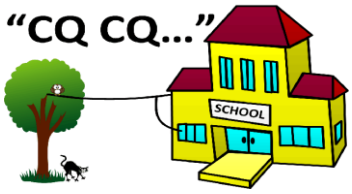

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PTH Soldering Workshop Notes

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 electronic components to Plated Through Hole (PTH) 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 printed circuit board and the side-cutters ready.
    - The electronic components have wire leads which fit into holes in the circuit board.
    - Surrounding each hole is a tinned-copper solder pad.
    - The holes are also plated with tinned copper.
3. Pick up an electronic component.
4. Bend the leads if necessary, to fit into the hole patten on the Printed Circuit Board.
5. Insert the component into the board.
    - Make sure it is in the right place and oriented correctly.
6. Hold the component in position.
7. Turn the board over and splay the leads so the component cannot fall out.
8. When sufficient components have been loaded onto the printed circuit board, place the board upside down on the mat.
9. Turn the soldering iron on, and wait 30 seconds for the tip to heat up.
10. 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.
11. 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.
12. Hold the soldering iron in your writing hand, just like you would hold a pencil.
13. Hold the solder wire in your other hand.
    - 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 skin or onto the work area.
    - We recommend cleaning the tip with a heat-resistant brass pot-scourer, not a wet sponge.
14. Poke the tip into the cleaner a few times.

15. Now, place the tip in the centre of the pad, touching both the pad and the component pigtail.
16. Wait for 3 seconds for the soldering iron tip to heat up the pad.
17. Next, apply the solder wire to the pad.
    - The solder will melt and smoke.
18. Apply just enough solder to fill the hole.
19. Remove the solder wire and wait 3 seconds for the solder to fully penetrate the hole.
    - It may even bubble as air escapes the hole.
20. Then remove the soldering iron tip, and wait 3 seconds for the solder to solidify.
    - Do not let the component wire move, or the joint will not be smooth.
21. Inspect each soldered joint to see if the hole is filled on both sides, and the surface is smooth.
    - Tin solder is always a little grey, not shiny like lead solder.
22. Continue to solder all of the components.
23. Use the flat-side of the side-cutters to trim the leads to about 2 millimetres above the board's surface.
24. Inspect both sides of the board 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.