

Workshop 1 — Basic Soldering Techniques

Thursday, January 10, and Friday, January 11, 2008
38-600

1 Items to Bring

- Soldering supplies (optional; may be purchased from the 6.270 office).
- All other materials will be provided at the workshop.

2 Reading

Section 4.1 of course notes

3 Solder

When you solder something, the joint should look shiny—if it's not, the joint is not well-soldered, and you might want to resolder it. Try to make your joints look like Hershey Kisses, not balls. When the solder is sufficiently hot, it flows properly, giving the Hershey-Kiss appearance (Figure ??).

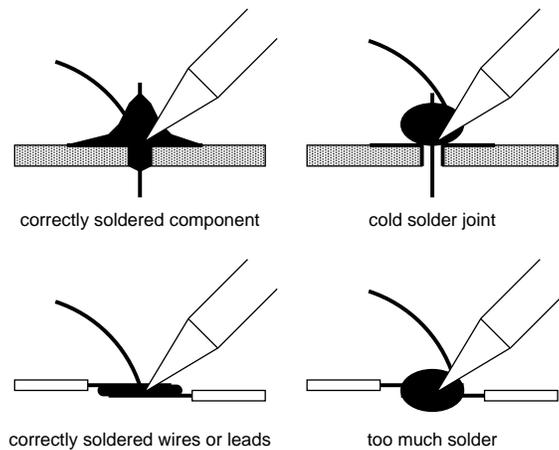


Figure 1: Soldering Joints

4 Purchasing and Using Lab Soldering Irons

6.270 has purchased a quantity of soldering irons, and we have them available for purchase. We also have lab soldering irons as well. Purchasing a soldering iron gives you the freedom to work anywhere; using a lab soldering iron saves you a few bucks. In either case, we have solder in the lab that you're welcome to use, at no cost.

When using the soldering irons, try to keep them clean and well-maintained. Doing so will make them work better, making your life easier. To do this, be sure to keep your sponge wet, and keep the tip of the iron clean by wiping it on the sponge.

Also, make sure the tip of the soldering iron is tinned before use. The tips last longer. Immediately after use, the soldering iron *must* be cleaned off, or the solder hardens and burns to the tip.

5 How to Solder PCBs

To solder components, stick the component through the PCB, and bend the leads if they are sufficiently long, so that the component stays attached to the board while you solder it. Stick the board upside down, so that the component is on the underside of the board, and you are soldering the top side of the board. Hold a piece of solder to the joint, and then use your soldering iron to heat the joint, melt the solder, and make a solid connection. Remember that your connection should be shiny and shaped like a Hershey Kiss—reheat the joint if it's not.

If the leads are long, after you have soldered the joint, cut the excess off with the diagonal cutters.

Please note: the ribbon cable available in lab is used for the motors and sensors only, not the expansion board. Also, do not try to use just one strand from the battery cable provided in your kit.

6 Soldering Motors and Sensors

Use the ribbon cable available in lab for your motors and sensors. Expose some of the wire, then twist the wire to keep the strands together. Tin the wire by melting a small bit of solder. Doing so will keep the wire from splitting, and it will make it easier to stick through joints in the PCB.

Be sure to insert shrink wrap before soldering the wire to the component. The shrink wrap insulates the connection. Use the 1/16" shrink wrap available in lab.

7 When You Make a Mistake

- **Desoldering pump.** Get the desoldering pump and set it, by pushing in the plunger. Heat the joint with the soldering iron, place the tip of the pump over the joint, and press the button on the pump. It should suck off the solder. You might have to do this a few times before you get all the solder off, especially if you use a large amount of solder. Do not take the desoldering pump without asking a staff member!
- **Desoldering wick.** Obtain a roll of desoldering wick from the lab. The desoldering wick is rolled inside a plastic case for easy use. Expose a small piece of the wick. Place it over the joint, and heat the joint with the soldering iron. Do not touch the wick itself, for it will get very hot very quickly. The wick should absorb the solder, removing the solder from the joint. After you are finished, cut the used wick to expose an end with no solder in it, and return it to a staff member. Do not take the desoldering wick without asking a staff member!

8 Some Tips

- The wires do begin to get hot after a while, so be careful about keeping the soldering iron on the wire or electrical component for too long. When soldering header, keeping the soldering iron on for too long may lead to unaligned prongs, which will be a problem when you try to plug sensors, motors, or servos onto your expansion board or Happyboard.
- Solder as quickly as possible. Sometimes if the iron is held too long the insulation can begin to melt, and begin to warp. When it does it will not necessarily keep the wires insulated as they should.
- Tinning stranded wires (battery pack cable, ribbon cable) before soldering to the component can make soldering easier.

- Helping Hands: while not necessary, they can do their job. Consider purchasing one by the 6.270 office. Helpful with male header and smaller PCBs.
- Be careful of the male header, because it will get hot once it's in contact with the soldering iron.
- *Keep the soldering tips clean, whether it is your soldering iron or the lab's.*
- *Make sure the sponge is wet with water.*