THE SCREAMING FANS. THE FLOOD OF LIGHTS. THE ONSTAGE RUSH. littleBits AND KORG WANT YOU TO

UNLEASH YOUR INNER ROCK STAR.

⚠ WARNING

• This product contains small magnets. Swallowed magnets can stick together across intestines causing serious infections and death. Seek immediate medical attention if magnets are swallowed or inhaled.
• Most littleBits modules are small parts. DO NOT allow children under 3 years old to play with or near this product.
• NEVER connect any littleBits modules or circuits to any AC electrical outlet.
• Do not touch or hold any moving parts of littleBits modules while they are operating.
• Keep conductive materials (such as aluminum foil, staples, paper clips, etc.) away from the circuit and the connector terminals.
• Always turn off circuits when not in use or when left unattended.
• Never use littleBits modules in or near any liquid.
• Never use in any extreme environments such as extreme hot or cold, high humidity, dust or sand.
• littleBits modules are subject to damage by static electricity. Handle with care.
• Some littleBits modules may become warm to the touch when used in certain circuit designs. This is normal. Rearrange modules or discontinue using if they become excessively hot.
• Discontinue use of any littleBits modules that malfunction, become damaged or broken.

VERY IMPORTANT NOTE

• Several projects in this kit involve the use of a box cutter and/or a hot glue gun.
• These tools should be used ONLY under direct adult supervision and ONLY by children capable of using them safely.

INSTRUCTIONS

We recommend using littleBits brand 9-volt batteries, but standard alkaline or standard rechargeable batteries may also be used. Properly discard and replace exhausted battery. Do not connect the two battery terminals with any conducting material.

CARE AND CLEANING

Clean Bits modules ONLY by wiping with a dry cloth. If necessary, isopropyl alcohol on a cloth may be used sparingly.

DO NOT use any other cleaning products on Bits modules. Congratulations for reading this fine print. Your dedication and persistence will serve you well.

FC RADIO AND TELEVISION INTERFERENCE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and the receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commissions rules.

SEND US YOUR LOVE

Contact support@littleBits.cc with any questions or comments.

www.littleBits.cc

littleBits Electronics, Inc.
60 E. 11th Street, Fifth Floor
NY, NY 10003
(917) 464-4577

You are a proud owner of the **Synth Kit v1.**
Over 500,000 combinations?! Are you serious?
Yep, www.littleBits.cc/mathmagic

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MAKE SOMETHING THAT DOES SOMETHING™

LITTLEBITS™ BASICS

1 CIRCUITS IN SECONDS™

littleBits™ makes an expanding library of modular electronics that snap together with magnets.

You always need a Blue and a Green, Pink and Orange are optional, in between

2 COLOR CODED

Bits™ modules are grouped into four different categories, which are color coded:

POWER is needed in every circuit and the start of all your creations.

INPUT modules accept input from you and the environment and send signals to the modules that follow.

OUTPUT modules DO something–light, buzz, move...

WIRE modules expand your reach and change direction–great for helping to incorporate modules into your projects.

3 ORDER IS IMPORTANT

Power Modules always come first and **Input Modules** only affect the **Output Modules** that come after them.

4 MAGNET MAGIC

littleBits™ modules snap together with magnets. The magnets are always right, you can't put modules together the wrong way.

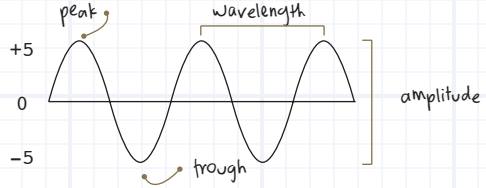
5 littleBits™ + anything

The modules are just the beginning. Combine them with craft materials, building sets, and other toys to electrify your life. We'll show you how!

no soldering
no programming
no wiring

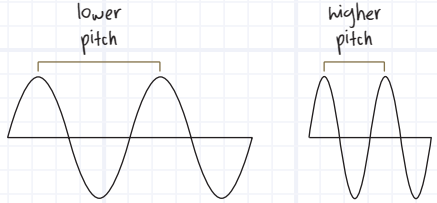
WHAT IS SOUND?

Sound is the vibration of air or another medium (like water). When you speak, sing, or clap, you create sound waves that radiate out into the environment. Every sound has its own "signature" that is called a waveform.



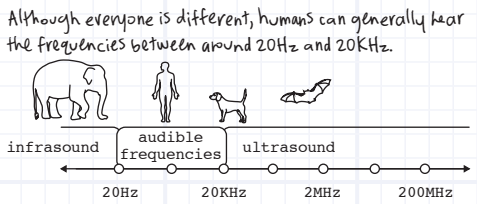
PITCH

Pitch is how a person perceives the frequency of a vibration. Every person perceives pitch differently and some have a better sense of pitch than others. Sound can generally be categorized as pitched or un-pitched.



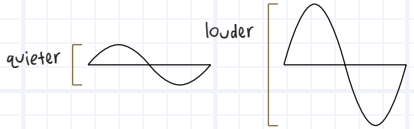
PITCH VS. FREQUENCY

Frequency and pitch are similar, but not the same! Frequency can be measured scientifically, while pitch is dependent on individual perception. You can distinguish pitches as being "higher" or "lower."



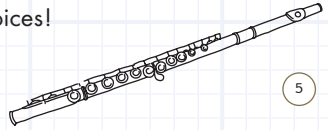
AMPLITUDE

Amplitude relates to the change in the peaks of waveforms and is perceived as the loudness of a sound. The higher the amplitude of a waveform, the louder it sounds.



TIMBRE

Timbre (pronounced tam-ber) is what differentiates sounds of the same pitch. It is what makes a violin and a flute sound different... or your friends' voices!



HISTORY OF THE SYNTH

THEREMIN - first electronic musical instrument.

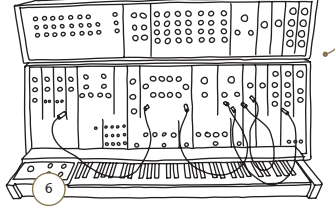
Film score for FORBIDDEN PLANET see pg 23

SWITCHED ON BACH see pg 13

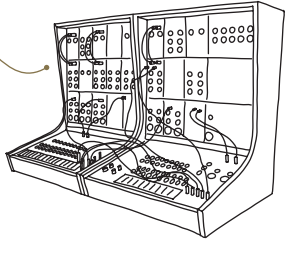
KORG MS-20 introduced.

Sounds were created digitally. Most famous was the Yamaha DX7, which used FM synthesis.

then | 50 | 60 | 70 | 80 | 90 | 00 | now



ROBERT MOOG and DON BUCHLA began producing the first commercial musical synthesizers.



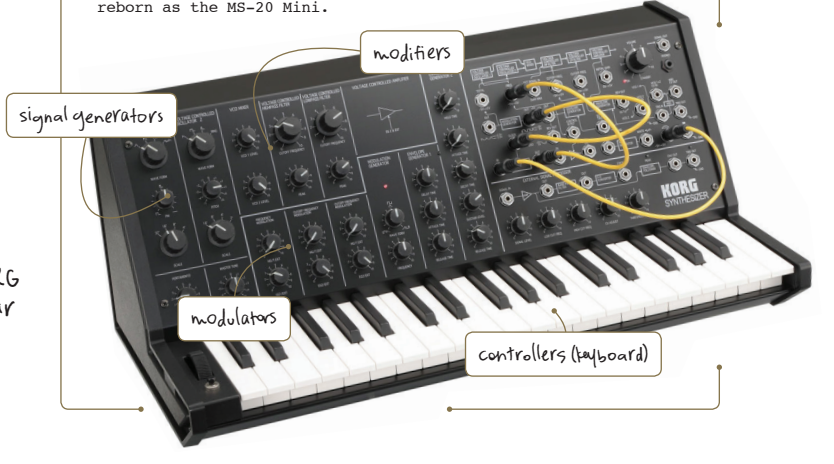
Synthesis dominated by computer interfaces.

Rebirth of analog modular synths.

littleBits + KORG launch modular Synth Kit!

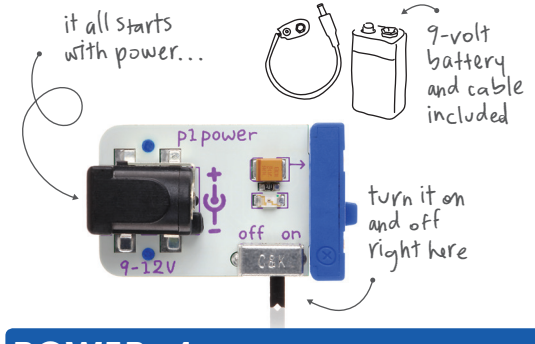
ELEMENTS OF A SYNTH

Korg's MS-20 synthesizer, first introduced in 1978, is still a coveted instrument to this day; thanks to its thick, robust sound, its powerful, iconic analog filter, and its versatile patching options. Today, the sounds of the MS-20 have been reborn as the MS-20 Mini.



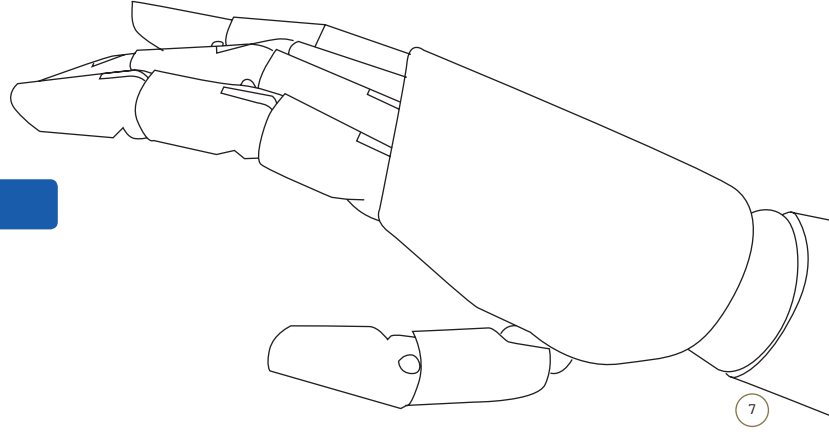
KNOW YOUR BITS™ MODULES

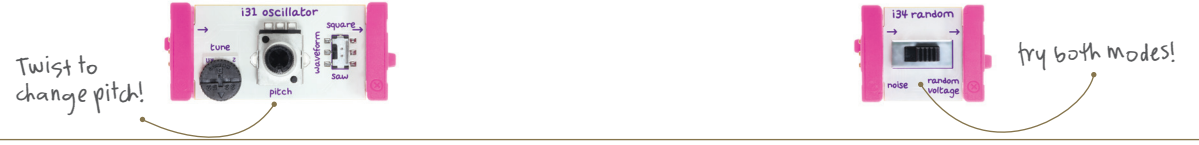
This is the Synth Kit, Version 1
Learn more and shop for individual
Bits modules at littleBits.cc/Bits



POWER p1

This power module lets you use a 9-volt battery to supply electricity to your other Bits modules. Snap in the battery + cable (both included) and flip the switch to turn it on.





OSCILLATOR i31

The oscillator is the main sound source in the Synth Kit and is capable of creating audio tones that will be used in almost every sound experiment you create. It features a "pitch" knob to adjust its output tone and a "tune" dial for adjusting the tuning (learn about tuning on pg 21) when using with the keyboard. It also features a mode switch that selects between "square" and "saw" waveforms. The "square" waveform has a rich, powerful character, and the "saw" waveform has a more mellow, rounder character.

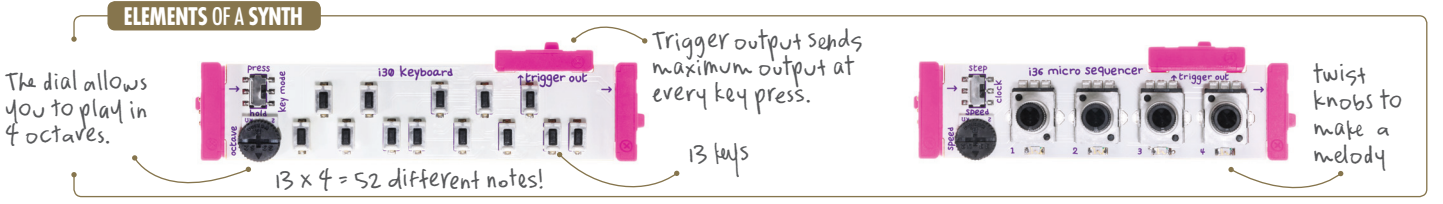
RANDOM i34

The random module has two modes: "noise" and "random voltage". In "noise" mode, it outputs white noise, like a television set not tuned to any channel. In "random voltage" mode, it outputs random voltage signals that can control oscillators and make them play random pitches. The "trigger out" of the micro sequencer can be used to set the timing of the random voltages.

SIGNAL GENERATORS

In a synthesizer, these elements are known as signal generators and can be either pitched or un-pitched. In the Synth Kit, you have both (oscillator & random). These are the modules that actually produce the sound.

ELEMENTS OF A SYNTH



KEYBOARD i30

The keyboard lets you play melodies – it features 13 switches that make up an octave of notes. It has two modes: "press" (which only produces output when you press a switch) and "hold" (which will sustain the last note you played). It also features an octave control which changes the playable range. In addition to its main output, which is great for controlling our oscillators, it also has a "trigger out", which you can send to the "trigger in" of the envelope or other littleBits modules.

MICRO SEQUENCER i36

The micro sequencer sends out voltages based on the position of each of the four "step" knobs. Connect it to an oscillator and it will step through the "sequence" consecutively to make a melody (The LEDs tell you which step is active). Turn a knob fully counterclockwise to make the step silent. Use the module in "speed" mode to set the speed using the dial, or flip the switch to "step" mode to use an input module like a pulse or button for control. It also has a trigger output, which you can send to any of your other modules.

CONTROLLERS

Controllers do exactly what it sounds like they do; they control elements of a synthesizer. Sometimes controllers are familiar like a keyboard and some are lesser known like a sequencer. The Synth Kit has both!

The control can come in the form of control voltages or triggers. A control voltage is usually a changing signal that is often used to control the pitch of an oscillator. A trigger is a short voltage pulse that is commonly used to trigger or "turn on" other parts of circuits. Triggers are also good at generating rhythmic patterns.

To see how triggers are used, go to page 24 for the Percussion Party project.

ELEMENTS OF A SYNTH

Attack = time to reach loudest point

Decay = time to return to silence

ENVELOPE i33

The envelope modifies the loudness contour of a sound. It takes a sound input and shapes it into something you'd hear from an acoustic musical instrument, like a piano or saxophone. This envelope has two controls: "attack", which is how long it takes to ramp up to maximum volume, and "decay", which is how long it takes to fade to silence again. You can use its third bitSnap™ to trigger the envelope from different sources, like the keyboard.

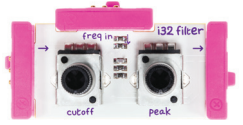
MODULATORS

Modulators are elements of a synthesizer that alter the main audio signal with another signal. In the synth Kit, they are the oscillator, envelope and random modules.

Even though the oscillator is a signal generator, it can also be used as a modulator. You can turn the pitch knob fully counterclockwise to produce frequencies low enough to control other modules.

When the random module is in "random voltages" mode, it is also a modulator.

ELEMENTS OF A SYNTH



Cutoff = set limit for frequencies

Peak = set intensity of cutoff

FILTER i32

The filter has the biggest effect on the sound's character or "timbre". It affects the timbre by changing the relative volume of certain frequencies in the sound. Use it to give the impression that a sound is "brighter" (more high frequencies) or "darker" (more low frequencies.) The "cutoff" knob sets the frequency to be emphasized, and the other controls "peak," or intensity of the filter. If the "peak" is turned up all the way, the filter turns into an oscillator!

create spacey echoes!

DELAY i35

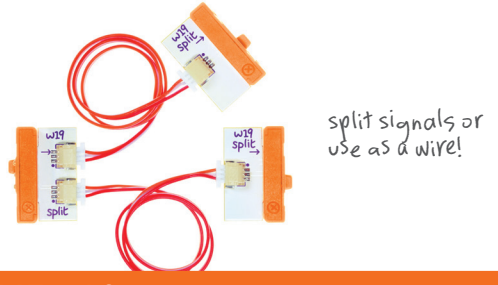
The delay module takes incoming audio and repeats it, like an echo. It has two knobs: "time", which sets the delay length between a sound and its repetition, and "feedback", which controls how many times the sound repeats. Delays can be long and spacey, like shouting into the Grand Canyon, or loud and crazy. This module will play forever if you turn the "feedback" knob all the way up. You can also shift the pitch of a sound by turning the "time" control while a sound is repeating.

MIX i37

The mix module allows you to combine two inputs and send them to a single output. It also has a volume control for each of its inputs – that's where the mixing comes in. Use it to play two oscillators on a single speaker!

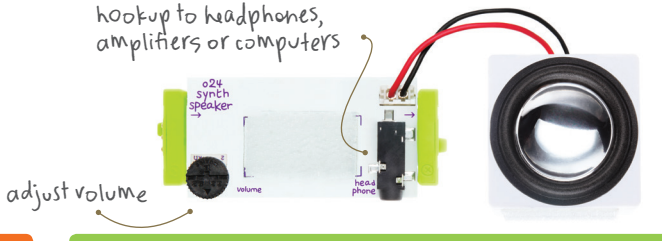
MODIFIERS

Modifiers are synthesizer elements that directly affect the sound of the signal generator. They can either reduce or enhance characteristics of sound and manipulate waveforms (filter, delay, and mix modules).



SPLIT w19

The littleBits split module sends a single input to two wired outputs. It's great for connecting one output to two inputs, like using a keyboard to control two oscillators. But keep in mind that it can be used just like a wire module if you ignore one of its outputs.



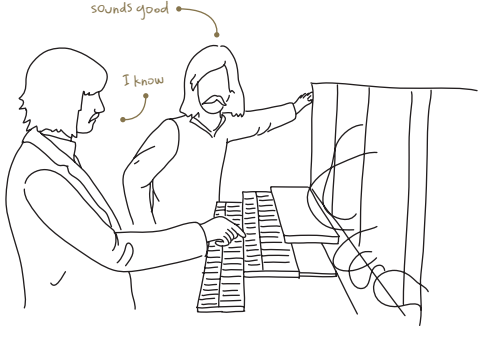
SYNTH SPEAKER o24

The synth speaker amplifies your sonic explorations! You can control the volume with a dial on the front of the module. It also features an output jack. Use an audio cable to connect to headphones or a computer for recording, or to an amplifier for a show. The speaker can detach from the circuit board, so you can orient it to your liking.

BATTERY AND CABLE a1

This Kit contains a 9-volt alkaline battery and a cable to connect it to the power module. Connect it and then flip the switch to power all of your creations!

SYNTH IN POP CULTURE



IN 1968, **Wendy Carlos** a pioneer in electronic music recorded the landmark album **"Switched-On Bach"**, which consisted of pieces by Johann Sebastian Bach performed on a synthesizer. "Switched-On Bach" was one of the first classical albums to sell half a million copies. The album won 3 Grammy Awards. **FORMED IN 1970**, **Kraftwerk**, which means "power station" in German, built the foundation of the electro-pop genre with their revolutionary synth sound. The band and its members are recognized as pioneers in music technology. Kraftwerk is credited with making machine made sounds commercially appealing and an integral part of pop music. Their studio, "Kling Klang", was a place where the band not only recorded music, but also invented and built their own complex electronic instruments. **FORMED IN 1965**, **Pink Floyd** was a progressive rock band known for experimenting with different technologies to create a unique, uncharted experience with music. Released in 1973, **"The Dark Side of the Moon"** featured heavy use of analog synthesizers and brought electronic sound further into the main stream. They've sold more than 250 million albums worldwide and are one of the world's most legendary rock bands. **THE 1982 ALBUM "Thriller"** by **Michael Jackson** is one of the best-selling albums of all time. Nearly every song on the album features synthesized sounds. **IN 2000** the renowned rock band **Radiohead** won a Grammy for their album **"Kid A"** which brought synth sounds to the forefront. The album features wide use of analog modular synthesizers and the **Ondes Martenot**, an early electronic instrument. **TODAY** **Björk** is praised for her experimental electronic music. She has received 13 Grammy nominations as well as an Oscar nomination for Best Original Song from the film **"Dancer in the Dark."** She uses cutting-edge synths like the **"Reactable,"** a digital tabletop that creates sounds by moving tangible blocks.

LISTEN Carlos' compositions can be heard in the films A Clockwork Orange (1972), The Shining (1980) and Tron (1982).

LISTEN "Trans-Europe Express" from Kraftwerk's 1977 album of the same name. Replicate the background beats with "Percussion Party" on page 24.

LISTEN "On The Run" from "The Dark Side of the Moon" is one of the first uses of a sequencer.

LISTEN "Thriller", the loud blast of chords that queues the zombie dance was performed on a synthesizer.

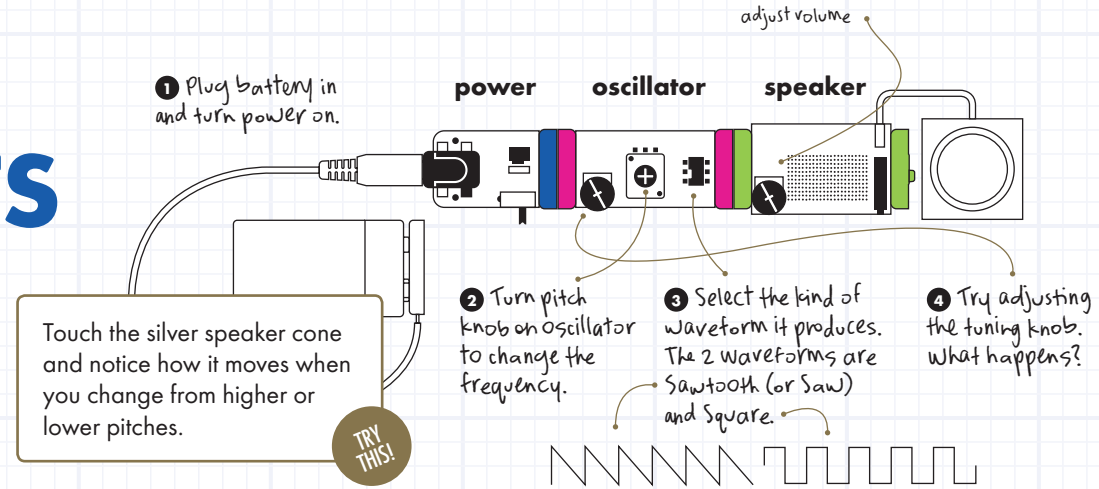
LISTEN "Idioteque" from Kid A. Try replicating these sounds in the "Synth Band" project on page 26.

LISTEN "Army of Me" (1995) by Björk. Try replicating the bass line by lowering the pitch of the oscillator and playing with the micro sequencer or keyboard.

TRY THESE CIRCUITS

Get started with these but don't let us hold you back – every module fits with every other module – feel free to experiment.

PITCH SWEEPS Learn how an oscillator works.

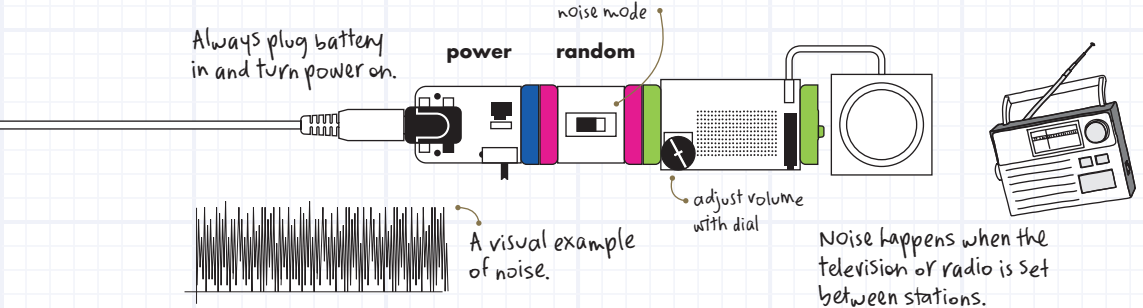


The "pitch" range goes from being so low that it is unpitched (you actually hear clicks) to very high pitches. You can have lots of fun by twisting the pitch knob and "sweeping" through all the frequencies!

"Saw" and "square" are similar waveforms. The saw has a "mellow" character to it and the square sounds more "edgy."

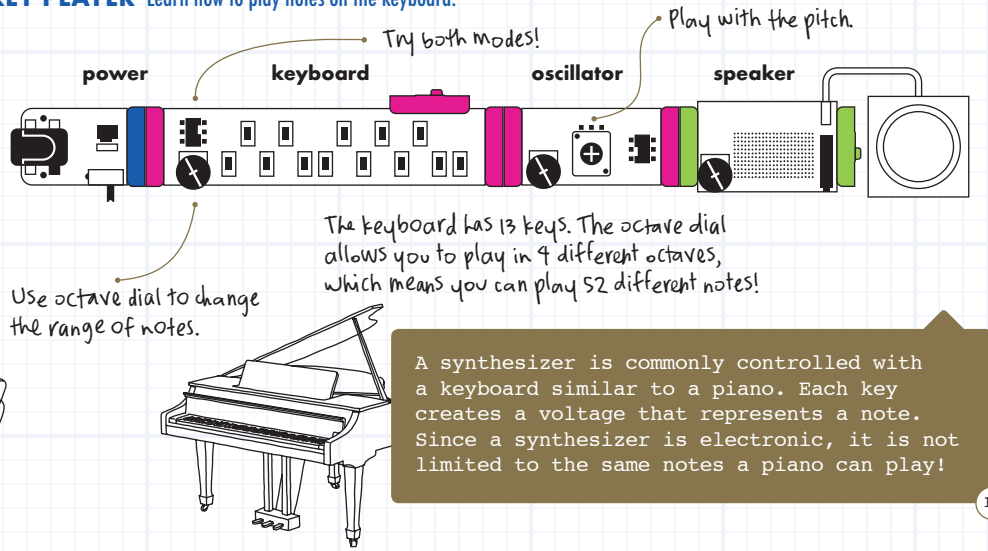
The timbres of these two waveforms are most related to bowed strings and brass in the acoustic instrument families.

WHITE NOISE Experience the random module.



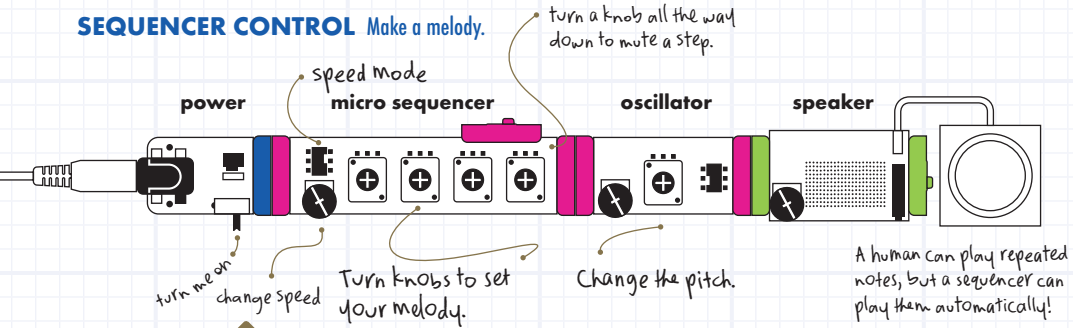
The random module has two modes and one of them is called "noise". Un-pitched sound is generally categorized as noise or a collection of many frequencies that are not distinguishable from one another. Unlike a waveform, noise has no repeating pattern.

KEY PLAYER Learn how to play notes on the keyboard.



A synthesizer is commonly controlled with a keyboard similar to a piano. Each key creates a voltage that represents a note. Since a synthesizer is electronic, it is not limited to the same notes a piano can play!

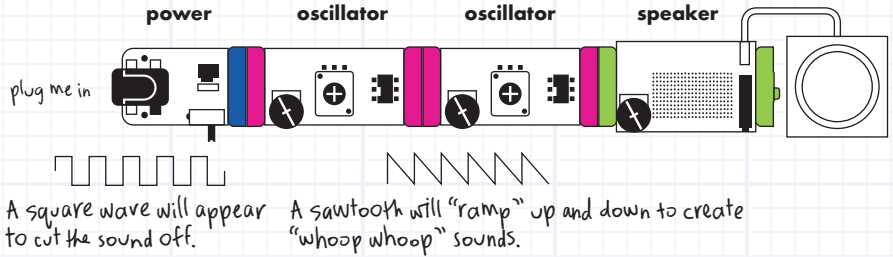
SEQUENCER CONTROL Make a melody.



A sequencer is a very novel controller and is unique to the world of synthesizers. A sequencer allows you to store note values and play them back in a repeating order.

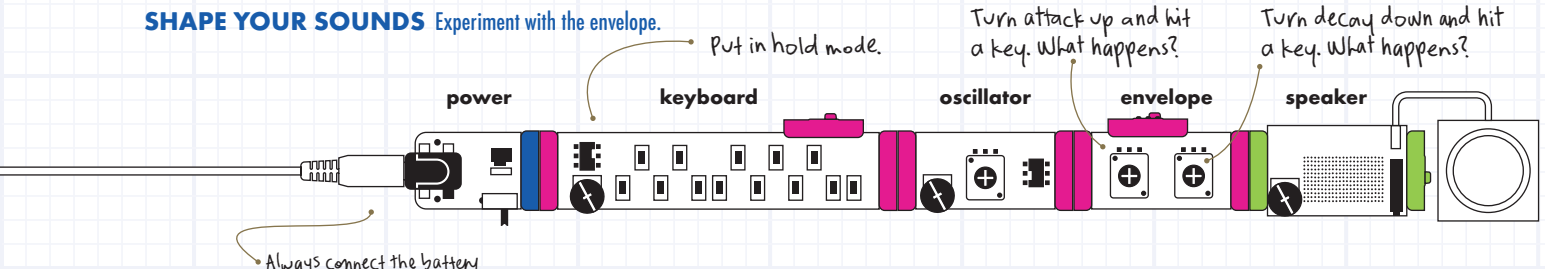
The stored notes are set by tuning each step using the knobs. The pattern will repeat sequentially forever and the speed can be controlled within the sequencer or from an outside pulse.

FREQUENCY MODULATION Discover how two oscillators interact.



As previously mentioned, an oscillator can produce a frequency that is too low to be perceived as a pitch. In this case it is known as an LFO or low frequency oscillator. Because the oscillator in your kit can be both low frequency and audio range, you can turn up the frequency of one oscillator and feed it into another oscillator to create "frequency modulation."

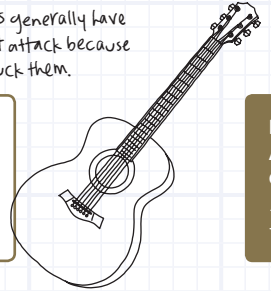
SHAPE YOUR SOUNDS Experiment with the envelope.

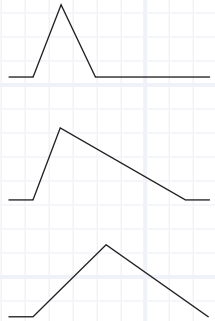


The envelope of a sound has a big effect on the character of the sound. The controls on the envelope Bits module are "attack" and "decay."

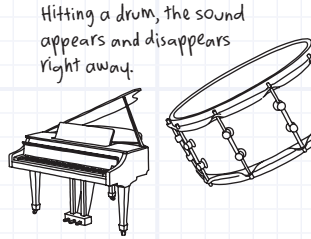
ATTACK
Attack is how long it takes the sound to get to its loudest point.

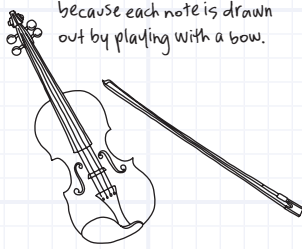
DECAY
Decay is how long it takes the sound to fade to silence.



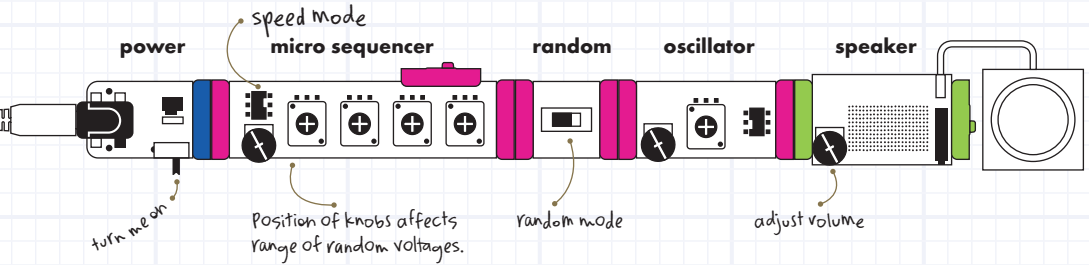


EXAMPLES OF ENVELOPE AMPLITUDE OVER TIME
Can you think of other instruments that fit these profiles?



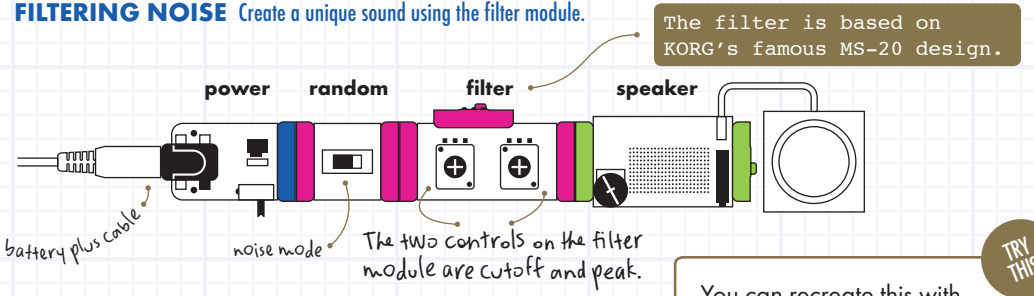


RANDOM VOLTAGE Have fun with this random sound generator!



Random voltages can produce interesting effects in a synthesizer. Traditionally, this is created by a circuit called "sample and hold" or "S&H". In a sample and hold circuit, a voltage is sampled from noise and sent to affect another circuit. There is no telling which voltage will be sampled!

FILTERING NOISE Create a unique sound using the filter module.

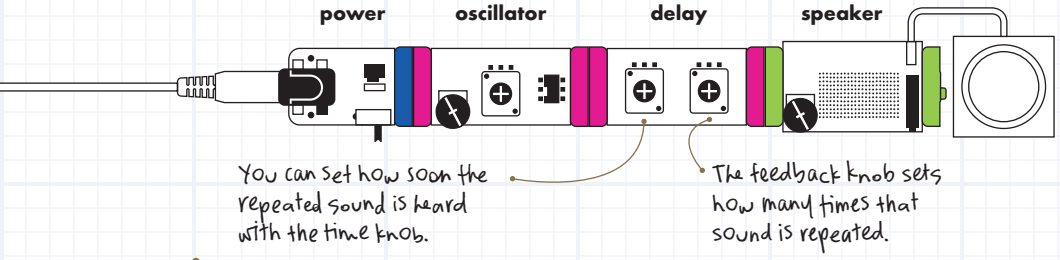


- The filter is known as a low-pass filter. This means that frequencies higher than a certain point will be reduced or filtered out.
- When the peak is increased and the cutoff is adjusted, the timbral effect can sound like a person making vowel like sounds.

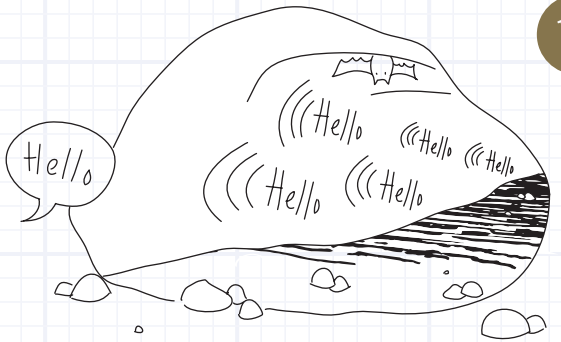
TRY THIS

You can recreate this with your voice. Try making an "Ah" sound and then slowly shift to an "Ooh" sound. Your mouth creates a filter that changes the timbre of the sound much like the filter.

ECHO AND DELAY Learn how to make infinite repeating sounds with the delay.



The delay affects the sound, but unlike the filter, its primary function is not to add or subtract from the original sound, but to reproduce it. Think of it as an echo in a large room or cave. You make a sound, and that sound gets repeated for some amount of time depending on how big the space is.



TRY THIS

1. Set the "feedback" knob fully clockwise and play a few notes, the delay will repeat those notes and then repeat the repeats.
2. Adjust the "time" knob to create the effect of raising or lowering the pitch.
3. Twist the knob really fast in both directions to create some really crazy effects!

SYNTH HIST

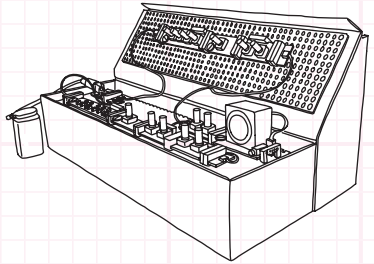
Artist and producer **Brian Eno** is well known for pushing the technological boundaries of music. He has famously produced mega albums like "Low" by **David Bowie**, "Remain in Light" by **Talking Heads**, and "Joshua Tree" by **U2**.

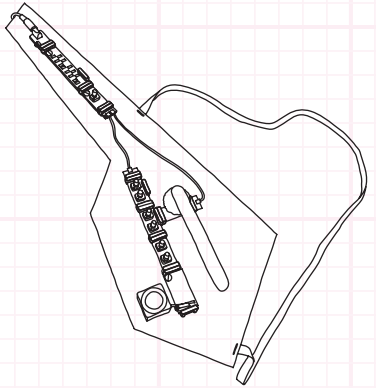
PROJECTS

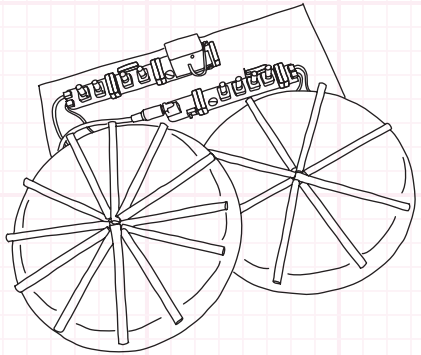
Enhanced instructions plus tons more projects online, **littleBits.cc/synth**

Visit **littleBits.cc/recordyourmusic** for tips on how to record, edit and share your music.

TRY THESE AND INVENT YOUR OWN





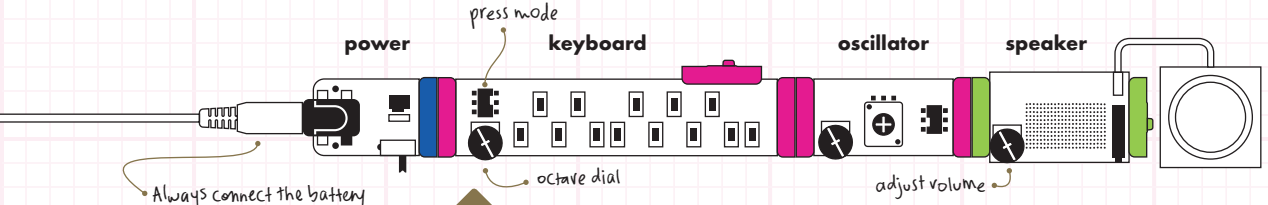


PROJECT 1: Learn how to make your song's pitch perfect.

TUNING

❶ Start with this circuit.

❷ Pick one key and turn the "octave" dial clockwise and counterclockwise. Do you hear the difference? Listen to the range (how "high" and "low" the sound goes).



❸ Turn the keyboard "octave" control to the middle of the range.

❹ Turn pitch knob on oscillator to change the frequency.

❺ Play all the notes on the bottom row of the keyboard consecutively from left to right. This is called a major scale in music. You may recognize it as do-re-mi-fa-so-la-ti-do.

❻ Play do-re-mi again, does it sound "right" to you? Remember "pitch" is perceived differently for everyone! If the notes didn't sound quite right, try slowly adjusting the tune dial counterclockwise until it sounds "in tune."

TUNING

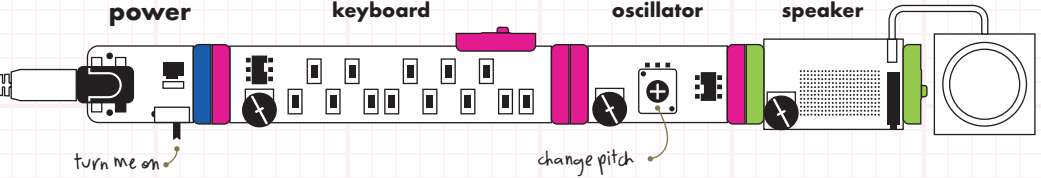
- Tuning is the relationship between the pitches in a musical instrument. Instruments need to be "tuned" and a synthesizer is no different. By tuning instruments, you can create "melodies" that are recognizable.
- The tuning dial on the oscillator Bits module will alter the relationship between pitches. This will be important when using the keyboard and micro sequencer.

❼ You've successfully tuned your oscillator, YOU'RE READY TO PLAY!

PROJECT 2: Serenade a friend!

PLAY A SONG

1. Start with this circuit.
2. Then, tune your oscillator (see previous project).
3. Adjust pitch to match the range of your voice!



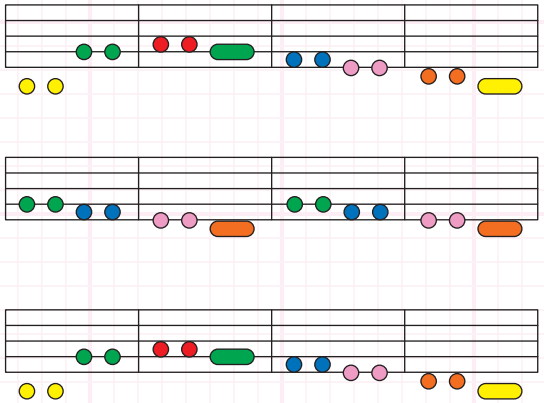
The bass sound in **Stevie Wonder's** 1973 song "Living for the City" features the use of a keyboard, oscillator, and envelope. Can you replicate that sound?

SYNTH HIST

4. USE THIS COLOR CODED KEYBOARD AND THE NOTES TO THE RIGHT TO HELP YOU PLAY A SONG!

Go to **littleBits.cc/synth** to learn how to play more tunes!

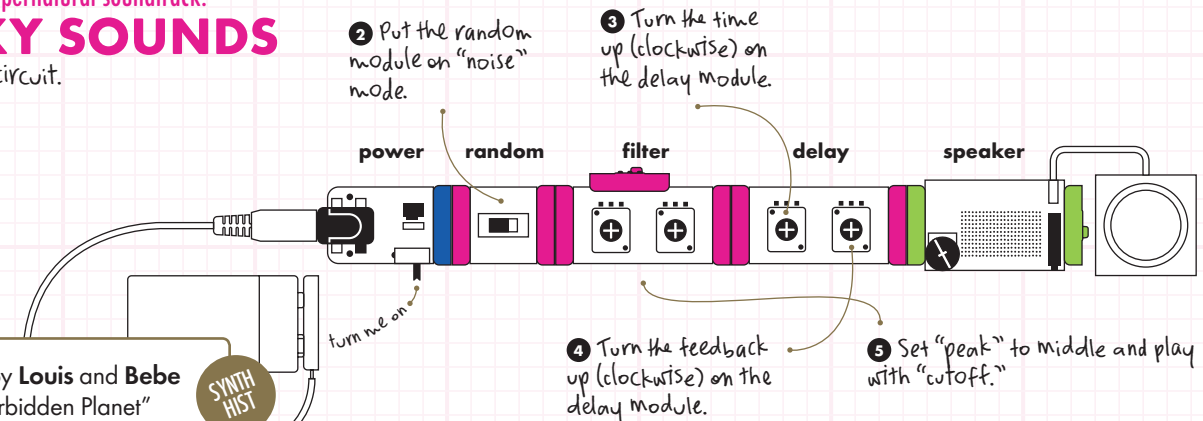
Do you recognize it?



PROJECT 3: Create a supernatural soundtrack.

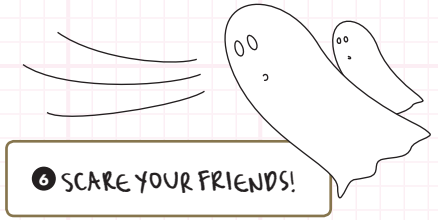
SPOOKY SOUNDS

1. Start with this circuit.



SYNTH HIST

The film score by **Louis** and **Bebe Barron** for "Forbidden Planet" (1958) was one of the first to make use of entirely electronic music.

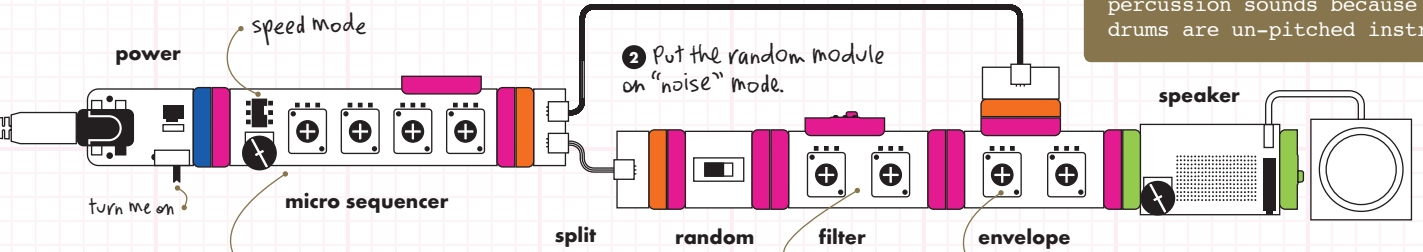


The peak knob has a large effect on what the cutoff knob does. It emphasizes certain frequencies and creates a "peak" at these frequencies. If the peak is turned all the way up, the emphasis can be strong enough to increase the loudness of the sound and in some cases create an oscillation.

PROJECT 4: Dance to the beat of your own drums.

PERCUSSION PARTY

1. Start with this circuit.



2. Put the random module on "noise" mode.

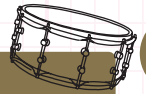
3. Set your rhythm by adjusting knobs on the micro sequencer and adjust tempo with speed dial.

4. Adjust the filter to affect the timbre.

5. Turn the "attack" knob all the way down (counterclockwise). Turn the "decay" knob low, but slightly higher than the "attack."

NOISE

Noise is an un-pitched sound. It is often used as a way to create percussion sounds because most drums are un-pitched instruments.



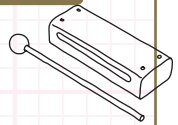
BONUS

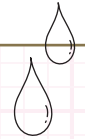
TRY MAKING A...

...horse galloping sound – Turn one of the knobs all the way down on the sequencer to make the sound effect for a horse galloping.

...woodblock sound – Turn the peak knob up (clockwise), turn the cut off down (counter clockwise).

...water drop sound – Keep the peak up. Turn the cut off to a mid-range (higher than the woodblock).



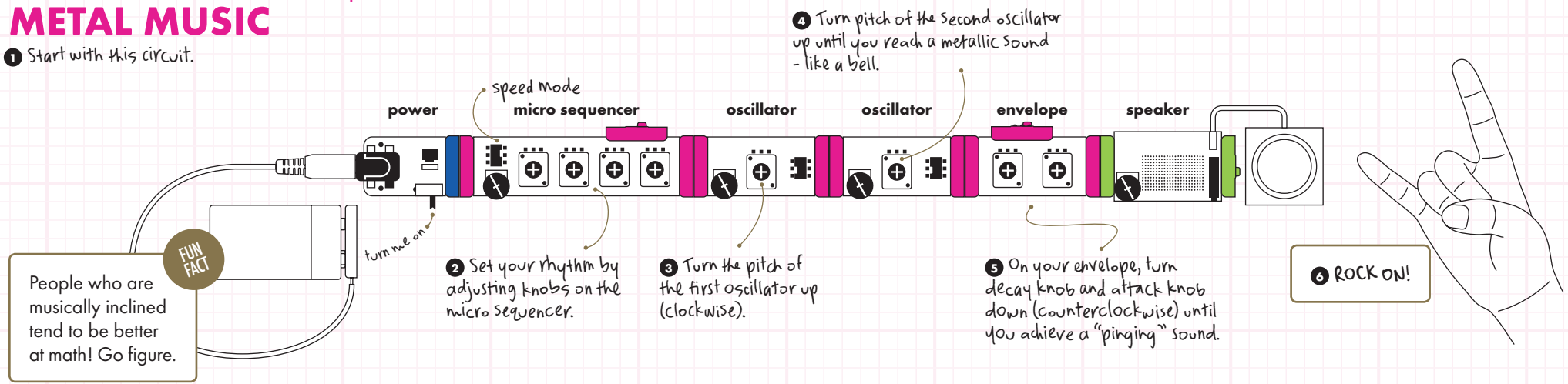


6. WAIL on your synth drumset!

PROJECT 5: Recreate metallic sounds with the envelope.

METAL MUSIC

1. Start with this circuit.



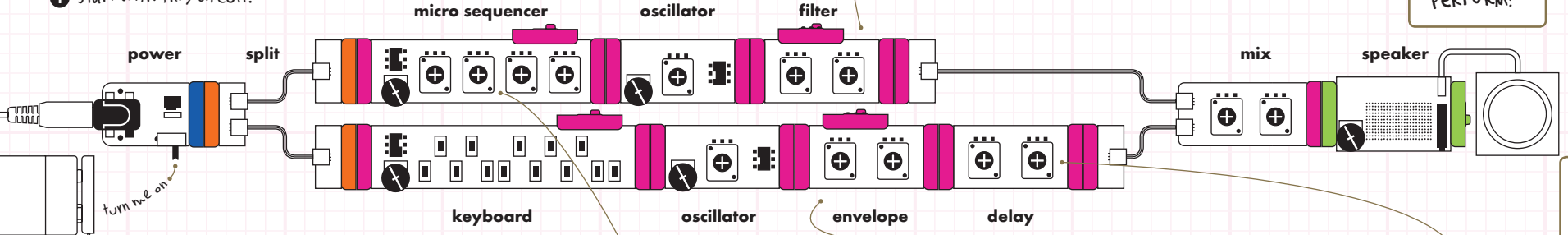
FUN FACT

People who are musically inclined tend to be better at math! Go figure.

PROJECT 6: Learn how to play a melody with accompaniment.

SYNTH BAND

1 Start with this circuit.



4 Adjust the filter until you reach the sound you like.

5 Set mix level 1 low and mix level 2 higher.

8 YOU'RE READY TO PERFORM!

2 Tune both oscillators (refer to page 21 on how to do this). Oscillators can either be set to "consonant" or "dissonant" intervals. In consonance, they are in harmony. In dissonance, they will sound inharmonious.

3 Create a pattern on the micro sequencer that you like. This will become your backing music.

6 Play a few notes on the keyboard. The keyboard is like the "lead singer" and will appear louder than your sequencer because nothing is filtering the sound.

7 Adjust the envelope and delay – these will change your keyboard's sound.

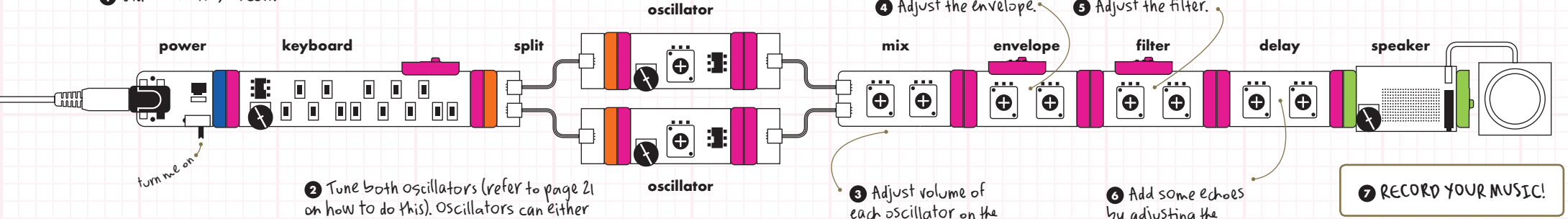
PRO TIP

Use an audio cable to connect your speaker to your computer, headphones, or an amplifier!

PROJECT 7: Create one monster synth with all of these modules!

SYNTHESIZER WITH THE WORKS

❶ Start with this circuit.



❹ Adjust the envelope.

❺ Adjust the filter.

❷ Tune both oscillators (refer to page 21 on how to do this). Oscillators can either be set to "consonant" (harmonious) or "dissonant" (inharmonious) intervals.

❸ Adjust volume of each oscillator on the mix module.

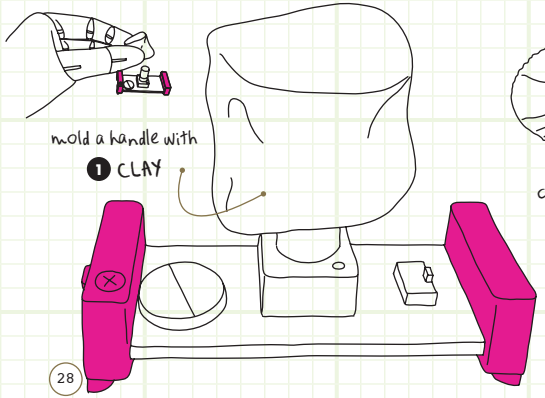
❻ Add some echoes by adjusting the delay module.

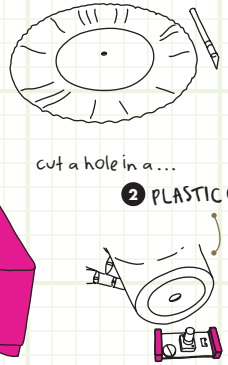
❼ RECORD YOUR MUSIC!

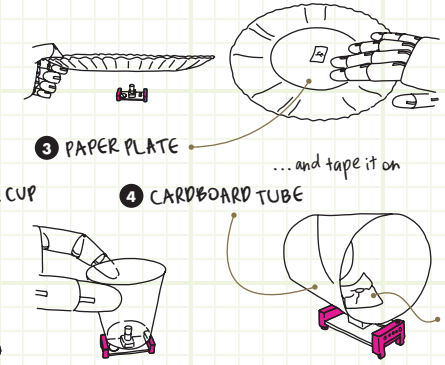
Record your music and share it with us! **littleBits.cc/upload**

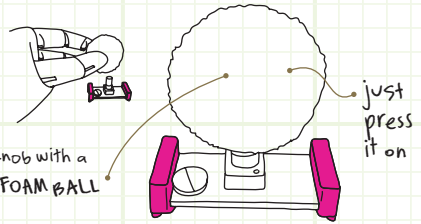
And now a brief intermission from the projects.

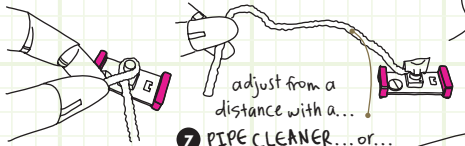
VISIT US AT LITTLEBITS.CC/TIPS FOR SOME AMAZING TIPS & TRICKS

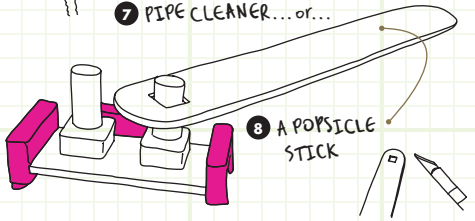


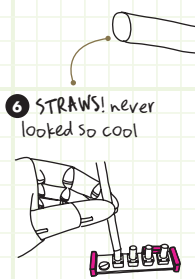


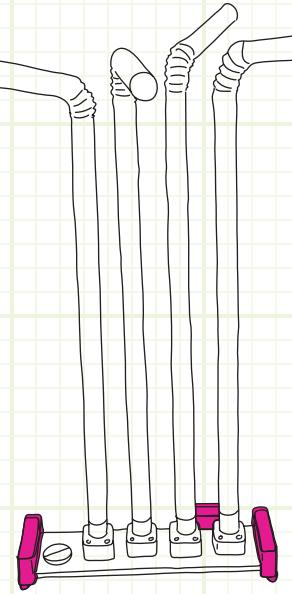










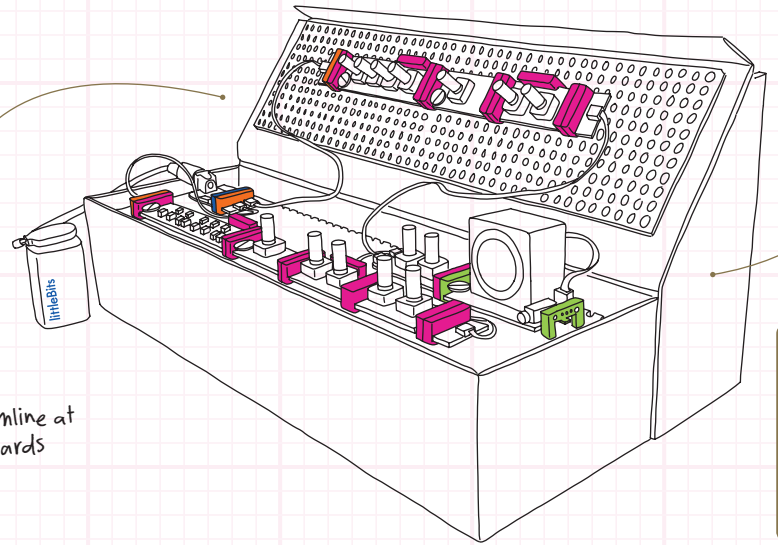


PROJECT 8: Transform your box!

PERFORM LIKE A PRO

Visit **littleBits.cc/prosetup** for instructions on how to set up your modules so you can put on live performances anywhere and on the go!

TIME: 60 mins
DIFFICULTY: ●●○○○



Buy mounting boards online at littleBits.cc/mountingboards

Build a performance station!

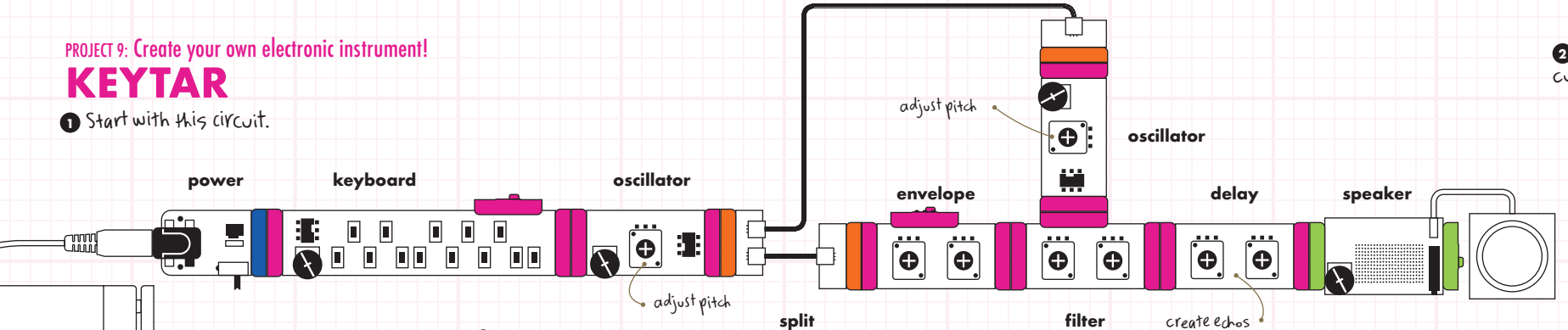
Power up your circuit and START PLAYING!

COOL! Just like the KORG MS-20.

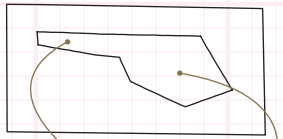
PROJECT 9: Create your own electronic instrument!

KEYTAR

1 Start with this circuit.



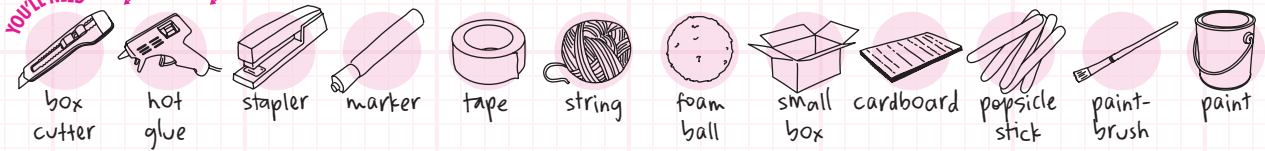
2 Draw a guitar-like shape and cut it out of cardboard.



TIME: 60 mins
DIFFICULTY: ●●○○○

STAY SAFE! Always use with an adult.

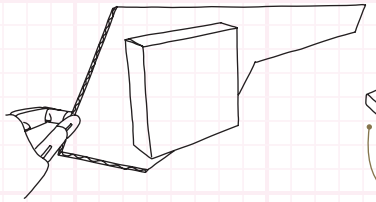
YOU'LL NEED



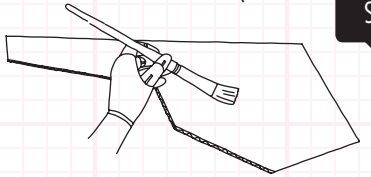
In the early '70s **Edgar Winter** was one of the first people to create a makeshift "keytar" by adding a shoulder strap to an electronic keyboard. Check out the popular song "Frankenstein."

SYNTH HIST

3 Tape or glue smaller box to the back of the wider end.

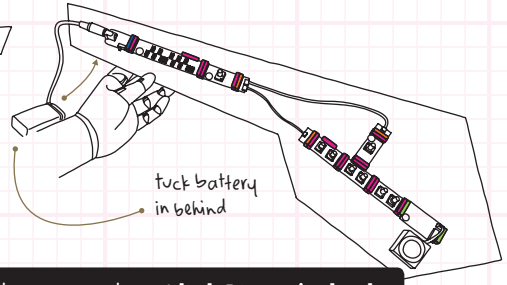


4 Decorate! Use paint, markers, whatever you have!

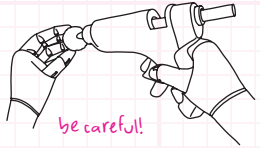


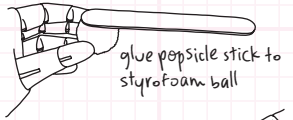
Show us your design! **littleBits.cc/upload**

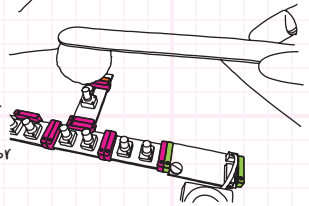
5 Add the circuit.



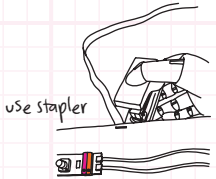
6 Add a whammy bar!

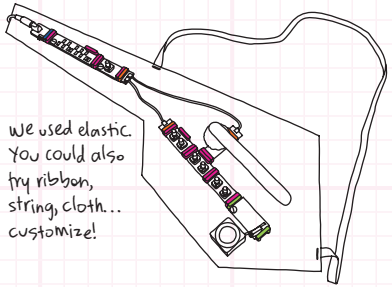


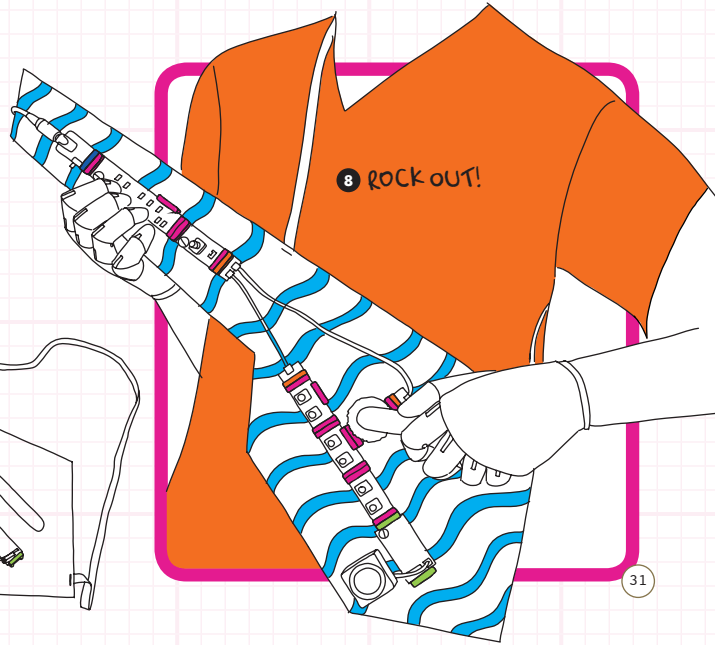




7 Add a strap.



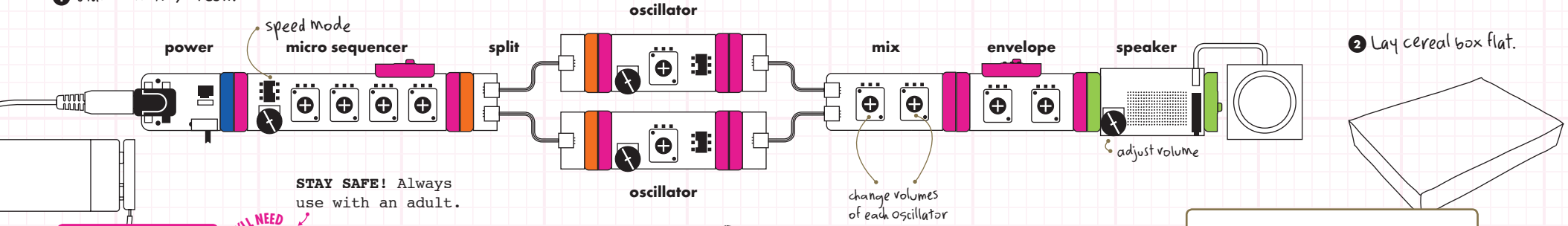




PROJECT 10: Play your Synth Kit like a DJ.

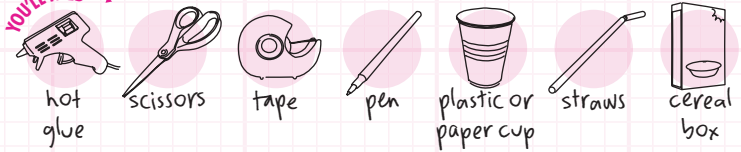
SYNTH SPIN TABLE

❶ Start with this circuit.



STAY SAFE! Always use with an adult.

YOU'LL NEED



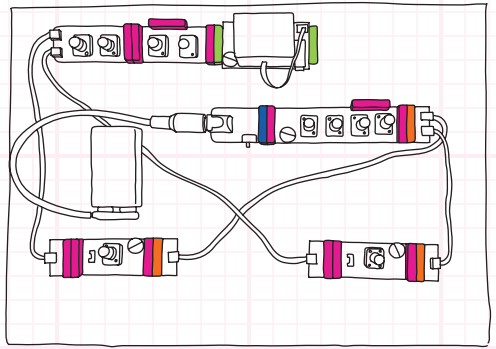
TIME: 2 hrs
DIFFICULTY: ●●●○○

❷ Lay cereal box flat.

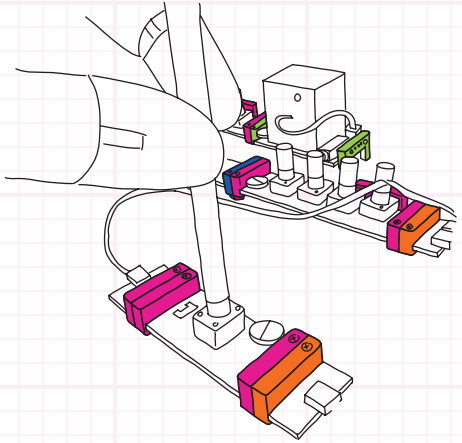
SYNTH HIST

Disco! The first notable fully synthesized disco hit was "I Feel Love" by **Donna Summer** in 1977.

❸ Put the circuit on the box.
Use tape to keep 'em in place.

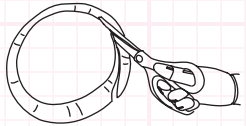


❹ Attach one straw on each oscillator knob.

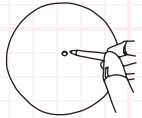


make first turntable

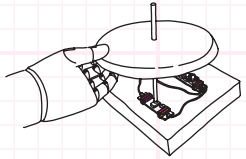
❺ Get paper plate cut down to size.



❻ Mark center of plate and poke hole.

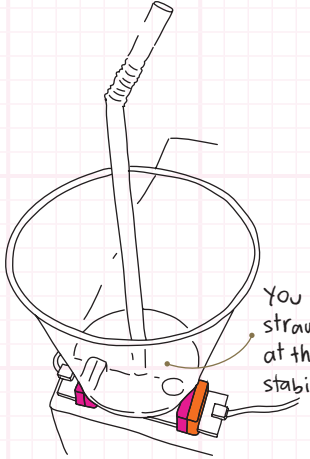


❼ Slide plate onto straw.



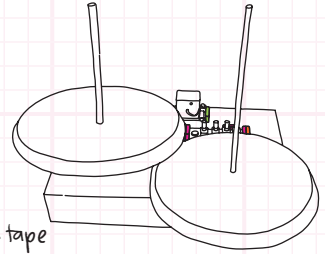
make second turntable

❽ Poke a hole in the bottom of a cup and slide it on the straw of the second oscillator.

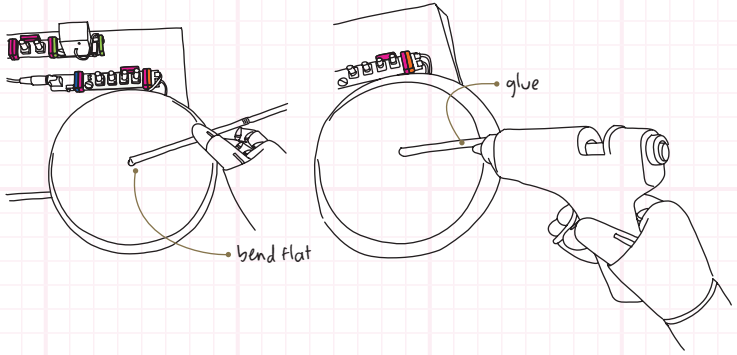


You can tape straw to cup at the base for stabilizing.

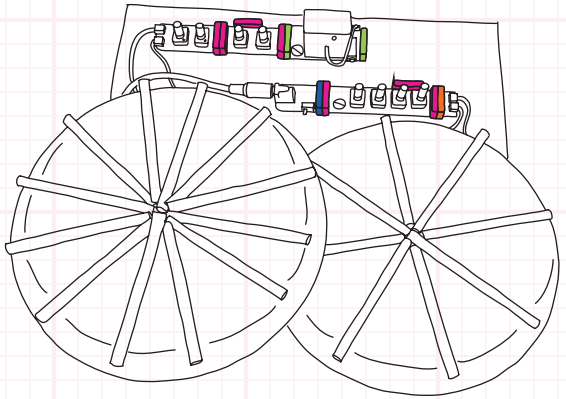
❾ Repeat steps 5-7 and add another plate on top of the cup.



10 Glue straws to plates.

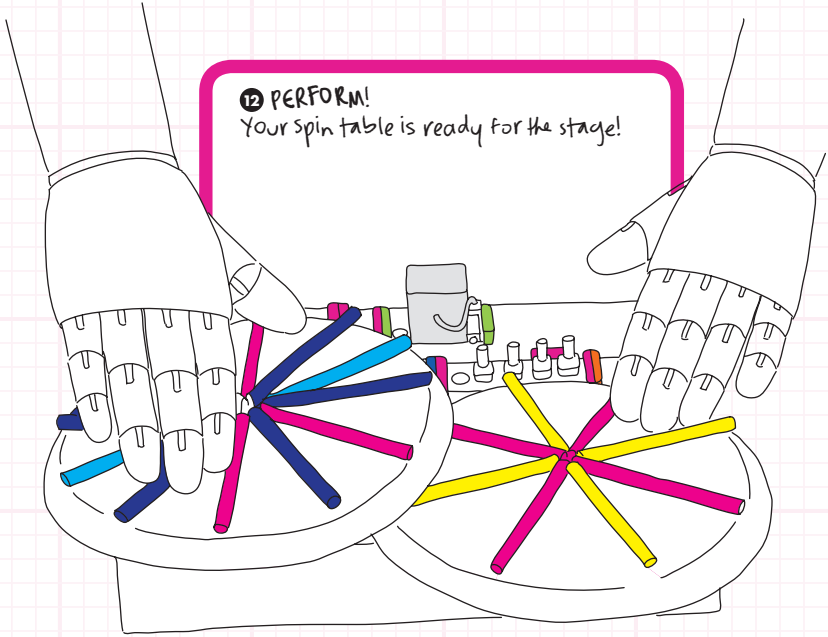


11 Decorate!



We used colored straws. What materials do you have at home?

12 PERFORM!
Your spin table is ready for the stage!

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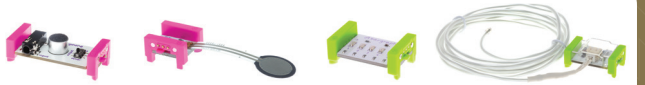

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