

Soldering Guide

Reference: © John Hewes 2006, The Electronics Club, www.kpsec.freeuk.com

Safety Precautions

- **Do not solder if you are pregnant or think you might be pregnant**
- **Never touch the element or tip of the soldering iron.**
They are very hot (about 400°C) and will give you a nasty burn.
- **Take great care to avoid touching any metal parts of the iron.**
The iron should have a heatproof flex for extra protection.
- **Always return the soldering iron to its stand when not in use.**
Never put it down on your workbench, even for a moment!
- **Allow joints a minute or so to cool down before you touch them.**
- **Work in a well-ventilated area.**
The smoke formed as you melt solder is mostly from the flux and quite irritating. Avoid breathing it by keeping your head to the side of, not above, your work.
- **Wash your hands after using solder.**
Solder contains lead.

Treatment for minor burns

Most burns from soldering are likely to be minor and treatment is simple:

- **Immediately cool the affected area under gently running cold water.**
Keep the burn in the cold water for at least 5 minutes (15 minutes is recommended). You do not wish to freeze the tissue, so running water is much better than ice.
- **Do not apply any creams or ointments.**
The burn will heal better without them. A dry dressing, such as a clean handkerchief, may be applied if you wish to protect the area from dirt.
- **Seek medical attention if the burn breaks the skin.**

Preparing the soldering iron

- **Place the soldering iron in its stand and plug in.**
The iron will take a few minutes to reach its operating temperature of about 400°C.
- **Dampen the sponge in the stand.**
The best way to do this is to lift it out the stand and hold it under a cold tap for a moment, then squeeze to remove excess water. It should be damp, not dripping wet. Don't put the electronics near the tap water
- **Wait a few minutes for the soldering iron to warm up.**
You can check if it is ready by trying to melt a little solder on the tip.
- **Wipe the tip of the iron on the damp sponge.**
This will clean the tip.
- **Melt a little solder on the tip of the iron.**
This is called 'tinning' and it will help the heat to flow from the iron's tip to the joint. It only needs to be done when you plug in the iron, and occasionally while soldering if you need to wipe the tip clean on the sponge.



Preparation

- **You have two hands.**
One hand will hold the iron and the second hand will hold the solder. This means everything else must be immobilized.
- **Immobilize the two ends to be soldered such the two ends are in physical contact.**
In EE319K we will be soldering a wire to a component. One simple way is to 1) use masking tape to fix the component to a ceramic tile; 2) cut and strip solid wire; and 3) use masking tape to hold the wire so that the two metallic parts are touching. Another approach is to 1) cut and strip solid wire; and 2) tightly wrap the stripped portion of the wire around the component.

Making soldered joints

- **Hold the soldering iron like a pen, near the base of the handle.**

Imagine you are going to write your name! Remember to never touch the hot element or tip.

- **Touch the soldering iron onto the joint to be made.**

Make sure it touches both the component lead and the track. Hold the tip there for a few seconds and...

- **Feed a little solder onto the joint.**

It should flow smoothly onto the lead and track to form a volcano shape as shown in the diagram below. Make sure you apply the solder to the joint, not the iron.

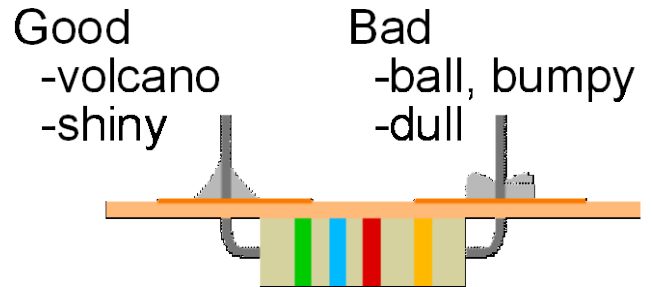
- **Remove the solder, then the iron, while keeping the joint still.**

Allow the joint a few seconds to cool before you move the circuit board.

- **Inspect the joint closely.**

It should look shiny and have a 'volcano' shape. If not, you will need to reheat it and feed in a little more solder.

This time ensure that both the lead and track are heated fully before applying solder.



Soldering advice for components

Some components require special care when soldering.

Many must be placed the correct way round and a few are easily damaged by the heat from soldering.

Appropriate warnings are given in the following, together with other advice which may be useful when soldering.

Components	Pictures	Advice
Resistor		No special precautions are required. Connect either way round.
Diodes		Diodes must be connected the correct way round: a = anode, k = cathode. Use a heat sink with germanium diodes.
Chip holder		Ensure the notch is at the correct end. Do not insert the IC at this stage to prevent it being damaged by heat.
Ceramic, or nonpolarized capacitor		No special precautions are required. Connect either way round. Take care to identify their value.
Electrolytic or polarized capacitor		Electrolytic capacitors must be connected the correct way round, they are marked with + or - near one lead.
LED		LEDs must be connected the correct way round: a = anode (+), k = cathode (-).
Transistors		Transistors have three leads and must be connected the correct way round.
Integrated circuits		When all soldering is complete, carefully insert ICs the correct way round in their holders. Make sure all the pins are lined up before pushing in firmly.