Good Soldering

A quote from Ask Dr. Solder sums things up quite well:

Q: How long should it take to make a "good" solder joint on a common solder pad?

A: Tricky question! The time spent on the pad is called "dwell time." A dwell time of 4 seconds at 700 degrees-F might be considered destructive for some components – however, a dwell time of 2 seconds with an 1100 degree-F unregulated soldering iron can be much more destructive. A 700 degree-F dwell time of 3-4 seconds is not uncommon, to allow for "filling the pocket" – that's the volume of the thru-plated hole, flush to the component side and properly "feathered" evenly to the circumference of the solder pad – on the solder side. The "pocket" should be filled – but not over-filled – and the solder in the center of the pad should rise evenly to the component lead that will be trimmed. Never have a solder pad with an under-filled "dimple" on the pad. The solder level at the component lead should be higher than the edges of the pad. A soldered pad should never look like a "round BLOB of solder *sitting* on the pad." Wire soldering is more of an art than a science, and with practice – 1 to 3 second dwell times can be achieved, while safely meeting all of the above criteria.

They also have an excellent soldering PDF tutorial there, with pictures, suggested solder, warning to *not use lead free or no clean solder* on thier kits, etc....

Here are some short mpeg videos online of a dude @ nasa doing some soldering....Note that his dwell times are a bit too long for average chips and leds to endure
http://radiojove.gsfc.nasa.gov/elab/soldering.htm

More pics and another tutorial are here http://www.aaroncake.net/electronics/solder.htm

Even more pics and [yet another tutorial....|http://www.epemag.wimborne.co.uk/solderfaq.htm]

Quotes from the forum:

i have had a few peeling pads when doing these boards, it seems that the recoil from the pump hitting the hot pad/trace can strip it off sometimes... (it's certainly also bent some very thick wires) i'm going to get some desoldering braid instead

Bingo! This is the very reason why I tend to recommend solder wick or similar stuff for desoldering instead of using desoldering pump if you are not being experienced in soldering. Applying a lot (well, too much) of heat will cause the pads to detach from PCB, especially if there is any force applied on pad. Yes, you can get the pads off with solder wick as well if you start rubbing it against the joint, but in my opinion it is still safer way that using a pump.

Thus a trick for using solder wick that may not be so obvious: Solder the tip of the wick strip. May sound stupid, but the wick works best when there's some solder and extra resin in it. Apply only gentle force over the wick and joint and let the wick do the magic. Never start to stir around the soldering iron! If you are able to control the temperature of your soldering iron you may also increase

the temperature little for this operation. Otherwise the temperature may not spread wide enough. — *SmashTV 2006/03/13 10:44*

Some More Tips

- Make sure your board is *clean!* A bare copper board has noticable oxidization within minutes. Before soldering, consider lightly scrubbing your board with steel wool and a little solvent (isopropyl alcohol works well). Even tinned/plated boards are filthy - you'd be surprised what you wipe off if you pour a little alcohol on it and rub it vigorously with a paper towel.
- Only use rosin, or rosin-mildly-activated (RMA) flux-cored solder. Do not use solid solder wire, and especially don't use plumbers' “acid core” solder! Flux is an often neglected, but essential ingredient for a good solder joint. When it heats up, flux cleans the surfaces so that they can better bond with the solder. RMA flux is best because it does not remain corrosive after it cools off.
- It is good to have some extra RMA flux on-hand for when you need to reheat a solder joint. Common flux dispensers look like squeeze bottles or liquid paper bottles.
- Flux Removal - A convenient way to remove flux from a PCB after soldering. Requires no special chemicals or tools. — *unknown 2006/08/03*
- What Smash said above notwithstanding, if you *really* want your wick to work well, wet it with some flux first!
- The best tip for your soldering iron is not necessarily the smallest. In fact, you want the tip that will allow you to best heat up the surfaces to be soldered, by making the best contact. Such a tip should have a flat edge to make the best contact with a round component lead.
- On boards with plated thru-holes, lay the flat edge down on the pad with the side of the tip touching the component lead. Hold it there for about a second prior to introducing solder. This ensures that the entire plated thru-hole heats up enough to melt (and subsequently bond with) solder.
- On boards without plated thru-holes, the component lead is harder to heat than the pad, so hold the flat edge against the lead and the end against the pad. Add solder after about a second.
- Do not put a gob of solder on your iron then just wipe it on the joint to be soldered. This rarely works well.
- After you remove your soldering iron from the joint where the solder is melted, it takes a second or two to solidify. This period is referred to as the solder's “plastic state”. During this time period it is essential that you do not disturb the joint. In other words, never allow the board to be jarred or shaken immediately after you remove your iron, and do not allow the component lead to wiggle. The reliability of the joint will be compromised if you do.
- “Standard” electronic solder is 60% tin and 40% lead. The best solder is 63% tin and 37% lead. This combination yields the shortest “plastic state” - put simply, it solidifies faster after you remove the iron.
- Flux residue after soldering is common. It's a good idea to clean this, because certain fluxes (not RMA however) remain somewhat corrosive. All fluxes remain a bit sticky, and subsequently attract dust. You can clean flux off with isopropyl alcohol, or any of a wide variety of spray-on flux removers.
- After handling solder, do not eat, smoke touch anything which will enter your mouth without washing your hands thoroughly with soap and water. Solder contains **lead,** a heavy metal which never really leaves your body - it can't be good!

Hopefully these tips will come in handy. My work sent me on a 6-day soldering course covering thru-hole and surface mount rework and repair a few years ago, and I found it incredibly handy! Happy soldering! -nebula

Bad Soldering

see → Bad Solderings Gallery

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