2.0 Soldering Technique

EE 302
Electronic Equipment Repair

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Introduction

- Soldering is the process of joining two metals together to form an electrically and mechanically secure bond using heat and a third metal alloy known as solder.
- Poor soldered joints will fail, causing partial or complete failure of the circuit.
- NOTE: If part of a circuit fails, it could permanently damage a board, depending on the circuit design.

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Soldering Equipments

- The solder you will be using is a metal alloy of 60% tin 40% lead with a low melting point & a rosin core (acts like flux to help remove oxidation).
- This is eutectic solder – goes directly from solid to liquid state when melted (no plastic phase).
- Solder properties
  - A) Melting point
  - B) Mechanical resistance to fractures
  - C) Cost
- Solder poses a health hazard
  - Do not hold solder with your teeth
  - Do not lick, bite or place hands in mouth
  - Do not hold solder for excessive periods of time
  - Avoid breathing fumes… guaranteed it’s not nicotine!

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Soldering Equipments

- **Temperature-controlled iron.** A soldering iron with electronic temperature control.
- **Non-temperature-controlled iron.** A low wattage (10 W to 25 W) pencil-type (not gun-type).
- **Sponge.** A sponge is required for keeping tips clean for best heat transfer.
- **Tips.** Currently, most tips sold for electronics work are iron-clad copper and have long life spans.
- **Solder sucker.** Is a device which sucks the molten lead.

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Pictorial View of Soldering

1. Assemble the proper tools.
2. Mount component by bending leads out sightly.
5. Remove solder. Remove iron.

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Soldering Inspection

What to look for:
- Bond should be a cone and shiny.
- Profile of bond should be concave, not convex.
- Bond surrounds part completely… not 99%.
- Bond does not cover other connections.

How to fix problems:
- Apply heat again, not as long as before, with clean iron.
- Add a small amount of solder… very small.
- If too much solder is applied, use a copper wick or solder sucker to remove the solder.

Note: Solder sucker removes most of the solder. You will have to re-solder after this process. This may produce excessive heat on your part… possibly damaging it.
Here is a picture of a good bond. Note the concave cone, and the shiny metal. The second picture is a cross section of the wire soldered through a via (hole) in a PCB.

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Soldering Inspection

- This is an example of not enough solder.
- Note other bonds are shiny and surround the entire part.

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Cold Joint

- Can occur when not enough heat is applied

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Parts Flush Mounted?

- Your parts must be flush mounted on the board to avoid broken bonds. The picture on the right shows two bonds that are mechanically broken. Let the PCB take the stress, not your bonds.

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