

Soldering Intro | EECS16A Touch 1 Lab

Total points 5/6 ?

Please read the soldering overview and answer the 6 check-off questions BEFORE attending the Touch 1 lab. This is required for you to get checked off for Touch 1.

The respondent's email address (**sierradean@berkeley.edu**) was recorded on submission of this form.

Section score 0/0

Name *

Sierra Dean

SID *

3033700297

EE16A Lab section that you attend *

Lab 122/122A (Friday: 5-8 Peru), Cory 125

Soldering

In order to build more "permanent" (not breadboarded) circuits for our Touchscreen module, we are going to learn how to solder (pronounced "saw-der"). Soldering is the process where 2 or more metal elements are joined together by melting and flowing solder into an electrical junction called a solder joint.

Equipment Overview

Learn how to appropriately use the equipment in Cory 140 and avoid damaging them.

Lead-free Solder (stays on TA desk)



About:

Solder is used to make electrical connections between parts and PCBs or between wires. Think of it as a conductive "glue" to establish connections in your physical circuit.

Do:

- Cut off 2-3 inches from the TA desk to use at your station.
- Wash your hands thoroughly after using.
- Turn on the fume extractor while using.

Don't:

- Breathe the fumes created while soldering.
- Remove solder roll from TA desk.

Fume Extractor (1 per lab station)



About:

This tool pulls the fumes and smoke generated during soldering away from your face and through the filter.

Do:

Turn on when soldering with the on/off switch on the top of the tool.

Turn off when no longer soldering.

Place front of extractor close to soldering location.

Soldering Iron (1 per lab station)



About:

This tool is used to melt the solder between components, wires, and/or PCBs for a permanent electrical connection. Think of this as the heat source to melt the conductive solder "glue."

The tip of the iron takes 2-3 minutes to heat up to ~ 600F (315C) in order to melt the solder. Wet the sponge to clean the iron and use the metal iron holder to prevent accidents. After you are finished using the iron, melt a small blob of solder on the tip of the soldering iron to tin the tip which will prevent the tip from oxidizing and being unable to heat up to the appropriate temperature. Then, turn off the iron.

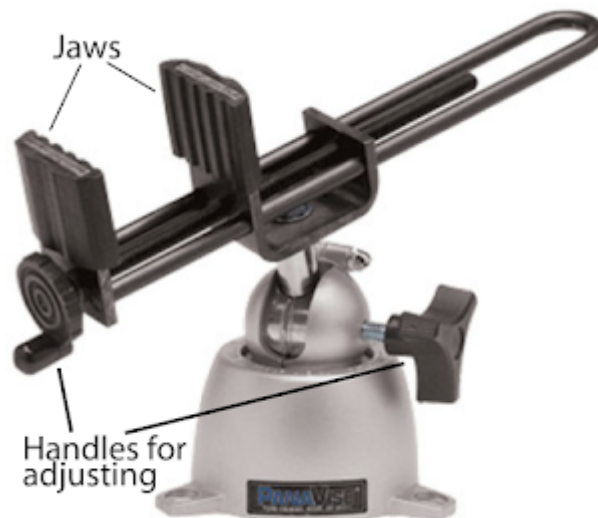
Do:

Make sure the circuit you are soldering is unpowered.
Keep the sponge moist using bottles that stay on TA desk.
Keep the tip clean by scrapping excess solder onto the sponge.
Use to solder parts to PCBs.
Use to solder connectors to wires.
Place the iron in the holder when not actively soldering.
TIN THE TIP and TURN IRON OFF after each use.

Don't:

Ever touch the tip of the iron.
Use this tool to cut plastic.
Poke the tip into anything.
Place iron flat on lab table.

Wide Jaw Vise (1 per station)



About:

This tool is used to hold parts and PCBs up to 6" since both hands are needed for soldering. Adjust the jaws of the vise using the handles so that they will hold your board where you want it.

Do:

Use to hold PCBs in place while soldering.
Adjust for the proper board position and orientation.

Don't:

Melt the rubber jaws.

Wire Stripper/Cutter (1 per station)

**About:**

This tool is used to strip the insulation and expose the copper in the wires on the TA desk for use as a male-to-male wire. The flat cutting portion of the blade can be used to cut wires.

Do:

Use the section of the blade that is appropriate for the size of wire you are stripping.
Throw all trimmed pieces of copper and insulation into the trash.

Don't:

Use on powered circuits.
Use on launchpad specific jumper wires.



Diagonal Precision Cutter (stays on TA desk)



About:

This tool is used to cut off component legs and excess solder from joints after soldering.

Do:

Use to make cuts more flush to surface of circuit.

Bring circuit to TA desk to use the cutter.

Don't:

Use on powered circuits.

Take cutter away from TA desk.

Printed Circuit Board [PCB] (in kit or on TA desk)



Front



Back



About:

Thin board made of fiberglass, composite epoxy, or other laminate material. Conductive pathways maybe etched or "printed" onto board, connecting different components on the PCB.

Do:

Place components so that they are on the front side of PCB.

Solder on the back side of PCB.

Place solder between component leg and copper pad of PCB.

Cut off excess solder and component legs after soldering.

Don't:

Heat up anything other than the copper pads and component legs.

Keep iron in contact with board for too long.

Soldering Instructions

Section score 0/0

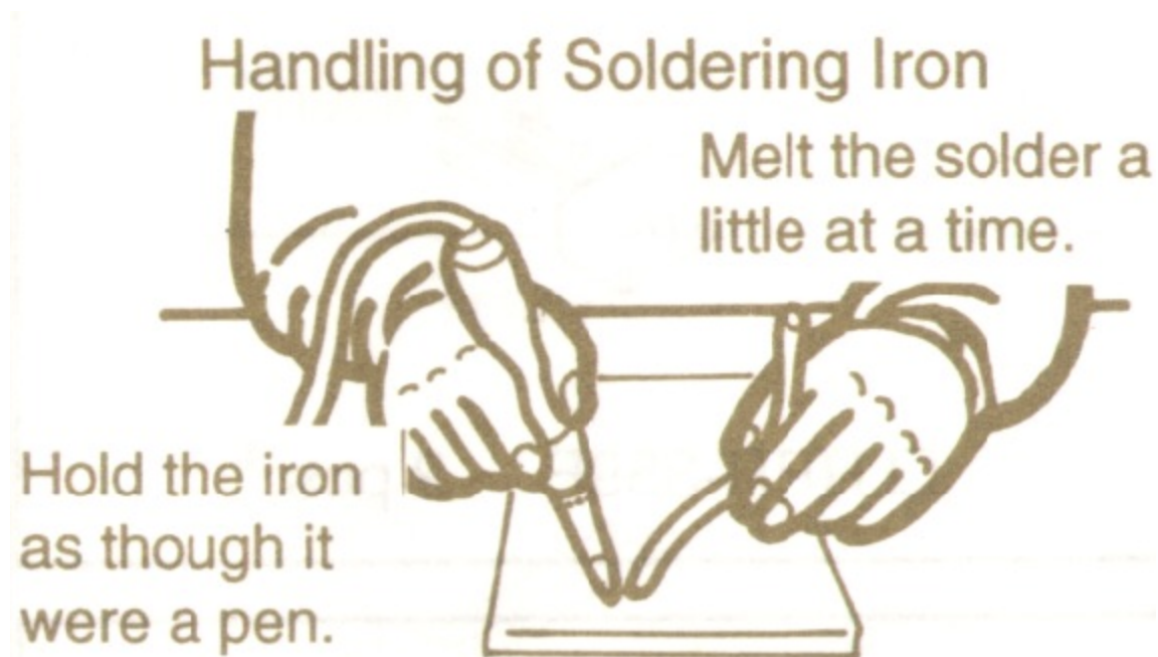


Repeat these steps for each joint:

1. Make sure the sponge is wetted and that the iron and fume extractor are on. If the iron is not clean (tip not shiny) wipe tip on wet sponge until it is.
 2. Place your circuit element into front of the PCB. Flip PCB over and bend the component legs 45 degrees to fix it in place.
 3. Check the temperature of your tip by melting a small blob of solder on the tip of the soldering iron.
 4. Hold the tip of your soldering iron to the PCB's copper pad and component leg at the same time.
 5. Touch the solder to the heated copper pad and component leg and feed solder into that joint for 1-2 seconds only.
 6. After enough melted solder is present, remove the solder from joint.
 7. Remove the iron tip from joint.
 8. Check that the component is secured to the PCB and that the entire joint is filled with solder.
 9. Let the joint cool down for at least 5 seconds and then trim the excess ends of the wire(s) with diagonal cutters.
 10. Clean the tip of the soldering iron by scraping the tip on a wet sponge and place iron back into holder.
- When finished with iron:
11. Tin the tip of the iron (melt and leave a small blob of solder on the tip) and place iron back into holder.
 12. Turn iron off.

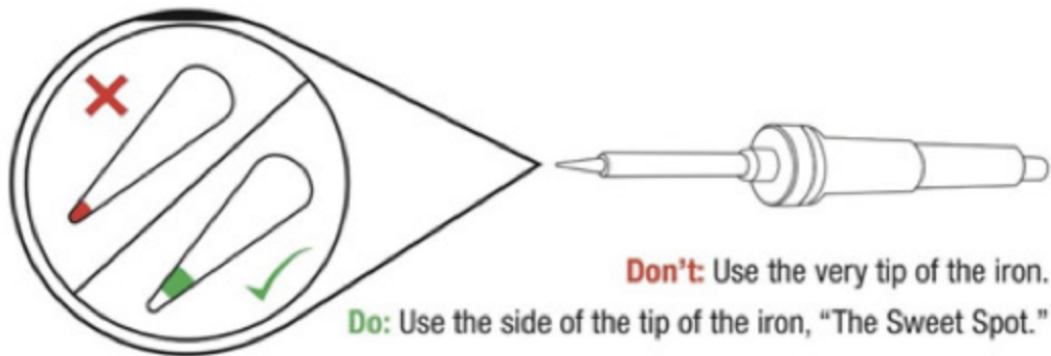
Holding the Iron (in dominant hand) 





Tips on using the iron





Do: Touch the iron to the component leg and metal ring at the same time.



Do: While continuing to hold the iron in contact with the leg and metal ring, feed solder into the joint.



Don't: Glob the solder straight onto the iron and try to apply the solder with the iron.



Do: Use a sponge to clean your iron whenever black oxidization builds up on the tip.

Additional Soldering Tips

- If solder is not melting, first feed solder into the blob (from tinning) then move over to feed solder into the joint.

- Tinning the tip improves the transfer of heat from your soldering iron to the component you want to solder.

Oxidized (BAD) vs Tinned Tip



Watch this (40 second) video on how to tin the tip

Tinning and Wetting a Solder...



Soldering Joints 



**A**

Solder flows around the leg and fills the hole - forming a volcano-shaped mound of solder.

**B**

Error: Solder balls up on the leg, not connecting the leg to the metal ring.
Solution: Add flux, then touch up with iron.

**C**

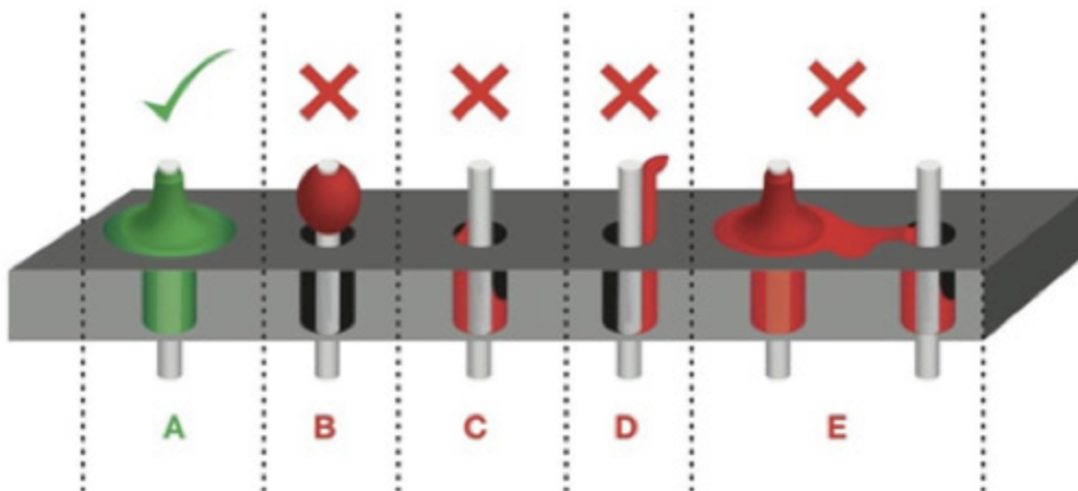
Error: Bad Connection (i.e. it doesn't look like a volcano)
Solution: Flux then add solder.

**D**

Error: Bad Connection...and ugly...oh so ugly.
Solution: Flux then add solder.

**E**

Error: Too much solder connecting adjacent legs (aka a solder jumper).
Solution: Wick off excess solder.



Virtual Soldering Demo

For a virtual soldering demo, watch the following 5 minute video.

Soldering Techniques



Check-off Questions

Answer the following 6 questions to test your understanding.

Save the check-off confirmation email with the "VIEW SCORE" button. At the start of lab you will need to show your TA/ASE your score and explain the correct answer to any missed questions for credit. Don't worry about getting 100%, but make sure you understand all the answers before attending lab.

Section score 5/6



✗ Which of the following is/are at and needs to stay at the TA desk? * 0/1

- ☒ Roll of solder ✓
- ☐ Soldering Iron
- ☐ Sponge
- ☐ Bottle to wet the sponge
- ☒ Diagonal Precision Cutter ✓
- ☐ Wire Stripper

✓ Which of the following should you check BEFORE you start to solder (apply iron to solder)? * 1/1

- ☒ Fume extractor is on ✓
- ☒ Sponge is wet ✓
- ☒ Tip is clean and shiny ✓
- ☒ Iron is on ✓

Soldering Steps

- A. Touch and feed solder to joint
- B. Remove solder from joint
- C. Touch tip of soldering iron to joint
- D. Remove soldering iron from joint



✓ Which of one the following is the correct ordering of the above 4 soldering steps? * 1/1

☐ A C B D

☐ A B C D

☒ C A B D ✓

☐ C A D B

✓ Where should you feed the solder into? * 1/1

☐ The component leg

☐ The copper pad

☒ The space between the copper pad and component leg ✓

☐ The iron tip

✓ What needs to be done AFTER you finish soldering? (select all that applies) * 1/1

☒ Clean tip with wet sponge then tin the tip of the iron ✓

☒ Turn off iron ✓

☒ Place iron into holder ✓

☒ Throw away trimmings ✓

☐ Check that the tip is cooled by touching it



✓ What is the purpose of tinning the tip? (Pick 2) *

1/1

- ☐ To use up all your solder
- ☒ Protecting the tip from oxidation ✓
- ☐ Protecting the tip from being scratched
- ☒ Helps with heat transfer between iron and component ✓

This form was created inside of UC Berkeley.

Google Forms

