit only has one transistor.



Project 14 — Color Optic Sounds

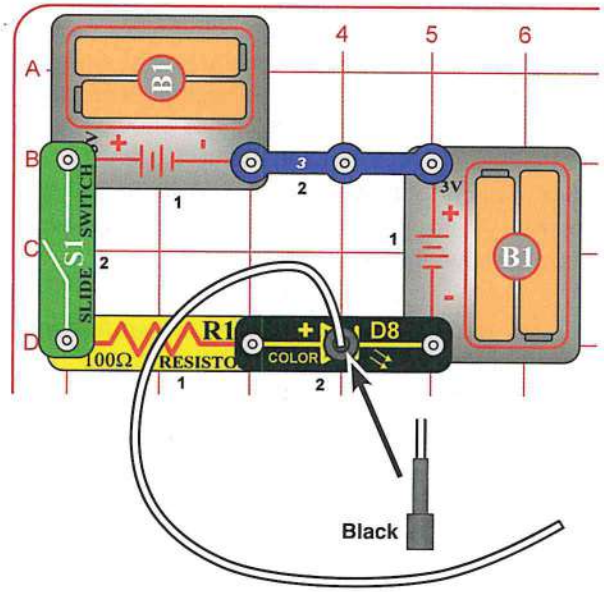


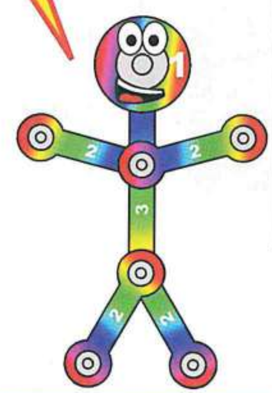
Build the circuit as shown. Place the clear cable holder on the color LED (D8) and the black cable holder on the phototransistor (Q4), then place the fiber optic cable into the holders as far as it will go. For best performance the fiber optic cable should stand straight up in the holders, without bending them.

Turn on the slide switch (S1) and push the press switch (S2). Light is transmitted from the color LED, through the fiber optic cable, to control the strobe IC (U23) and speaker (SP).

☐ Project 15

Color Light Transporter





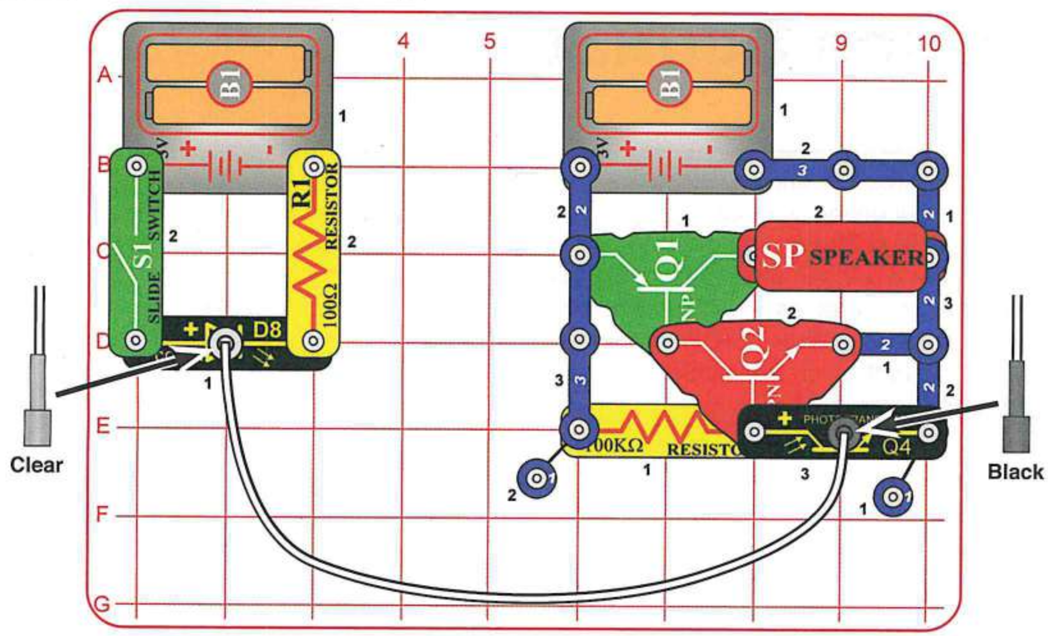
Build the circuit as shown. Place the black cable holder on the color LED (D8), then place the fiber optic cable into the holder as far as it will go. For best performance the fiber optic cable should stand straight up in the holder, without bending it. Leave the other end of the cable free.

Turn on the switch (S1), and look into the loose end of the fiber optic cable. Flex the cable into loops but don't dent it. Take the circuit into a dark room and see how the cable looks.

You can use the clear cable holder on the color LED instead of the black holder.

☐ Project 16

Color Optics

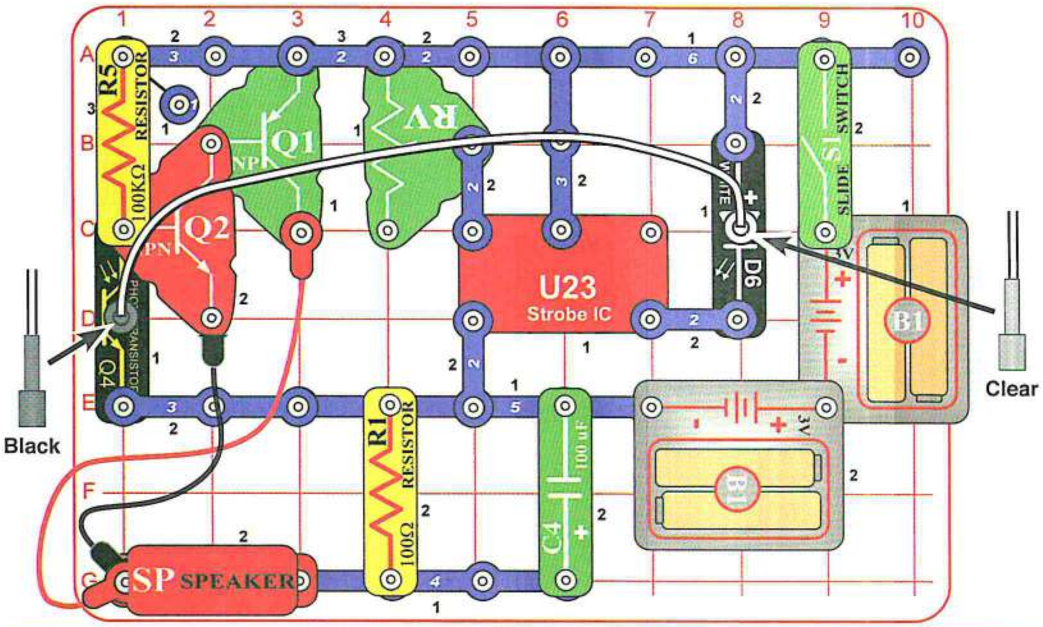


Build the circuit as shown. Place the clear cable holder on the color LED (D8) and the black cable holder on the phototransistor (Q4), then place the fiber optic cable into the holders as far as it will go. For best performance the fiber optic cable should stand straight up in the holders, without bending them.

Turn on the switch (S1). The color LED (D8) turns on and off repeatedly as it changes colors. This produces interesting effects when connected to the speaker circuit through the fiber optic cable.

□ Project 17

High Power Fiber Optics



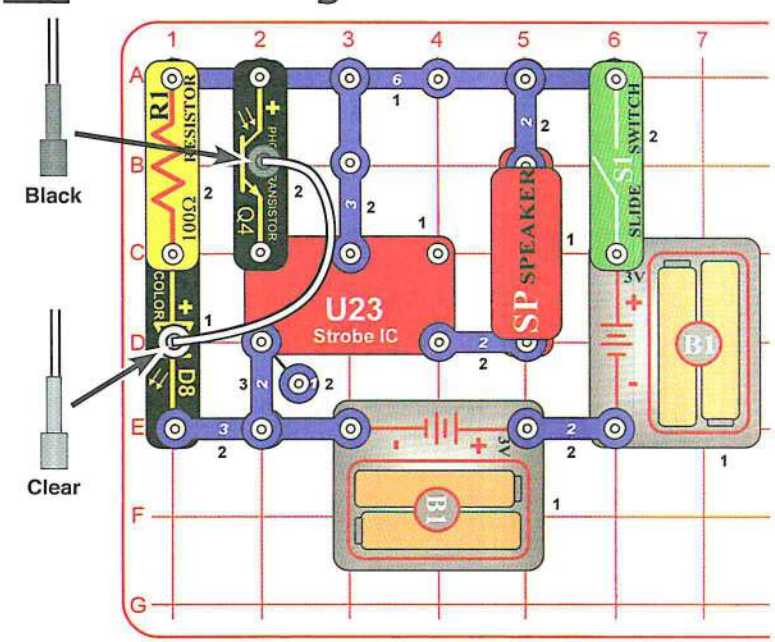
Build the circuit as shown. Place the clear cable holder on the white LED (D6) and the black cable holder on the phototransistor (Q4), then place the fiber optic cable into the holders as far as it will go. For best performance the fiber optic cable should stand straight up in the holders, without bending them.

Turn on the slide switch (S1) and move the lever on the adjustable resistor (RV) around. The sound from the speaker (SP) changes as you move the lever on RV.

Try removing the black cable holder and just holding the fiber optic cable next to the phototransistor with your fingers. Hold it at different angles and compare the sound. You may not hear anything, due to background light in the room. Take the circuit into a dark room or place your fingers around the phototransistor to block the room light to it. Now put the black cable holder back on, remove the clear cable holder, and try holding the fiber optic cable at different positions around the white LED. You can also replace the white LED with the red LED (D1) or the color LED (D8).

□ Project 18

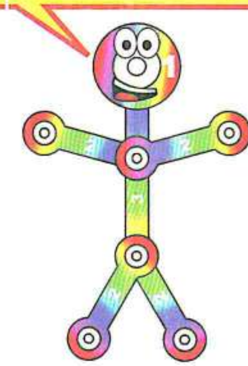
High Color Optics Sounds



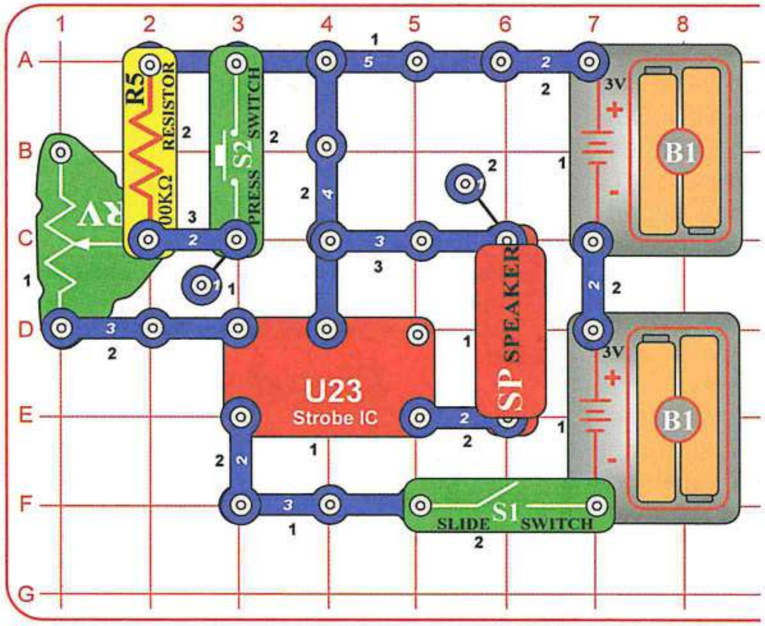
Build the circuit as shown. Place the clear cable holder on the color LED (D8) and the black cable holder on the phototransistor (Q4), then place the fiber optic cable into the holders as far as it will go. For best performance the fiber optic cable should stand straight up in the holders, without bending them.

Turn on the slide switch (S1). Light is transmitted from the color LED, through the fiber optic cable, to control the strobe IC (U23) and speaker (SP).

The circuits on this page are similar to projects 12 and 14, but have the fiber optic transmitting sub-circuit (with the LED) and the receiving sub-circuit (with the phototransistor) using the same voltage sources. Normally the transmitting and receiving circuits will be in different locations with separate voltage sources, but they were combined here to increase the power.



Project 19 Sound Maker



The strobe IC (U23) produces an electrical "tone". The pitch of the "tone" is adjusted by changing how much electricity flows into its upper-left snap, using a resistor. The electrical tone it produces can be used to make sound using a speaker, or to control the flash rate of an LED see project 20, the Strobe Light).

Build the circuit and turn on the switch (S1). You hear sound from the speaker. Adjust the sound using the lever on the adjustable resistor (RV), and by pushing the press switch (S2).

Note: In rare cases the circuit may not work at all settings on RV. If this happens, move the RV lever to the side near the strobe IC, turn the slide switch off and on to reset the circuit, and only move the RV lever over a small range.

Project 20 Strobe Light

Use the preceding circuit, but replace the speaker with the white LED (D6). Now you have a strobe light!

When S2 is pressed, the light may be blinking so fast that it appears to be on continuously.

Project 21 Color Strobe Light

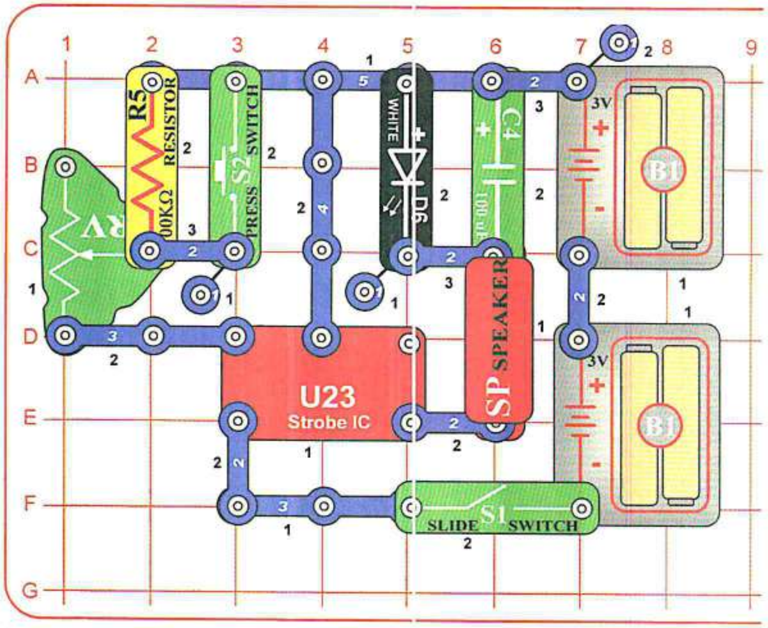
Use the preceding circuit, but replace the white LED with the color LED (D8).

The color LED will not be changing colors like it does in other circuits. When the strobe IC (U23) turns the color LED on and off, it resets the color-control microcircuit in the color LED. Even your slowest strobe speed is too fast for the color LED.

Project 22 Red Strobe Light

Use the preceding circuit but replace the color LED (D8) with the red LED (D1).

Project 23 Noisy Strobe Light



Modify the project 19 circuit to be this one, which has the white LED (D6) next to the speaker (SP). Build the circuit and turn on the switch (S1). Adjust the blink rate and sound using the lever on the adjustable resistor (RV), and by pushing the press switch (S2).

Note: In rare cases the circuit may not work at all settings on RV. If this happens, move the RV lever to the side near the strobe IC, turn the slide switch off and on to reset the circuit, and only move the RV lever over a small range.

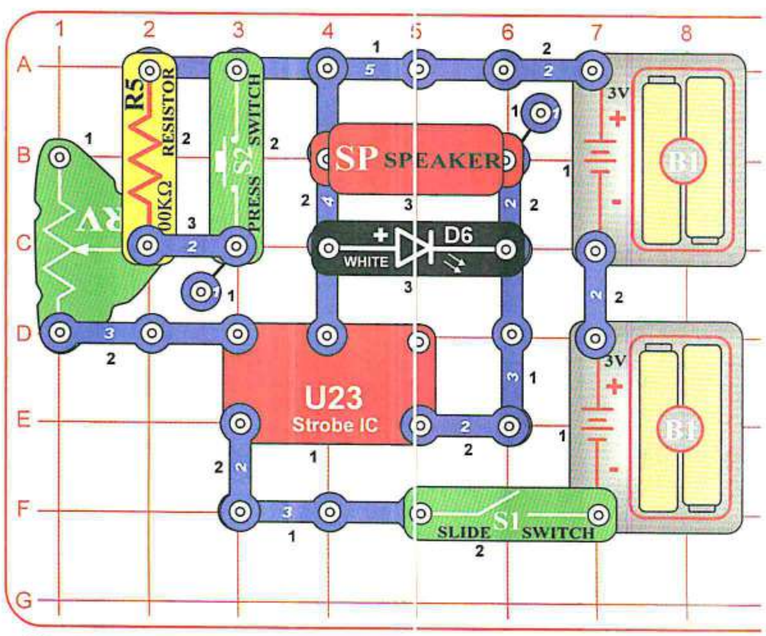
Project 24 Noisy Red Strobe Light

Use the preceding circuit but replace the white LED (D6) with the red LED (D1) or the color LED (D8).

Project 25 Double Strobe Light

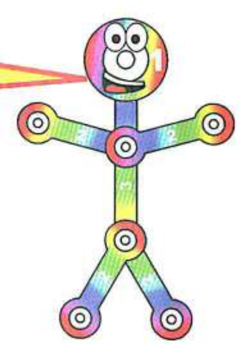
Use the preceding circuit but replace the speaker and LED with any two LEDs (red, white, or color).

Project 26 Louder Strobe Light



Modify the preceding circuit to be this one, which has the white LED (D6) in parallel with the speaker (SP). Build the circuit and turn on the switch (S1). Adjust the blink rate and sound using the lever on the adjustable resistor (RV), and by pushing the press switch (S2).

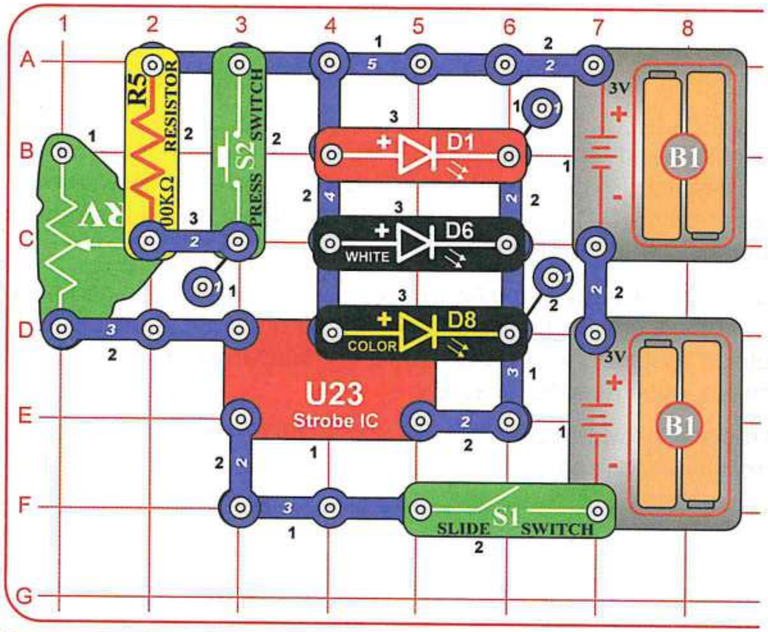
This circuit is louder than the previous circuits because the speaker is in parallel with the LED instead of in series with it. This increases the voltage across the speaker, making it louder.



Project 27 Louder Color Strobe Light

Use the preceding circuit but replace the white LED (D6) with the red LED (D1) or the color LED (D8).

☐ Project 28 Triple Strobe Light



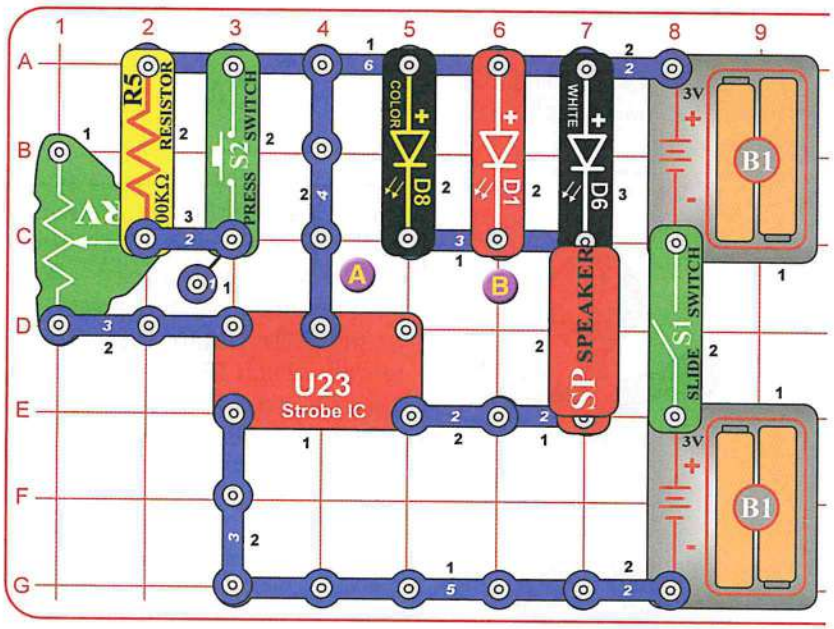
Build this circuit and turn on the slide switch (S1). Adjust the blink rate using the lever on the adjustable resistor (RV), and by pushing the press switch (S2).

Note: In rare cases the circuit may not work at all settings on RV. If this happens, move the RV lever to the side near the strobe IC, turn the slide switch off and on to reset the circuit, and only move the RV lever over a small range.

☐ Project 29 Noisy Double Strobe Light

Use the preceding circuit but replace one of the LEDs (D1, D6, or D8) with the speaker (SP).

☐ Project 30 Noisy Triple Strober



Build this circuit and turn on the slide switch (S1). Adjust the blink rate and sound using the lever on the adjustable resistor (RV), and by pushing the press switch (S2).

Note: In rare cases the circuit may not work at all settings on RV. If this happens, move the RV lever to the side near the strobe IC, turn the slide switch off and on to reset the circuit, and only move the RV lever over a small range.

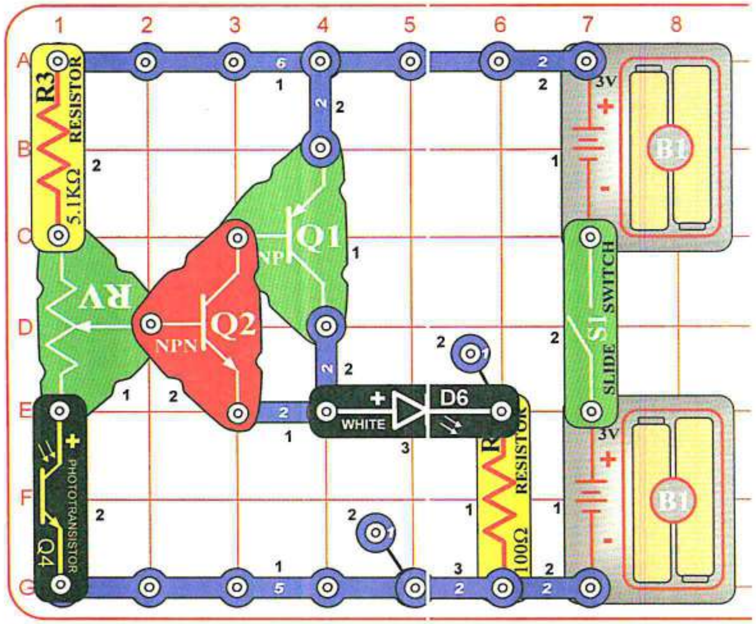
☐ Project 31 Triple Light Noisy Motion Strober

Use the preceding circuit but replace the speaker (SP) with the motor (M1, "+" toward white LED), then place the speaker across the points marked A & B in the drawing. Do not place any fan on the motor.

The LEDs (D1, D6, & D8) flash, the speaker makes noise, and the motor shaft spins or wiggles. Adjust the blink rate, sound, and motor spin using the lever on the adjustable resistor (RV), and by pushing the press switch (S2).

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

Project 32 — Automatic Light

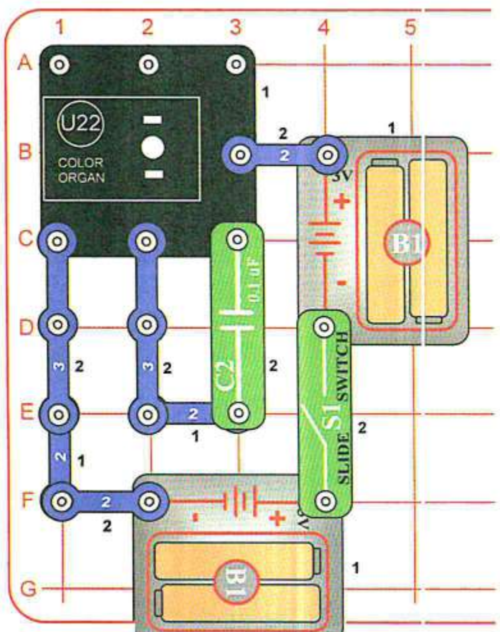


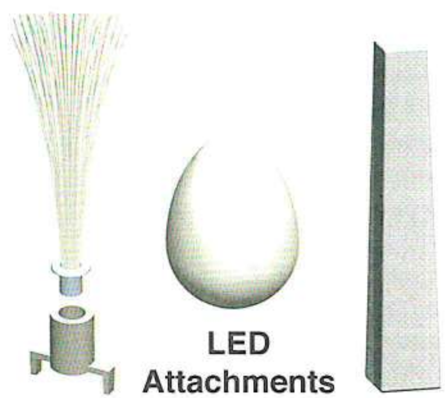
Build the circuit and turn on the slide switch (S1). Set the lever on the adjustable resistor (RV) so the white LED (D6) just turns off. Slowly cover the phototransistor (Q4) and the white LED brightens. Adjust the light to the phototransistor to turn the white LED on or off.

This is an automatic street lamp that you can turn on at a certain darkness and turn off by a certain brightness. This type of circuit is installed on many outside lights and forces them to turn off and save electricity. They also come on when needed for safety.

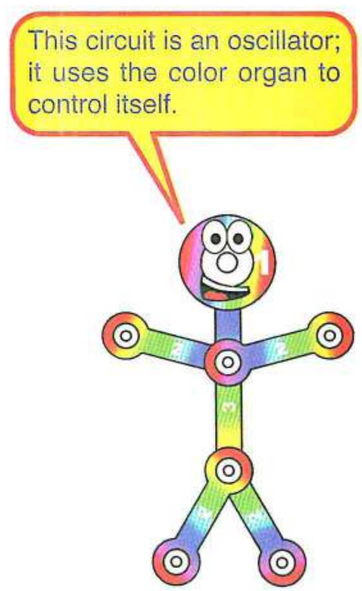
You can replace the white LED with the color LED (D8) or the red LED (D1), but you may need to readjust the sensitivity using the lever on RV.

Project 33 — Color Oscillator



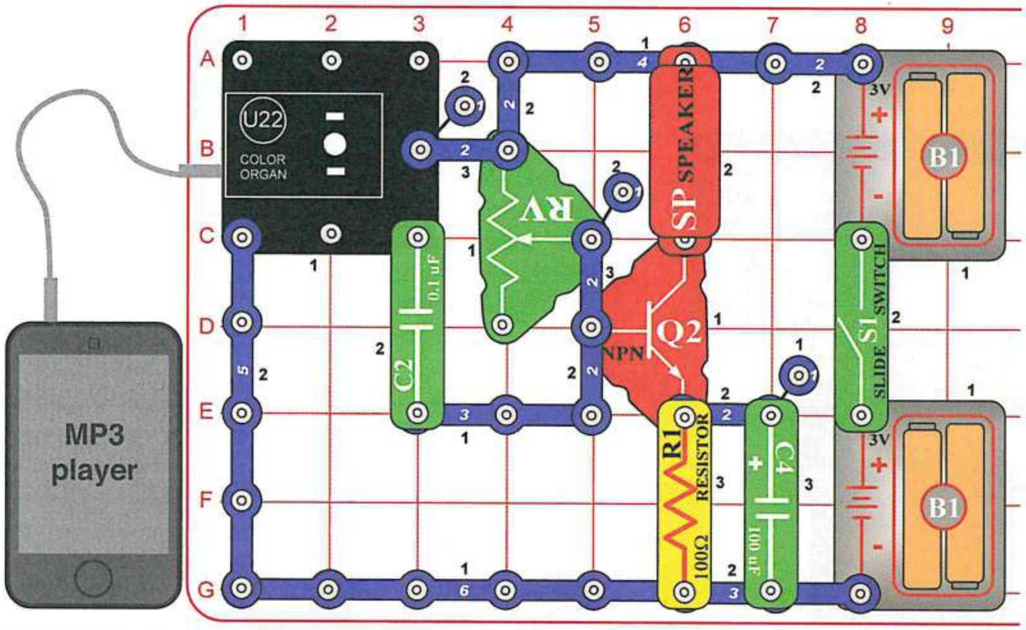


LED Attachments

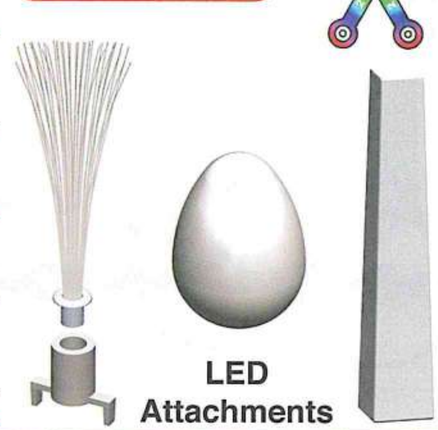


Build the circuit as shown, and place one of the LED attachments (tower, egg, or fiber optic tree) over the LED on the Color Organ (U22). Turn on the switch (S1) and watch. The color organ light will change colors on its own.

Project 34 Dance to the Music

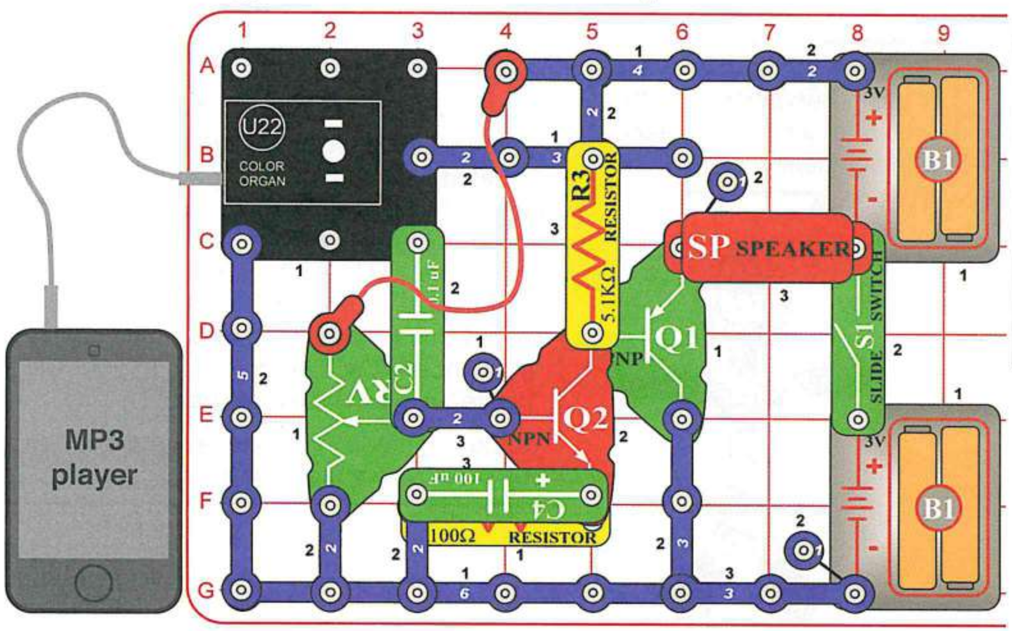


This circuit amplifies the music so it can be heard on the speaker. This is a simple circuit, so sound quality may not be as good as your other music players.

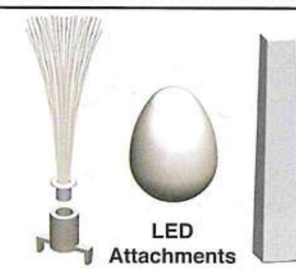


Build the circuit. Connect a music device (not included) to the color organ (U22) as shown, and start music on it. Place one of the LED attachments over the light on the color organ. Set the lever on the adjustable resistor (RV), and the volume control on your music device, for best sound quality and light effects. The color organ light will "dance" in synch with the music. Compare fast and slow songs, and different loudness levels.

Project 35 Super Dance to the Music



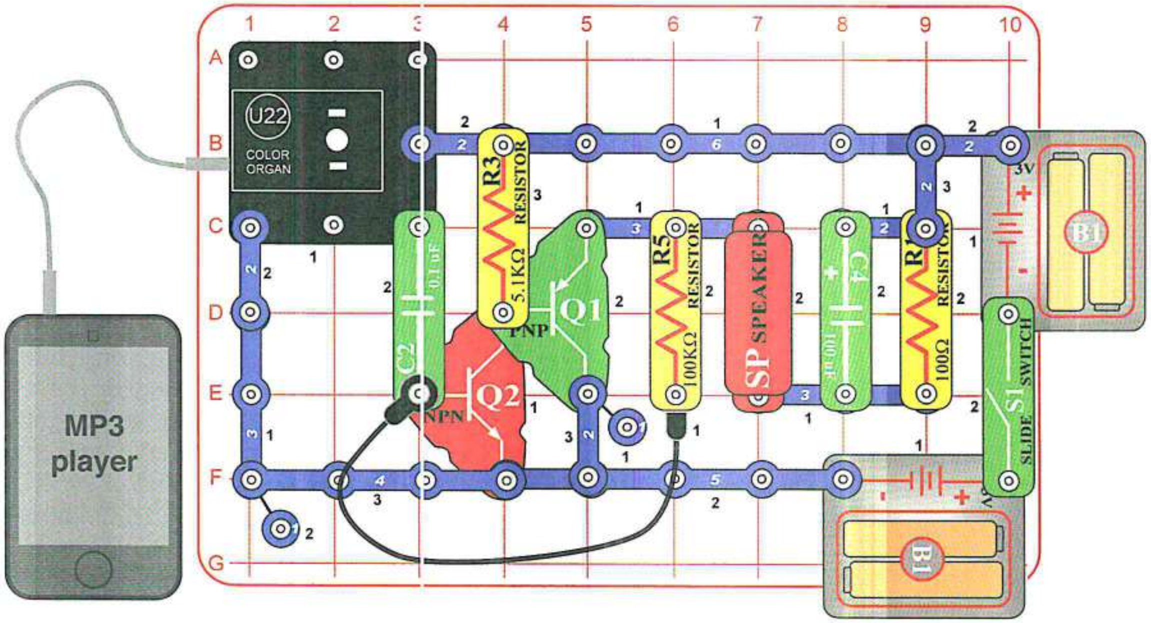
This circuit is similar to the preceding one, but louder and more sensitive. Build the circuit as shown. Connect a music device (not included) to the color organ (U22) as shown, and start music on it, set the volume to mid-range. Place one of the LED attachments over the light on the color organ. Turn on the switch (S1) and SLOWLY ADJUST the lever on the adjustable resistor (RV) for best sound; there will only be a narrow range where the sound is clear. Adjust the volume on your music device for best sound quality.



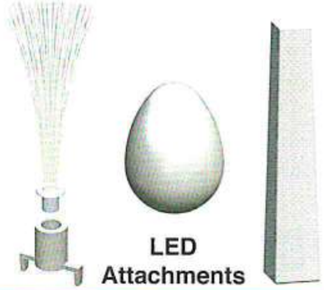
Project 36 Super Dance to the Music (II)

Use the preceding circuit, but remove the 100μF capacitor (C4). The sound will not be as loud, but will be less distorted. Adjust RV and the volume on your music deice for best sound.

Project 37 Follow the Music

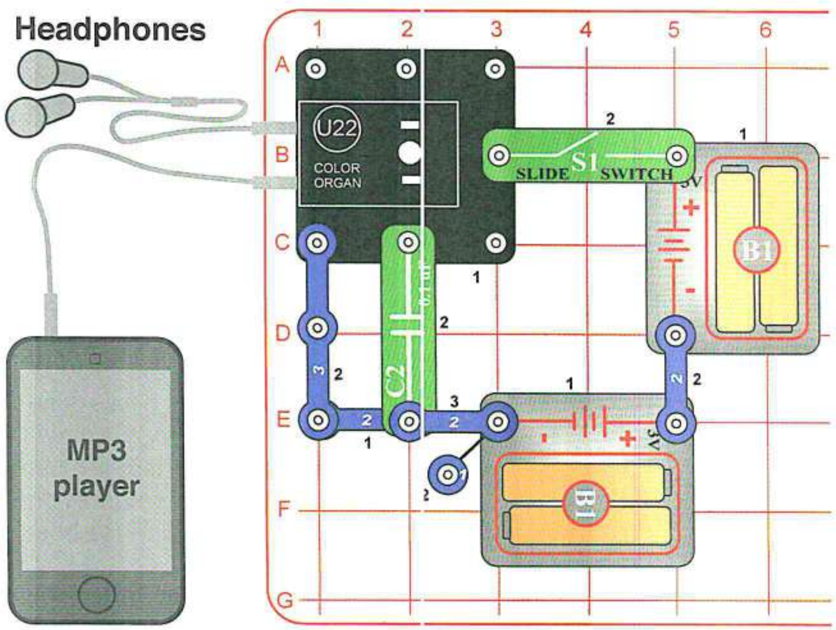


Build the circuit. Connect a music device (not included) to the color organ (U22) as shown, and start music on it. For best effects, place one of the LED attachments over the light on the color organ. Set the volume control on your music device for best sound quality and light effects. The color organ light will "dance" in synch with the music. Compare fast and slow songs, and different loudness levels.



LED Attachments

Project 38 Color Organ - Headphones

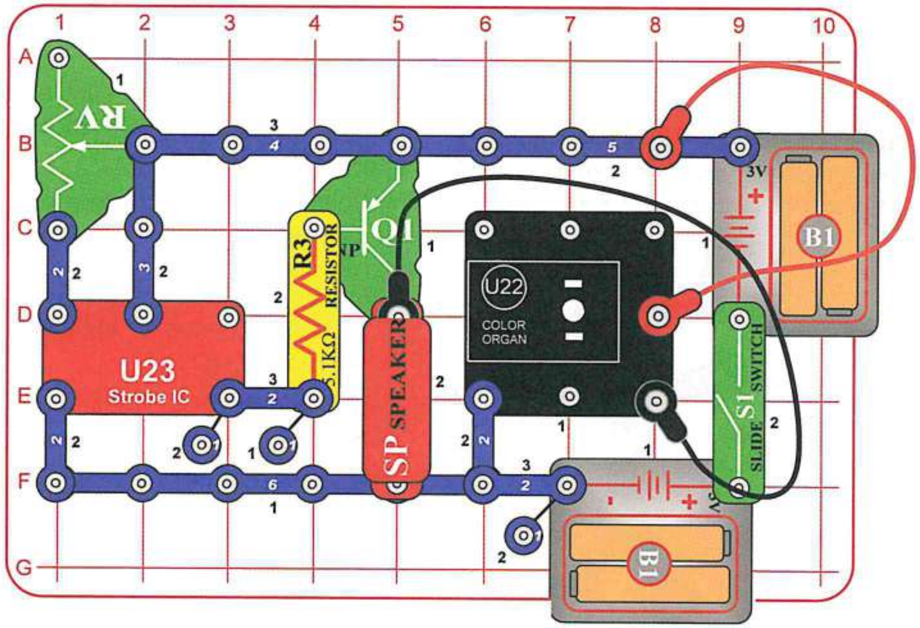


Build the circuit. Connect a music device (not included) and your own headphones (not included) to the color organ (U22) as shown, and start music on it. For best effects, place one of the LED attachments over the light on the color organ. Set the volume control on your music device for best sound quality and light effects. The color organ light will "dance" in synch with the music.

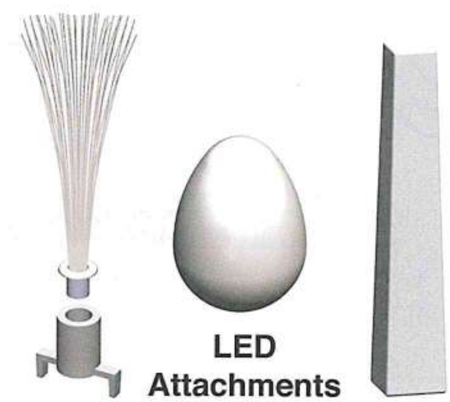
Output signal to headphones is mono, so you will not hear stereo effects.

☐ Project 39

Adjustable Light Dance

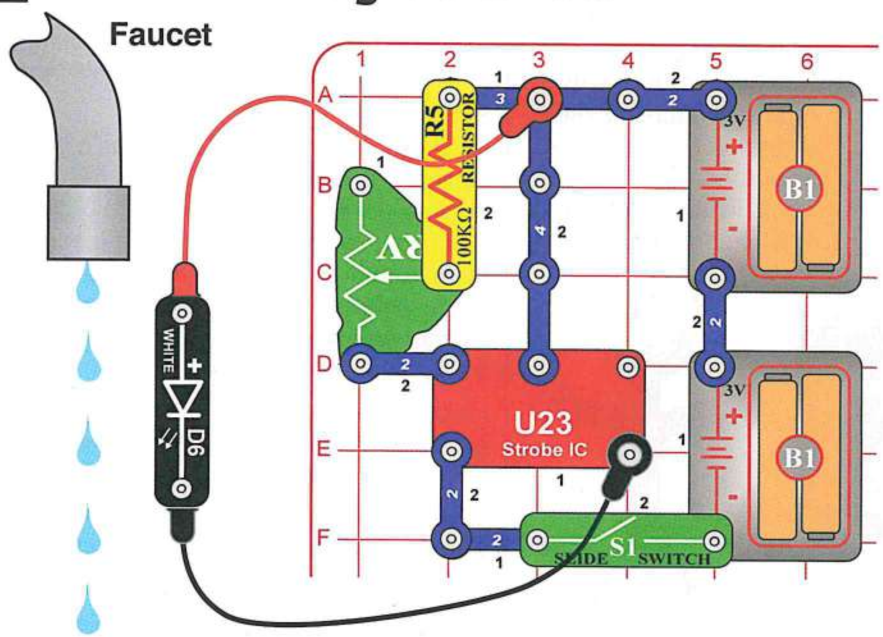


Build the circuit as shown. For best effects, place one of the LED attachments over the light on the color organ. Turn on the switch (S1) and move the lever on the adjustable resistor (RV) to change the tone of the sound and "speed" of the light.



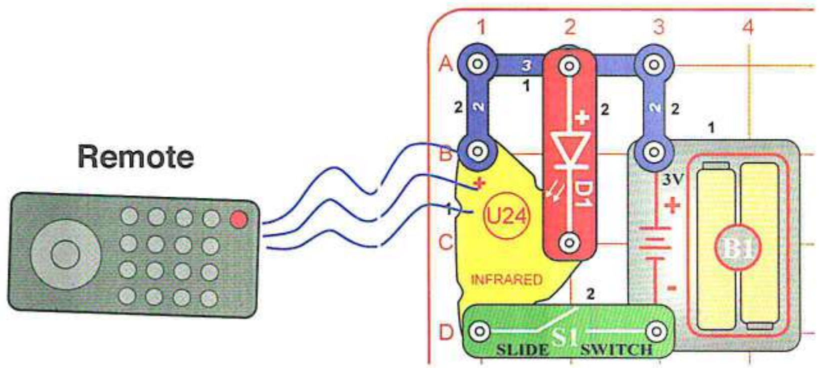
☐ Project 40

Suspended Raindrops

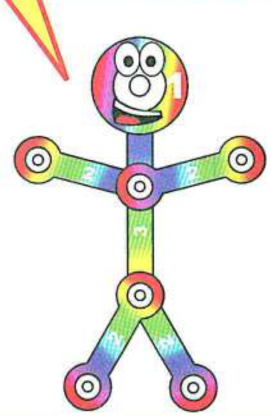


Build the circuit as shown. Connect the white LED (D6) to the red & black jumper wires. Turn on the slide switch (S1). Go to a water faucet and adjust the faucet so water is dripping at a steady rate. Dim the room lights and hold the white LED so it shines on the dripping water. Try to set the lever on the adjustable resistor (RV) so that the dipping water drops appear suspended in mid-air. You may need to adjust the drip rate on the faucet to make this work. You may get better results if you replace the 100kΩ resistor (R5) with the 5.1kΩ resistor (R3). Also, try setting the strobe rate to minimum and adjusting the drip rate.

Project 41 — Infrared Detector



TV remote controls transmit a sequence of pulses representing the TV model and the button that was pressed. The U24 infrared detector is just looking any infrared signal.

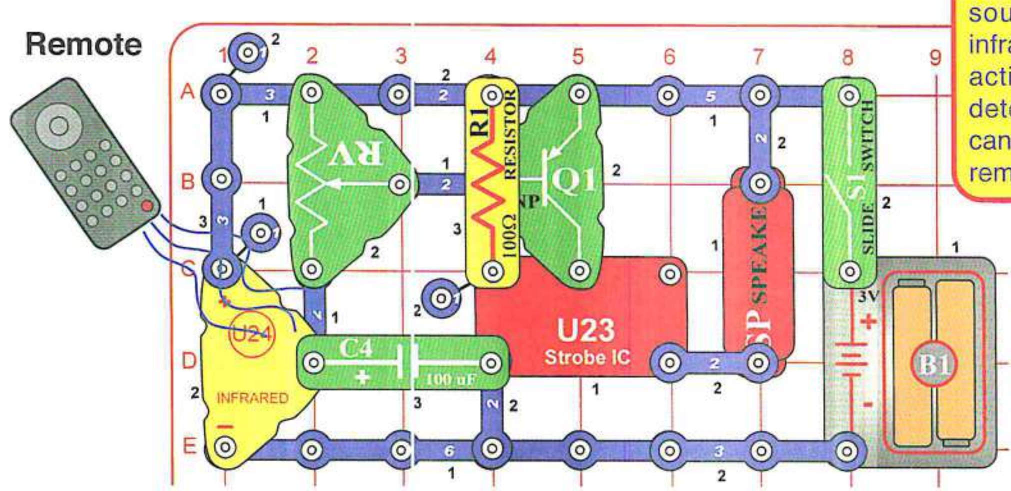


You need an infrared remote control for this project, such as any TV/stereo/DVD remote control in your home.

Build the circuit and turn on the switch (S1). Point your remote control toward the infrared module (U24) and press any button to activate the red LED (D1).

Sometimes this circuit may activate without a remote control, due to infrared in sunlight or some room lights. If this happens, try moving to a dark room.

Project 42 — Audio Infrared Detector



Sunlight and other light sources emit some infrared light, and may activate the infrared detector. See if you can activate it without a remote control.

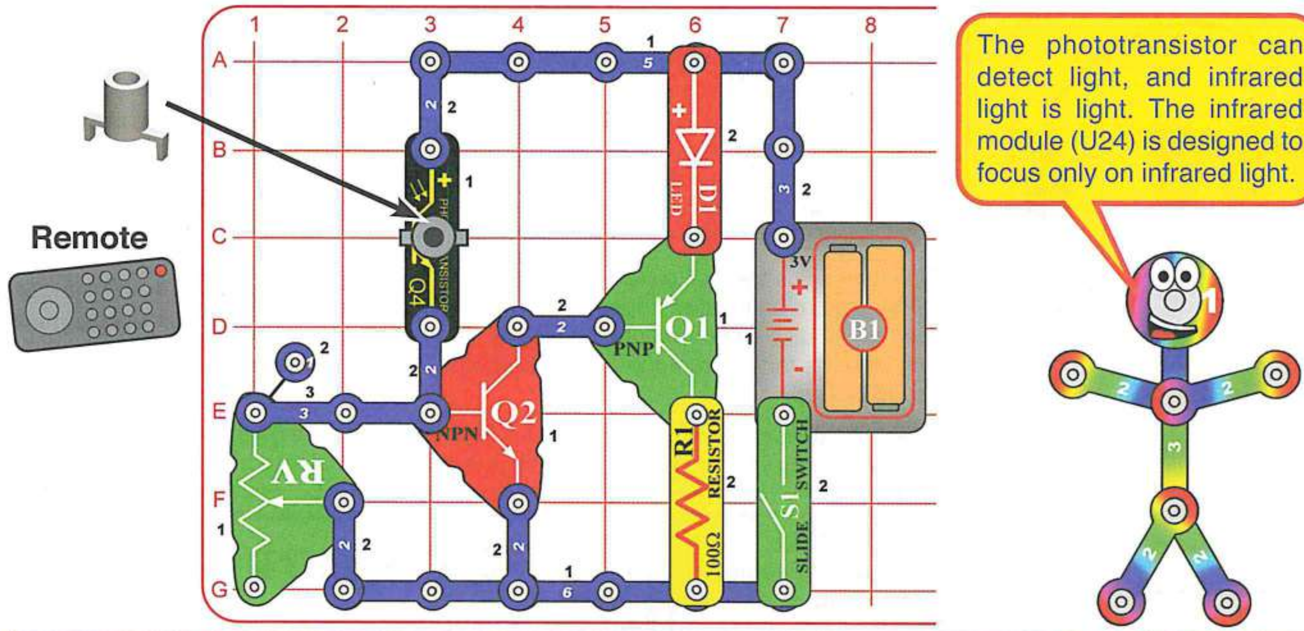
You need an infrared remote control for this project, such as any TV/stereo/DVD remote control in your home.

Build the circuit, set the lever on the adjustable resistor (RV) all the way towards the infrared module (U24), and turn on the switch (S1). Point your remote control toward the infrared module and press any button to activate an alarm sound. The lever on the adjustable resistor sets how long the alarm plays for, but it only works over a narrow range.

Next, replace the 100Ω resistor (R1) with the 5.1kΩ resistor (R3). The alarm sound is a little different, but the control range on RV is wider.

Sometimes this circuit may activate without a remote control, due to infrared in sunlight or some room lights. If this happens, try moving to a dark room.

Project 43 Photo Infrared Detector

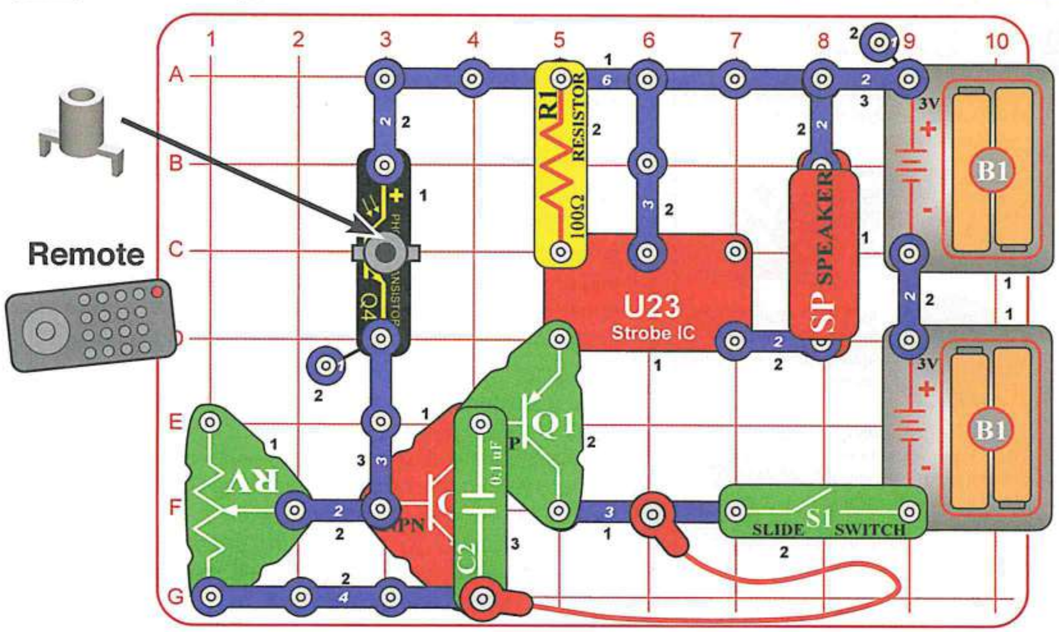


The phototransistor can detect light, and infrared light is light. The infrared module (U24) is designed to focus only on infrared light.

You need an infrared remote control for this project, such as any TV/stereo/ DVD remote control in your home.

Build the circuit and turn on the switch (S1). Place the mounting base (normally used with the fiber optic tree) on the phototransistor (Q4). Set the lever on the adjustable resistor (RV) so the red LED (D1) just turns off; if it never turns off, move away from room lights. Point your remote control directly into the mounting base on Q4, and press any button to activate the red LED (D1).

Project 44 Photo Audio Infrared Detector



You need an infrared remote control for this project, such as any TV/stereo/DVD remote control in your home.

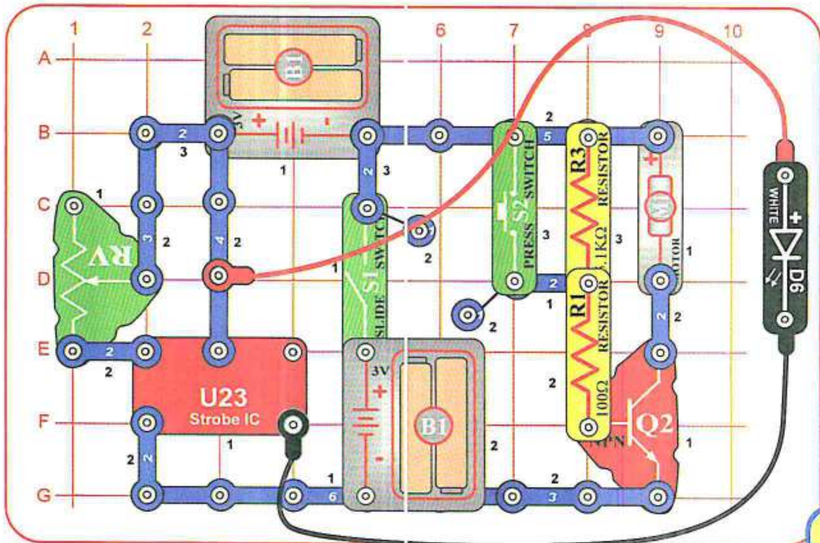
Build the circuit and turn on the switch (S1). Place the mounting base (normally used with the fiber optic tree) on the phototransistor (Q4). Set the lever on the adjustable resistor (RV) so the sound just turns off (if it never turns off, move away from room lights. Point your remote control directly into the mounting base on Q4, and press any button to activate the sound.

Project 45 Photo Audio Infrared Detector (II)

Use the preceding circuit, but replace the 0.1μF capacitor (C2) with the 100μF capacitor (C4). The circuit works the same way, but the sound stays on longer and is more pleasant.

Project 46

Strobe Effects



Build the circuit as shown. Take the colored disc shown and install it into the disc holder, then place the disc holder on the motor (M1). Connect the white LED (D6) to the red & black jumper wires.

For best effects, do this in a dimly lit room. Turn on the slide switch (S1). Push the press switch (S2) until the motor spins continuously (if it stops after you release the press switch, replace your batteries). Hold the white LED upside down over the disc holder so it shines on the spinning disc, and move the lever on the adjustable resistor (RV) slowly while watching the pattern on the spinning disc.

The motor spins the disc so fast that it looks like a blur. However, as you slowly adjust RV the pattern on the disc appears to slow down, stop, and reverse direction. Patterns close to the disc center may be moving at different speeds, or in different directions, from patterns farther from the center! Some patterns may become clear while others are still blurred.

If the motor does not continue spinning after you release S2, then replace your batteries. If it still won't keep spinning then replace the 5.1kΩ resistor (R3) with a 3-snap wire.

Slide tabs into slots.


Place disc holder onto the motor as shown.


Hold white LED (D6) over disc as shown.

How does this work? The strobe IC is making the white LED flash so fast that your eyes think it is on continuously. RV sets the flash rate, and at some settings the LED flashes are synchronized with speed of the patterns spinning on the disc, making them appear visible instead of blurred.

When the disc pattern is totally blurred, it will appear as purple, orange, and light green. Combining equal amounts of red & blue makes purple, red & yellow makes orange, and yellow & blue makes green.

OPTIONAL
(Adult supervision required)

The disc holder rests on the motor top loosely and vibrates, making the disc pattern blurry even when the RV setting makes the pattern "stop". The disc patterns will appear clearer if you permanently mount the disc holder to the motor top. This set contains a spare motor top, which can be used for this. This requires removing the motor top from the motor whenever you want to switch from using the disc holder to using the glow fan, so is optional, and requires adult supervision.

If you want to do this, pry the motor top off the motor shaft using a screwdriver.

Lay the spare motor top in the disc holder upside down, and bond together with glue (glue not included).

After the glue dries, push the modified disc holder on the motor shaft and install a disc cutout. When you want to return to using the glow fan, replace the motor top disc holder with the normal motor top.

Project 47

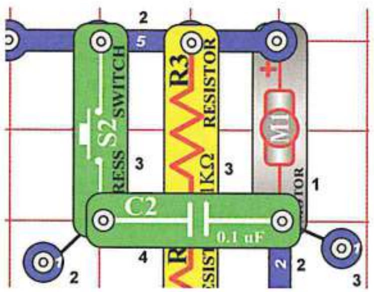
Slow Strobe Effects

Use the preceding circuit, but replace the 3-snap on the adjustable resistor (RV) with the 100kΩ resistor (R5). The circuit works the same, but the strobe rate is much slower (now you can see the LED flashing), so the strobe effects are different. Slowly adjust the setting on RV as before, and watch the patterns on the spinning disc.

Note: In rare cases the LED may not flash at all settings on RV. If this happens, move the RV lever to the side near the strobe IC, turn the slide switch off and on to reset the circuit, and only move the RV lever over a small range.

Bonus for owners of other Snap Circuits® sets: If you have a second 100kΩ resistor (from model SC-100 / 300 / 500 / 750 or other sets), place it directly over the R5 that replaced the 3-snap in the above circuit (and place a 1-snap under one side of the additional R5). Stacking the two 100kΩ resistors together creates a "medium" range of strobe speeds, in between the speeds created with the 3-snap and single 100kΩ. Adjust the RV setting and watch the strobe effects as before.

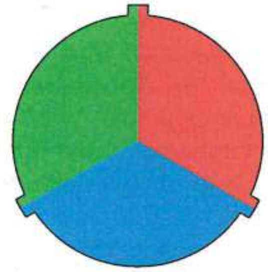
☐ Project 48
Stable Strobe Effects



The 0.1μF capacitor has no electrical effect,but it helps to hold the motor in place better and reduce vibrations. Less motor vibration makes the disc holder more stable, and so makes the patterns a little clearer. See if you can notice a difference.

Use the circuits from projects 46 and 47, but add the 0.1μF capacitor (C2) next to the motor, as shown here. Set the strobe speed so the patterns are visible, and see if they look less blurred than before.

☐ Project 49
Strobe Effects (II)



When the disc pattern is totally blurred, it appears to be white. Combining equal amounts of red, green, and blue makes white. The LED in the color organ IC combines red, green, and blue lights to make white.

Replace the disc in the disc holder with the one shown here, and repeat projects 46-48. Observe the strobe effects. To remove a disc from the holder, use your fingernail, or use a pencil to push it up from beneath one of the tabs.

☐ Project 50
Strobe Effects (III)

Replace the disc in the disc holder with the one shown here, and repeat projects 46-48. Observe the strobe effects. At some RV settings, the rainbow of colors comes into view.

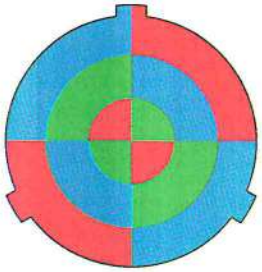
☐ Project 51
Strobe Effects (IV)

Replace the disc in the disc holder with the one shown here, and repeat projects 46-48. Observe the strobe effects. With this pattern, some areas may appear to be moving at different speeds or directions. Sometimes you can see all the colors on the disc, but sometimes you can see all the colors except blue, which is hidden.

☐ Project 52
Strobe Effects (V)

Replace the disc in the disc holder with the one shown here, and repeat projects 46-48. Observe the strobe effects. This unusual pattern produces several amazing displays at different RV settings.

Project 53
Strobe Effects (VI)

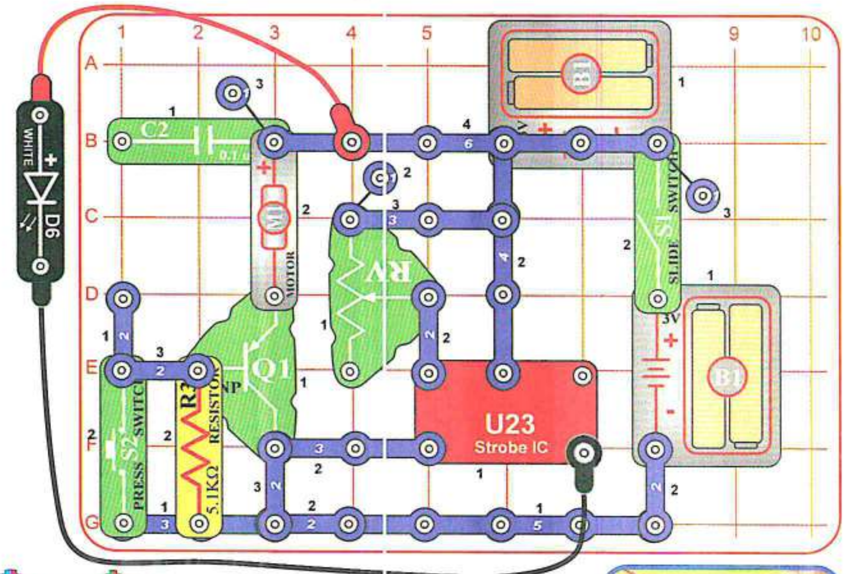


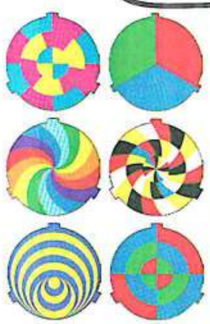
Replace the disc in the disc holder with the one shown here, and repeat projects 46-48. Observe the strobe effects. When the disc pattern is totally blurred, it will appear as purple, cyan, and yellow. Combining equal amounts of red & blue makes purple, green & blue makes cyan, and red & green makes yellow.

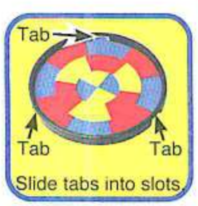
Project 54
Make Your Own Strobe Effects

Draw your own patterns on paper or cardboard, then cut them to the same size as our discs. You can also draw patterns on the backs of our discs. Put them on the disc holder and repeat projects 46-48. Have a contest with your friends to see who can make the most interesting strobe effects! You can also find lots of fun patterns and visual illusions by doing a search on the internet. There is no limit to what you can do!

Project 55
Another Strobe Light







Slide tabs into slots


Place disc holder onto the motor as shown.


Hold white LED (D6) over disc as shown.

This circuit is similar to project 46, and works the same way. Build the circuit as shown. Take one of the colored discs and install it into the disc holder, then place the disc holder on the motor (M1). Connect the white LED (D6) to the red & black jumper wires.

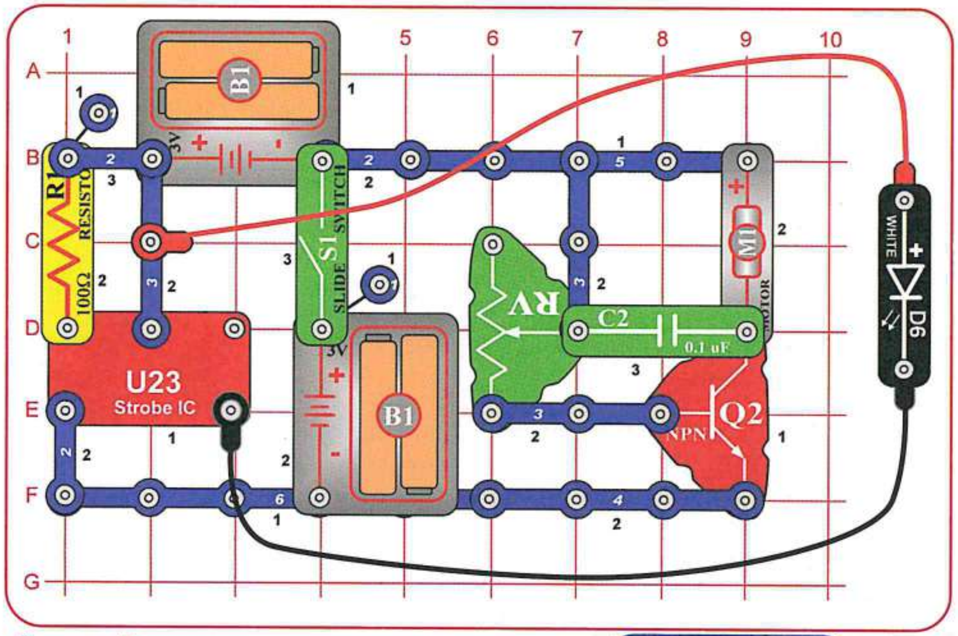
For best effects, do this in a dimly lit room. Turn on the slide switch (S1). Push the press switch (S2) until the motor spins continuously (if it stops after you release the press switch, replace your batteries). Hold the white LED upside down over the disc holder so it shines on the spinning disc, and move the lever on the adjustable resistor (RV) slowly while watching the pattern on the spinning disc.

The motor spins the disc so fast that it looks like a blur. However, as you slowly adjust RV the pattern on the disc appears to slow down, stop, and reverse direction. Patterns close to the disc center may be moving at different speeds, or in different directions, from patterns farther from the center!

If the motor does not continue spinning after you release S2, then replace your batteries. If it still won't keep spinning then replace the 5.1kΩ resistor (R3) with the 100Ω resistor (R1).

You can reduce the strobe speed by replacing the 3-snap on the adjustable resistor (RV) with the 100kΩ resistor (R5), just as is done in project 48.

☐ Project 56 Motor Strobe Effects



Slide tabs into slots.


Place disc holder onto the motor as shown.


Hold white LED (D6) over disc as shown.

This project is similar to project 46. Build the circuit as shown. Take one of the colored discs and install it into the disc holder, then place the disc holder on the motor (M1). Connect the white LED (D6) to the red & black jumper wires.

For best effects, do this in a dimly lit room. Turn on the slide switch (S1). Set the lever on the adjustable resistor (RV) down towards the 4-snap. Hold the white LED upside down over the disc holder so it shines on the spinning disc, and move the lever on the adjustable resistor (RV) slowly while watching the pattern on the spinning disc.

The motor spins the disc so fast that it looks like a blur. However, as you slowly adjust RV the pattern on the disc appears to slow down, stop, and reverse direction. Patterns close to the disc center may be moving at different speeds, or in different directions, from patterns farther from the center!

Compare this circuit to the one in project 46. This project changes the strobe effects by using RV to control the motor speed, while project 46 does it by using RV to control the LED flash rate. Getting the best strobe effects by adjusting the motor speed is more difficult, because the motor takes time to adjust its speed, while the LED flash rate adjusts instantly.

☐ Project 57 Motor Strobe Effects (II)

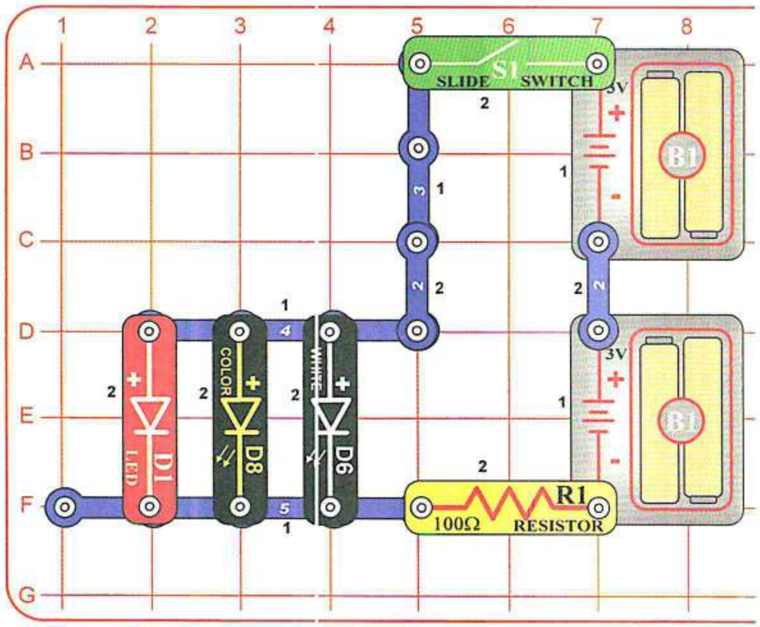
Use the preceding circuit, but replace the 100Ω resistor (R1) with the 5.1kΩ resistor (R3). The circuit works the same, but the LED flash rate is slower, so the strobe effects are different. Adjust the setting on RV as before, and watch the patterns on the spinning discs.

☐ Project 58 Motor Strobe Effects (III)

Use the preceding circuit, but replace the 5.1kΩ resistor (R3) with the 100kΩ resistor (R5). The circuit works the same, but the LED flash rate is slower (now you can see the LED flashing), so the strobe effects are different. Adjust the setting on RV as before, and watch the patterns on the spinning discs.

Project 59

LEDs Together

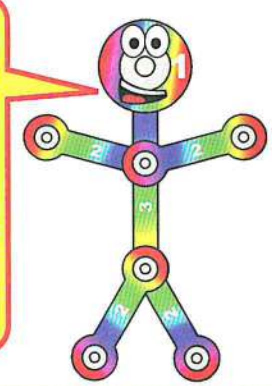


Turn on the slide switch (S1), and compare the brightness of the three LEDs.

Next, remove any of the LEDs and see how the brightness of the others changes.

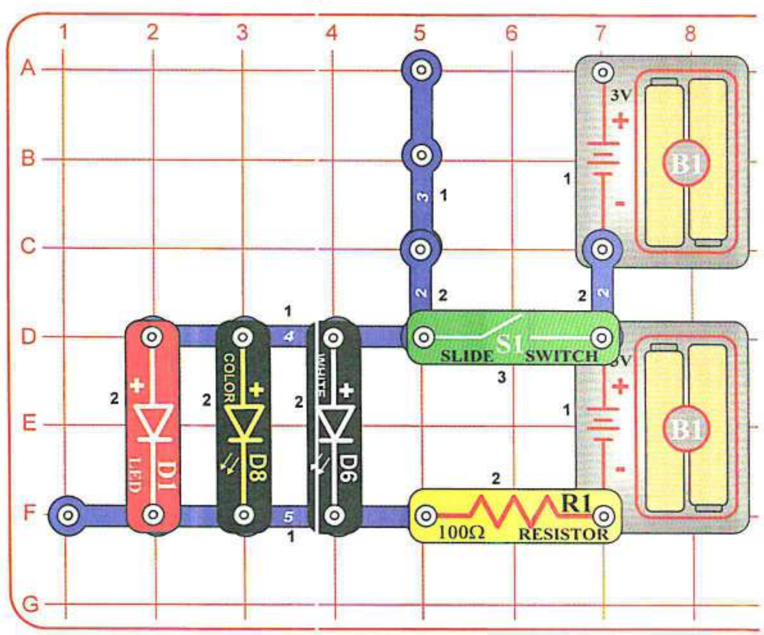
The voltage needed for an LED to turn on depends on the light color. Red light needs the least, green needs more, but blue and white need the most. The color LED (D8) contains red, green, and blue LEDs.

The R1 resistor reduces the voltage available to the LEDs. The LED brightness varies because some of the LEDs need more voltage than is available. The red LED (D1) will dominate the other colors because it turns on more easily.



Project 60

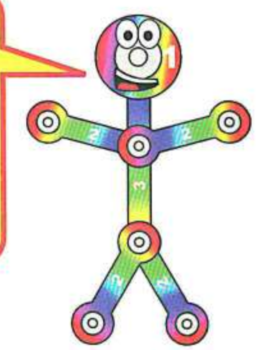
LEDs Together (II)



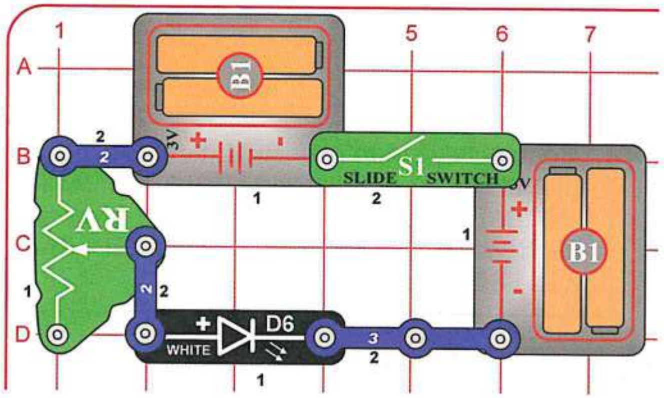
Modify the preceding circuit by moving the slide switch (S1) to the location shown here. Compare the brightness of the LEDs. Some LEDs may not turn on.

Next, remove any of the LEDs and see how the brightness of the others changes.

This circuit reduces the voltage to the circuit, because only one set of batteries is connected. The limited battery voltage is split between the R1 resistor and the LEDs. The remaining voltage across the LEDs is enough to activate the red LEDs, but may not be enough to activate the other colors. With the reduced voltage, the red LED will dominate even more than in the preceding circuit.



☐ Project 61 — Brightness Control



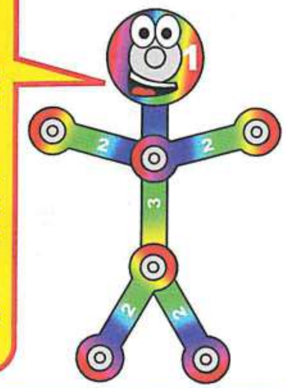
Build the circuit and turn on the slide switch (S1). Move the lever on the adjustable resistor (RV) to vary the brightness of the light from the white LED (D6). If desired, you may place any of the LED attachments (tower, egg, or fiber optic tree) on the LED.

Resistors are used to control or limit the flow of electricity in a circuit. Higher resistor values reduce the flow of electricity in a circuit.

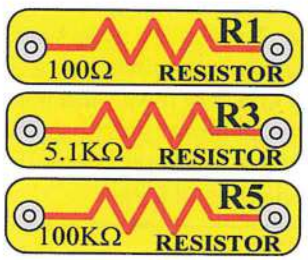
In this circuit, the adjustable resistor is used to adjust the LED brightness, to limit the current so the batteries last longer, and to protect the LED from being damaged by the batteries.

What is Resistance? Take your hands and rub them together very fast. Your hands should feel warm. The friction between your hands converts your effort into heat. Resistance is the electrical friction between an electric current and the material it is flowing through.

The adjustable resistor can be set for as low as 200Ω, or as high as 50,000Ω (50kΩ).

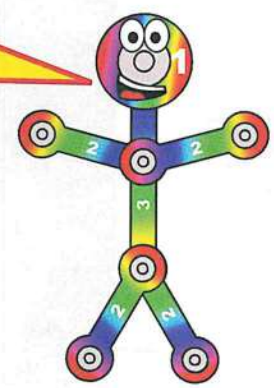


☐ Project 62 — Resistors



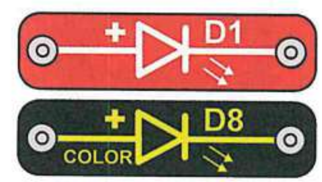
Use the circuit built in project 61, but replace the 3-snap with one of the yellow resistors in this set (R1, R3, or R5). Observe how each changes the LED brightness at different settings for the adjustable resistor.

The R1 resistor (100Ω) will have little effect, since it will be dominated by the adjustable resistor. Resistor R5 (100kΩ) is a high resistance, which greatly restricts the flow of electricity, so the LED will be very dim or off. Resistor R3 (5.1kΩ) will be in between those.

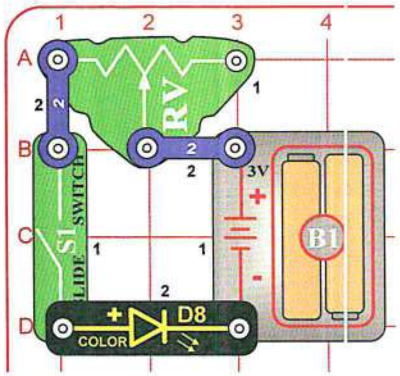


☐ Project 63 — Resistors & LEDs

Use the circuits from projects 61 and 62, but replace the white LED (D6) with the red LED (D1) or color LED (D8). Vary the adjustable resistor lever and change the yellow resistors to see how the light varies with each LED.



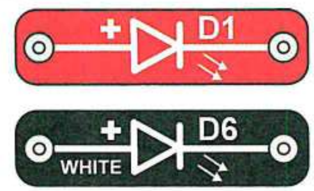
Project 64
Low Power Brightness Control



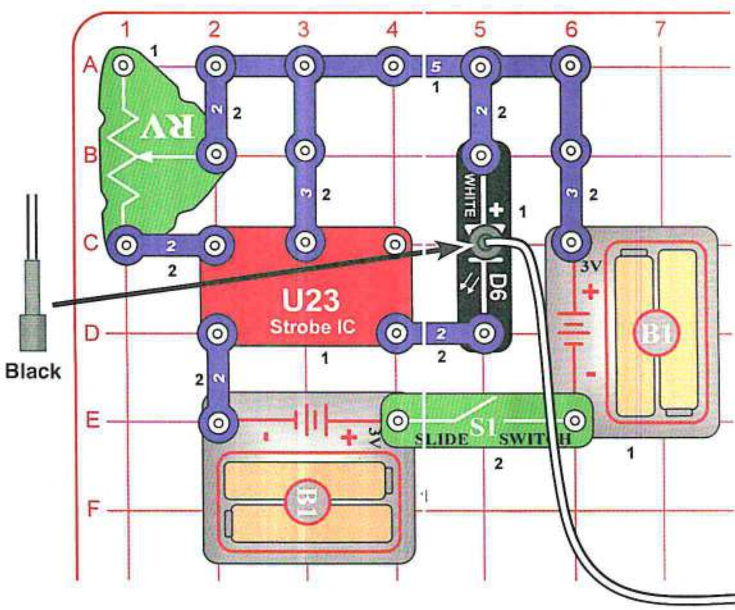
Build the circuit and turn on the slide switch (S1). Move the lever on the adjustable resistor (RV) to vary the brightness of the light from the color LED (D8). For best effects, do this in a dimly lit room. At some RV settings the LED will be very dim, and some of its colors may be totally off.

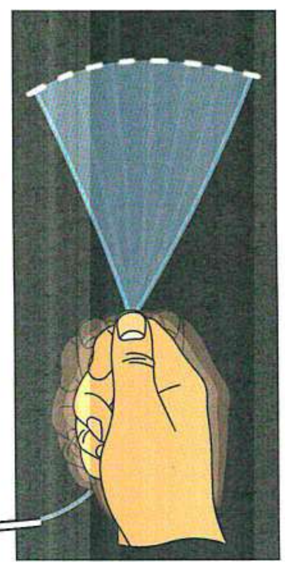
Project 65
Low Power Resistors & LEDs

Use the circuit from project 64, but replace the color LED (D8) with the red LED (D1) or white LED (D6). Vary the adjustable resistor lever to see how the light varies with each LED. The white LED may not be on at all.



Project 66
Persistence of Vision

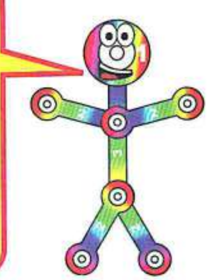




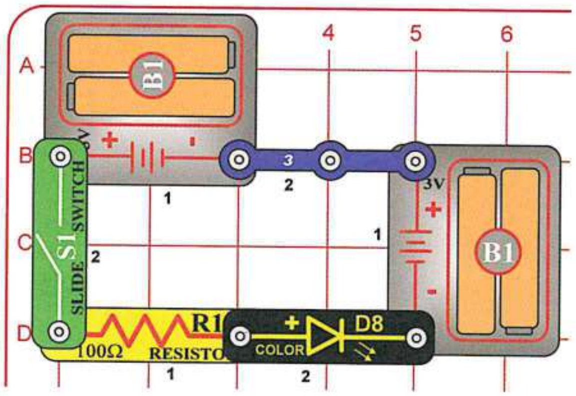
Build the circuit as shown. Place the black fiber optic cable holder on the white LED (D6) and insert the fiber cable into the black holder as far as it will go. Turn on the slide switch (S1). Take the circuit into a dark room and wave the cable around while watching the loose end. Try it with the lever on the adjustable resistor (RV) at different settings. The light coming out the loose end of the fiber optic cable will separate into short segments or dashes of light.

"Persistence of Vision" works because the light is changing faster than your eyes can adjust. Your eyes continue seeing what they have just seen.

In a movie theater, film frames are flashed on the screen at a fast rate (usually 24 per second). A timing mechanism makes a light bulb flash just as the center of the frame is passing in front of it. Your eyes see this fast series of flashes as a continuous movie.



☐ Project 67 Prismatic Film



This is the same circuit as project 1, but you will view it differently. Turn on the switch (S1), and view the LED through the prismatic film (the clear slide). Prismatic film makes interesting light effects.

Replace the color LED (D8) with the white LED (D6) and red LED (D1); view them through the prismatic film.

Prismatic film separates light into different colors. White light is a combination of all colors.

☐ Project 68 Look at the Lights

View different light sources in and around your home through the prismatic film.

☐ Project 69 Scattering Light

Use the project 67 circuit, but view the color LED through various semi-transparent liquids, glassware, and plastics. Juices, jello, and cloudy glass or plastic work well.

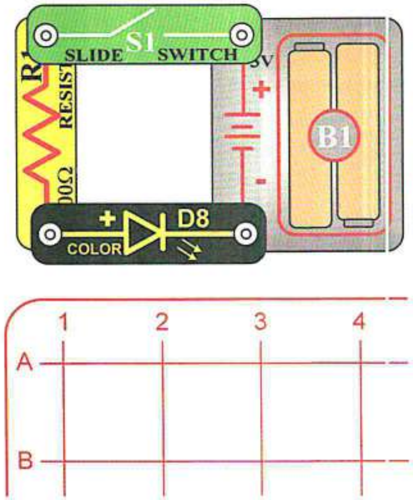
Replace the color LED with the white LED (D6). The white LED is brighter, but does not change color.

Semi-transparent materials scatter the light without completely blocking it, so a wide area of the liquid or material is lit up by the light. This happens in the egg and tower LED attachments.

☐ Project 70 Color Fiber Light

Use the circuit from project 67, but place the clear cable holder on the color LED (D8), then place the fiber optic cable into the holder as far as it will go. Turn on the switch, then take the circuit into a dimly lit room and see the light coming out the open end of the cable. The light travels through the cable even as you bend it around.

Project 71 — One Way Plastic

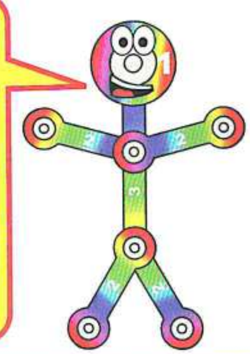


Side view of base grid

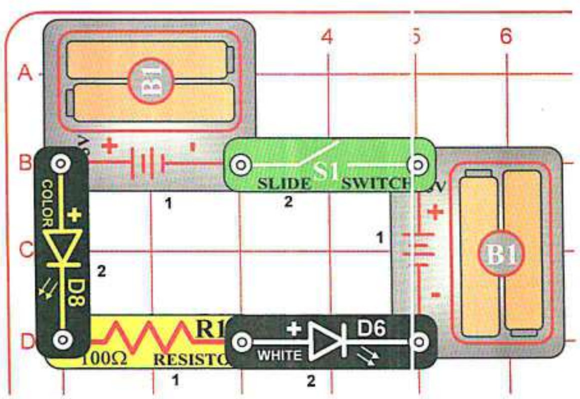
Build the circuit shown, but build it without using the base grid. Turn on the switch (S1) and view the color LED (D8) light through the base grid. Then turn the base grid on its side and try to see through it; you can't.

Try viewing other lights through other clear materials.

The main surface of the base grid is flat and smooth, giving a nice transition for light rays to pass through. If you look closely at the side edges (using a magnifying glass helps), you will see they are slightly curved. These curves, and the angle of the light hitting them, cause more light to be scattered or reflected than light hitting the main surface. Some materials can also pass light better in some directions than in other directions, due to their physical structure.

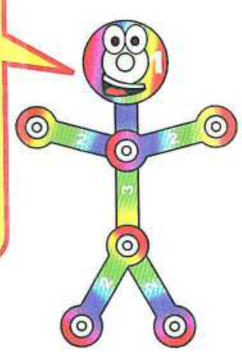


Project 72 — White Blinker



Build the circuit as shown and turn on the switch (S1). Both LEDs are blinking.

The color LED (D8) has a microcircuit that changes the light colors. As it does this, it changes the current through the circuit - which also affects the brightness of the white LED (D6).



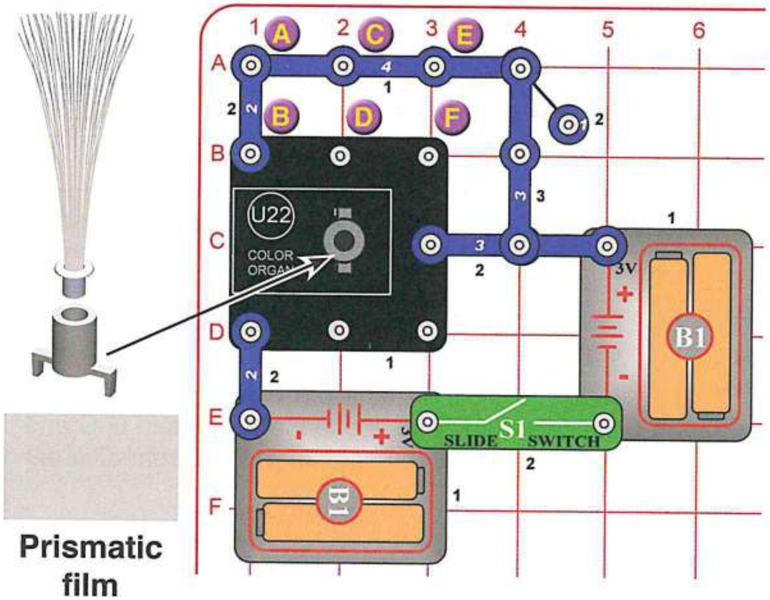
Project 73 — Red Blinker

Use the preceding circuit, but replace the white LED (D6) with the red LED (D1).

Project 74 — Red & White

Use the preceding circuit, but replace the color LED (D8) with the white LED (D6). Both LEDs light, but neither in blinking.

☐ Project 75 Color Selector - Red



Build the circuit as shown. Place the fiber optic tree and mounting base on the color organ (U22). Turn on the switch (S1). The color organ makes a red light. Remove the fiber optic tree and mounting base, and look at the light through the prismatic film.

☐ Project 76 Color Selector - Green

Use the preceding circuit, but remove the 2-snap between points A & B, and add one between points C & D. Now the color is green. Look at it using the fiber optic tree, and then the prismatic film.

☐ Project 77 Color Selector - Blue

Use the preceding circuit, but remove the 2-snap between points C & D, and add one between points E & F. Now the color is blue. Look at it using the fiber optic tree, and then the prismatic film.

☐ Project 78 Color Selector - Cyan

Use the preceding circuit, but add a 2-snap between points C & D. Now the color is cyan, which is a combination of green and blue. Look at it using the fiber optic tree, and then the prismatic film.

☐ Project 79 Color Selector - Yellow

Use the preceding circuit, but remove the 2-snap between points E & F, and add one between points A & B. Now the color is yellow, which is a combination of red and green. Look at it using the fiber optic tree, and then the prismatic film.

☐ Project 80 Color Selector - Purple

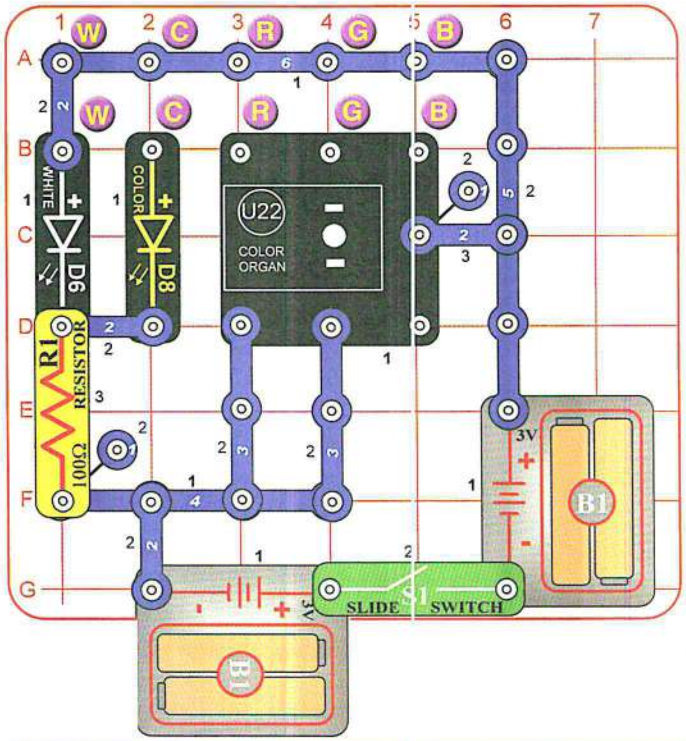
Use the preceding circuit, but remove the 2-snap between points C & D, and add one between points E & F. Now the color is purple, which is a combination of red and blue. Look at it using the fiber optic tree, and then the prismatic film.

☐ Project 81 Color Selector - White

Use the preceding circuit, but add a 2-snap between points C & D. Now the color is white, which is a combination of red, green, and blue. Look at it using the fiber optic tree, and then the prismatic film.

Black is made by turning off all the colors.

Project 82 LED Color Spectrum



Build the circuit as shown, and turn on the switch (S1). The white LED (D6) will be on. Look at the white LED through the prismatic film to see the color spectrum of white light, which is all the colors of a rainbow. For best effects, do this in a dimly lit room.

Now remove the 2-snap across points W-W, and place it across points C-C (the color LED), then points R-R, G-G, and B-B (for the color organ). Using the prismatic film, look at the color spectrum produced by the color LED, and the different colors from the color organ. Compare them to the white LED spectrum.

Project 83 LED Color Spectrum (II)

Use the preceding circuit, but remove the 2-snap across points W-W and place 2-snaps across R-R and G-G. Use the prismatic film to look at the color spectrum. View from different directions and different angles.

Next, move the 2-snaps to R-R and B-B, and look at the spectrum. Then move the 2-snaps to G-G and B-B and look at the spectrum. View from different directions and different angles.

For each combination, the color spectrum should be mostly light of the 2 individual colors you are combining.

Project 84 LED Color Spectrum (III)

Use the preceding circuit, but place 2-snaps across points R-R, G-G, and B-B. Use the prismatic film to look at the color spectrum. View from different directions and different angles.

With the above connections, the color organ (U22) produces white light. The actual color spectrum you see will vary with your viewing angle, because the light is produced using separate red, green, and blue LEDs next to each other.

Now remove the 2-snaps from R-R, G-G, and B-B, and place one across W-W, so the circuit is like the project 82 drawing. Use the prismatic film to view the color spectrum from the white LED (D6) again, and compare it to the white light spectrum from U22. The D6 spectrum does not vary as much with the viewing angle because the light is produced by a single LED, and it is brighter.

Project 85 LED Color Spectrum (IV)

Use the circuit combinations from projects 82-84, but look at the different lights through the red, green, or blue filters instead of the prismatic film. Each filter only allows you to see light of that color, and blocks the other colors. If you put all three filters together then all light is blocked.

Actually, the red filter will pass a little of the green light, the blue filter will pass a little of the green light, and the green filter will pass a little of the green and blue light. This is because green light is between red and blue light in the color spectrum, and the filters are not perfect. See page 13 for more information about the color spectrum.

Project 86 LED Color Spectrum (V)

Repeat project 82, but place the black fiber optic cable holder with the fiber optic cable on the LED you want to view. Look at the light coming out the other end of the cable using the prismatic film, and view in a dimly lit room. The light is not as bright but the beam is narrower, so the color spectrum may be clearer.