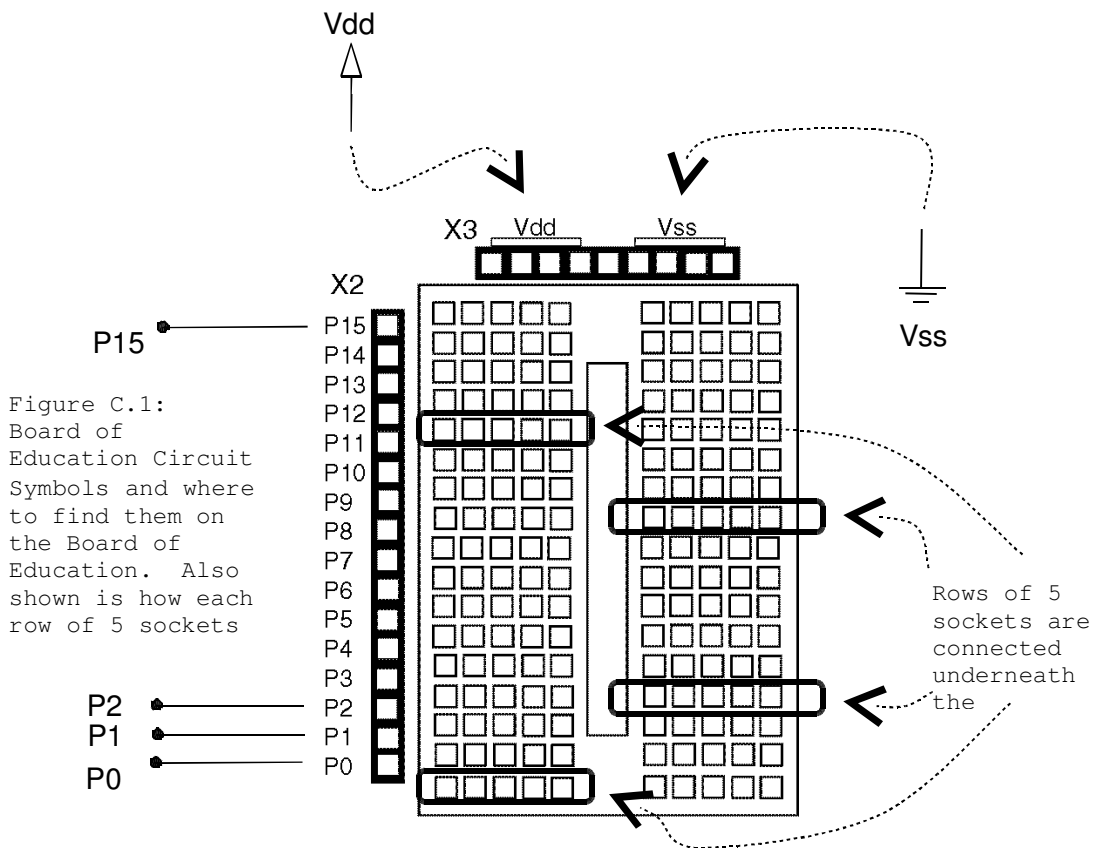




## Appendix C: Breadboarding Rules

Figure C.1 shows the circuit symbols used in the experiments along with where to find them on the Board of Education. The symbol for Vdd is the positive 5-volt supply for the Javelin and the Board of Education. There are four sockets along the top side of the breadboard to the left for making connections to Vdd.



Next, the ground symbol is used for Vss. This is the reference terminal for taking measurements, and it's considered to be 0 volts compared to all other voltages on the Board of Education. The four sockets for connecting jumper wires to Vss are along the top of the breadboard to the right.

There is a row of 15 sockets along the left side of the breadboard for connecting to the Javelin I/O pins. Each I/O pin has a label. I/O pin P0 is connected to the bottom left socket. Pin P1 is the next socket up, and above that socket is the connection to pin P2, and so on through pin P15 at the top left.

Figure C.1 also shows some samples of five-socket-wide rows that are electrically connected underneath the breadboard. There are 34 of these rows arranged in the two columns on the breadboard. If you want to connect two jumper wires to each other, you can just plug them both into the same row of five. Then the wires are electrically connected. Likewise, if you want to connect one or more wires to the terminal of a part, just plug them into the same row on the breadboard and they'll be connected. Four sockets at a time can be added for Vdd, Vin, or Vss by just running a jumper wire from a socket, such as Vdd, to an empty row on the breadboard.

Figure C.2 shows the BOEBot breadboard. Along with Vdd and Vss, three sockets are also added for accessing Vin, the BOEBot's unregulated power source. Whatever voltage is plugged into the BOEBot is what appears at the Vin sockets. If the power supply is the four 1.5 V AA batteries in the J-Bot battery pack, Vin will be at 6 V. If the power supply is a 9 V battery connected to the battery clips on the BOEBot, Vin will be 9 V. If a wall mount 7.5 V power supply is connected to the BOEBot's power plug, Vin should be 7.5 V. However, be careful of wall mount power supplies. Their voltage output varies with the current draw placed on the supply.

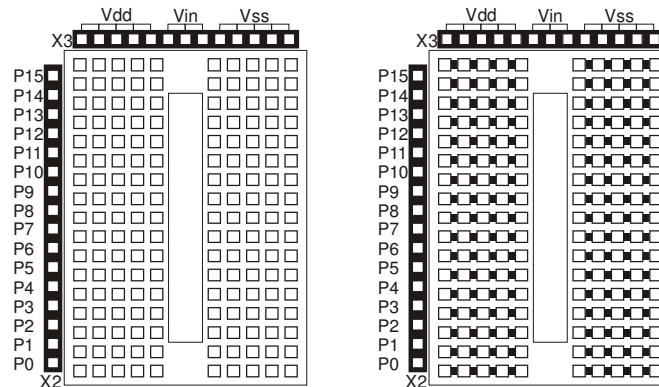


Figure C.2: Another look at the connections underneath the breadboard, this time on the BOEBot.