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.
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 each 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.
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.
• 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.