

SRC Roundtable Meeting: December 2012

In the month ahead, the following items should be considered as you move forward with materials to begin the circuit board construction:

1. Robot Control Board Assembly Tips:

- a. Always MOUNT parts FLAT to the board. This keeps parts from getting broke.
- b. DO NOT create BRIDGED solder joints on your circuit board. The RULE OF THUMB is; if it's not connected by COPPER it SHOULDN'T be connected by solder.
 - i. Several ways to CORRECT BRIDGED SOLDERING are;
 1. Use a solder sucker
 2. Clean the iron TIP and wipe the hot iron between pins.
 3. Hold the board on its side, heat the area in question and while the solder is HOT tap the board on the desk. This causes the HOT solder to "DRIP" off the board.
- c. Keep all soldering iron tips CLEAN and TINNED. Use sandpaper, a file and/or tip cleaner.
- d. Create for yourself a "TEACHER WORKSTATION" that has all the necessary tools and supplies that will allow you to inspect and fix, if necessary, their circuit boards. A soldering iron with a clean tip and the hand tools in arms reach will make YOUR job MUCH easier!
- e. Pass out COMPONENTS to students a few at a time and have them return to you with their board for INSPECTION before moving forward. This allows you to INSPECT their work to be sure they are soldering parts correctly and in the right spot. It also allows you to check for POLARITY on parts like Capacitors and LED's.

2. Programming – Keys to Success

- a. Details are CRITICAL in programming! Be sure to look carefully at spelling, typing of symbols, tabs, indents, spaces and general LAYOUT of the code on the page.
- b. Pay close attention to the color changes in the program as various code is added.
- c. Pay close attention to the "grey code links". These grey links let you know that the code is following a specific path through the program.
- d. The following issues are general hang-ups that students get into when beginning programming
 - i. Connecting the PROP PLUG backwards. (Error Message No Propeller Chip found!)
 - ii. Program doesn't recognize the chip. Generally 1 of two issues, either there is NO POWER to the board, or the USB port is not recognizing the PROP PLUG.
 1. A quick fix, if the USB PORT is the issue, is to plug the PROP PLUG into another USB port. If the problem persists, you will need to click the drop down menu under the EDIT tab, then click preferences. Select the OPERATION tab, and click EDIT PORTS. See if the USB PORT is being recognized. (If the program crashes, it generally locks up the USB port you are using) You will likely have to click RESTORE DEFAULTS, then accept to get things right!
- e. Get students to **save** the programs they write. This allows them to keep moving along and then when you have a free moment, you can ask to see all the programs they have completed. They also make it good for the students to have programming references to refer to as they learn more.
- f. Have your students that "GET IT" share with those that don't. Peer teaching is a great tool!

3. Powering – UP issues:

- a. If the POWER is connected backwards (negative to positive and positive to negative) the diode will BLOCK all current so that the board cannot be burned up. The RED LED will not light up, which indicates that there is NO POWER to the board. Reverse the leads. The NEGATIVE power lead connects closest to the diode.
- b. When pushing wires into the green power connector, have students “TIN” the leads first so that all stranded wires go into the green connector. If even 1 small wire crosses over and touches the opposite polarity terminal, the power supply will be shorted and serious damage can occur. (INSTRUCTORS SHOULD VISUALLY CHECK FOR THIS BEFORE STUDENTS POWER UP THEIR BOARDS!) Teachers should also be sure that the insulation goes all the way up to the front edge of the connector. This will prevent stray wires from shorting.
- c. The power supply or battery voltage should be 12 volts. The board can handle up to 15 volts, but it is not recommended since the regulator cuts the voltage down to 5 volts.
- d. In order for all the experiments on Programming Activity Board 1 to run properly, the 12v supply needs to have at least 1 amp of current. If you choose to use another power source, just be sure that it has 12v DC output and at least 1 amp of current.
- e. When using the 12v Batteries that the robots use, 10.7 volts is the critical threshold voltage. If the battery falls BELOW 10.7 volts the yellow and green led’s on the Robot Control Board may start to cut on and off. This is an indication that your battery MUST be charged. Often the robots will stop responding to the PS2 control when this occurs. Optionally, the robot control may come and go. Essentially, what is happening is that the robot does not have enough current available to power the chip and the XBEE. The XBEE gets its power after the propeller chip gets power. This is why communication gets dropped.

4. Robot Control Board - Layout and PIN Configurations

- a. When looking at the ROBOT CONTROL BOARD there are three rows of pins connected to the Propeller. Teachers SHOULD emphasize to the students the assignment of each row. The PINS closest to the PROP CHIP are PROP PINS. They are the pins that either send out a signal or accept a signal (Controlled by code). The MIDDLE row of the upper and lower set is +5 volts. These pins connect all the way across the board and each pin is connected to the next. Finally, the OUTSIDE row of pins (farthest from the CHIP) is GROUND on the top and on the bottom set of pins. This becomes critical when plugging on things like SERVO motors that require a pin, 5volts and ground.