**RCB Troubleshooting and Checklist:**

***Each Robot Control Board (RCB) should be tested in the following ways prior to assembly.***

1. Continuity test – Using a multimeter set to read continuity, check each of the copper traces on the board to see that they connect at their farthest points. Any area of copper that travels from one point on the board to another point should be checked. This eliminates the problem of having a non-working circuit due to connection issues.
2. Before construction begins, each board should be looked over by the instructor to clear any areas of connected copper that SHOULD NOT be connected. The etching process used in making the RCB’s copper traces can often leave small copper connections paths between areas of copper that are very close together. These would be areas that ARE NOT supposed to be connected, but are connected because of under-etching. The instructor should take an exacto-knife blade and scrape between areas that should not connect together to be sure there are no short circuits.

**Troubleshooting DURING construction:**

 ***What does the instructor do if;***

1. The holes don’t exactly line up for a part that is to be installed such as a chip socket or header pin.
	1. *Use a small tipped device to gently bend the pin in question into the desired hole. If pins on the top of the board get bent, just use small pliers to bend them back.*
2. A student bridges two areas of copper together that SHOULD NOT be connected.
	1. *Use a DE-soldering tool to REMOVE the solder form the two locations and re-solder them correctly.*
3. A student heats up the copper on the board too much and BREAKS the copper trace that connects two or more points.
	1. *The teacher can cut a small piece of BARE wire and solder each end of the wire to a point of “Good” connection. In other words, you are replacing the copper trace with a solid piece of wire. It will need to be soldered at each end to re-establish the connection. Be sure the “NEW” wire does not touch areas of copper it is NOT supposed to contact.*
4. The copper has been damaged at the point where a pin is supposed to be soldered.
	1. *This can often happen in the drilling process and you could find that there is no copper to solder to. In this case you should bend the pin that comes through the hole to make contact with the copper trace that connects the pin to the circuit. Solder the pin to the available copper.*

**Before placing chips in the RCB check the following things;**

* Check for solder bridges.
* Check for any areas of broken copper.
* Check the Voltage regulators to see that they are each in the correct location. They physically look the same. The correct numbers are on the back of the circuit board.
* Check to see that there are no un-etched areas of copper connecting copper traces that SHOULD NOT connect. If you find connected areas, use an exacto knife to score the areas apart.
* Check the polarity of all the electrolytic capacitors.
* Check the polarity of the Tantalum Capacitors in front of the regulators.
* Check the polarity of all the LED’s.
* Check the polarity of the DIODE.

**After these items are checked, install the following items;**

* Propeller Chip – Pin 1 is closest to the Prop plug
* EEPROM – Pin 1 faces the TOP of the board
* Other items DO NOT need to be installed to check the operation of the board.
* Apply 12volts. Be careful to get the POLARITY correct. I always place a “+” and “–“ on the FRONT of the green power connector to remind me. The DIODE side is ground.
* The RED and Yellow LED’s should come on after the program is downloaded. The GREEN LED will only come on AFTER the xbee is installed. There is a separate testing setup for checking the wireless communication.