The Breadboard (Solderless Prototyping)

- **Purpose:** Used for testing and changing circuit designs quickly without permanent connections.
- **Internal Structure: * Power Rails:** Two vertical columns on each side (marked + and -) for power distribution.
  - **Terminal Strips:** Horizontal rows of 5 connected holes separated by a center "ravine" (for IC chips).
- **Step-by-Step Assembly:**
  1. Place the IC across the center notch.
  2. Connect power and ground to the side rails.
  3. Use **Jumper Wires** to link components.

Keep wires short and flat to avoid "bird's nest" wiring

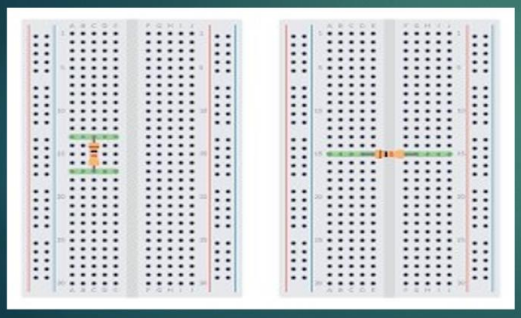
The Vero Board (Stripboard)

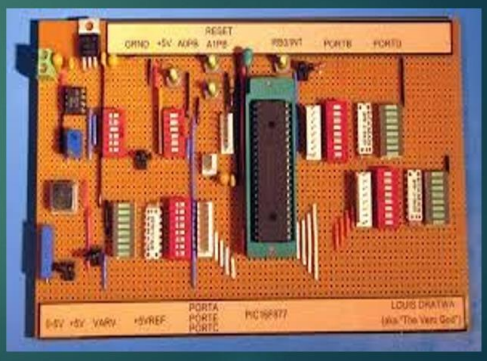
- **Purpose: Used for semi-permanent or permanent circuits. It requires soldering.**
- **Construction: A pre-drilled PCB with parallel copper tracks on one side.**
- **Key Technique: Breaking Tracks:**
  - **Since the copper runs the full length of the board, you must use a Track Cutter (or drill bit) to break the connection between components that shouldn't be linked.**
- **Step-by-Step Assembly:**
  1. **Plan the layout on graph paper first.**
  2. **Insert components from the non-copper side.**
  3. **Solder leads to the copper strips.**

Cut the tracks where necessary to isolate nodes

bread board

Vero board





Testing Electronic Components

Objectives & Tools

- **Learning Goals:**
  - **Understand the function of core electronic components.**
  - **Master testing techniques using a Multimeter.**
  - **Identify signs of physical and electrical failure.**
- **Required Tools: Digital Multimeter (DMM), Soldering Station, Desoldering Pump, and Component Te**




Electronic components Resistors

- The Resistor (R)
- Definition: A component that limits or regulates the flow of electrical current in a circuit.
- Unit of Measurement: Ohms (Ω).
- Governing Law: Ohm's Law (V=I×R).
- Functions:
- Voltage division.
- Current limiting (protecting LEDs/sensitive parts).
- Heat generation (in power resistors).

- Resistors (The Limiters)
- Function: To limit current flow and divide voltage in a circuit.
- How to Check: * Set DMM to Ohms (Ω).
  - Measure across the resistor (ensure power is OFF).
- Signs of Damage: * Burn marks or discoloration.
  - Open Circuit: DMM reads "OL" (Infinite resistance).
  - Value Drift: Measured value is outside the tolerance band (e.g., +/- 5%).

حساب المقاومة بالألوان

شرح الطريقة وبرنامج أونلاين للحساب