

A Complete Guide to Soldering

➤ *Soldering Tips*

- Types of Tips
 - **Conical Tip:** A tip with a rounded tip, allows for soldering at various angles
 - **Chisel Tip:** A tip with a larger surface area (similar to the tip of a highlighter), higher surface area tip than the conical tip
- How do I know what tip to use?
 - **Size:** Use the LARGEST sized tip you possibly can, the larger the tip the larger the surface area meaning the faster/easier your soldering will be
 - **Type:** Conical types are typically used for more precision based activities whereas chisel types are more versatile and not as precision based. Majority of soldering will use a chisel tip as it is so versatile.
- How do I change the tip of a soldering iron?
 - *Change your tip if...*
 - Your tip is “pitted” (aka worn out)
 - Your tip is not best fitted to the task at hand
 - *How to change your tip...*
 - 1) Be sure your iron is cooled
 - 2) LOOSEN the screw located in the shaft of the iron
 - 3) Replace the tip
 - 4) Tighten the screw
 - ***Alternative: The method above works for the Weller, in other models you may need to unscrew a ring around the tip in place of a screw

➤ *Beginning to Solder*

- Tinning the Tip + Getting Started
 - 1) Set your temperature in the lower 300s C range or lower; the lower the better
 - *Soldering through hole components may require a slightly higher temperature as it allows more heat through wire/plated hole
 - 2) Wipe the tip of the soldering iron
 - 3) “Tin” the iron by touching solder to the tip of the iron. This should be done before AND after each soldering session!
 - 4) Solder!
- Soldering on Circuit Boards
 - 1) **Mount the component:** Insert the leads of your component into the holes in the circuit board. Bend the leads at 45 degree angles to allow for easy soldering + stability.
 - 2) **Heat the joint:** Touch the TIP of the iron to the copper pad and the component simultaneously to heat both. This step should be BRIEF; DO NOT burn the circuit board.
 - 3) **Apply Solder:** Hold the soldering iron to the copper pad and lead, the solder should be placed where the copper pad and the lead meet (the joint).
 - 4) **Trimming:** Cut any excess wire after soldering is completed
- Side Note: Types of Soldering
 - We are currently learning **THT (through-hole soldering)**; there are multiple different types of soldering for different uses. A common type is SMD (surface mount device) soldering which is used to solder a component mounted on the circuit board.

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➤ Desoldering

○ Using Solder Wick/Desoldering Braid

- 1) **Place the solder wick:** The solder wick should be placed on top of the solder that is being removed. Be sure that contact is made.
- 2) **Heat the wick:** Touch the tip of the soldering iron to the wick. The wick will then absorb the unwanted solder
- 3) **Remove the wick:** Remove the wick with the absorbed solder. Be careful as the wick will be hot.

○ Using a Solder Sucker

- 1) **Heat the joint:** Heat the solder you wish to remove
- 2) **Position the sucker:** Position the sucker above the melted solder you are removing
- 3) **Suck up the solder:** Suck up solder by pressing the release button
- 4) **Empty the sucker:** Press down on the plunger to empty the sucker

➤ Flux

○ What is flux?

- A substance that allows solder to spread uniformly over a surface without dewetting (aka balling up/wrinkling) by removing the oxide film that forms around metals being soldered.

● **Things to know about flux...**

- At higher temperatures flux decreases
- Often used with “cold solder joints” (aka when the solder is grayish in color and swells)
- ALWAYS use flux if you attempted to solder in its liquid form
- When using flux on a circuit board a black mark may be left behind; this is NOT a burn mark! This is staining from flux and can be cleaned.

○ What is flux used for?

- Used to aid in soldering AND desoldering. For soldering this is used when the solder starts to dewet or if you're looking to create a strong joining. For desolder this is used mostly in the context of a circuit board.

○ How do I use it?

■ **Soldering:**

- **Apply flux:** Apply flux to the joint you're seeing dewetting
- **Melt the flux:** Take your soldering iron and melt the flux
 - Be sure the temperature is not too high; flux corrodes faster at high temperatures
- **Reapply solder:** Reapply solder as needed to repair the joint (may not be needed)
 - ***The steps above are for when fixing a joint, solder can also be used to create a strong connection. In this case use the flux first.

■ **Desoldering:**

- **Apply flux:** You can apply flux before using the solder wick
 - ***This allows the desoldering process to go faster which is important because if the desoldering process takes too long then you will end up burning the board.
- **Follow the steps in the desoldering region of the guide**