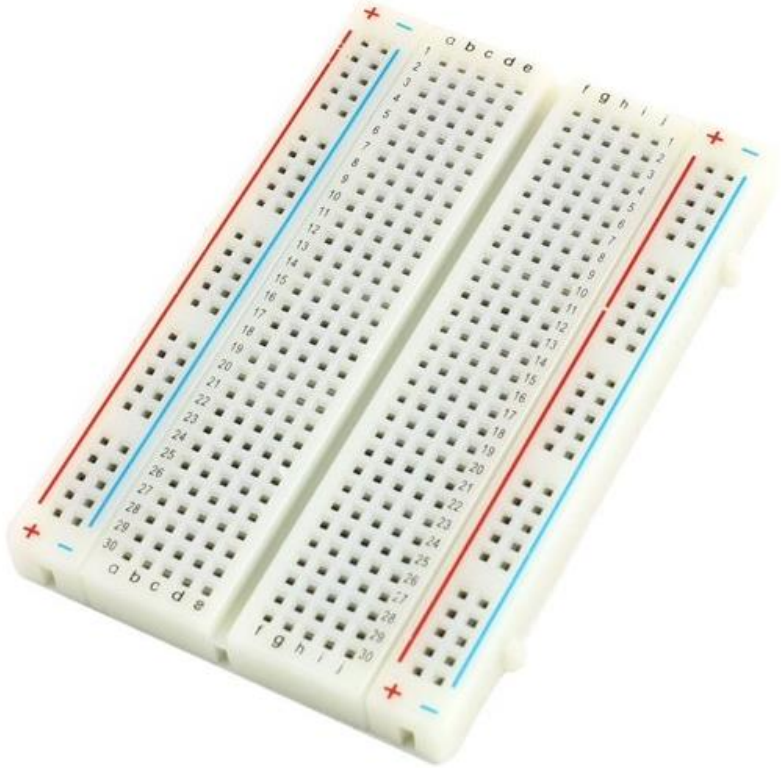
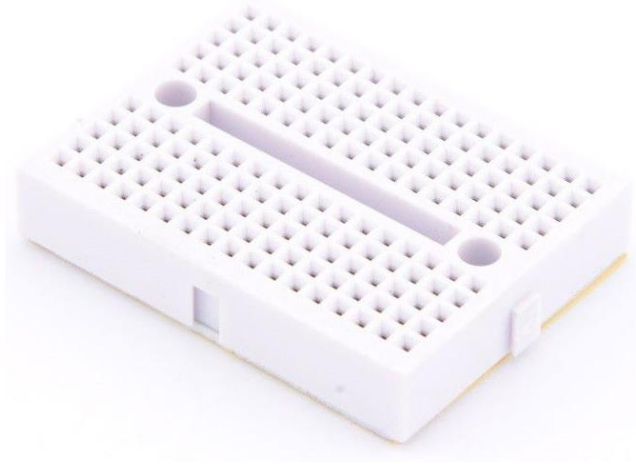
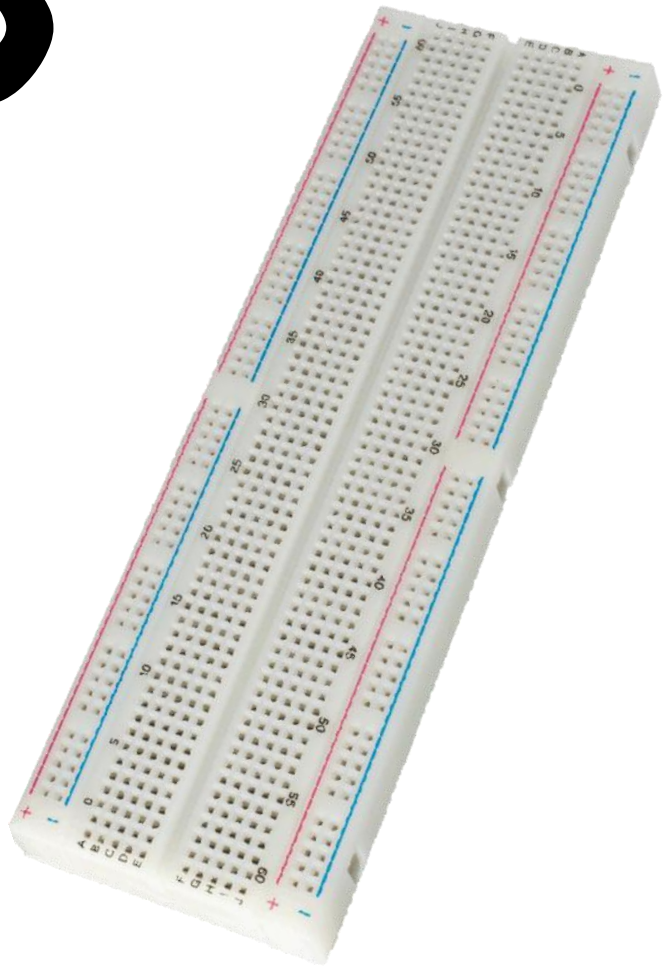
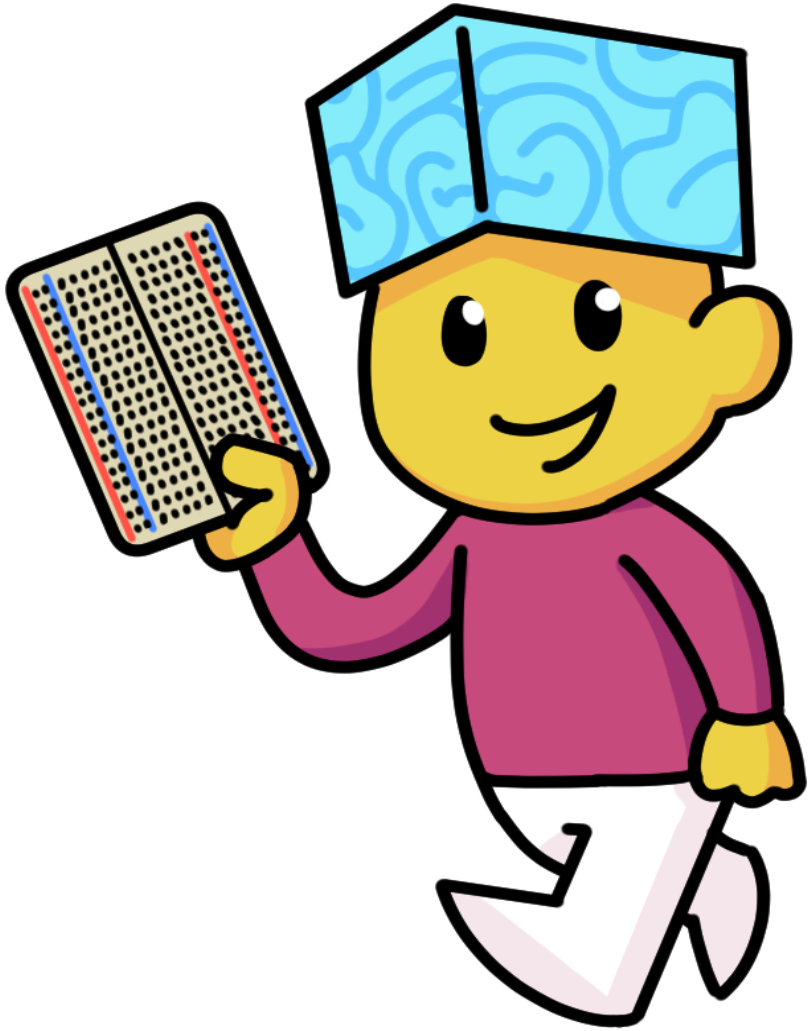
BREADBOARDS





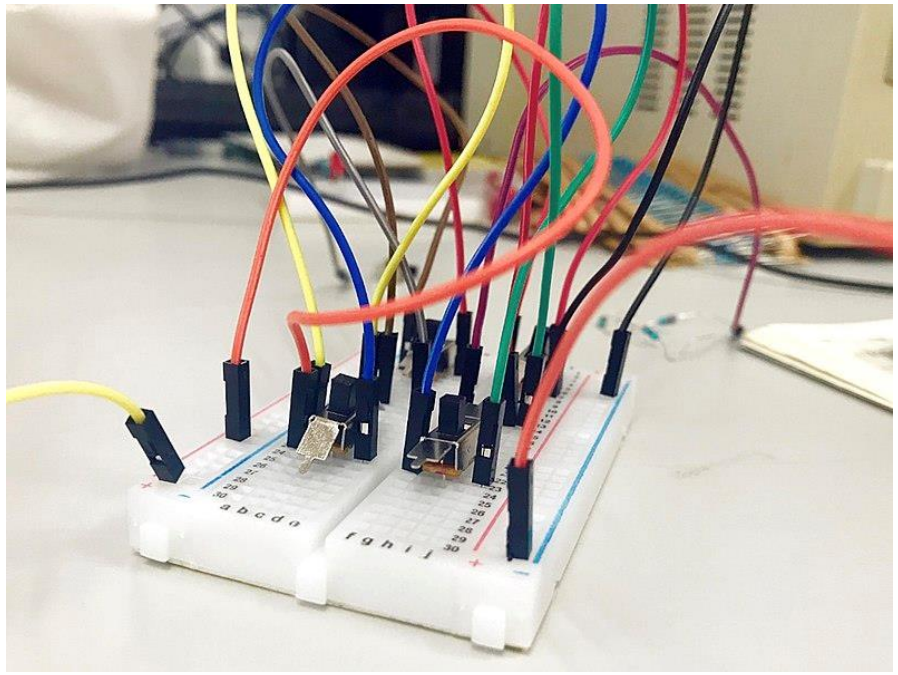


Breadboards are a common tool used for creating electronic prototypes and experimenting with circuit design.



Why Use Breadboards?

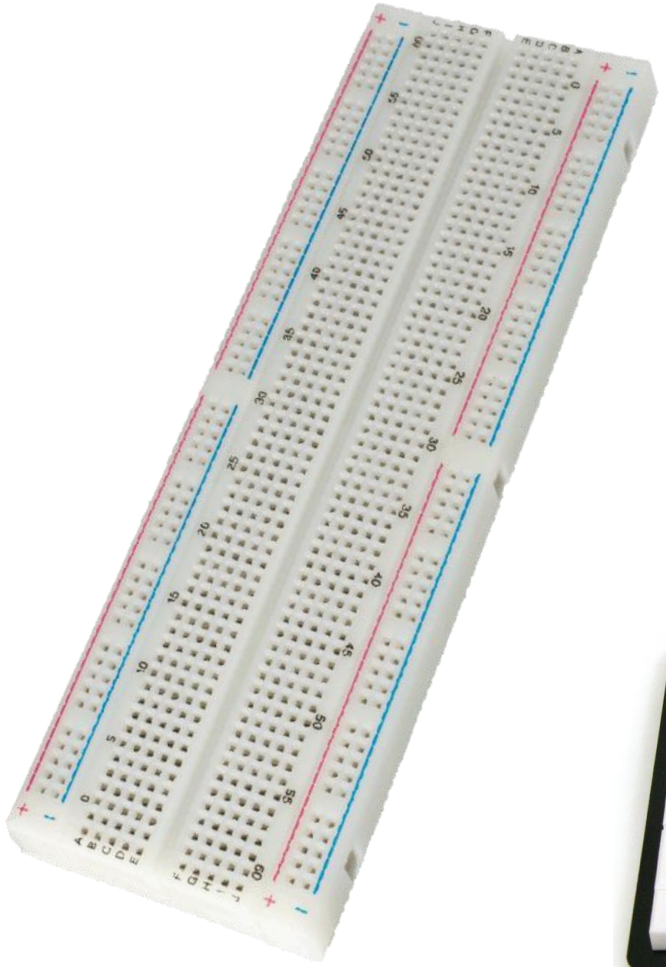
By simply removing components and reattaching them elsewhere on the breadboard, you can easily build and rebuild a circuit as many times as you want!

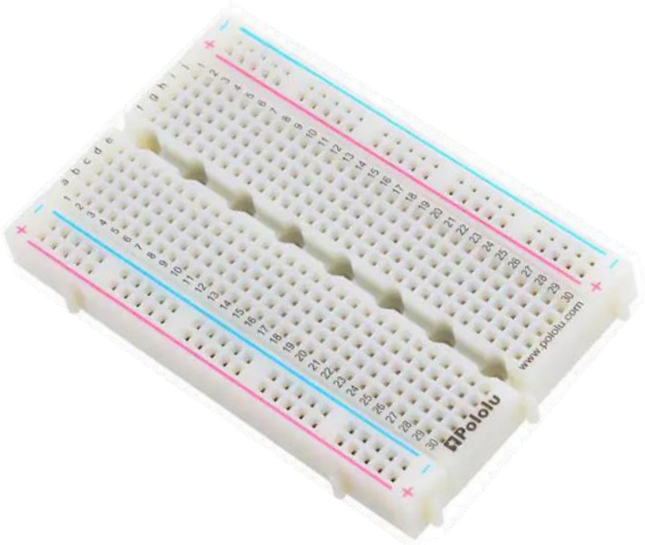


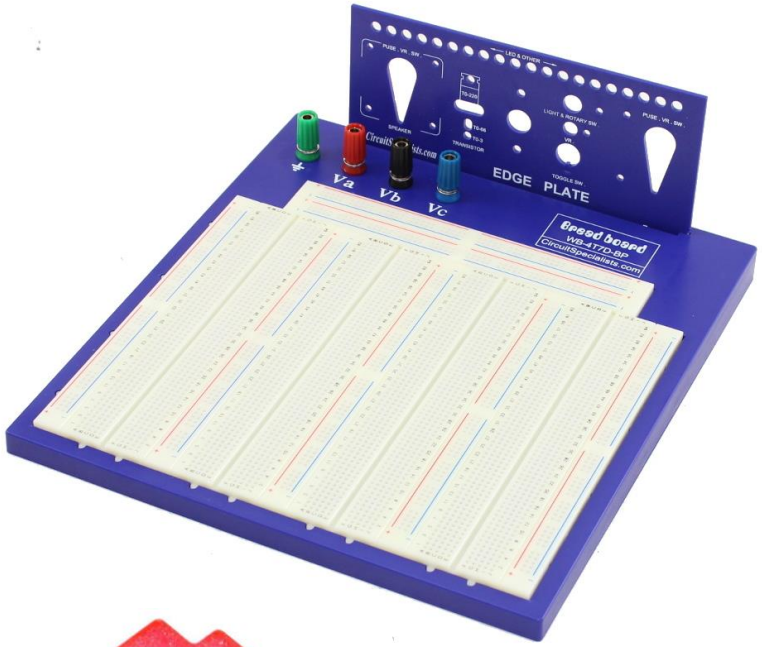
Where Did the Name Breadboards Come From?

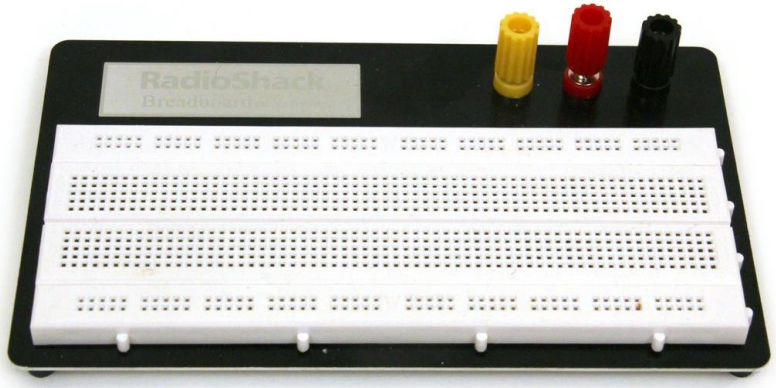
In the early days people used thumbtacks, screws, or nails to attach wires and electrical components to wooden planks, or *breadboards,* from the kitchen!

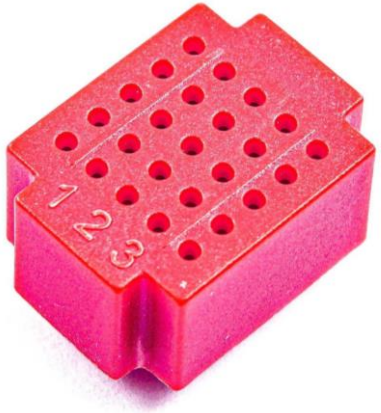
There are Many Types of Breadboards







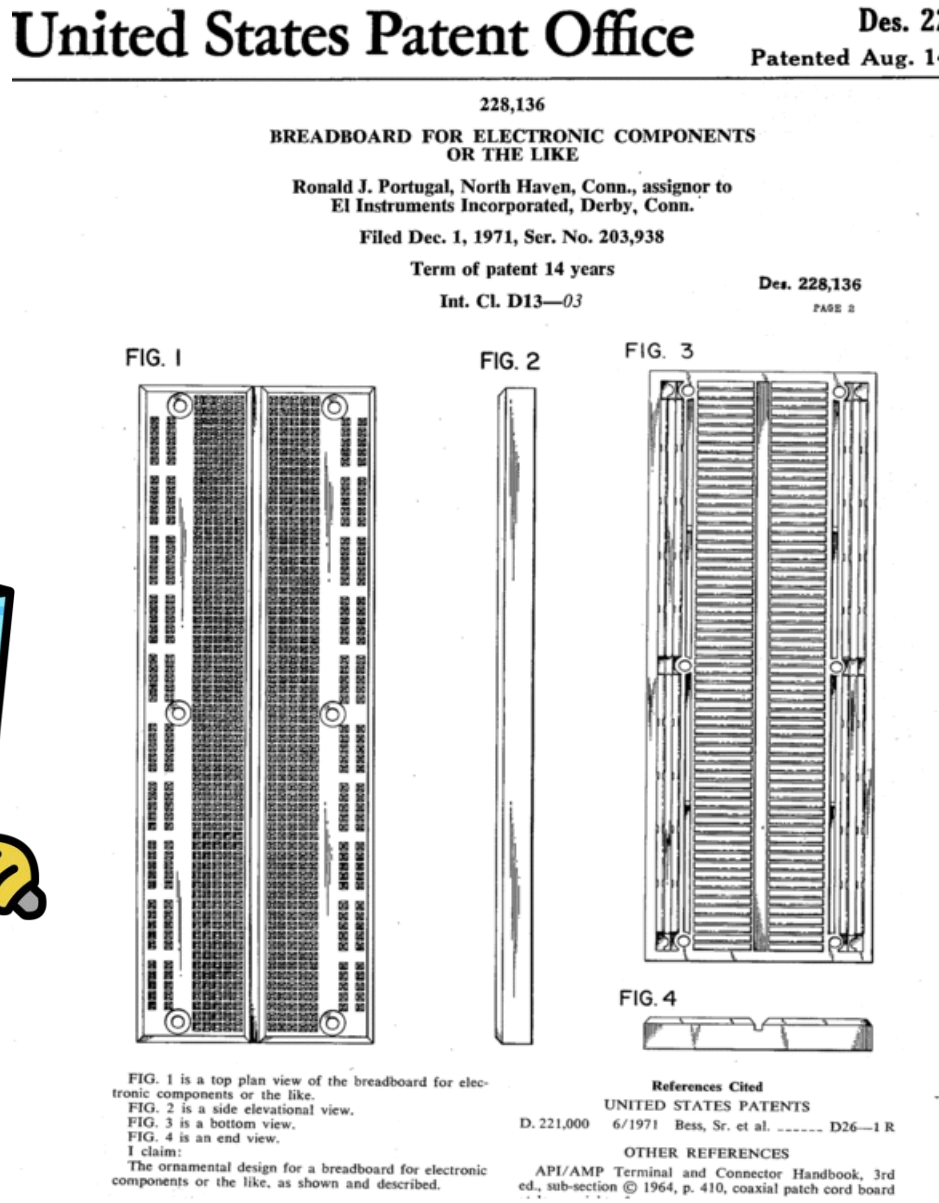




Who Invented the Modern Breadboards?

The modern solderless socket breadboard was invented by **Ronald J. Portugal** for E&L Instruments.

On August 14th, 1973, his *BREADBOARD FOR ELECTRONIC COMPONENTS OR THE LIKE* was patented.



United States Patent Office

Des. 228,136
Patented Aug. 14, 1973

228,136

BREADBOARD FOR ELECTRONIC COMPONENTS OR THE LIKE

Ronald J. Portugal, North Haven, Conn., assignor to El Instruments Incorporated, Derby, Conn.

Filed Dec. 1, 1971, Ser. No. 203,938

Term of patent 14 years

Int. Cl. D13—*03*

Des. 228,136
PAGE 2

FIG. 1

FIG. 2

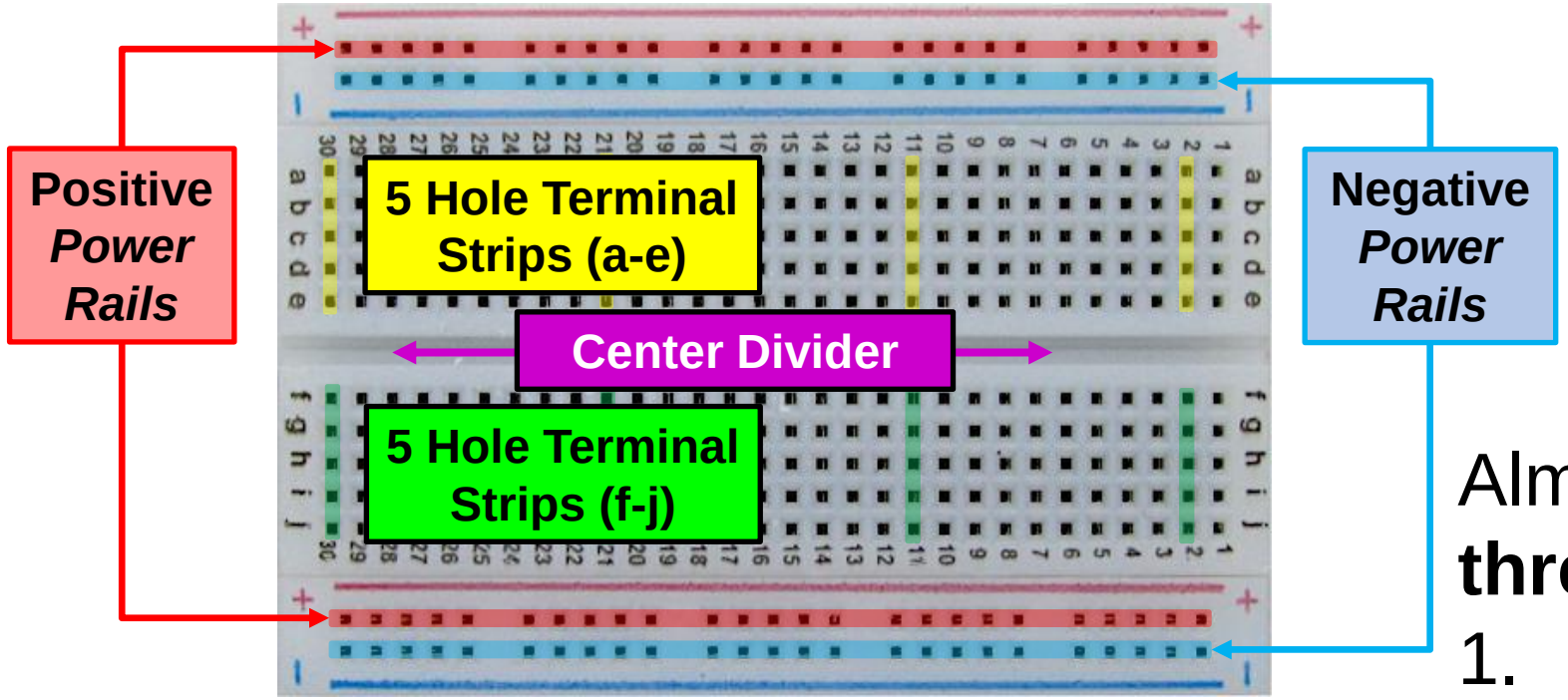
FIG. 3

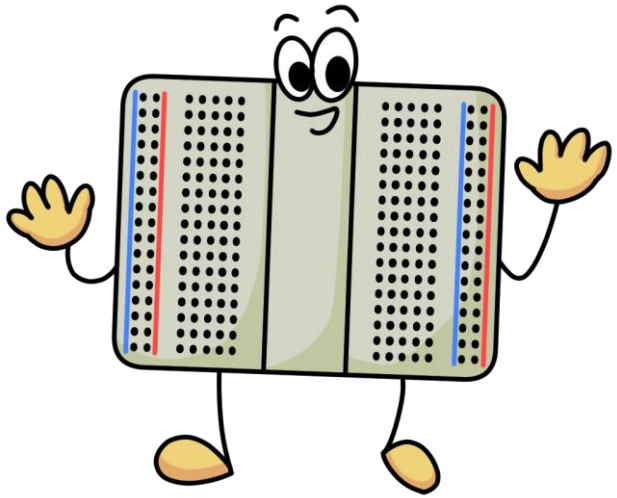
FIG. 4

FIG. 1 is a top plan view of the breadboard for electronic components or the like.
FIG. 2 is a side elevational view.
FIG. 3 is a bottom view.
FIG. 4 is an end view.
I claim:
The ornamental design for a breadboard for electronic components or the like, as shown and described.

References Cited
UNITED STATES PATENTS
D. 221,000 6/1971 Bess, Sr. et al. ------ D26—1 R
OTHER REFERENCES
API/AMP Terminal and Connector Handbook, 3rd ed., sub-section © 1964, p. 410, coaxial patch cord board

Parts of the Breadboard

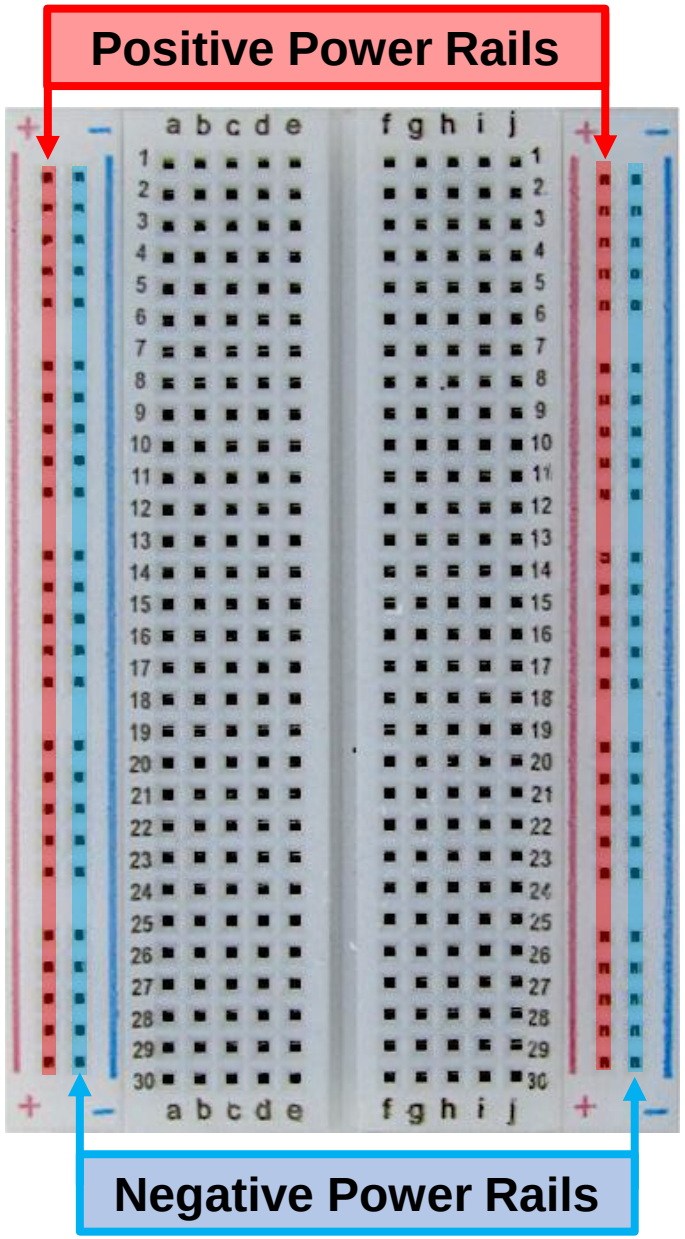




Almost every breadboard has **three main sections**:

1. Power Rails
2. 5 Hole Terminal Strips
3. Center Divider

Breadboard – Power Rails

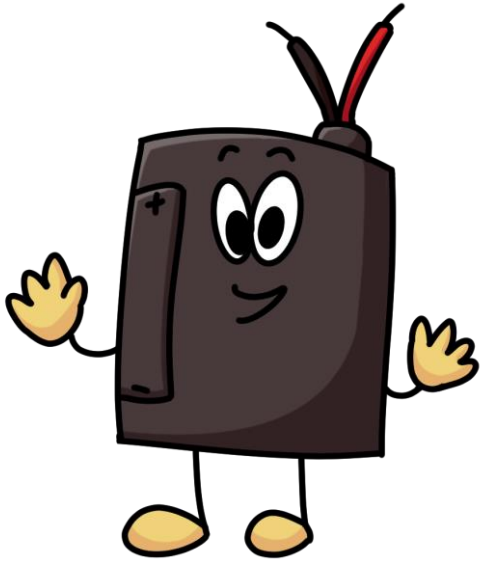


The ***Positive Power Rails*** has a red line and plus (+) next to the rail.

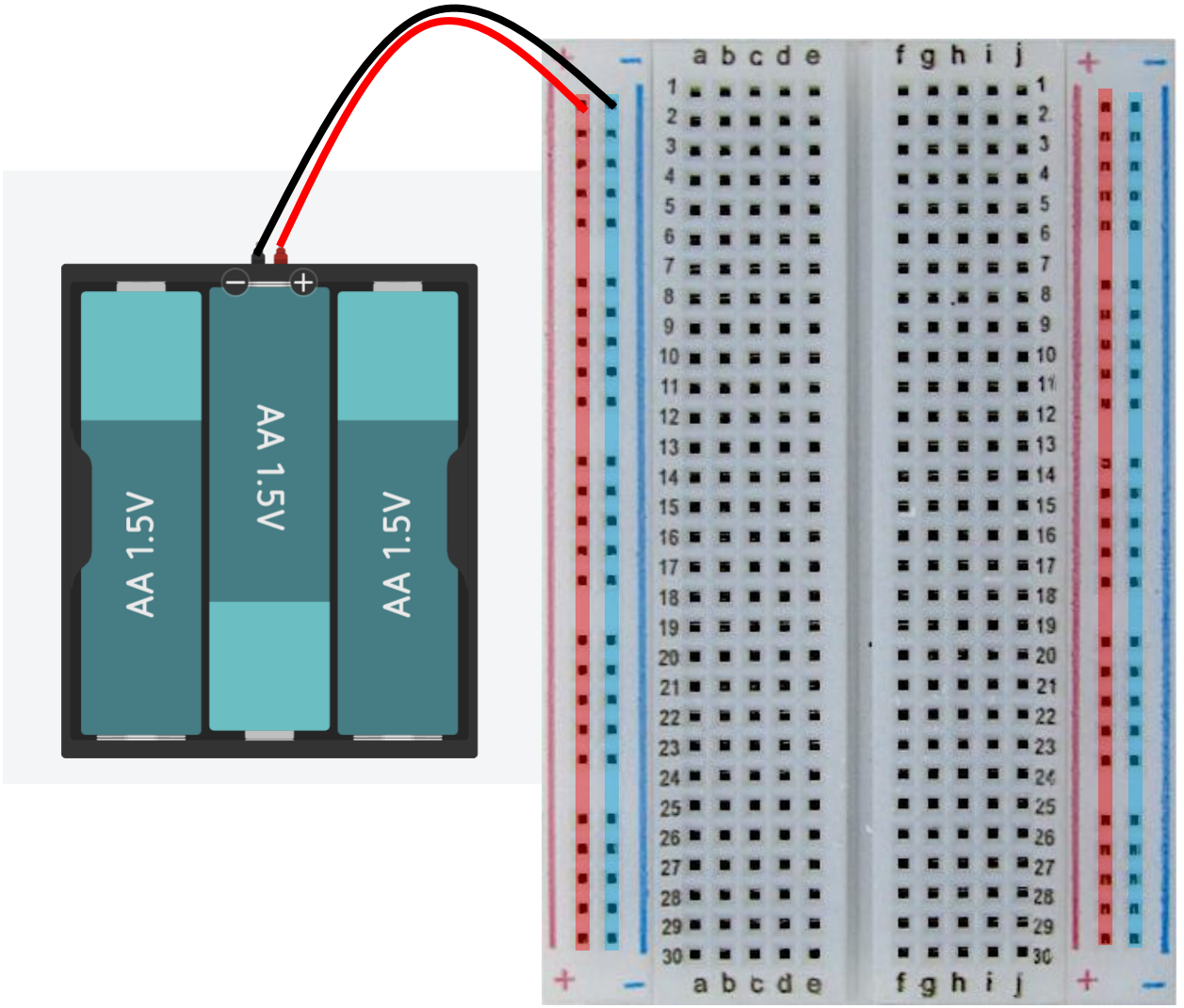
The ***Negative Power Rails*** has a blue line and minus (-) next to the rail.

The ***Power Rails*** holes are connected vertically down a breadboard.

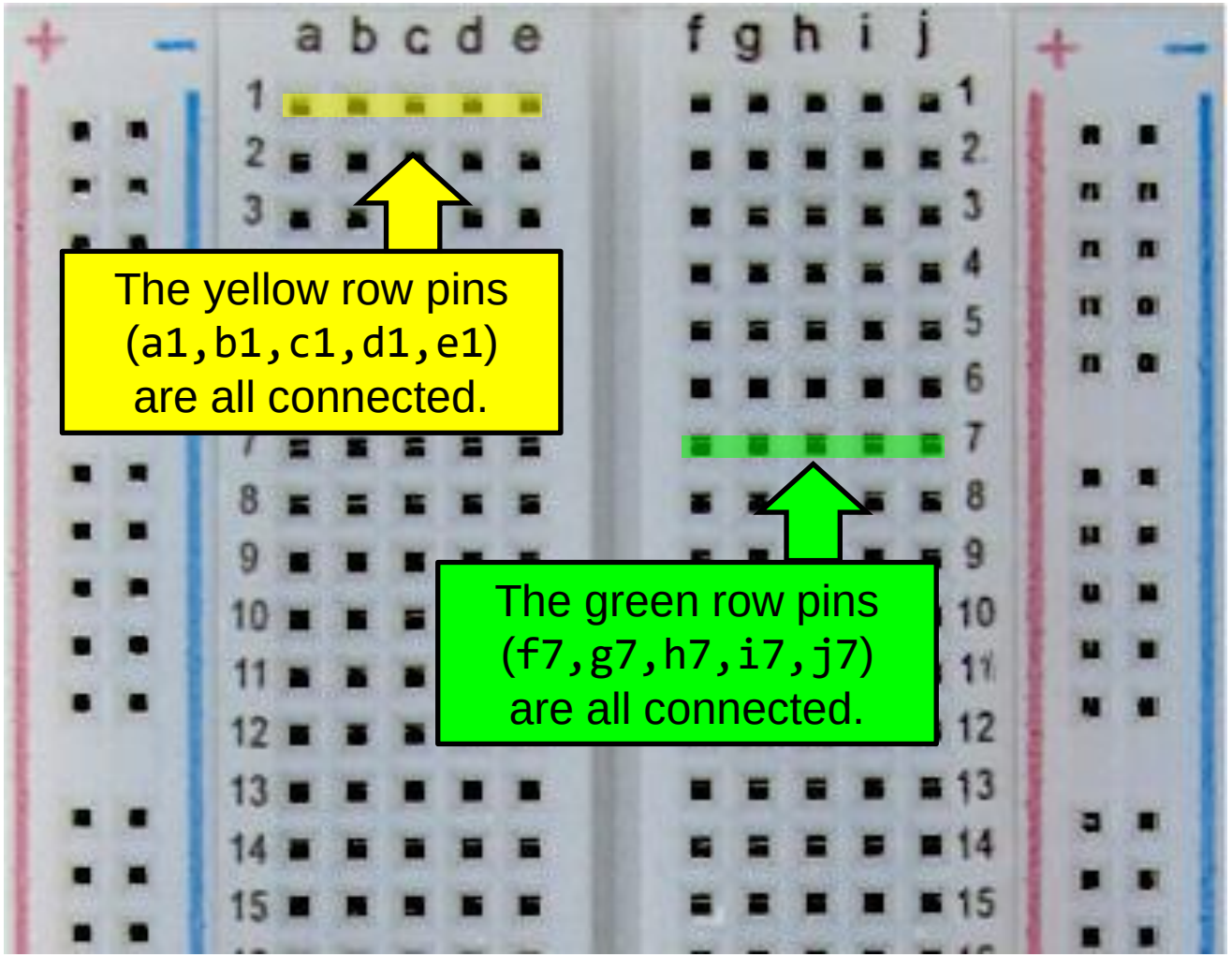
Breadboards - Connections



The Power Rails are also the place where a power source can be hooked up to the breadboard.



Breadboard – 5 Hole Terminal Strips

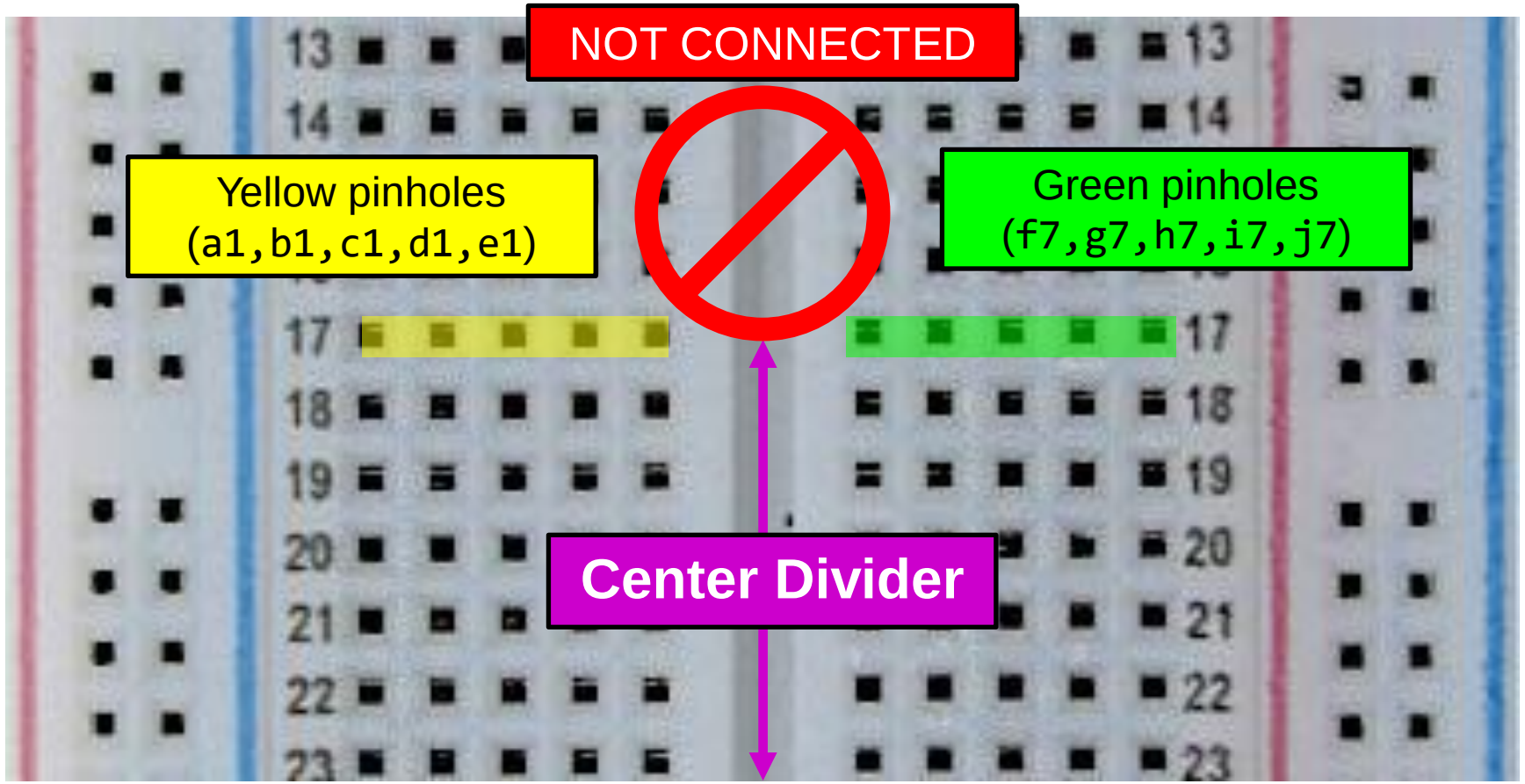


The ***5 Hole Terminal Strips*** connect holes

a-e **or** f-j

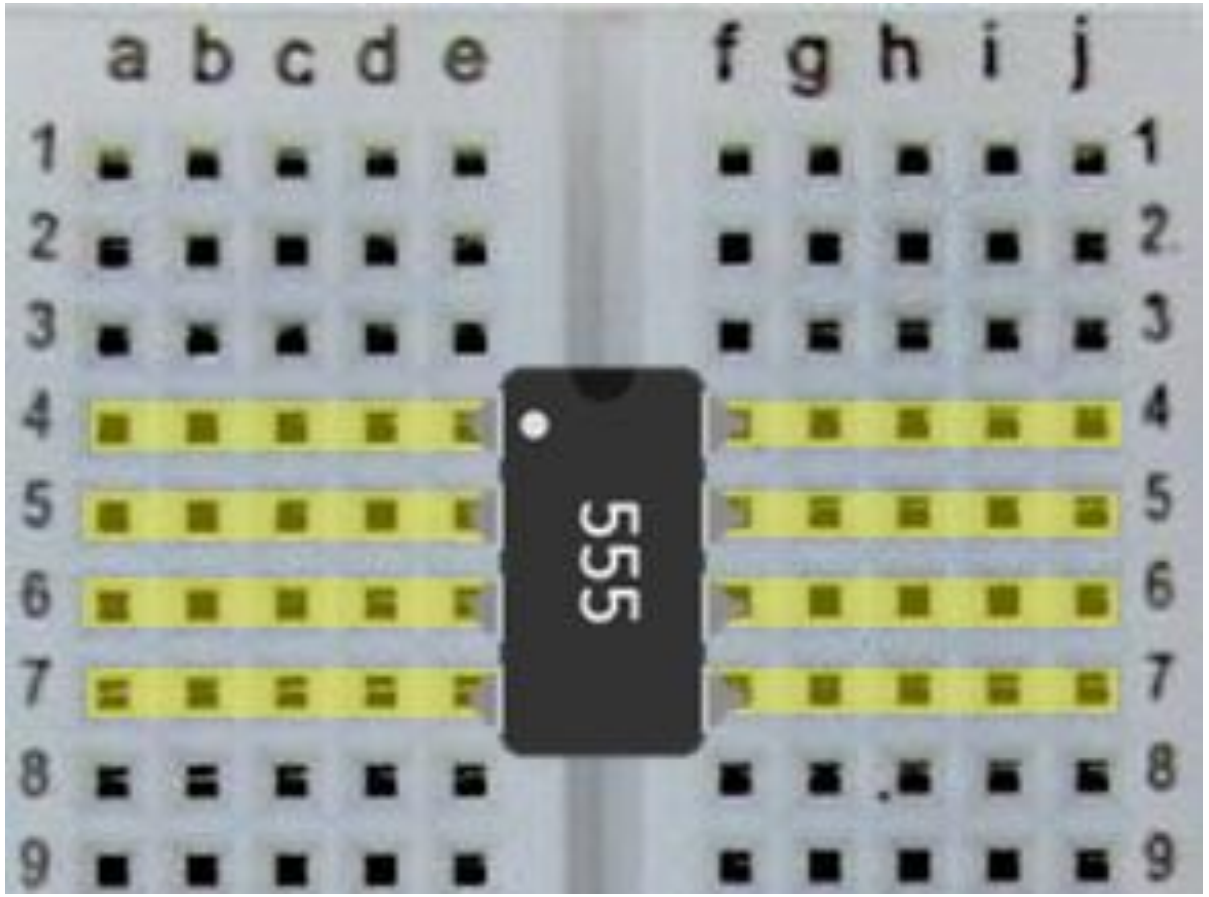
along any number row.

Breadboard – Center Divider



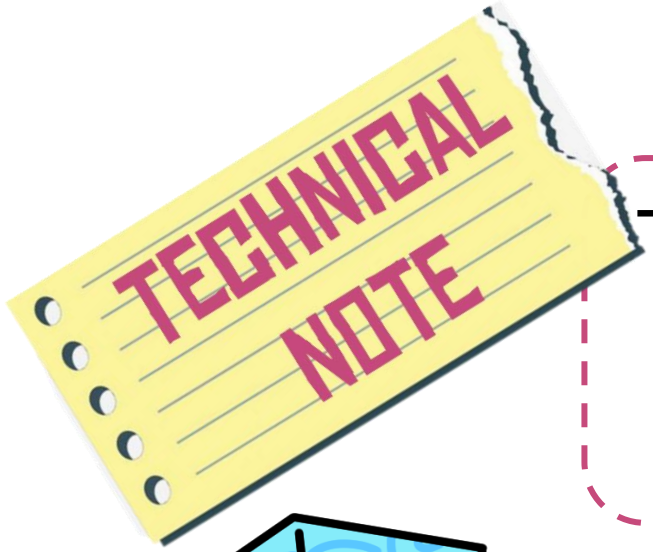
The ***Center Divider*** splits the breadboard into two halves, so `(a to e)` pinholes are **not** connected to `(f to j)` pinholes.

Breadboards – Chips crossing the Threshold

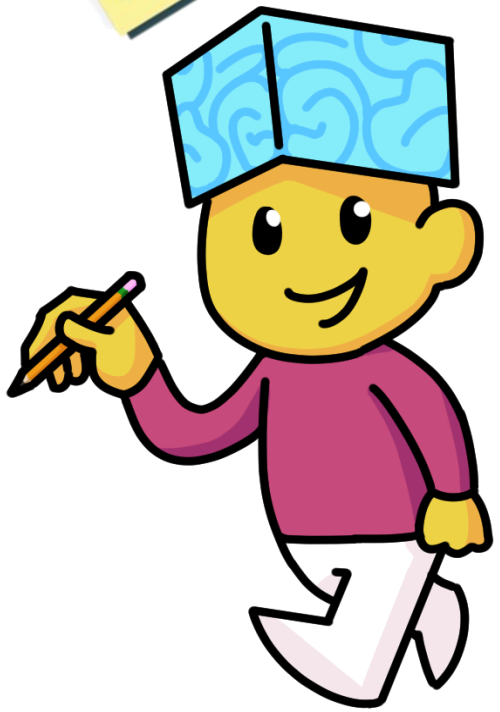


The ***Center Divider*** also makes it possible to isolate each pin on a chip.

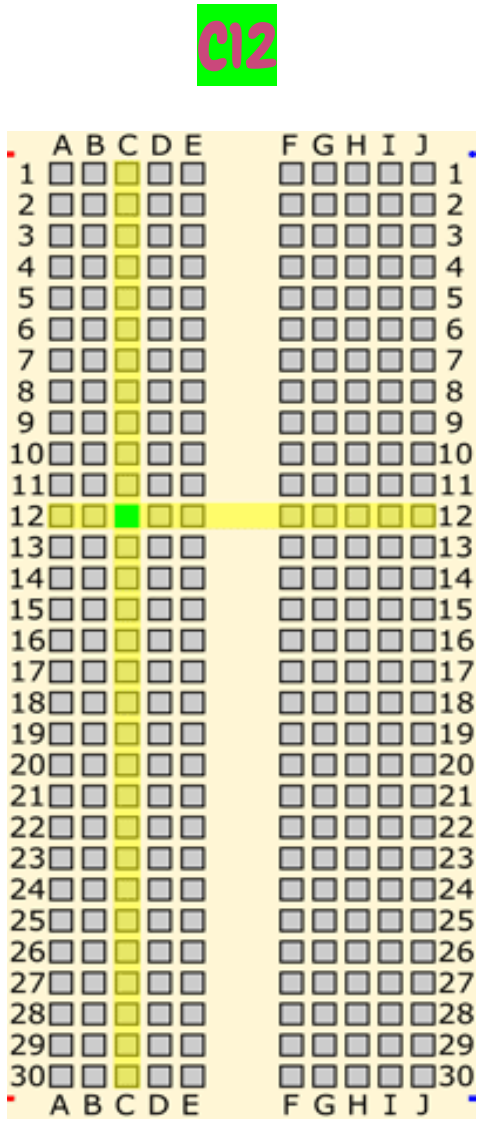
When chips are inserted across the gap, each pin has its own row where multiple connections can be made to the individual pins.



The letter and numbers located on a breadboard are for reference only!

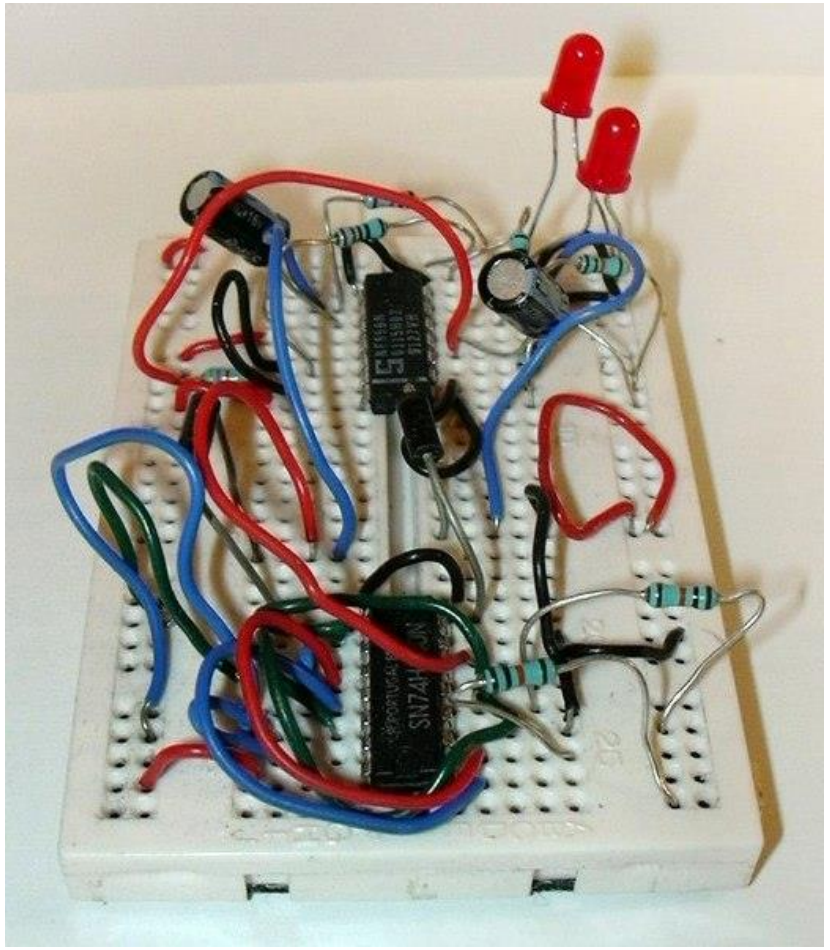


Using the column letter and the row number, you can describe the exact location of any pin hole on the breadboard!

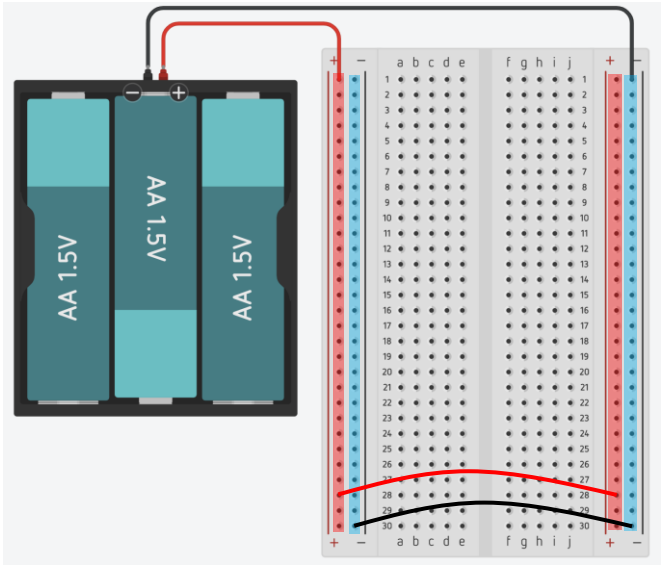


Breadboards - Connections

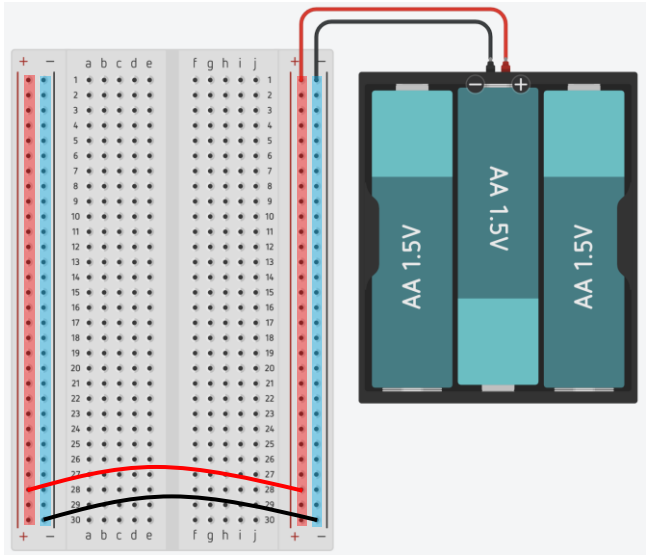
Any row or column on the breadboard can be connected using jumper wires or electrical components.



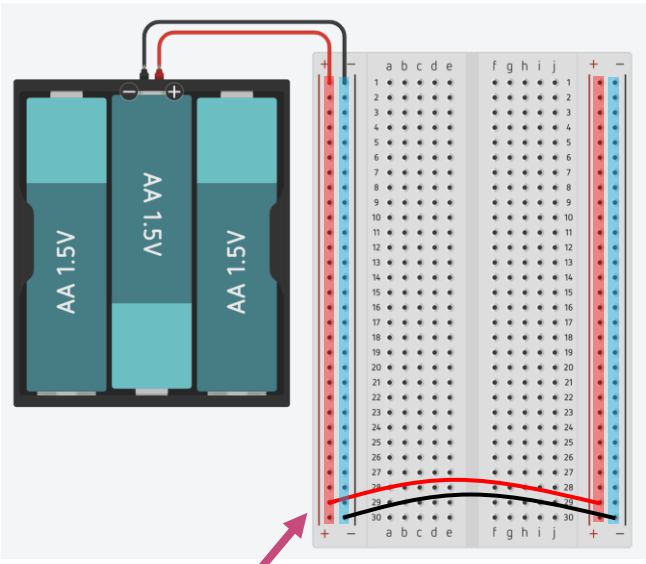
Breadboards - Connections



A battery can be connected a Power Rail in many ways, but it is always a good practice to connect the positive battery leads to the positive Power Rails and the negative battery leads to the negative Power Rails.

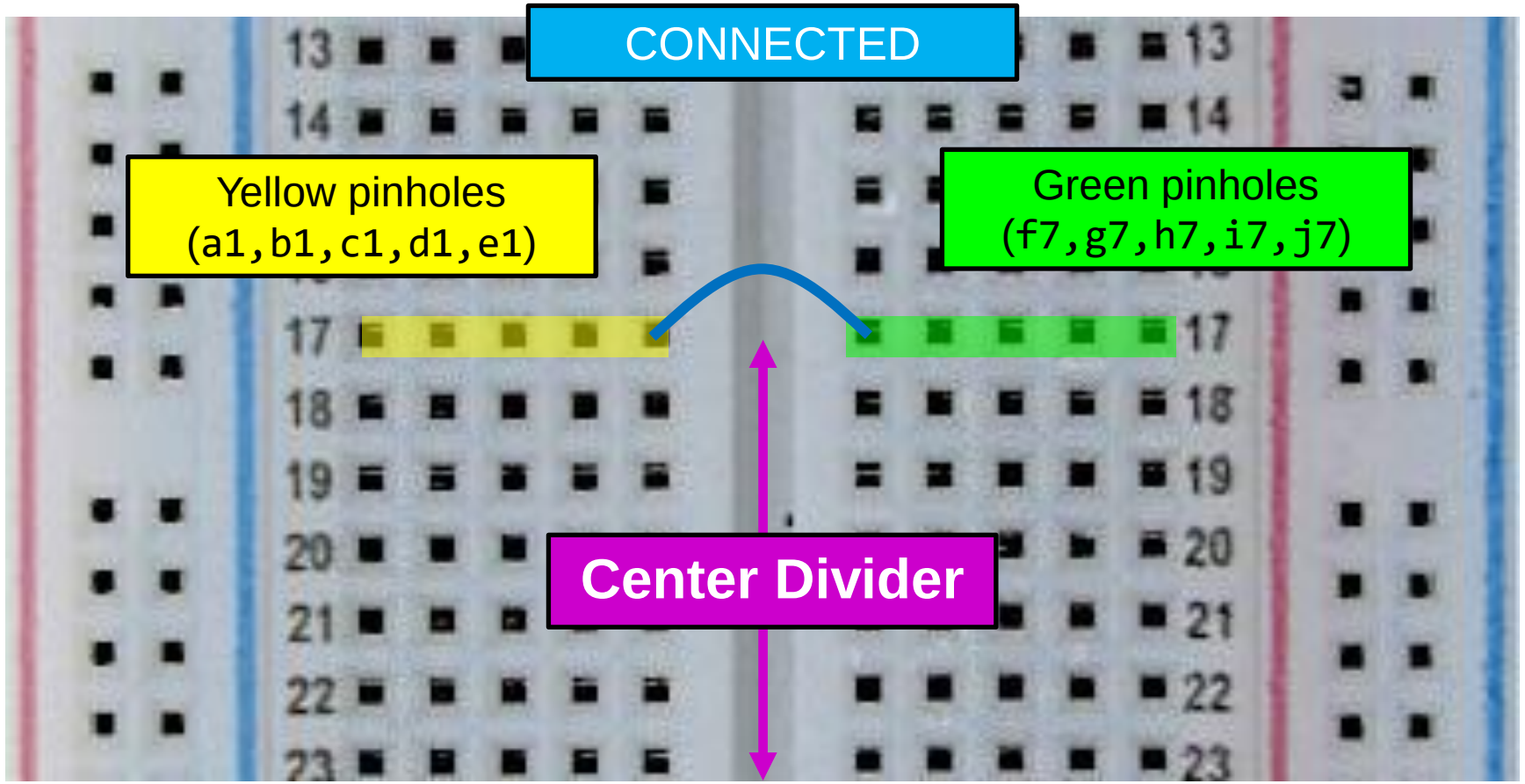


Jumper wires are used to connect the Power Rails on both sides of the breadboard.



Be sure to only connect positive power rails together and negative power rails together keeping everything consistent on both sides of the breadboard!

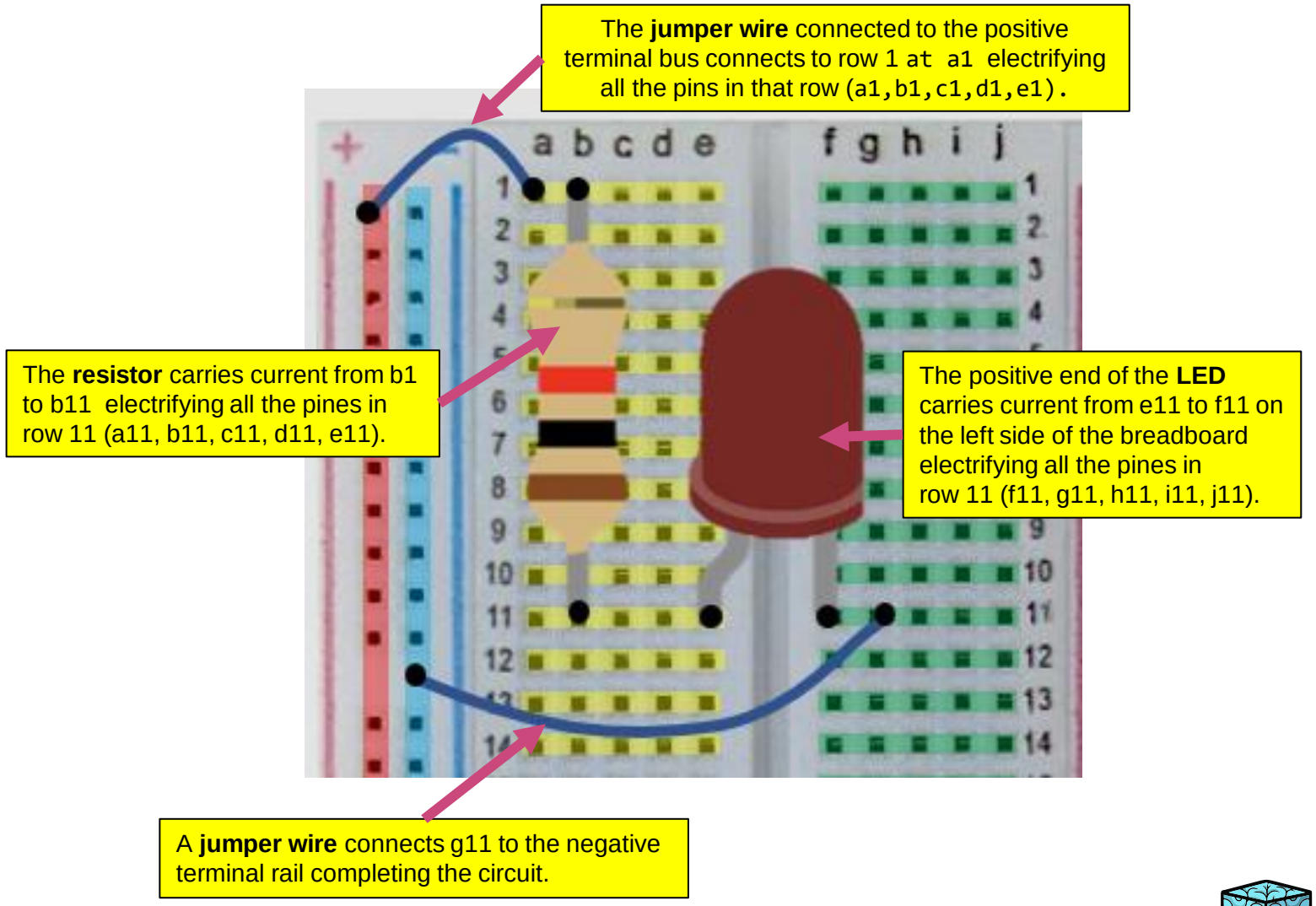
Breadboards - Connections



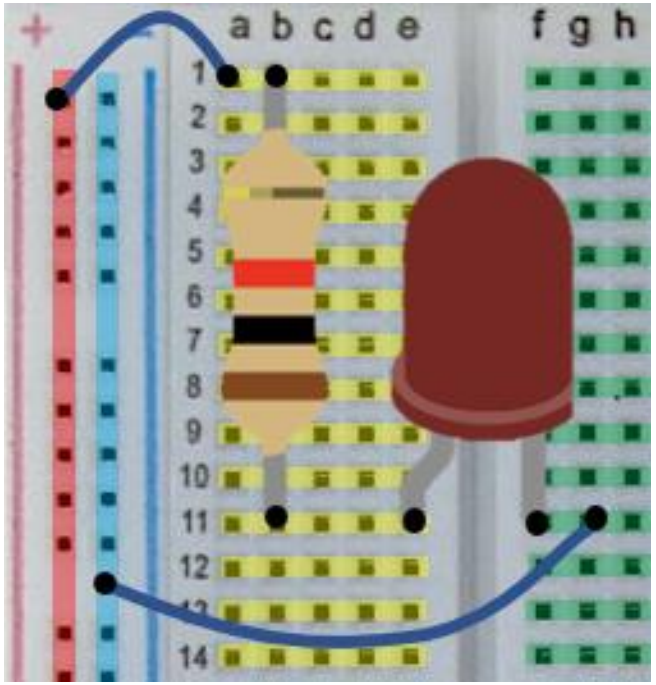
Use a jumper wire to connect the halves! Pinholes (`a to e`) ***are*** connected to pinholes (`f to j`)!

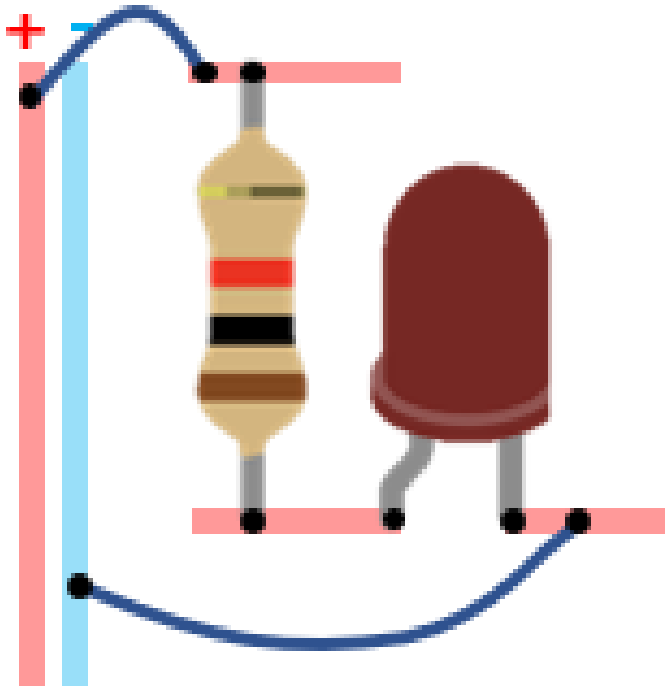
Breadboards - Connections

Here is an example of how a simple circuit could be built on a breadboard!



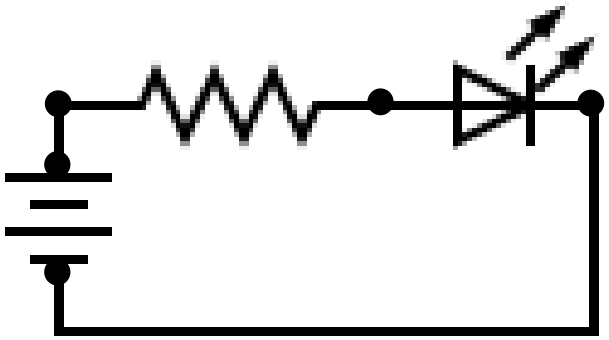
Breadboards - Connections

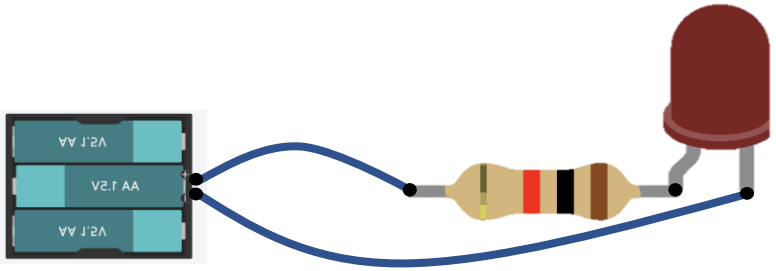


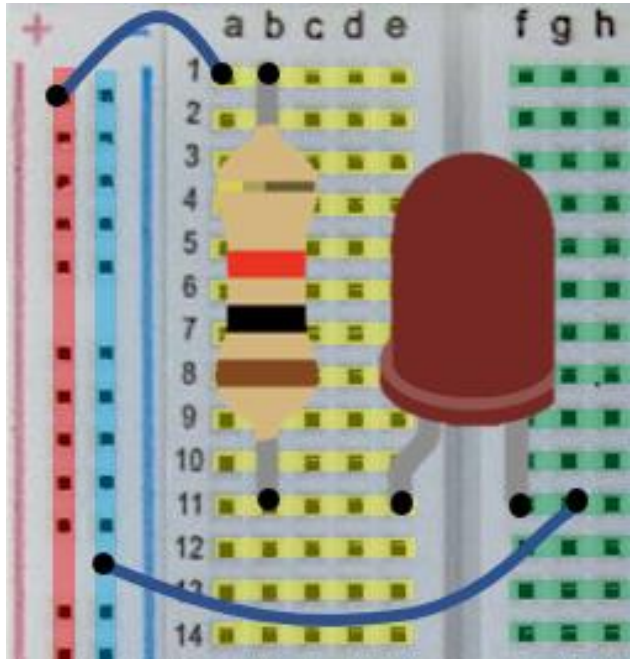


A simplified drawing of the breadboard circuit makes it easier to see all the connections in the circuit.

Breadboards - Connections

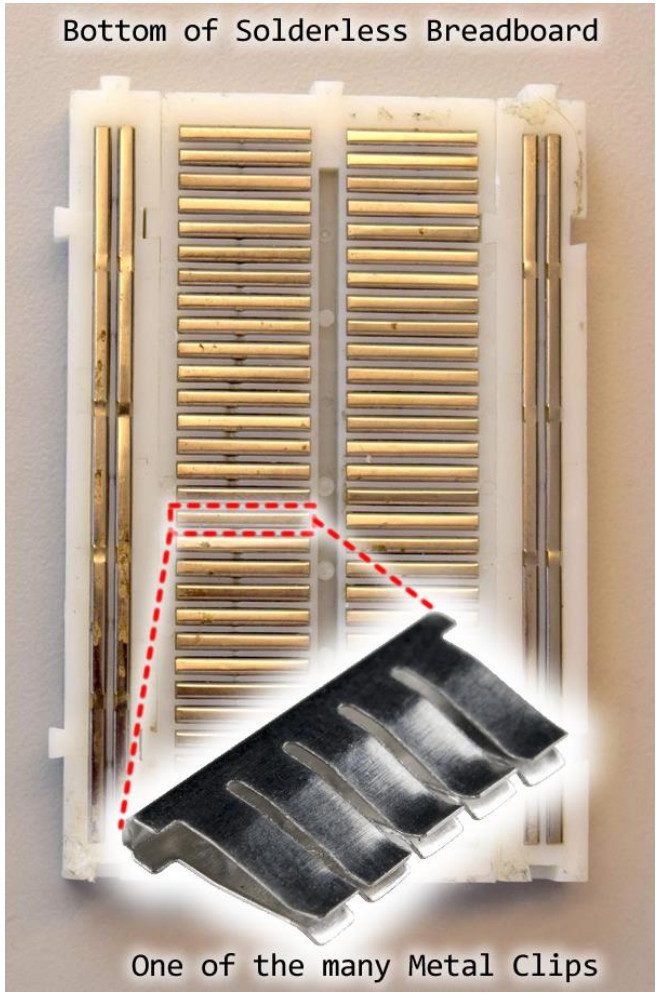






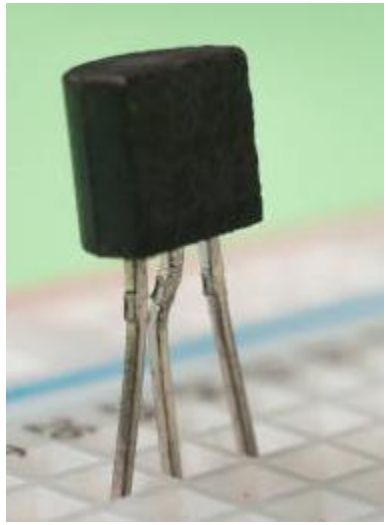
A progression of the circuit from a schematic, to a drawing, to a breadboard design clearly shows all the component connections in the circuit.

Breadboards - Connections



With the back of the breadboard uncovered, you can see how the breadboard is constructed with all the metal strips that connect the rows and columns.

If you remove one of the metal strips you can see how the components connect to the breadboard.



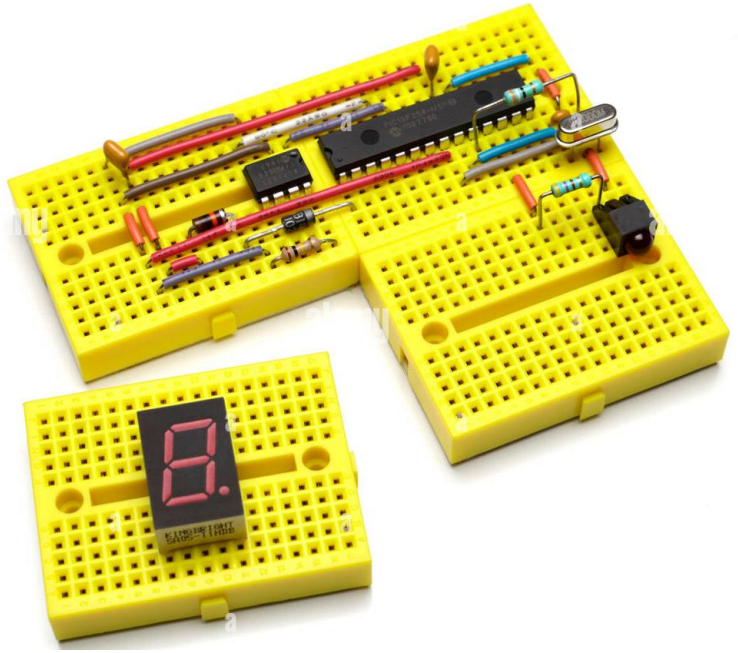
When a pin is inserted into the pin holes on the breadboard……

……..a physical compression fit connects the pin of the component to the breadboard connecting it to the row.

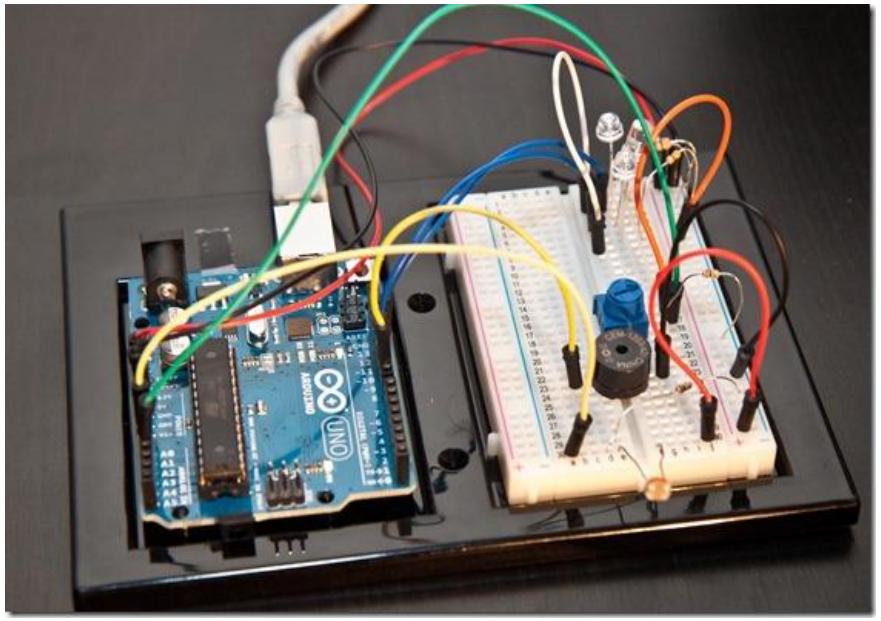
FUN FACTS

Did you know that breadboards can be joined to make a larger area to build circuits on?!
Use the tabs on the top and sides of the breadboards to connect them together!

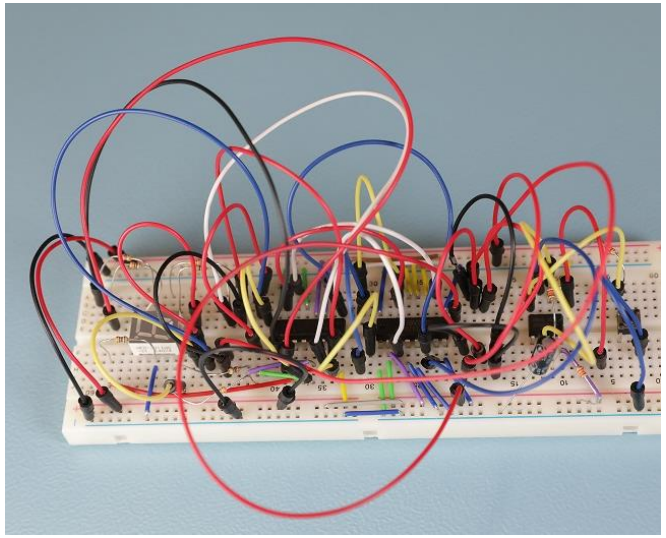
You must use jumper wires to make electrical connections between the boards!



Stick your breadboard to any surface! Peel away the protective paper on the bottom to expose the adhesive layer!



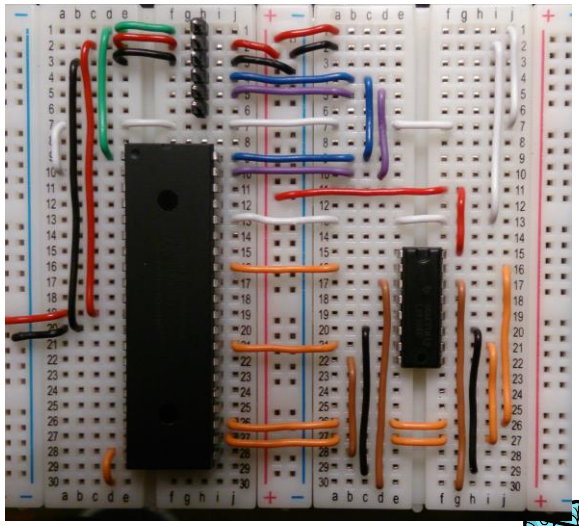
But, be warned, once stuck to a surface, it is extremely difficult to remove the breadboard!



TECHNICAL NOTE

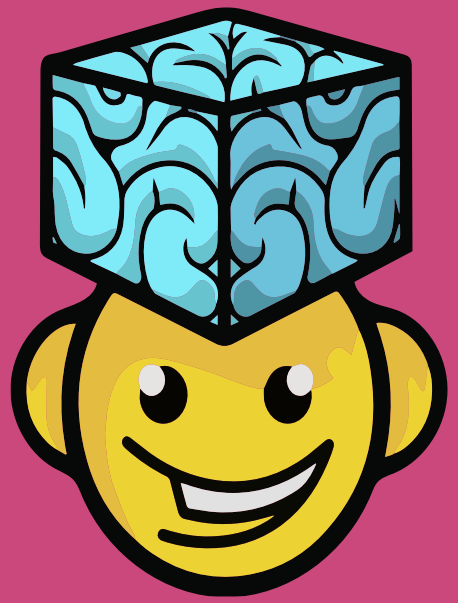
Jumper wires do not lay flat. When there are multiple connections in a circuit it can sometimes be difficult to see all the connections clearly when troubleshooting.

Solid core wires lay flat and allow you to see the connections in the circuit a bit more easily when there are many connections.



SQUARE BRAIN

Looking to get your own breadboard and complete circuit kit?



Visit us at SquareBrain.com