

Tips on How to Solder

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Soldering is defined as "*the joining of metals by a fusion of alloys, which have relatively low melting points*". In other words, you use a metal that has a low melting point to adhere the surfaces to be soldered together. Soldering is more like gluing with molten metal than anything else. Soldering is also a must have skill for all sorts of electrical and electronics work. It is also a skill that must be taught correctly and developed with practice. These tips below are for general soldering. We recommend you take a soldering class before attempting ANY soldering job. Contact your local vocational schools, etc for more info.

How To Solder

Step 1: Equipment

Soldering requires two main things: a soldering iron and solder. Soldering irons are the heat source used to melt solder. Irons of the 15W to 30W range are good for most electronics/printed circuit board work. Anything higher in wattage and you risk damaging either the component or the board. Note that you should not use so-called soldering guns. These are very high wattage and generate most of their heat by passing an electrical current through a wire. Because of this, the wire carries a stray voltage that could damage circuits and components. The choice of solder is also important. One of the things to remember is to never use acid core solder. Acid core solder will corrode component leads, board traces and form conductive paths between components. The best solder for electronics work is a thin rosin core solder (thickness of 0.75mm), but other thicknesses will also work. Just remember not to get anything too thick.

Remember that when soldering, the rosin in the solder releases fumes. These fumes are harmful to your eyes and lungs. Therefore, always work in a well ventilated area. Hot solder is also dangerous. Be sure not to let it splash around because it will burn you almost instantly. Eye protection is also advised.

Step 2: Surface Preparation:

A clean surface is very important if you want a strong, low resistance joint. All surfaces to be soldered should be cleaned with steel wool and some sort of solvent. Laquer thinner works well. Some people like to use sand paper, but I think that it is all too easy to sand right through circuit board traces, so steel wool is my preference. Don't neglect to clean component leads, as they may have a built up of glue from packaging and rust from improper storage.

Step 3: Component Placement

After the component and board have been cleaned, you are ready to place the component on the board. Bend the leads as necessary and insert the component through the proper holes on the board. To hold the part in place while you are soldering, you may want to bend the leads on the bottom of the board at a 45 degree angle. Once you are sure that the component is properly placed, you can move on to the next step.

Step 4: Apply Heat

Apply a very small amount of solder to the tip of the iron. This helps conduct the heat to the component and board, but it is not the solder that will make up the joint. Now you are ready to actually heat the component and board. Lay the iron tip so that it rests against both the component lead and the board. Normally, it takes one or two seconds to heat the component up enough to solder, but larger components and larger soldering pads on the board can increase the time.

Step 5: Apply Solder And Remove Heat

Once the component lead and solder pad has heated up, you are ready to apply solder. Touch the tip of the strand of solder to the component lead and solder pad, but not the tip of the iron. If everything is hot enough, the solder should flow freely around the lead and pad. Once the surface of the pad is completely coated, you can stop adding solder and remove the soldering iron (in that order). Don't move the joint for a few seconds to allow the solder to cool. If you do move the joint, you will get what's called a "cold joint". This will be discussed shortly.

Step 6: Cleanup

After you have made all the solder joints, you may wish to clean with steel wool or solvent to remove all the left over rosin. You may also wish to cover each solder point with black electricians tape (to prevent a short-Recommended).

Cold Solder Joints (No good)

A cold joint is a joint in which the solder does not make good contact with the component lead or printed circuit board pad. Cold joints occur when the component lead or solder pad moves before the solder is completely cooled. Cold joints make a really bad electrical connection and can prevent your circuit from working.

Cold joints can be recognized by a characteristic grainy, dull gray color, and can be easily fixed. This is done by first removing the old solder with a desoldering tool or simply by heating it up and flicking it off with the iron. Once the old solder is off, you can resolder the joint, making sure to keep it still as it cools.

Tips and Tricks

Soldering is something that needs to be practiced. These tips should help you become successful so you can stop practicing and get down to some serious building.

Use heat sinks. Heat sinks are a must for the leads of sensitive components such as ICs and transistors. If you don't have a clip on heat sink, then a pair of pliers is a good substitute.

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.

Double check joints. It is a good idea to check all solder joints with an ohmmeter after they are cooled. If the joint measures any more than a few tenths of an ohm, then it may be a good idea to resolder it.

Use the proper iron. Remember that bigger joints will take longer to heat up with an 30W iron than with a 150W iron. While 30W is good for printed circuit boards and the like, higher wattages are great when soldering to a heavy metal chassis.

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. We recommend you always use a 15W solder pencil for modchip installations with extremely thin, single stranded wire (30 gauge) works best.