SMT Soldering

SMT Soldering Tool Suite



Basic Tools

- Soldering Stations (s)
  - Soldering iron tips
  - Stand
  - Sponge, tip cleaner
- Water bottle with distilled water
- Isopropanol 99% with drop dispenser bottle
- Cotton swabs –'Q-Tips'
- Liquid no clean flux with flux dispenser bottle
- Solder
  - Either tin lead or lead free (higher melting point)
    - ≈ No clean flux core is ideal
  - Small diameter .01 to .020 inches (0.25 to 0.5 mm)

SMT Soldering Tool Suite



Basic Tools (cont'd)

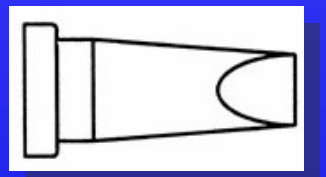
- Tweezers – length grip to tip – relaxed opening width – tip shape –heft
- Lamp loupe – large glass with three diopter optics or head band magnifying glass (personal preference)
- PCB holder / vice – low profile so hands can rest on bench for support and still reach PCB working area – alternately hand rest area on holder
- Electrostatic Discharge (ESD) protection
  - Mat and or wrist strap to ground

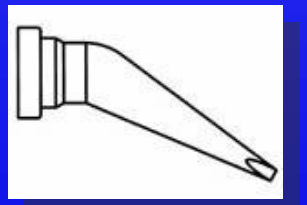
Tool Tips



Soldering Irons – what to look for…

- Controlled tip temperature
- Short tip to grip distance
- Stable fairly heavy stand with tip cleaning sponge
- Replaceable tips
- Short in length Chisel tip
  - about 1.2 -1.5mm end
- Bent round tip with point under 1mm.





Soldering Stations



Soldering Stations I like

- Personal preference – both produce sufficient heat for most applications (tough sledding in large ground planes with lead free solder)
- Cooper tools Weller WD1 with WP80 pencil
  - Low cost replaceable tips LTB, LTC, LTHX
- Metcal STS. STSS, or SP200
  - Very short tip to grip distance
  - Small tip diameter .020 with bent round tip STTC-144
- Both can be found on eBay for typically under $100 or new from about $230. Active Components Ottawa stock.





Other Tools



Magnifier Lamp

- Craftex B2462 from Busy Bee Machine Tools 3 diopter 7” lens with dust cover. 32W fluorescent tube($60.00)



Tweezers

- TNI-U TU-14B from eBay via BudgetGadgetsSuperStore Hong Kong ($4.00)



Other Tools



Solder Flux

- No clean similar to Kester 851
- Flux dispenser bottle
- Not always used especially on tinned PCB's but it's extremely good at getting solder to wet on harder to solder surfaces



Bench top Smoke Absorber

- I don't use one but probably should. Like the smell of solder fumes.



Soldering Process



General Stuff

- Set the soldering iron tip temperature to about 300 C. This is sufficient heat for all tin lead and lead free solders. Too much head can damage the board and parts.
- The soldering iron tip must be well tinned for good heat conduction

Non-tinned boards

- Two and three lead devices
  - Wipe area clean with swab and isopropanol
  - Apply a drop of flux to one PCB land
  - Apply a very small amount of solder to ‘wet’ the land
  - Position the part and heat the ‘wetted’ land to tack the part down
  - The part should now be in position and affixed to the board

Soldering Process (cont'd)



Non-Tinned Boards (cont'd)

- Solder the other lead
  - ≈ Place solder against the part covering half to 2/3 of the part's end
  - ≈ Bring the soldering iron to the PCB land and melt the solder to get good reflow
  - ≈ Avoid hitting the part with your soldering iron tip or you may move it
  - ≈ Be quick. Long applications of heat will melt solder at both ends of the device and through surface tension you may end up pulling the device off the board especially with smaller 0603 and 0402 parts
- Solder all other leads

Soldering Process (cont'd)



Non-Tinned Boards

- Multi lead parts
  - Tack two diagonally opposite leads first
  - Insure all leads align with the PCB pads reposition the part as necessary to get best alignment
  - Solder the remaining leads

Tinned Boards

- In most cases there is no need to wet the land with solder flux before tacking the first lead to the PCB

De-Soldering



Two Leaded Components

- Use two soldering irons one on each end of the part
  - Small parts will ‘stick’ to one of the irons so lifts off the board easily
  - Larger parts can be lifted off the board by gripping it between the soldering irons

Multi-Leaded Parts

- Heat Gun
  - Tends to heat up all surrounding parts so is useful to cut a hole in a piece of aluminium foil and use it as a mask to protect other parts. Cost around $40
- Hot Air Rework Station
  - Better solution provides a variety of heat nozzles with different opening diameters to contain and direct heat, temperature and air flow controlled. Cost $100 & up
  - I use an Aoyue 852A++ cost $150.
- Technique is the same for both. Apply heat on the solder joints moving the wand around until solder melts at all leads. Pick device from the PCB with a pair of tweezers or vacuum.

De-Soldering (cont'd)



Cleaning Up

- De-Soldering Braid removes excess solder
  - Resin impregnated copper braid with brand names like Soder-Wick, Dri-Wick, Pro-Wick etc.
  - Best widths 0.8mm (.030") for SDM 2mm (.075") for bigger stuff
  - Place the braid over the area with the excess solder then place the soldering iron on the braid. Let the soldering thoroughly heat the braid, don't rub the area. The excess solder will wick into the braid
- Isopropanol 99% soaked into a cotton swab removes solder flux

What to avoid



Tools & Supplies

- Soldering Irons with long tip to grip distances
- Rosin based flux – leaves a gooey mess under the part that's hard to clean
- Trying to apply liquid no-clean flux without a proper dispenser – the stuff has low viscosity, runs all over the place. You'll waste a lot of material, and it doesn't smell nice.