EE 1202 Labs: Ground Rules

- There are eight lab exercises that you will do as a part of EE 1202.
- The EE 1202 lab is ECSS 4.622, on the third floor of the ECSS building.
- Lab exercises will be done by teams of two students, working together.
- You will do these labs on your own, at your own rate.
- There are no scheduled lab times. Go to the lab and do your lab work when you wish (subject to lab open hours).

Reserving a Lab Position

- **Reserving a lab is simple:**
  - **Go to ECSS 4.622 during open hours (11:30 AM-8:30 PM, M-R, or on Friday, 11 AM to 12 Noon).**
  - **Sign up on the reservations list for a lab position and time. Reservations are available in 2-hour slots. The Friday hour is only for signing up for next week's slots.**
  - **At the reserved time, come to the lab and do the exercise. If you do not finish in two hours, you must reserve another slot.**
  - **After completing the lab, write your lab report and turn in on the due date in class.**

Lab Facilities

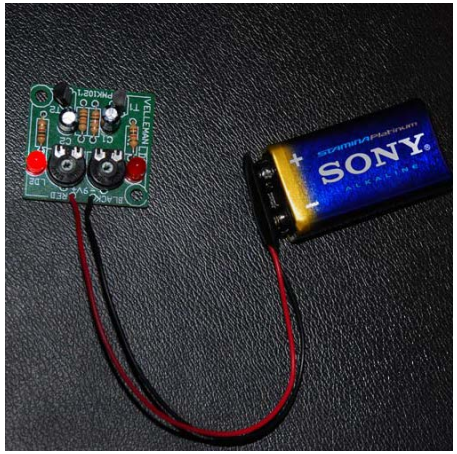
- **Supplies needed for EE 1202 labs (except for the electronic kits) are in the EE 1202 supply cabinet.**
- **The EE 1202 supply cabinet is on your left as you enter the lab.**
- **Plywood solder boards are just right of the three lab cabinets.**
- **You are responsible for getting supplies as needed from the cabinet for each lab, for replacing them when done, and for cleaning up your work area.**

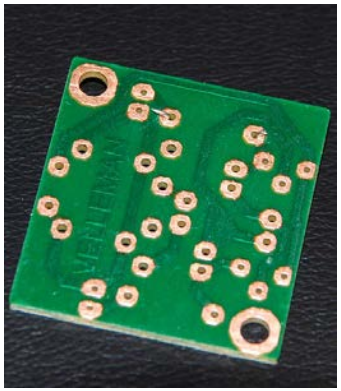
Building a Simple Electronic Circuit

- **Each year, billions (yes, BILLIONS) of printed circuit boards are built, so it is worthwhile to understand the basic principles of PCB assembly.**
- **Lab #1 is an exercise in building a simple PCB light blinker kit. As with all EE 1202 lab exercises, you will do this on your own in the EE 1202/2310 lab, which is ECSS 4.622.**
- **While in the lab, there will be a teaching assistant on duty, who can provide advice about the lab exercise. However, it is your responsibility to do the lab work.**

Light Blinker Circuit and PCB

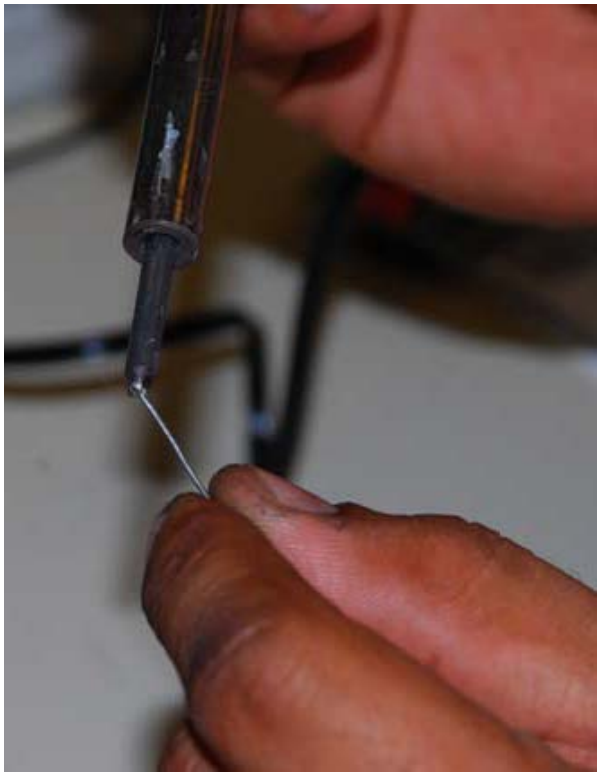
- The assembled light blinker circuit is shown to the right.
- You and your partner will <u>each</u> build a circuit.
- Follow instructions in the kit plus additional tips in your lab book (some tips follow).
- Examine the blank PCB. One side has copper wires; the other a printed parts outline.





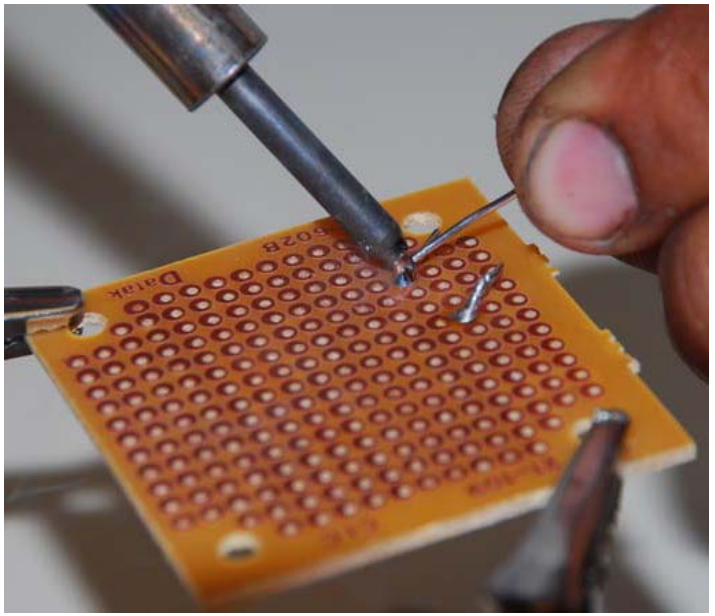
Preparing the Soldering Iron

- Plug in the soldering iron.
- Turn on bench power.
- Iron should heat in ~ 5 minutes.
- Clean off tip with wire cleaner.
- “Tin” Solder tip as shown.
- Repeat clean/tin cycle during soldering as required.



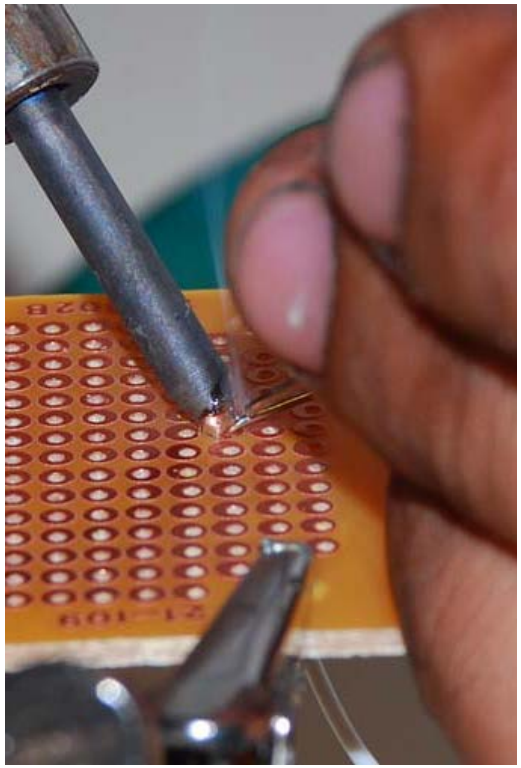
Practice Soldering Board

- **Attach a practice solder board to the “third hand.”**
- **Clip several 4-5” pieces of solid wire from the spool provided.**
- **Strip pieces ¼” from end.**
- **Insert into hole on board so that stripped end protrudes from copper side.**
- **Solder several pieces.**



Soldering Technique

- **Apply hot iron to wire and copper on board simultaneously.**
- **Let heat for ~ 1 second.**
- **Touch solder to junction of wire and board.**
- **When solder flows, apply no more than ½ inch length of solder.**
- **Remove solder and let iron stay in contact with junction about ½ sec.**
- **Remove soldering iron. Junction will solidify almost instantly.**

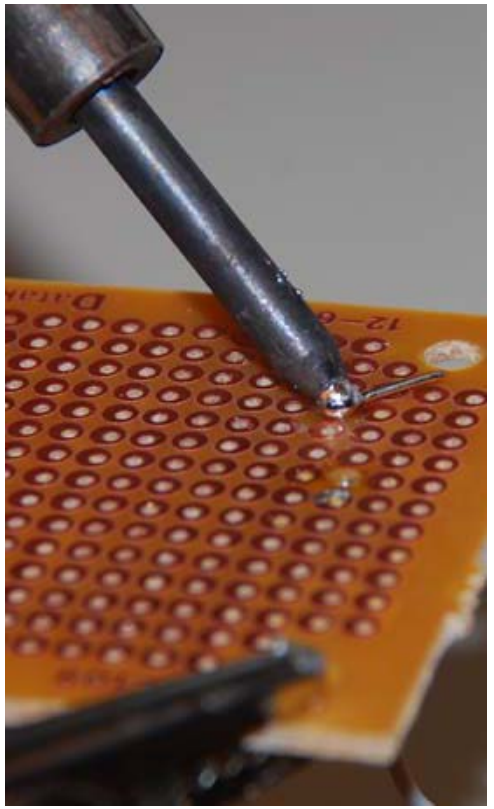


Quality of Soldering Joint

- **A good soldering joint will be shiny; the surface will be concave around the wire.**
- **A "cold solder joint" will be fuzzy-looking. Such a joint is not a good connection and must be re-soldered.**

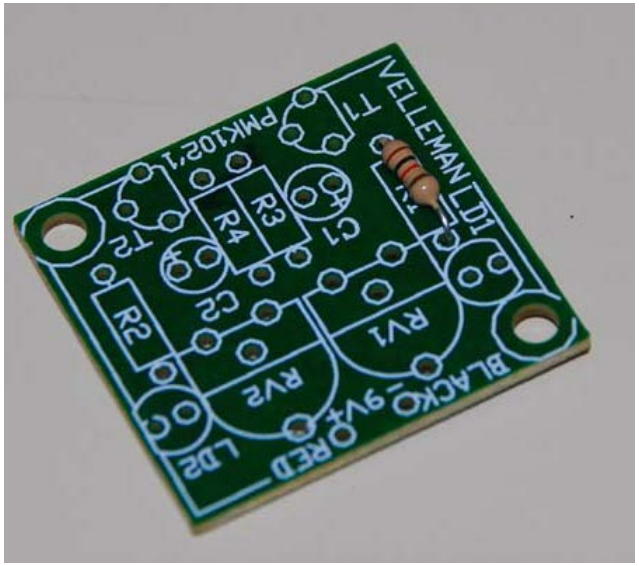
Correcting a Solder Joint

- **A badly-soldered connection must be re-heated.**
- **Touch the soldering iron to the junction until solder melts.**
- **Leave soldering iron in contact for a short (~1/2 sec.) time after solder melts in joint.**
- **Remove soldering iron and let solder set.**
- **Check joint – it should be concave around the wire and shiny.**



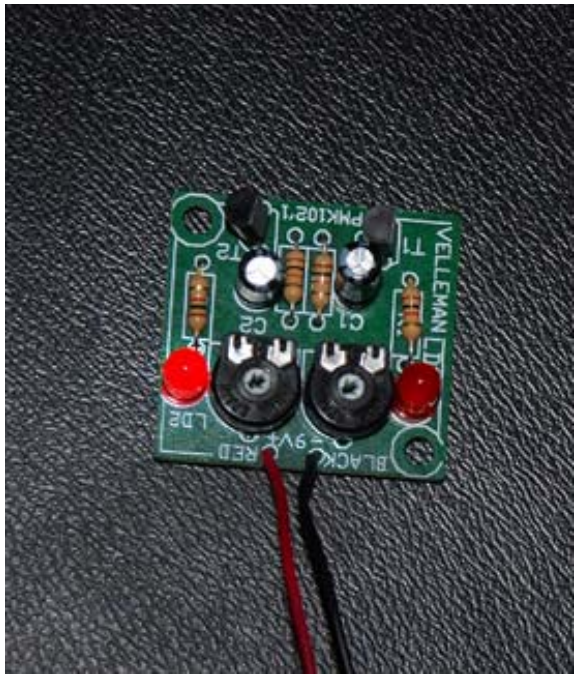
Building the Circuit

- **Remove parts and inventory using included list.**
- **Start with resistors. Insert them so that color code lines up – easier to check (color code in manual).**
- **Use kit information to select each resistor for placement.**
- **Insert from back (picture) side.**
- **Bend leads to hold in place.**
- **Clip leads to ¼ inch.**
- **With all resistors in place, give to partner to check placement.**



Building the Circuit (2)

- When resistors are checked by partner, solder in place.
- Follow up with other components by type, inserting, checking, and then soldering.
- Be careful with capacitors and LED's, which are polarized, and must be connected in the correct direction.
- Potentiometers and transistors also must be soldered in correctly, but their wire arrangements are shown correctly on the picture side of the board.

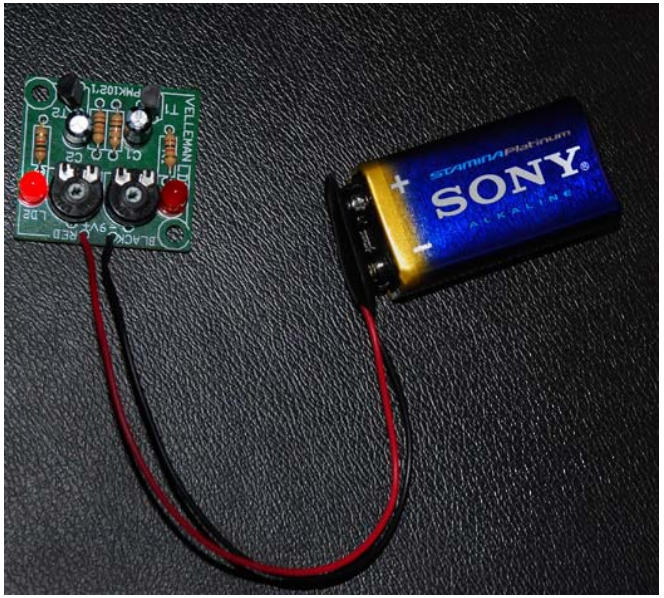


Removing an Incorrectly-Placed Part

- If a part is placed incorrectly, you will need to remove it, using the "solder sucker" or solder wicking tools.
- Heat junction until liquid, then use the solder sucker to remove solder.
- Do not heat junction too long, or the copper etched wires could become delaminated.
- You will need to heat each junction several times to remove all the solder.
- Use the wicking tool to remove the final bits of solder. Heat once more, wiggle lead with needle-nose pliers, and remove.

Building the Circuit (3)

- **Add the battery connector last.**
- **When you have finished the soldering, connect the battery.**
- **If the circuit is correctly assembled, the LED lights should immediately begin to blink.**
- **Using the potentiometers, adjust the blinking rate and finish the exercise as directed in the lab manual.**



Writing the Lab Report

- When you are finished, write the lab report, using the report outline.
- Look over the example report to get an idea of what is expected.
- Lab partners submit only one report.
- Partners should alternate writing the report.
- Your lab reports represent one-half of your EE 1202 grade. Please make sure that you do the lab exercises carefully and work diligently to create an informative, readable lab report.