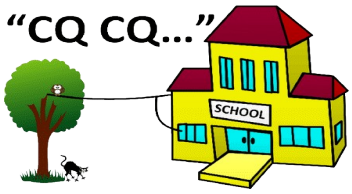

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PTH Soldering Workshop Notes

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 365 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 it is 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, on the underside of the board, is a tinned-copper solder pad.
3. Pick up an electronic component.
4. Bend the leads, if necessary, to fit into the hole pattern on the 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. Use the flat-side of the side-cutters to trim the leads to about 2 millimetres above the board's surface.
    - Don't trim the leads too close to the board as the components will fall out
10. Turn the soldering iron on, adjust the temperature to 365 degrees if adjustable, and wait for the tip to heat up.
11. 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.
12. Have the solder wire ready.
    - The solder wire contains a resin, called soldering flux. It cleans the work as the solder melts and helps make a smooth joint.
    - The resin produces a little smoke when it boils. Although it isn't toxic, it might cause breathing irritation, so try not to inhale the smoke.
13. Hold the soldering iron in your writing hand, just like you would hold a pencil.
14. 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.

15. Poke the tip into the cleaner a few times, until it comes out shiny.
16. Now, place the tip in the centre of a pad, touching both the pad and the component pigtail.
17. Next, apply the solder wire to where the tip touches the pad.
    - The solder will melt and smoke.
    - The solder will flow over the pad and down the hole.
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.
    - The solder 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 move, or the joint will not be smooth.
21. Inspect each soldered joint to see if the hole is filled through on both sides, and the surface is smooth.
    - Lead-free solder is always a little grey, not shiny like leaded solder.
22. Continue to insert, clip and solder all of the components.
23. Inspect both sides of the board to see if each component is soldered correctly.
24. Reheat and reapply a little solder to any joints that are not smooth.
25. Turn off the soldering iron
26. Optionally clean any remaining soldering flux off the board using isopropyl alcohol and a small brush.