SOLDERLESS BREADBOARDS

Introduction

The solderless breadboard (generally a large, white, plastic component with rows and columns of holes) provides a working space where temporary circuits can easily be built[1]. Leads of electrical components (e.g. resistors) can easily be pushed into the breadboard holes.

A typical breadboard has a large number of holes which are organized in rows of five or six. The holes in any single row are electrically connected to one another. Any two rows of holes are isolated electrically from one another. A central groove or channel generally separates two banks of these holes. The overall situation is illustrated in Fig. 1. The holes on either side of this channel are also *not* electrically connected. The channel is not important to us now, but will become useful in later lab assignments when we create circuits containing integrated circuit (IC) chips packaged as DIPS (Dual In-Line Packages).

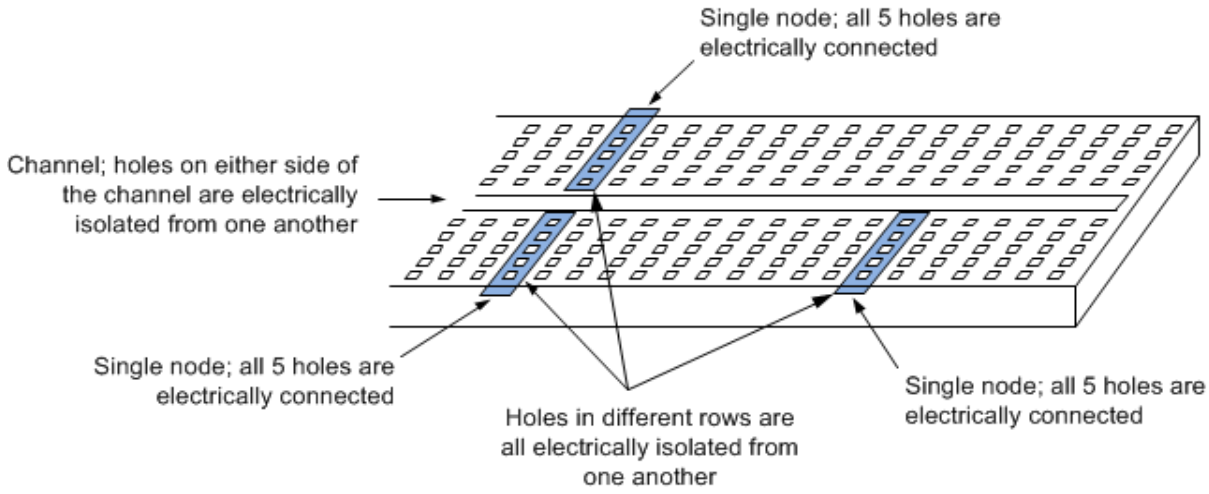

Figure 1. Hole connections on a typical breadboard.

Definitions

- Holes in a breadboard which are electrically connected are said to be at the same **node** in a circuit. A node is a point in a circuit where two or more components are interconnected by a **short circuit**. No energy is required to transfer current through a short circuit, so the short circuit does not restrict the flow of current—it has zero resistance. This means that there can be (theoretically) no voltage difference between two holes in any single row in a breadboard.
- No current will flow from one hole to another on a breadboard if the holes are not electrically connected. Different physical points in a circuit which are not electrically connected are sometimes said to be connected by an **open circuit**. No current can flow through an open circuit. There is no limit to the possible voltage difference across an open circuit.

Some breadboards have, in addition to the hole layout shown in Fig. 1, supplementary rows of holes running the entire length of the breadboard. These rows are called **bus strips**, and are indicated in Fig. 2. Bus strips are mostly useful when connecting the same voltage level at multiple locations in larger-scale circuits. Ground and fixed voltage supplies, for example, may be used in multiple stages in an overall circuit. Bus strips are often marked with a red or blue line running next to them.

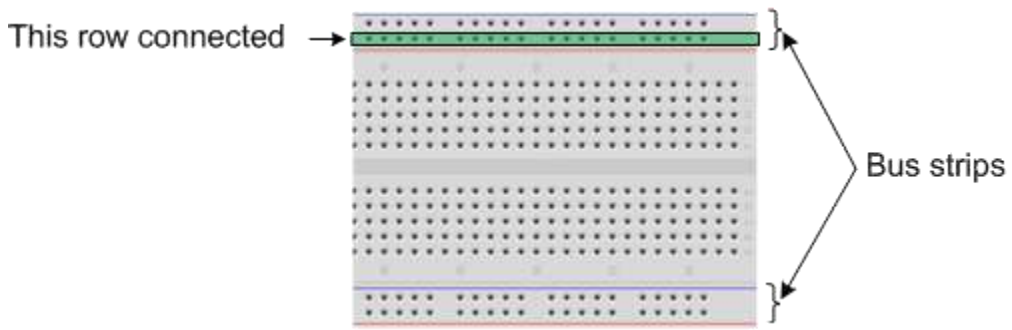

Figure 2. Breadboard with bus strips.

A number of additional variants on this basic setup are relatively common. For example, larger breadboards may contain multiple breadboards like those shown in Fig. 2 placed side-by-side. Other breadboards may have terminal strips which provide banana-plug type connectors on the breadboard; these types of connectors can facilitate connection of certain types of equipment to the breadboard. None of the variations, however, affect the basic breadboard functionality shown in Fig. 1.

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