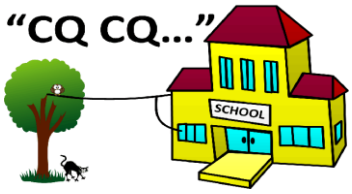

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SMT Soldering Workshop Notes

The School Amateur Radio Club Network®

Soldering is fascinating, creative, fun and quite safe, if you observe simple precautions:

- Only do soldering under constant adult supervision.
- Only use lead-free solder, as it is safe for you and the environment.
- Wear safety glasses and heat-resistant gloves if you are just learning.
- Make sure you have a clean work area with a heat-resistant mat.
- The soldering iron has an insulated handle and a metal tip.
- The tip reaches temperatures in excess of 360 degrees Celsius.
- Do not let the tip contact your skin, your clothing or the work area.

Soldering Surface Mount Technology (SMT) electronic components to Printed Circuit Boards (PCB):

1. Place the soldering iron on its stand.
    - Always return the hot soldering iron to its stand when not in use.
2. Get the electronic components, the PCB and the tweezers or toothpick ready.
    - The electronic components fit onto tinned-copper solder pads on the surface of the PCB.
    - The components are very small. Keep them in a sealed container until needed.
3. Turn the soldering iron on and wait 30 seconds for the tip to heat up.
4. Go through the safety precautions again while it heats:
    - Don't let the tip contact your skin, your clothing or the work area.
    - And always remember to turn the soldering iron off after use.
5. Have the solder wire ready.
    - The solder wire contains a rosin, called soldering flux. It cleans the work as the solder melts and helps make a smooth joint.
    - The rosin produces a little smoke when it boils. Although it isn't toxic, it might cause breathing irritation, so try not to inhale the smoke.
6. Place the PCB on the soldering mat, component side up.
7. Place the end of the solder wire near the PCB slightly above the soldering mat.
8. Hold the soldering iron in your writing hand, just like you would hold a pencil.
    - You may need to clean the tip of the soldering iron to remove any excess solder.
    - Never flick solder off the tip. It could splash into someone's eye or onto their skin or the work area.
    - We recommend cleaning the tip with a heat-resistant brass pot-scourer, not a wet sponge.
9. Poke the tip into the cleaner a few times.
10. Pick up an electronic component using tweezers or the moistened tip of a toothpick.
11. Place the component onto the surface of the PCB.
    - Make sure it is in the right place and is oriented correctly.
    - Make sure the metal component contacts precisely align with the pads.
12. Hold the component in position, correctly aligned and flat, on the surface of the PCB using the toothpick.
13. Pick up some solder (about 1mm) on the tip of the soldering iron by touching it against the solder wire.
    - The solder will melt and smoke.
14. Place the tip on the pad, touching both the pad and the component contact.

15. Wait for the soldering iron tip to heat up the pad and the component.
    - Solder will melt and flow onto the pad and around the component contact.
    - Do not let the component move, or the joint will not be smooth.
    - Apply just enough heat to solder the joint.
16. Remove the tip and wait for the solder to solidify.
17. Remove the toothpick from the component.
    - The component is now tacked into position ready for final soldering.
18. Place the tip on another pad of the component, touching both the pad and the component.
19. Next, apply the solder wire to the pad.
    - Solder will flow onto the pad and around the component contacts
    - Apply just enough solder to cover the pad.
    - Apply just enough heat to solder the joint.
    - Do not let the component move, or the joint will not be smooth.
20. Remove the soldering iron tip and wait for the solder to solidify.
21. Repeat for each contact on the component including the initially tacked contact.
22. Inspect each soldered joint to see if the solder has flowed around the component contacts and the surface is smooth.
    - Tin solder is always a little grey, not shiny like lead solder.
23. Continue to solder all of the contacts of all of the components.
24. Inspect to see if each component is soldered correctly.
25. Reheat and reapply a little solder to any joints that are not smooth.
26. Turn off the soldering iron
27. Optionally clean any remaining soldering flux off the board using isopropyl alcohol and a small brush.