

Soldering Information Sheet



Soldering is used to join components onto circuit boards.

The Work Area



Workbench

The workbench should be tidy, and there should be a clear area in which to work.

There should be no objects that you have to lean over, or could be knocked over while working.

All power cords should be tidy and run towards the back of the bench, and not across the work area.

If possible, a bench mat should be placed on the workbench top. This will prevent objects slipping, and protects the workbench top.

No food or liquid containers should be placed on the workbench.

You should know where the workbench electrical supply isolating switch is located (usually a red push button).

Press the push button to disconnect the supply in an emergency.

Lighting

The work area lighting must be sufficient so that you can clearly see to carry out your work task.

Report any lights that do not work to your instructor.

The Area Around the Workbench

There should be sufficient space so that you can sit at the workbench, and not be knocked by passing people as you work.

Be aware that as you work, people may enter your work area. A sudden movement or change of direction may cause a problem or injury, to either yourself or to the other person.



Solder

- Joins two metals together, mechanically and electrically.
- Commonly used size for PCB work is 0.048 inch diameter.
- Lead-based solder uses a mixture of tin and lead and melts at about 370 °F. However lead can be harmful to health and to the environment.
- Lead-free solder contains no lead. It typically uses a mixture of tin and other metals, such as silver and copper. Its melting point is typically around 420 °F, so it requires higher soldering iron temperatures than lead-based solder.



Flux

- Flux-core solder contains one or more cores of flux. The flux cleans the bare metal surfaces and prevents them from oxidizing. This reduces the chance of a bad solder joint.
- The two most common types of flux for electronics soldering are rosin-based and water-soluble.
- Rosin-based flux leaves behind a residue that can only be removed using toxic solvents.
- Water-soluble flux is more environmentally friendly. It leaves a conductive residue that can easily be removed using water.



Soldering Iron

- Melts solder to make a joint between component and copper track on the PCB.
- Takes time to warm up when first switched on.
- Tip can heat up to 750 °F.
- Bit can be replaced when worn out, or when different size is required.



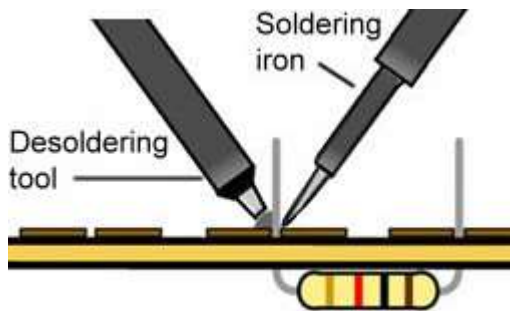
Soldering Iron Stand

Place soldering iron on stand when you are not using it.

Stand includes a sponge which must be dampened (not dry or soaked) to clean the soldering iron tip.



Desoldering Tool



- A tool that removes molten solder from a joint to allow component removal.

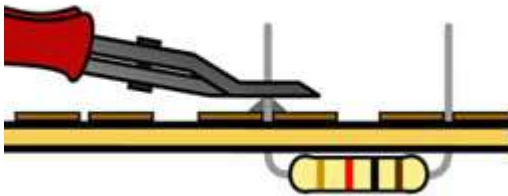


Desoldering Braid

- A fine braid of copper strands used for component removal. When placed in contact with molten solder, the solder is drawn into the braid



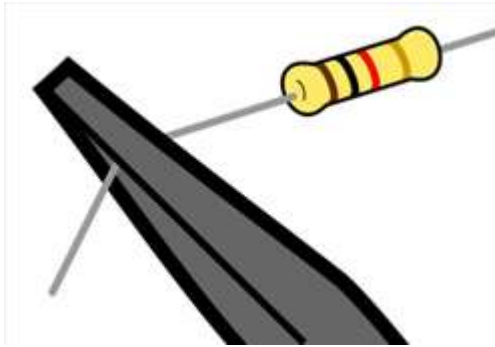
Wire Cutters



- Used to cut off component leads close to the circuit board track.



Long Nose Pliers



- Used for bending component leads, such as resistors etc.



Wire Strippers



- Used for removing insulation from a wire



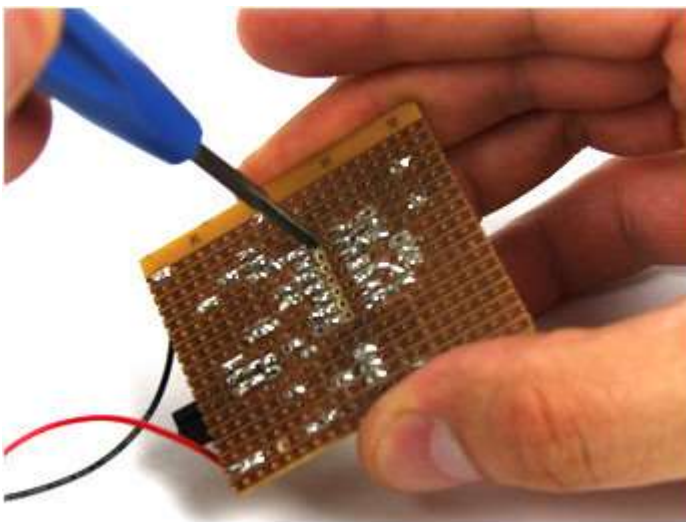
Small Flat Blade Screwdriver

- Used to tighten and undo screws.



Stripboard Track Cutter (not used on PCBs)

- Used to cut tracks on the copper side of stripboard.
- Place the cutter on the correct hole and twist using moderate force to remove the copper track, and not drill a hole through the board.



- After cutting, inspect area for copper threads that have been left behind. A magnifier may help.
- A 1/8 inch (3 mm) drill bit can be used to do the same job.

Soldering Precautions



Do not touch the soldering iron element, bit or tip.



WARNING:

Temperatures may be as high as 750 °F (400 °C) and you will get a serious burn.



Always place the soldering iron in its stand when not in use.

Never put it down on your workbench.



Inhaling solder fumes can cause long-term health problems. These include breathing difficulties such as asthma, and lead poisoning from lead-based solder.

As you solder, try not to breathe in the fumes that are given off.

Always work in a well-ventilated area. If your work area has a fume extraction system, switch it on before you start work.



Do not touch the soldering iron power cord with the soldering iron bit. If the cord insulation melts, there is a risk of electric shock to you and anyone else who uses the soldering iron.

Always check the power cord for damage before connection to a power socket.



Solder can ‘pop’ or ‘spit’ when heated. This is called solder spatter, and it can cause eye injury. Always wear goggles or safety glasses while soldering.

Preparing to Solder



Place the soldering iron in its stand.

Plug the soldering iron into a power socket and switch it on. It will take a few minutes for the tip to warm up.



Check the sponge, it must be damp, and not dry or soaked in water.



To test that the soldering iron bit is hot enough, try to melt some solder on its tip.

When the solder melts, clean the tip by wiping it on the sponge.

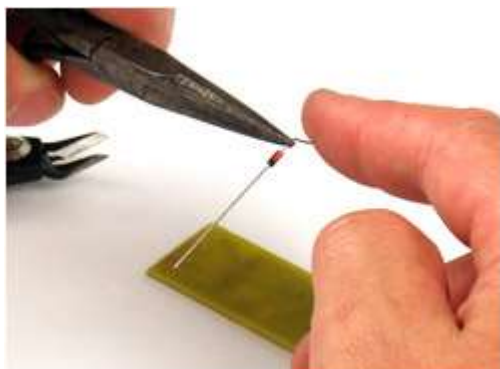
The soldering iron tip must be clean and bright when in use.

If the tip is dull or dirty, melt some more solder and wipe it off on the sponge.

Example of Soldering a Component

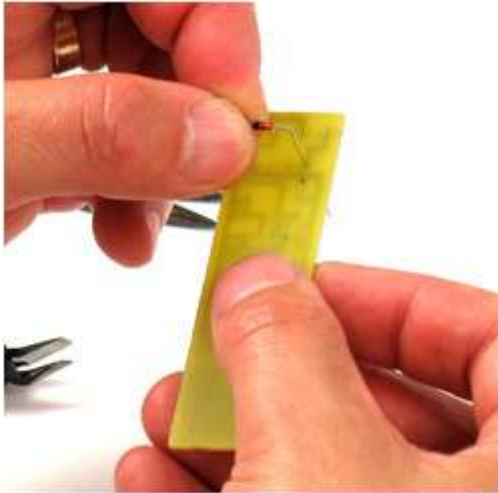


Identify the component to be soldered.



On the board (stripboard or PCB), locate where the component is to be placed. Note the hole spacing.

Using long nose pliers, bend the leads of the component so that it will fit into the holes.



Insert the component into the PCB (or stripboard), from the side which does not have copper tracks (known as the component side).

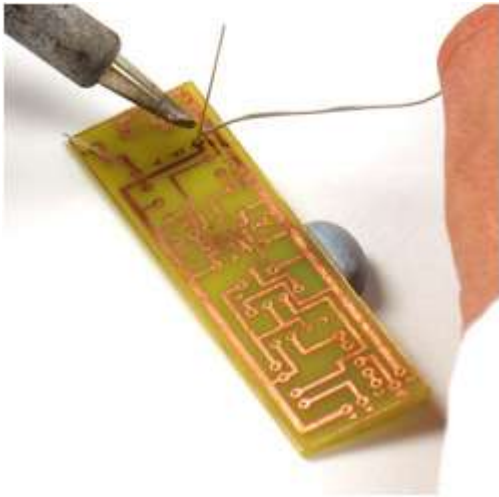
Ensure that the polarity of the component is correct.



When the component is flat against the board, slightly bend its leads outward to hold it in position.

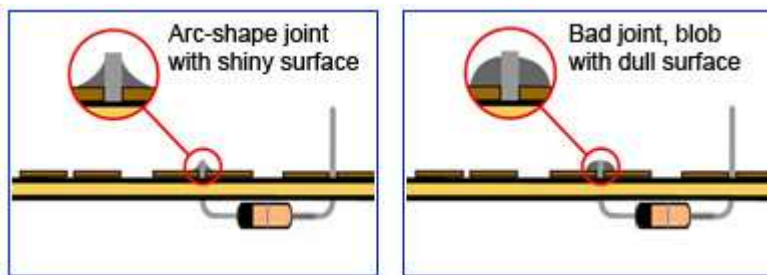
Then place the board on the workbench, copper track side up.

If necessary, support the board using a “third-hand” device or adhesive putty (see below).



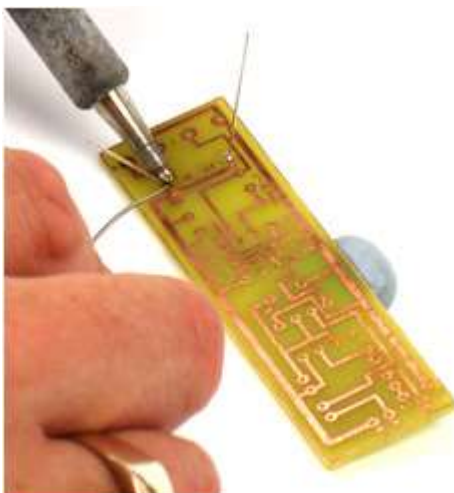
Remove the soldering iron from its stand, and with your other hand, pick up the solder.

Place the tip of the iron so that it touches both copper track and component lead, then apply some solder to the joint area, not to the iron.

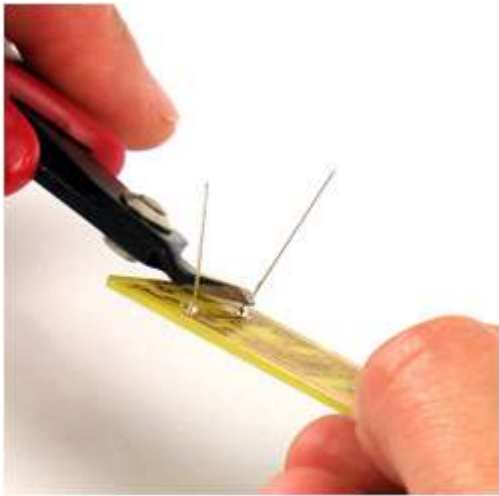


The solder should melt and flow smoothly onto the lead and track to form an arc-shape joint as shown below.

If it is a blob with a dull surface, reheat the joint.

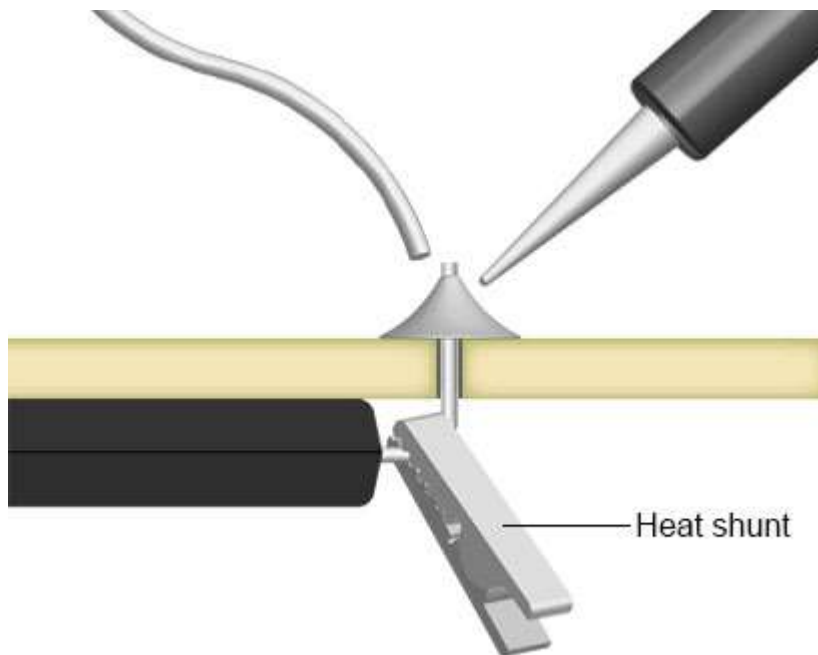


Ensure that the component is still flat against the board, then solder the other lead



Cut off both leads, just above the solder joint using wire cutters.

Heat Shunt



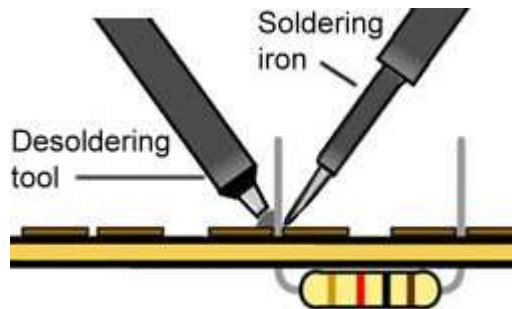
Some electronic components can be damaged by too much heat.

To protect them while soldering, a heat shunt can be attached between the component and the joint to be soldered.

This can be as simple as a metal alligator clip attached to the component leg. It absorbs heat from the soldering iron and limits the temperature rise of the component.

Desoldering

To replace or re-position a component, you have to remove solder from the joints that secure it. This is called desoldering.



Using a Desoldering Tool

The desoldering tool is designed to remove solder as follows:

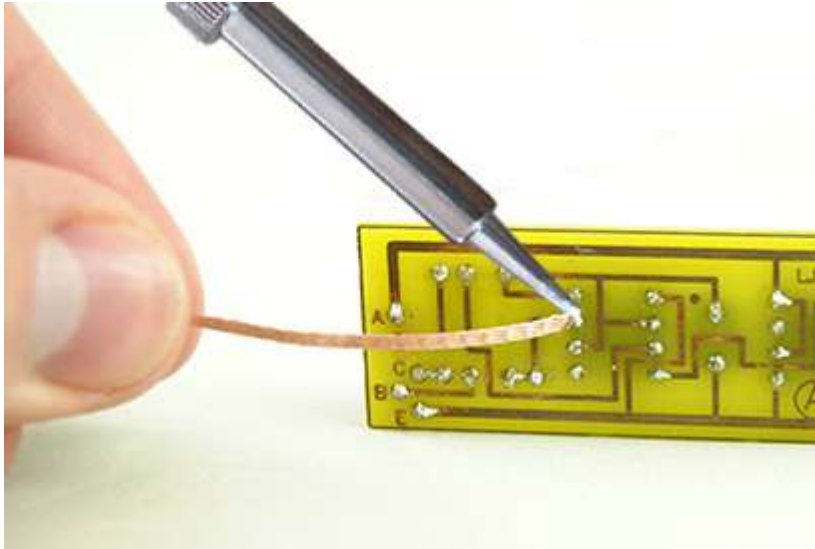
1. Push the spring-loaded plunger down until it locks.
2. Position the nozzle and the soldering iron tip at the solder joint.



3. When the solder melts, press the button to release the plunger. Melted solder will be sucked into the pump.
4. If necessary, repeat the process to remove any remaining solder from the joint.
5. Repeat the process at the other solder joint(s) for the component being removed.

6. Carefully remove the component from the board.

The desoldering tool will stop working when it is full of solder. It can be emptied by unscrewing the nozzle.



Desoldering with Braid

1. Position the soldering iron tip on the solder joint.
2. When the solder melts, place the desoldering braid on the joint.
3. Keep the solder molten by placing the tip of the soldering iron on top of the braid and over the joint.
4. Wait a few seconds until the solder has been fully absorbed into the braid.
5. Repeat the process at the other solder joint(s) for the component being removed. A new section of braid must be used for each joint.
6. Carefully remove the component from the board