

IAT 884
Lab 10
Soldering

Soldering

Types of Soldering Equipment

Soldering Gun

Higher temp
Faster Heating
Larger tip



Soldering Iron

Lower temp
Finer Tip Good For
Electronics



Soldering

Equipment Tips

- Buy a soldering iron with a **3 pronged plug** to protect electrical components.
- **Avoid using soldering guns** on sensitive components since they tend to collect voltage on their tips.
- Only use **lead-free rosin core solder** (not acid core).
- For most printed circuit board work, a solder with a diameter of **0.75MM to 1.0MM** is desirable.

Soldering

Solder

What is solder?

Solder is an alloy (mixture) of tin that traditionally contained 60% tin and 40% lead. Fortunately, there are now lead free varieties available which are safer to use.

Solder melts at a temperature of about 200°C (392°F).

Usually irons are set between 370°C and 426°C (700°F and 800°F).

Coating a surface with solder is called 'tinning' because of the tin content of solder.

Solder for electronics use contains tiny cores of flux. The flux is corrosive, like an acid, and it cleans the metal surfaces as the solder melts. Without flux most joints would fail because metals quickly oxidize and the solder itself will not flow properly onto a dirty, oxidized, metal surface.



Soldering

Soldering Tips

- **Work in a well ventilated area.** The flux in solder releases fumes that are harmful to your lungs and eyes.
- **Correct Tip.** Match the tip size to the work.
- **Low Temperature.** Keep temperature as low as possible while maintaining enough temperature to quickly solder a joint (2 to 3 seconds maximum for electronic soldering). Soldering temperatures range from 350 °C to 400 °C.
- **Keep the iron tip clean.** A clean iron tip means better heat conduction and a better joint. Use a wet sponge to clean the tip between joints. Keep the tip well tinned.
- **Solder small parts first.** Solder resistors, jumper leads, diodes and any other small parts before you solder larger parts like capacitors and transistors. This makes assembly much easier.
- **Install sensitive components last.** Install CMOS ICs, MOSFETs and other static sensitive components last to avoid damaging them during assembly of other parts.
- **Use heatsinks.** Heatsinks are a must for the leads of sensitive components such as ICs and transistors. If you don't have a clip on heatsink, then a pair of pliers is a good substitute.

Soldering

Getting ready to Solder

What you need

Soldering Iron

Soldering stand with wet Sponge

Sandpaper or Steel Wool

Helping hands or other tools



Soldering

Tinning

Before use, a new soldering tip, or one that is very dirty, must be tinned. "Tinning" is the process of coating a soldering tip with a thin coat of solder. This aids in heat transfer between the tip and the component you are soldering, and also gives the solder a base from which to flow from.

Soldering

Tinning

How to Tin

Step 1: Warm Up The Iron Warm up the soldering iron or gun thoroughly. Make sure that it has fully come to temperature because you are about to melt a lot of solder on it. This is especially important if the iron is new because it may have been packed with some kind of coating to prevent corrosion.

Step 2: Prepare A Little Space While the soldering iron is warming up, prepare a little space to work. Moisten a little sponge and place it in the base of your soldering iron stand or in a dish close by. Lay down a piece of cardboard in case you drip solder (you probably will) and make sure you have room to work comfortably.

Step 3: Thoroughly Coat The Tip In Solder Thoroughly coat the soldering tip in solder. It is very important to cover the entire tip. You will use a considerable amount of solder during this process and it will drip, so be ready. If you leave any part of the tip uncovered it will tend to collect flux residue and will not conduct heat very well, so run the solder up and down the tip and completely around it to totally cover it in molten solder.

Soldering

Tinning

VIDEO: How to Tin



Soldering

How to Solder wires

Step 1: Strip The Wires To Be Joined, Slip On Insulation (if necessary)

Step 2: Twist The Wires Together. Solder is not glue and breaks easily. The only thing holding these wires together is this twist.

Step 3: Apply Heat. Always heat the wires from underneath. Use the large part of the tip to generate more heat.

Step 4: Apply Solder To The Joint. Touch the solder to the top of the wire while maintaining contact with the soldering iron from below. Once the solder starts to flow, move along the twisted wire until the joint is fully covered.

Step 5: Clean The Flux using methyl hydrate or flux removal chemicals (available at hardware stores.)

Step 6: Insulate The Joint. Use a heat gun to shrink the insulation over the joint.

Soldering

How to Solder wires

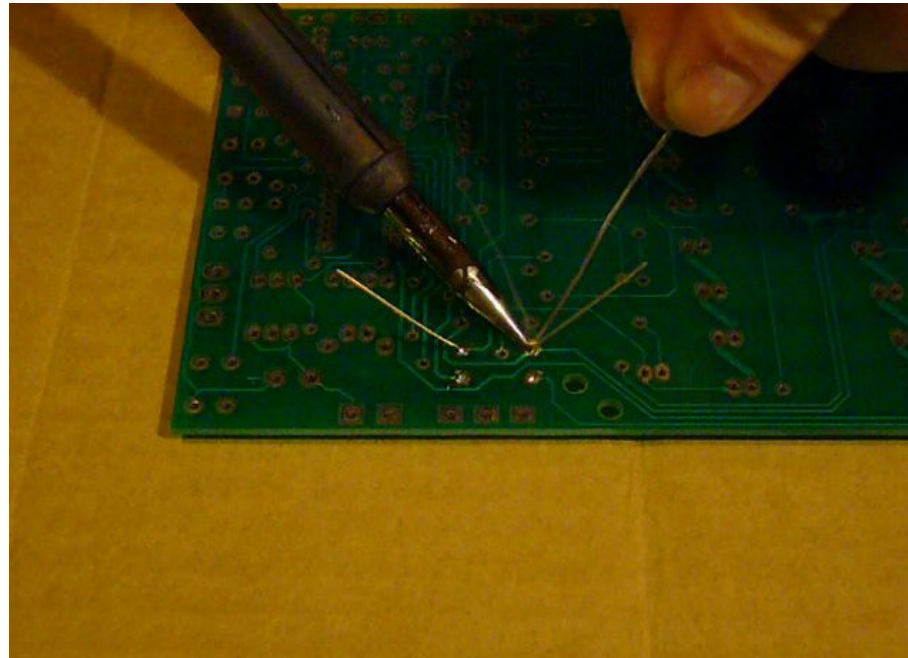
VIDEO: How to join two wires



Soldering

How to Solder Components

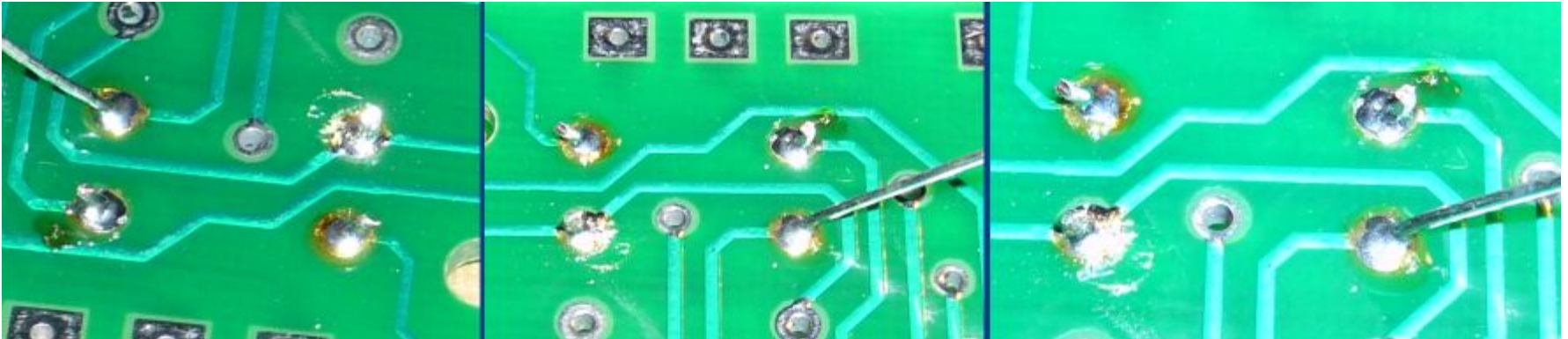
VIDEO: How to solder components



Soldering

How to Solder Components

Good Soldering



Soldering

How to Solder Components

Bad Soldering



Soldering

Cleaning the Tip

Over time the tip of the soldering iron can build up excessive flux and oxidation.

Prevention

Always dab the tip on the sponge after completing a join.

Always ensure that the tip is tinned, especially when you turn off the iron.

Maintenance

If the tip is oxidized or has hardened flux on it you can use sandpaper to gently rub off the corrosion. **Only do this while the iron is cold!**

You can use steel wool to scrape off excess material when the iron is hot.

Soldering

My Favorite Soldering Tool

Glue guns can be used to set components and wires in place once everything has been soldered.

This is especially useful if you are shipping your prototype.

