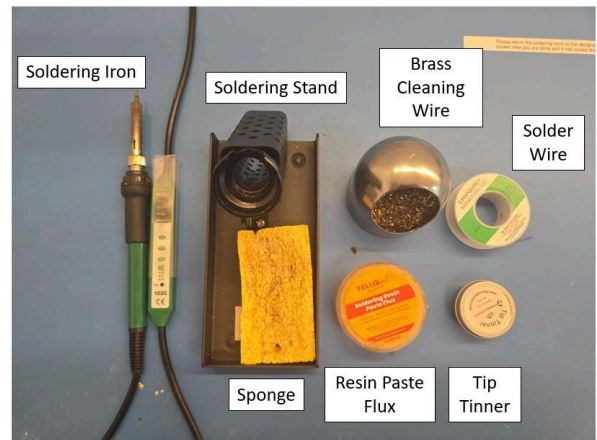


Through Hole Soldering

Necessary Equipment

Through hole soldering is for connection wires or pins to other wires or contact holes. This method requires the following equipment:

- Soldering Iron
- Solder Wire
- Flux or Resin Flux
- Wet Sponge
- Tip Tinner
- Ventilation Hood
- Brass Cleaning Wire



Preparing the Soldering Station

To prepare the soldering iron for work, there are a few major steps:

1. Turn on overhead ventilation to vent soldering smoke
2. Wet the sponge
3. Preheat the soldering iron
4. Clean the soldering iron with the sponge and brass wire
5. Tin the iron tip with the tip tinner
6. Clean the tip with the sponge once again

Solder the Joint

1. If connecting a wire to another wire or pin, wrap or otherwise connect the two to hold them together temporarily
2. Apply resin flux to either the wrapped wire joint or the contact hole / plate
3. Apply heat to the joint using the soldering iron tip while pressing solder wire into the joint.
4. Ensure the solder penetrates the joint

Protect the Joint

Whenever possible, apply heat shrink tubing or another protective layer like electrical tape to protect the joint from corrosion and shorting.

Surface Mount Soldering

Necessary Equipment

Surface Mount soldering involves soldering small, specially made components to contact plates, generally found on PCBs. Due to the nature of this soldering technique, instead of using a traditional soldering iron and solder wire, a solder paste and heat gun or reflow bed / oven is used. Though, having a small tipped soldering iron on hand is always useful. Generally, the required equipment includes:

- Solder Paste
- Precision Pliers / Tweezers
- PCB or Electronics Vice (or other method to hold board steady)
- Digital Microscope or Magnifying Glass
- Resin Flux Paste
- Heat Gun or Reflow Plate / Oven
- Isopropyl Alcohol
- Q Tips

Inspect the PCB

Inspect the PCB for damage and accuracy to your schematics. Clean the PCB with a bit of IPA using Q-tips or a microfiber cloth. Allow it to fully dry.

Solder your components

1. Secure the PCB using either an electronic component vice or helping hands.
2. Place the PCB under a digital microscope or magnifying glass.
3. Apply solder paste to the contact pads you will be adding components to.
 - a. This can be done manually or using a hard mask which only shows the contact pads of interest.
4. Use small pliers or tweezers to place the part's contact pads into position in the solder paste.
5. Confirm location and placement / orientation of all parts prior to heating.
6. Once confirmed, use a heat gun or reflow oven / plate to reflow the solder paste until it solidifies.
 - a. Do not overheat the PCB or components or they may be damaged.
 - b. Heating too quickly may also cause damage through thermal shock

Inspect the PCB and Soldered Joints

1. Inspect the soldered PCB for bridged connections, breaks, misaligned components or gaps in the solder, or any other potential issue. Issues can be confirmed through continuity testing with a multimeter.
2. Many small issues, such as breaking an accidental bridged connection or reaffirming a soldered joint, can be done with a soldering iron and solder wire.