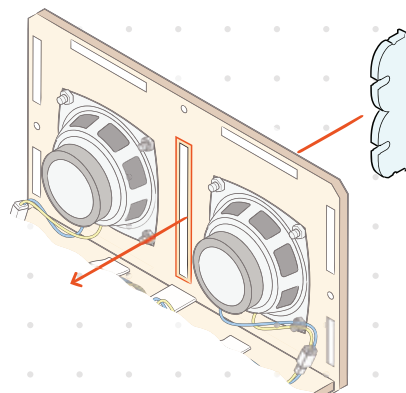


Add the lights

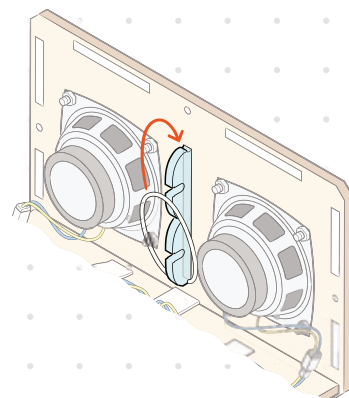
You'll need:

- ☐ speaker with large drivers (from Part B)
- ☐ light bar
- ☐ O-ring
- ☐ sticky foam rectangles
- ☐ LEDs

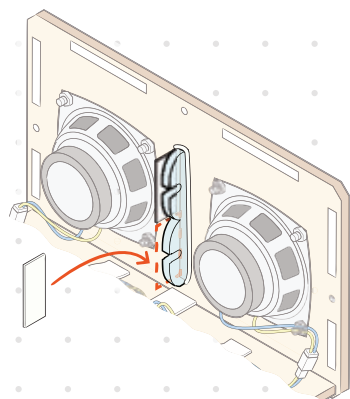
Step 1
From the front, slide the **light bar** through the **speaker's** middle slot.



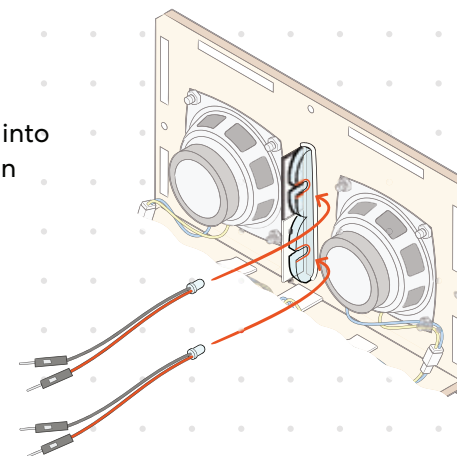
Step 2
Stretch the **O-ring** around the back of the light bar.



Step 3
Stick 2 **sticky foam rectangles** on one side of the light bar.

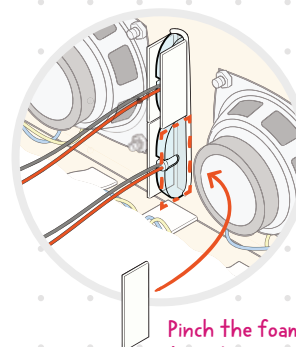


Step 4
Press an **LED** into each notch on the light bar.

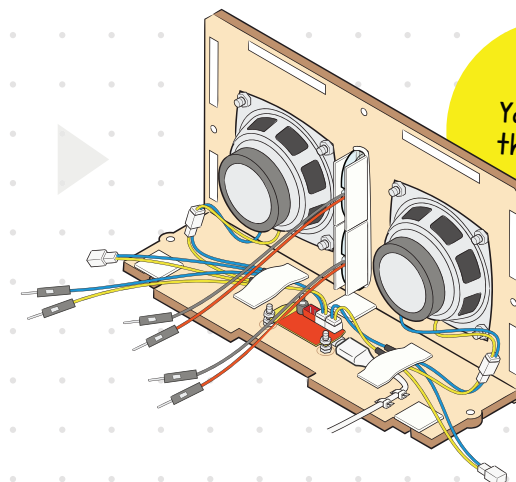


The sticky foam holds the LEDs in place.

Step 5
Stick 2 more sticky foam rectangles to the other side of the light bar.

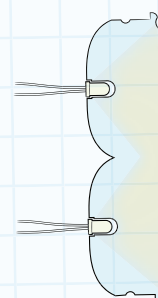


Pinch the foam to make sure it stays on.

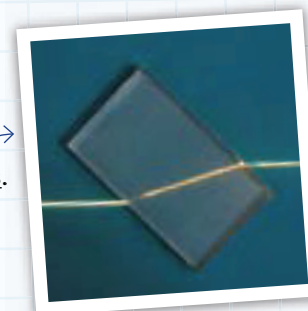


You added the lights!

Light refraction



The light bar's funky shape helps spread out light from the LEDs — so two lights cover as much area as ten. When light moves from one material to another — say, from air to the clear acrylic — it bends. That's **light refraction**! Each bump and divot in the acrylic bends light in a different direction, which sends a glow across the whole bar.



Connect the lights and sound

You'll need:

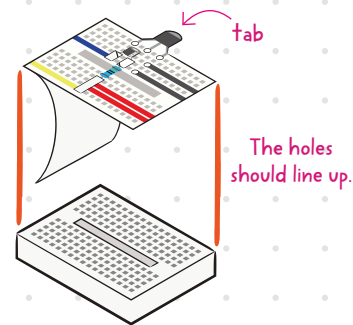
- ☐ speaker with lights (from Part C)
- ☐ breadboard
- ☐ breadboard guide
- ☐ transistor
- ☐ resistor
- ☐ capacitor

From home:

- ☐ USB power source
- ☐ device with Bluetooth technology

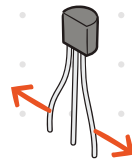
Step 1

Peel the backing off the **breadboard guide**. Stick it to the **breadboard**.



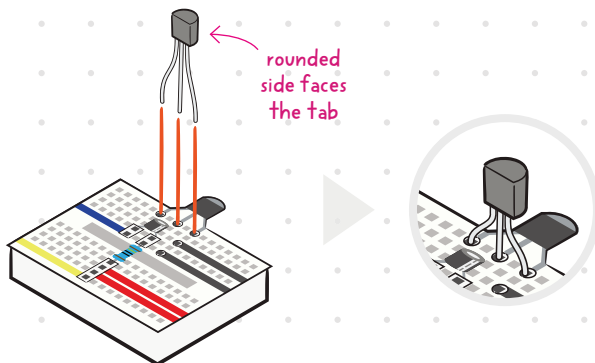
Step 2a

Find a **transistor** and gently spread the pins.



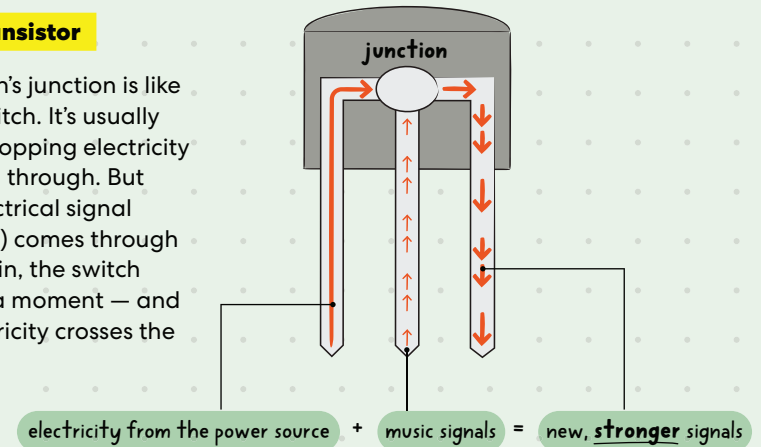
Step 2b

Push the pins into the breadboard. The transistor should match up with the symbol on the guide.



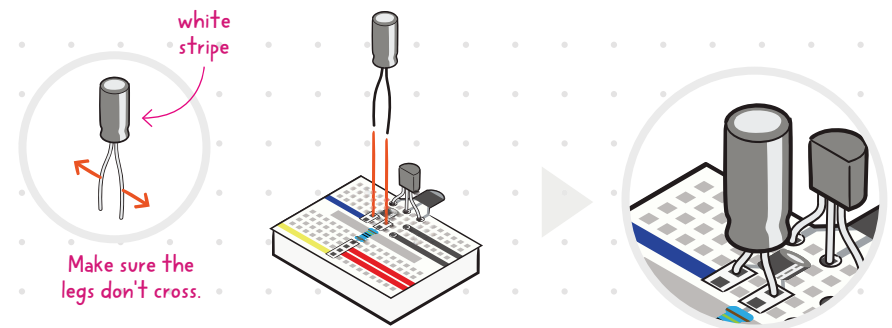
Meet the transistor

The transistor's junction is like an on/off switch. It's usually turned off, stopping electricity from passing through. But when an electrical signal (a.k.a. music!) comes through the middle pin, the switch turns on for a moment — and a bit of electricity crosses the junction.



Step 3

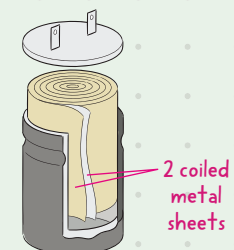
Find the **capacitor** and hold it so the white stripe is on the right. Push the pins in by the capacitor symbol.



Meet the capacitor

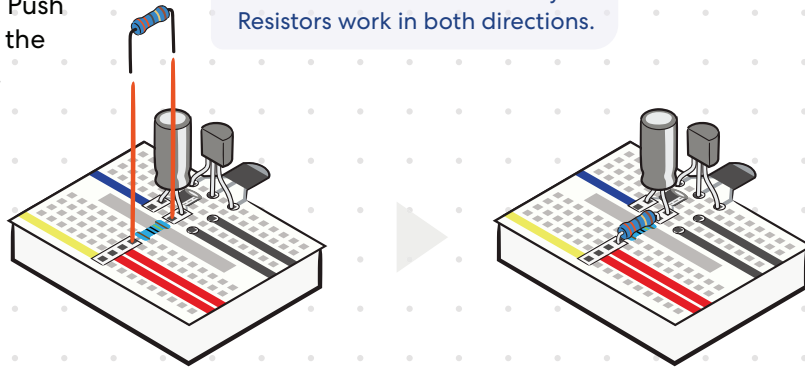
The **capacitor** acts kind of like a sponge for electricity. Two coiled metal sheets “soak up” the incoming power.

The power can only be released when certain kinds of signals come through the circuit. Until then, the capacitor holds on to the electricity.



Step 4

Find a **resistor**. Push the pins in over the resistor symbol.



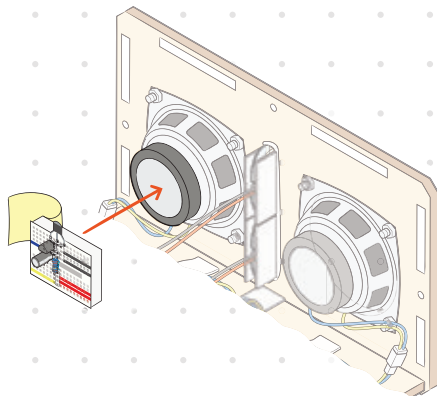
Meet the resistor

The **resistor** uses a long, thin spiral of electricity-resistant wire to slow down the electrical current. Electricity has to travel along the whole length of the wire, like it's going along a twisty, bumpy, muddy road.



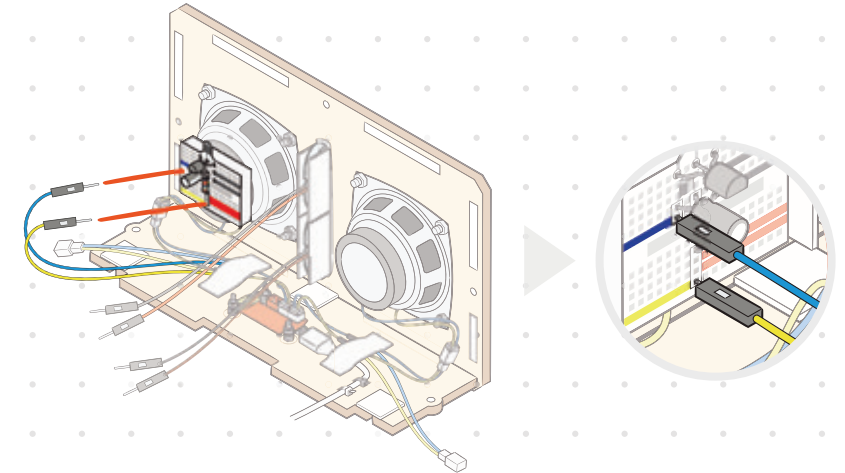
Step 5

Peel the backing off the breadboard. Stick it to the back of the driver on the left.



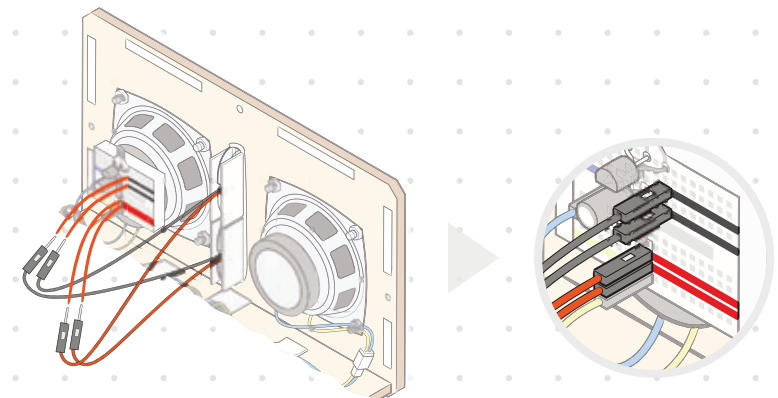
Step 6

Push the loose **yellow** and **blue** wires on the left into the **yellow** and **blue** holes.



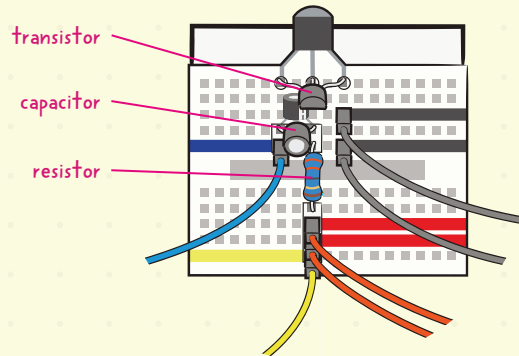
Step 7

Push the **black** and **red** LED wires into the **black** and **red** holes.

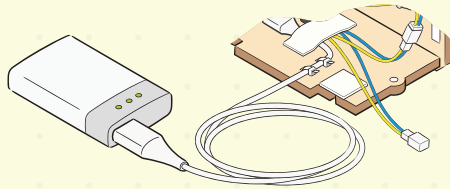


Stop & Test

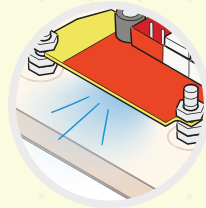
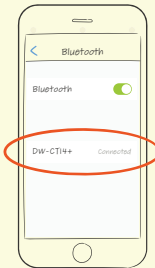
1. Make sure your breadboard looks like this.



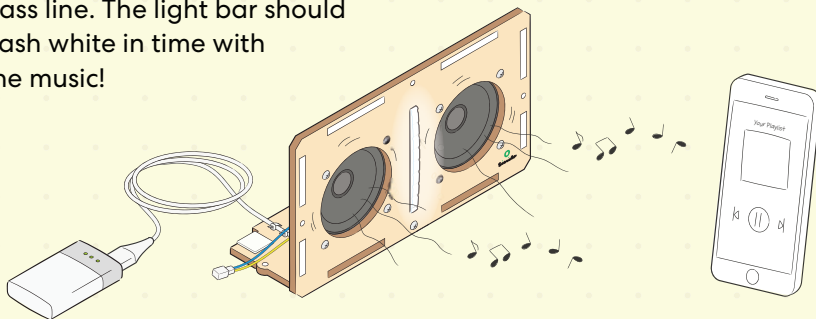
2. Plug the USB cable into a **USB power source**. The light bar should blink.



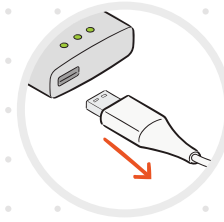
3. Pair the speaker with a **device with Bluetooth technology** (if it's not already connected).



4. Play some music with a strong bass line. The light bar should flash white in time with the music!

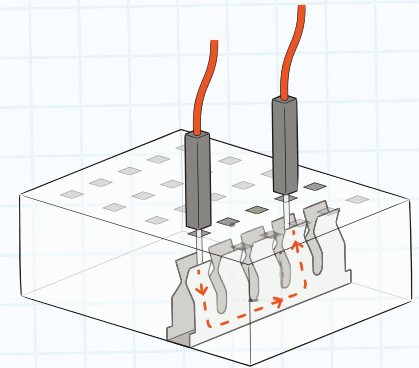


- Stop!
Before you keep building,
unplug the USB cable
from the power source.



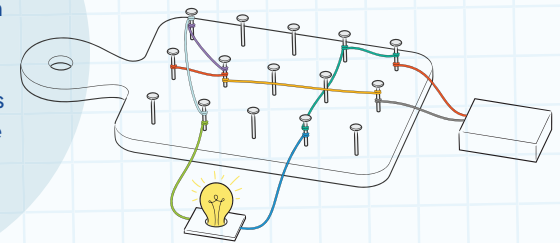
Breadboard

A **breadboard** makes it super easy to build a circuit. Each column of holes has a metal rail under it. So if you plug wires into any two holes in a column, they'll be connected to each other!



Did you know?

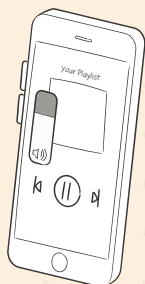
The name *breadboard* comes from the early days of electronics, when people would build circuits by hammering nails into wooden boards (like the kind people slice bread on) and wrapping wires around the nails.



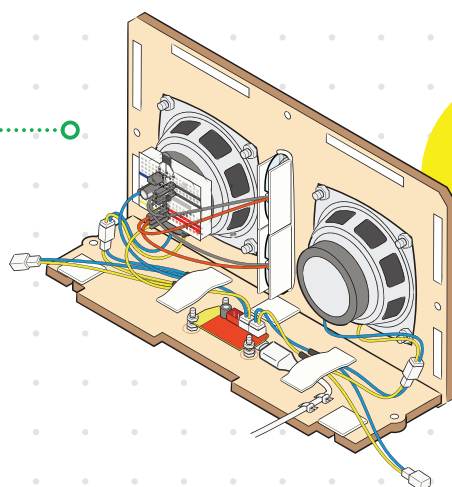
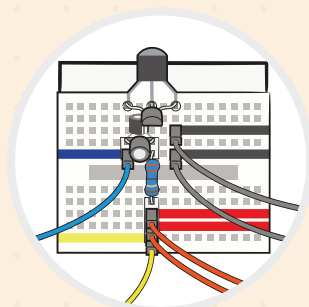
Troubleshooting

If the wireless board doesn't light up or pair, check the troubleshooting steps on Page 15.

If the light bar doesn't flash white, try turning up the volume or picking a song with a stronger bass line.



If the light bar still doesn't light up, make sure all the wires are plugged into the right spots on the breadboard.



You connected the lights and sound!

Bass-ic circuitry

High five, engineer! You just wired up a **low-pass filter**, so named because only low notes can pass through it.

If a signal plays a **high note**, it's (mostly) blocked by the filter.

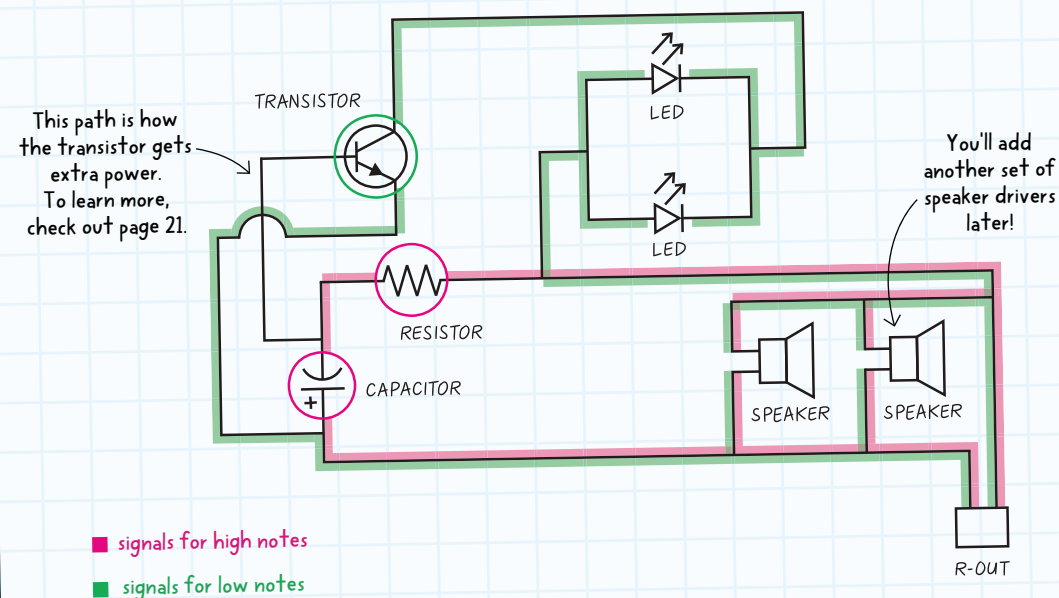
Signals for high notes go into the **capacitor** and then through the **resistor** — which bogs the electric signals down so much there's not enough power to turn on the lights.

If a signal plays a **low note**, it's allowed through the filter.

The capacitor can't process the signals that play low notes. So instead, they go along the easiest path: toward the **transistor** (which boosts their power) and onward to the lights. Flash! ^{1z}

Talk about an *electrifying* performance.

Here's how it all connects with your right speaker drivers . . .



Add the small speaker drivers

You'll need:

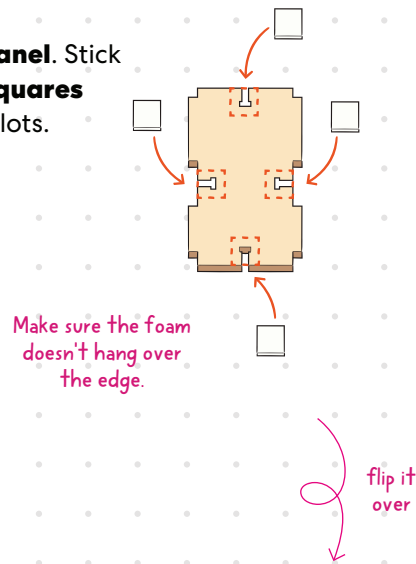
- ☐ speaker with breadboard (from Part D)
- ☐ side panels
- ☐ long screws
- ☐ small speaker drivers
- ☐ gaskets
- ☐ short screws
- ☐ washers
- ☐ square nuts
- ☐ sticky foam squares
- ☐ screwdriver
- ☐ foam balls

From home:

- ☐ USB power source

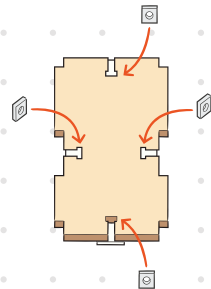
Step 1

Grab a **side panel**. Stick **sticky foam squares** over all the T slots.



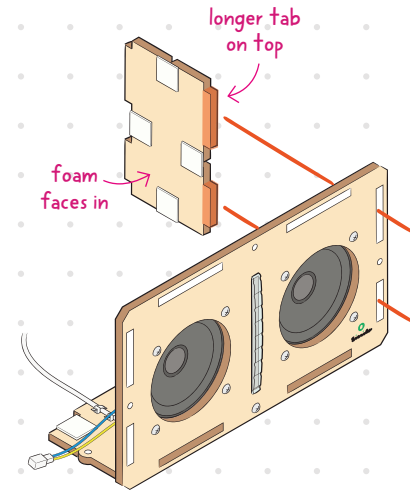
Step 2

Press a **square nut** into each T slot.



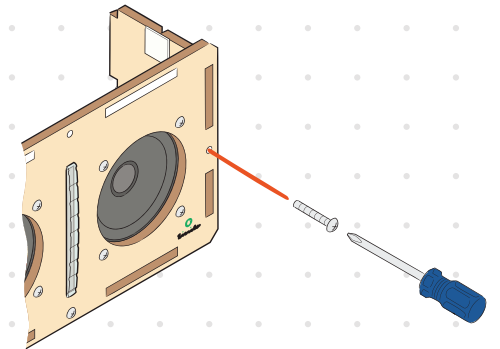
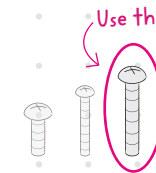
Step 3

Slide the side panel into the front panel.



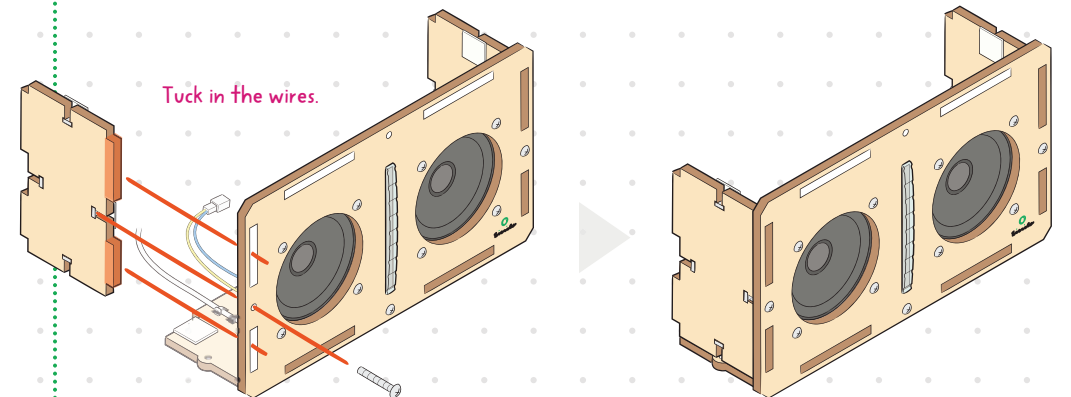
Step 4

Twist a **long screw** into the front hole. Secure it with the **screwdriver**.



Step 5

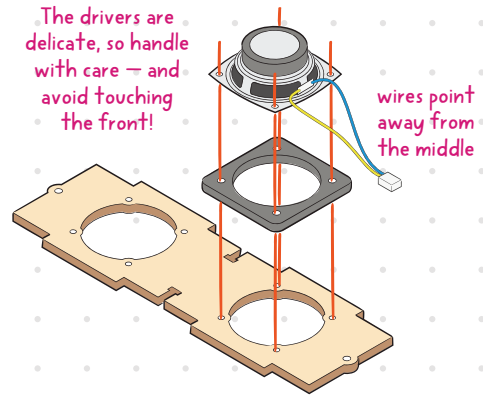
Repeat **Steps 1–4** to add the other side panel.



Step 6

Grab the **top panel**. Line up a **gasket** with a set of holes.

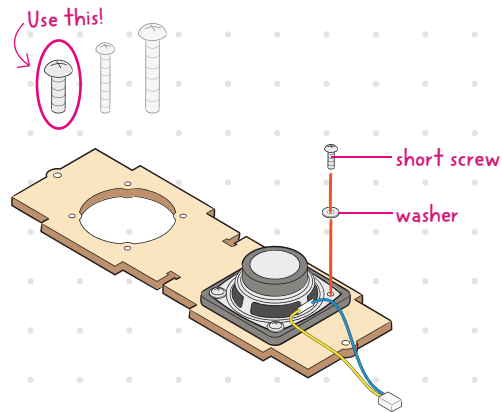
Then place a **small speaker driver** on top of the gasket.



Step 7

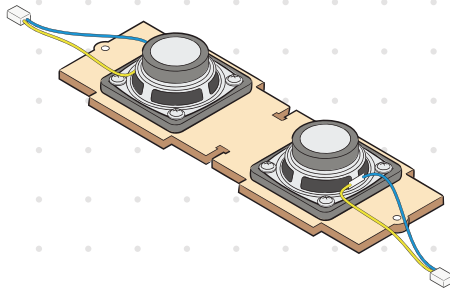
Slide a **washer** onto a **short screw**. Then twist the screw into a corner of the speaker driver.

Repeat to add screws and washers to the other 3 corners.



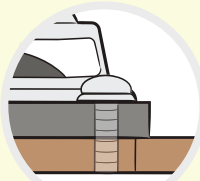
Step 8

Repeat **Steps 6–8** to add the other small speaker driver.



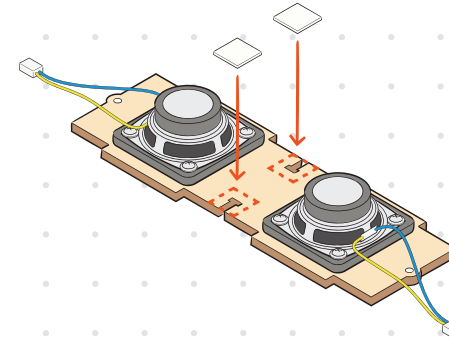
Stop & Check

Make sure all the short screws are flush with the front of the top panel.



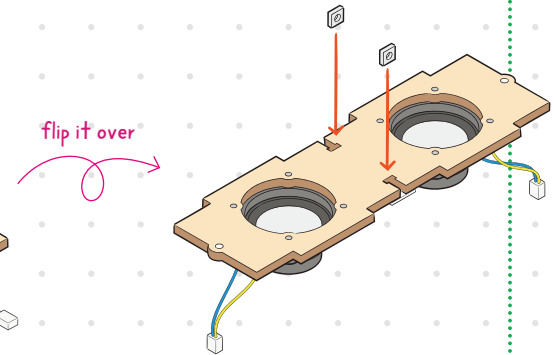
Step 9a

Stick two sticky foam squares over the T slots.



Step 9b

Press a square nut into each slot.



Step 10

Slide the top panel into the front panel. Twist a long screw into the front hole.

