

ECE401 – Perspectives in Electrical and Computer Engineering

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Component Identification and Soldering Technique

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LAB Section: 05






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Submission Date: October 9, 2020




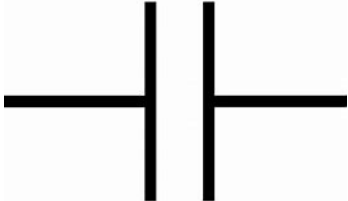

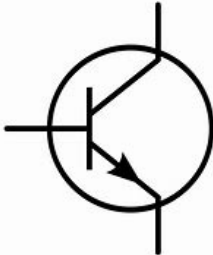

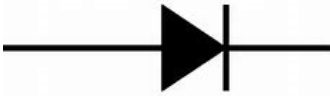

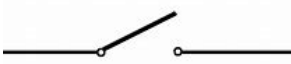
Introduction:

Lab 2 is titled “Component Identification and Soldering Technique. For this lab, I used the Weller WLC100 Soldering Station. The purpose of this lab is to both research and learn the correct techniques of soldering. The purpose is also to identify and describe common electrical components found of a printed circuit board. Knowledge of basic electrical components are a steppingstone to more advanced circuit design that will be expanded upon in later coursework.

Equipment List:

Equipment	Image	Description
Tool Kit		Common tools like the ones used in the previous lab (screwdrivers, diagonal cutter, etc.)
Soldering Iron		Hand tool used to melt and solder electrical components by touching hot metal tip against solder and component joint
60/40 Rosin Core Solder		Soft metal wire with organic compound in the center. Used by melting to component joint and forms a good electrical connection
“Helping Hands” Part Holder		Adjustable jig used to hold PCBs. Commonly has two alligator clips and occasionally a magnifying glass
Electronic Soldering Station		Damp sponge, soldering iron mount, and power station. These are all attached to each other and allow for holding an iron when not in use, cleaning the tip of the iron, and selecting a specific temperature to heat the tip up to

Components:

Equipment	Image	Description	Symbol
Resistor		Very small cylinder that resists an electrical circuit	
Capacitor		Tall cylinder that stores electrical energy	
Transistor		A semiconductor device that can amplify or switch electronic signals. Usually seen as a small black box with three electrical leads	
Diode		Very small cylinder that conducts current only one way	
Switch		Component that can open or close a circuit. Can also change the path of current	

Procedure:

First, I will explain the steps to the correct soldering techniques, then I will explain the steps I took during this lab to solder all the components to the first practice circuit board.

1. Plug in and turn on soldering station and wait for iron to heat up to specified temperature. For this lab, I was instructed to set the temperature to setting 3.
2. While the soldering iron heats up, clean the surface of the PCB, making sure the contact points are debris free.
3. Pull soldering iron from soldering station and press the tip of the soldering iron on the joint between the PCB and the component.
4. After heating up the connection area, carefully add 60/40 solder to the connection to join the two while still holding the tip on the connection.
5. After solder is covering the connection area, move the iron away to let the joint cool. A pyramidal shape is preferred.
6. Clean tip of iron by pressing it into brass coils or wet sponge.
7. When finished, add a slight coating of solder to prevent oxidation when not in use.

Now I will detail the steps I took to fully-solder all connections on the first practice board.

1. First, I opened the bag where I was supplied with all the components and the circuit board that would be used for the first practice board.
2. I then laid out all the components for clear and easy access when I was ready to mount it to the board.
3. During this preparation stage, I also mounted the empty circuit board in the alligator clips of the Helping Hands device.
4. Now that the iron is at the correct temperature, I first started in the center of the board and worked outside to the edges. I did this to ensure access to all components as I completed the board so I would not get caught up in all the uncut leads.
 - a. My first components were three resistors in the center of the board.
 - b. Next, I added three electrolytic capacitors.
 - c. After snipping long leads from the previous components, I then added the 8-pin IC connector. To solder this component in place, I first pressed one of the alligator clips against the back of the connector. Then I soldered the two pins furthest away from each other. This was meant to hold the rest of the connector in place so I could move the alligator clip back to holding the board. I then soldered the other pins after.
 - d. Next, I attached the red LED.
 - e. I then attached three disc capacitors.
 - f. After snipping leads again, I soldered a diode in place. The orientation of this component is very important a diode only allows current to flow in one direction and one direction only. Though the completed circuit has no actual function, it is still good to follow correct documentation.
 - g. Next, I attached the 12-pin connector. I did so with the same procedure as the last 8-pin connector.
 - h. I then attached the two remaining resistors and transistors.

- i. Now that all the components are attached to the board, let the board cool and all the solder joints to strengthen
5. You can now remove the board from the Helping Hands.
6. Now you can return the soldering iron to the soldering station and turn it off and unplug it.
7. My last step was cleaning up my workspace and returning the equipment I used and left the room.

Results:

After I finished soldering my first board, a TA checked my solder joints and said that they were overall good but some of the joints could use more solder. After I finished my second board, I was able to test it with a 9-volt battery. When I connected the two terminals, the LED lit up and the speaker played a tone. This signified that my solder joints were good, and a TA checked the joints individually and said the same.

Discussion:

During this lab, I found out what techniques are best for each stage of the soldering process. For instance, how long to hold the soldering iron's tip to the joint before adding the solder. Also as I said in the procedure, I found an easy way to attach components with multiple leads like the IC connectors was to use one of the helping hands to hold the part against the board while I soldered two ends of the component to better hold it in place while I soldered the rest of the pins. I was quick to realize how much better the soldering station used in this lab is compared to the soldering iron I own.

Conclusion:

Overall, I think this lab was very successful. The purpose of this lab is to learn the correct techniques of soldering and to identify and describe common electrical components found on a printed circuit board. I was able to do both in the time of the lab. I had previous soldering experience from my junior year of high school and was strengthened in this lab. I feel as though that gave me a big leg up compared to someone who has never soldered before.