

SoundTraxx Guide to Successful Soldering

A crucial element to most sound system installations is the ability to make a good solder joint. Unfortunately, many modelers think they know how to solder and can do a great deal of damage before someone sets them on the right path. Make sure to practice and sharpen your soldering skills before embarking on decoder installations.

Safety First

As you prepare for soldering, be aware of the following safety considerations:

- Solder contains a high percentage of lead. Dispose of used solder and desoldering braid. Keep all solder substances out of the reach of children and pets and wash your hands after handling solder.
- When you finish soldering, unplug the iron so it can cool before clean up and put it away. A hot iron can start fires or burn curious fingers.
- Secure the item to be worked on, i.e., put the circuit board on a stable work surface or in a vise – don't try soldering on your lap!

Choose the Right Tools

We recommend a temperature controlled soldering station and rosin-core solder for installing any SoundTraxx sound system. If the cost associated with a quality temperature controlled soldering iron is too high for your budget, we suggest using a 25 Watt soldering iron readily available from electronics supply houses, home improvement stores or online sources such as eBay and Amazon. Ensure that you purchase a grounded (3-pin plug) iron to prevent unwanted discharge of voltage onto the surface being soldered to.

Do not use a soldering iron rated for more than 40 Watts without the aid of a temperature control system. Doing so can impart damaging levels of heat onto the working surface of a decoder, speaker or LED.

Flux is Your Friend

Electronic solder is made as a tube, with the rosin (flux) in the tube. Things that get hot tend to oxidize. Metal will oxidize quickly when heated to the temperature (700°F) required to melt solder and solder will not adhere to oxidized metal. Solder also will rapidly oxidize while molten. Once solder has oxidized, it does not melt and flow, but resembles a paste instead. Flux helps to slow this oxidation process and bond the solder to the metal.

When applied to a hot solder connection, flux first flows over the work and tip, then begins to burn, normally without flame. As the flux burns, or oxidizes, it removes oxygen from the metal, as well as from the air in contact with the connection. This allows the solder to lock into the molecules of the metal, rather than resting on the oxide coating.

There are many different types of flux available separately to accomplish specific jobs. Brass model-building, jewelry work, or plumbing tasks all utilize different types of flux that can be damaging to delicate printed circuit board (PCB) work. Be sure to get flux that is designed for electronic PCB work. Avoid TIX or other brands of acid based plumber's flux as they will damage your products! It's also handy to have some liquid solder and flux remover.

Six Steps to Successful Soldering

1. Plug in the iron and rest it in its holder (if your soldering iron does not have a holder, make one from something nonmetallic that will not burn - like ceramic tile). If the tip or barrel comes in contact with metal, it will take longer for the iron to reach operating temperature.
2. When the iron is hot, wipe the tip on a dampened sponge, then tin the tip with a small amount of solder. A metal tray is handy to flick the excess solder into.
3. Heat the work, not the solder. Apply heat to the base metal for 2-3 seconds before applying any solder to the joint. Dab a bit of solder on the tip at the point where the tip touches the work, as it touches the work – this is a two-handed operation! This helps to heat the part quickly so that the solder will flow nicely. Then shift the solder to the part and flow it in.
4. Let the work cool for a few seconds.
5. Examine your work. The solder should be smooth and shiny, not dull and gray. It should look more like a smear, not a bubble. Where a wire enters solder, the solder should taper up to the wire.
6. Clean up the board with flux remover and a cotton swab or stiff bristled brush.

Using Heat Sinks on Delicate Components
Most components are designed to withstand the sustained heat wave of soldering circuit boards.

However, if you are unsure or if the parts are really, really expensive, you might want to use a heat sink on the part while soldering.

A pair of hemostats, or even a stray alligator clip will work well to hold components together. Of course, you can also use your trusty needle-nose pliers. Just keep whatever you use close to the component, or you won't be able to get the connection hot enough.

Desoldering

Oops! OK, so you used the wrong part, soldered in the wrong place, or need to replace a broken part. This requires desoldering. If you've never desoldered anything before, practice makes perfect. Keep old projects and circuit boards for practice pieces and as sources for practice parts.

Usually heating the leads and pulling them out of the board one at a time is good enough. A touch of solder on the iron often helps, but parts with multiple leads or legs can be tricky. This is where desoldering braid can come in handy.

1. Desoldering Braid

Desoldering braid is a copper braid with flux worked into it (sometimes known as solder wick). Usually the braid is placed on the connection with the iron then applied to it. Often a touch of solder will help get things going. Once enough solder is removed, you can often use a gentle pressure with small pliers to loosen the lead. A touch of liquid flux before heat is applied can also help.

Desoldering braid also is useful for removing solder from the holes in a circuit board so that parts may be inserted. This is common when replacing broken parts.

2. The Solder Sucker

Another useful desoldering device is the solder sucker. Basically, a solder sucker is a syringe with a spring and a trigger. The plunger is depressed to the lock position. A little fresh solder will provide flux to keep things molten. The Teflon tip is then held in proximity to the heated solder connection. When the trigger is pressed, the spring pulls the plunger outward, causing a vacuum, which inhales the molten solder. The plunger is depressed again to the lock position and it's ready to go once more.

Every few hundred cycles, the unit should be disassembled and cleaned. The seals should be greased with silicone grease and the tip will occasionally require replacement. Keep a spare around.

The solder sucker requires a bit of practice to nail down your technique. Positioning of the tip and compensating for the recoil of the spring are both important, as is deciding when the solder is just hot enough to flow well.

As with soldering, we recommend always using flux when desoldering to prevent oxidation and ease the process.

Cleaning Up

You will get the best results if you begin with a clean soldering iron tip; so at the end of every session, clean it so it will be ready for the next task. Most electronics stores sell tip-cleaning sponges. The sponge is soaked in water, wrung out, and placed in a convenient metal holder. Wipe the tip across the sponge with a rotary motion to remove burnt flux and crystallized solder.

Another thing that will affect the cleanliness of your iron is plastic. If, by accident, your iron should come in contact with plastic, clean it off with a damp rag. Tin the tip well with fresh solder and clean again. Lightly tin it again, leaving it ready for the next job. Plastic left to burn on a tip will quickly remove the plating from the tip and can actually cause craters to form. The tip will bend and break soon after.

Flux Remover

When the soldering is done, the flux remains. The yellowish brown residue should not be left on the board. It looks ugly and unprofessional, and if any moisture or condensation is present, it can support the growth of fungus, which will damage the circuit board.

Most electronics stores sell flux remover, which will make cleanup simple. Don't spray the whole board, however. This can cause condensation, as the alcohol-based chemical becomes cold when sprayed. For small areas, soak a wooden swab and wipe away the flux. For heavy concentrations, chip off the flux first. Be careful where you spray this stuff; some formulas will eat plastic. It makes a good paint remover too, and is usually quite flammable. For a cheap flux clean up option look for 91% isopropyl alcohol ("rubbing alcohol") in your local supermarkets.