



"Ask Dr. Solder!"

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I received a number of technical questions re: the Weller WTCPT solder station and solder tips. Since I'm **not** a real "Doctor of Solder," I decided to call one on the phone. I had a nice chat with Mr. Larry Smith in Weller's engineering support division, and a thirty-year veteran in the soldering industry. Here we go with, "Ask Dr. Solder."

Q: Why is a solder station "better" than a non-temp controlled (unregulated) soldering iron?

A: A non-temp controlled iron **continues** to increase in tip temperature the longer it's plugged in -- up to 1100 degrees-F! A solder station controls and maintains an exact tip temperature. In the case of 700 degree-F tips, you'll be soldering at a tip temperature of 400 degrees **less** than a non-temp controlled iron. A lower tip temperature with good technique, translates to better joints with less chance of damage to sensitive components -- IC's, etc. (The 700 degree-F Weller tips will **not** exceed 710 degrees-F.)

Q: Which tips do I use -- 700 or 800 degree-F?

A: The 700 degree-F tips are typically recommended for single layer and double-sided PC boards -- even four-layer PC boards. This includes practically everything in the world of amateur radio kits & homebrew. The most common tip for the WTCPT station is the Weller PTA-7 (1/16" screwdriver tip). You might also want a PTD-7 for much bigger pads/lugs, and a PTJ-7 for longer-reach work -- or <gasp> rework ;) If you want to try surface mount, pick up a PTS-7 for a start. The 800 degree-F tips are recommended for serious multi-layer boards -- 4 to 8 layer PC boards -- **not** typically used for ham radio kits ;)

(Note: Elecraft recommends the WTCPT station with PTF-7 1/32" tip for K2 construction.)

Q: Is the tip of a WTCPT really grounded?

A: YES !!! All Weller solder stations have grounded tips. You can check the integrity of the tip ground as follows:

Turn the solder station OFF and let it cool. Pull the plug OUT of the AC mains and using your DMM (ohm meter) check for continuity between the ground plug on the Weller AC plug (you know the one) and the tip of the soldering iron. You should be reading approximately one ohm. If your resistance is considerably higher, you probably need to clean the tip (with 600 emery cloth, etc.) and possibly remove the tip and the "barrel" (the hollow part that screws the tip to the iron) and clean the threads with a brass/bronze brush to remove any oxide build-up. Never use a 3-prong to 2-prong "ground cheater plug" -- obviously, this defeats tip grounding and ESD-safety.



Q: What is the meaning of "ESD-safe" in soldering stations?

A: "ESD-safety" guarantees that static energy from your body (hands, etc.) will be "dumped" to ground via the plastic soldering iron handle or solder station plastic housing. Otherwise, the ESD would transfer to the soldering tip, thus destroying the IC you're soldering. The solder station essentially discharges your body's static charge to ground every time you pick up the soldering iron. (Naturally, you should take additional ESD precautions if you're handling *extremely* sensitive components -- and not rely on the solder station for all ESD-safety in the lab!)

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.

Q: What about residual flux that's left on the board?

A: Flux removal is an issue that's best answered by the solder and board manufacturer. However, the *color* of the flux -- after soldering a pad -- is a good indicator of whether your dwell time is too long. Your residual flux should look "honey-colored" rather than "caramel colored." If you're starting to burn the flux, your dwell time is too long, OR your tip temp is too high, OR you need to consider a different tip shape, OR applying heat to the pad/component lead from a different angle. Heat primarily the pad, and catch the lead with the side of the tip -- then practice, practice... practice. Have a friend time you and inspect your work if you're serious.



Q: Any closing remarks?

A: Soldering stations allow for greater soldering consistency when compared to non-temp controlled irons. Overall, this translates to fewer cold joints, fewer heat-damaged components and fewer heat-damaged pads and traces. The quality of your work will be superior, compared to soldering with non-temp controlled irons. Remember to wash your hands after you're finished handling solder. Never smoke cigarettes or eat while soldering. Never allow kids to play with solder. And, practice soldering! It's still an art -- not a science!

There you have it! A conversation with "Dr. Solder."

Happy soldering,

Conrad Weiss - NN6CW -- remember, I'm *not* a real doctor ;) !