

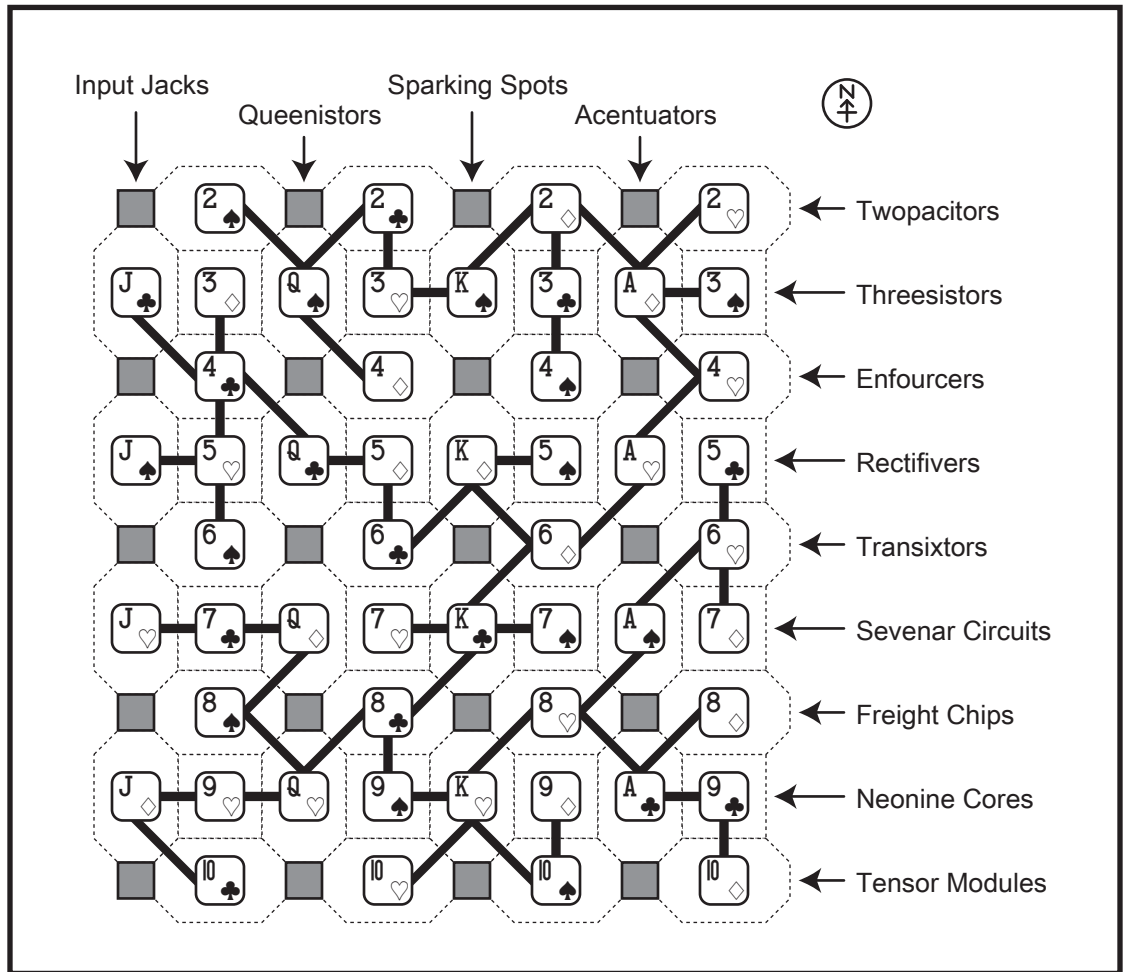
# How to Build a Circuit Board (by W. When, Ph. D.)

To the right is an example of a completed circuit board.

There are 52 different parts ("nodes") in thirteen different types:

- \* Twopacitors
- \* Threesistors
- \* Enfourcers
- \* Rectifiers
- \* Transixtors
- \* Sevenar Circuits
- \* Freight Chips
- \* Neonine Cores
- \* Tensor Modules
- \*\* Input Jacks
- \*\* Queenistors
- \*\* Sparking Spots
- \*\* Acentuators

Each type comes in four brands: Spartan (♠), Hartley (♥), Dimension (◇), or Cluster (♣). There are four designated slots for each type. Those four slots are always in the same location in each circuit; along a row (\*) or a column (\*\*).

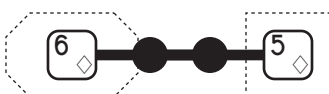


Note that in addition to figuring out where each node goes, you will have to wire the proper nodes together. Wires always cross between touching nodes, but only along an edge -- a connection between two nodes is called a "hop." The gray squares cannot be used. All the nodes have to be connected, and there CANNOT be any loops (that causes what Doctor When calls a "short circuit" -- I know, that's a technical term, you probably haven't heard it before).

Now, although the example is a COMPLETED circuit board, it is not the CORRECT circuit board. The good Doctor is busily trying to give us a list of necessary Circuit Constraints for the correct circuit board. Note that there is a compass rose in the upper-left of the diagram. There are two types of Circuit Constraints: "Directional" Constraints use the compass rose to tell you the direction between two nodes (but tell you nothing about their connectivity), and "Connectivity" Constraints tell you how many hops are between specific nodes (but tell you nothing about their relative direction).



This is an example of a Directional Constraint. It depicts the Dimension Acentuator and the Hartley Enfourcer, as well as the compass rose in the middle. It tells you that the Hartley Enfourcer is due northwest of the Dimension Acentuator, although there may be other nodes between them. Note that the direction is DUE northwest, north-by-northwest doesn't count.



This is an example of a Connectivity Constraint. It tells you that the Dimension Transixtor and the Dimension Rectifier are three "hops" apart; that is, there are two nodes between them along the connection lines. Since there aren't any loops and all nodes are connected, there's only one way to get from one node to the other. However, these two nodes could be located right next to each other (without a connection between them); this Constraint tells you NOTHING about their direction. The Rectifier might even be to the left (west) of the Transixtor!

That should be all you need to get started. Good Luck!