

Soldering: A Tutorial

As advertised, this soldering station appears too good to be true.

Mike (note: all names given are friends and/or associates of mine) borrowed my copy of Harry F. Olson's book *Acoustical Engineering* 30 years ago and I haven't seen it since. So while working on a recent project, I borrowed Dave's copy. But to be fair, I decided to replace my copy.

A quick web search showed this 1957 book selling for \$150 per copy used.

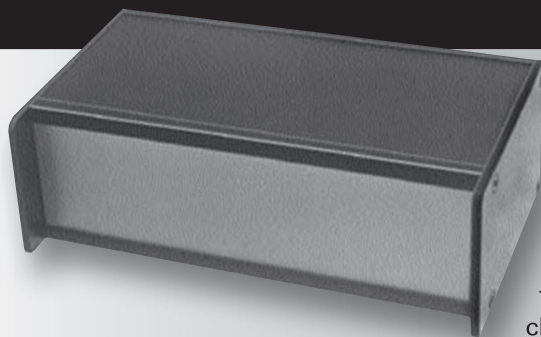
In 1991 Jesse got a pristine copy from Mark and, the copyrights having been expired, reprinted it with an updated introduction.

GOING SHOPPING

My web trip revealed that Old Colony Sound Lab had this version in stock for only \$69.95! They also had a few other items of interest. So I ordered two other books and one item that struck my

interest: a new soldering station from Velleman—the VTSS5V. This was listed as a 50W temperature-controlled soldering station for only \$21.99!

I placed my order through the website. The order entry was a bit different from most commerce sites, but quite functional. A few days later I received an e-mail from Old Colony customer service representative Sharon LeClair letting me know the items were ship-



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ping the next day.

I received everything well packed within a few more days. The reprinted book still contains the same error as Dave's older copy. Page 211 Equation 6.68 should be $DI = 10 * \log \text{ base } 10 (Q)$! The soldering system came in an attractive package touting its virtues as a temperature-controlled unit.

BACKGROUND

I first started soldering with a Weller soldering gun at least a few months ago. Shortly thereafter I graduated to a Marksman soldering iron. I own and have used soldering coppers, an acetylene torch, a propane torch, a butane iron, Weller, Unger, American Beauty, and many no-name soldering irons.

The most common soldering station I use today is the Weller WLC100 variable temperature station. This is pretty much just a soldering iron connected to a light dimmer to adjust the power delivered to the iron tip.

I use two different kinds of solder: 63/37 eutectic (or minimum melting temperature) and silver-filled solder. These melt at different temperatures. I also use these in sizes from 0.020" to 0.062", depending on the size of the joint.

When I am fixing a low-cost piece of gear, sometimes the pc foil is so thin that it wants to jump off the card at the slightest excuse, so I use a lower temperature and a finer tip. Other times I may be soldering a ground terminal that wants lots of heat and a bigger tip. So I adjust the power to the soldering iron manually with the control knob.

A proper solder joint takes 3 seconds to make. If it takes more than that to cool, then the temperature is set too high. Longer than that to heat the joint, and the iron needs to be hotter.

The light dimmer electronics in the Weller WLC100 does not monitor the tip temperature; it only adjusts the power going to the iron. So when Tim becomes impatient waiting for it to warm up and turns the control to full, the tip warms up faster and gets hotter than it needs to be. If he forgets to set it back to the normal operating range and leaves it on, the tips do not last very long.

Soldering works so well to join wires because the solder has the ability to dis-

solve a bit of the copper! Works great for the wires, but rather quickly eats up a copper tip. To prevent this, a thin iron plating is placed over the copper core on the better tips. Of course, I buy the "Iron Clad" tips because they last much longer than the older solid copper tips. This makes them a bit harder to tin, but greatly increases their lifespan. To keep the tip clean and the tinning uniform, most of today's soldering stations have a sponge to wipe the tip.

FEATURES

I was interested in trying this new low-cost temperature-controlled soldering system because a controlled soldering station adjusts the tip temperature by using a sensor to keep tabs on how hot the tip becomes. The control circuit would increase the power if the tip were too cold, and lower it if the tip became too hot. Better tip life and the ability to heat up larger joints, all in one!

The new Velleman station was a bit smaller than the Weller. It had the basics—a stand with an adjusting knob, a sponge, a holder for the iron with a guard, and a ground terminal for connecting an ESD mat or strap.

The tip on the new iron uses a screw-on collar to hold in a fairly long-bodied tip, which appeared to be "Iron Clad." The handle had a softish plastic grip on top of the body. That gives a better grip and helps you keep your fingers away from the hot parts.

The system seemed well made, so I set it up. I first noticed that the sponge is set into a well in the top of the base. I keep a plastic bottle of water with my solder station to wet the sponges. I was not quite comfortable with the idea of filling the sponge well, for fear that water would drip down the front of the soldering station. I compromised by filling the well half full of water and then lowering the sponge into the well. If this was not quite enough water, you can always remove the sponge and add more water.

I find most of my assembly time is spent putting parts in place; soldering is just a small step. So I usually place the iron to my left even though I solder with my right hand. Thus it is out of the way until I need it. The cord provided for the iron was just barely long enough to do this. This system is clearly intended

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to be used by a right-handed person on his/her right side.

Another possible problem is the small base, which tends to tip over on the left side if you are not careful with how the power cords are arranged. I also managed to not put the iron straight back into the holder and started melting the protective plastic surrounding the metal.

The collar nut used to hold the tip in place loosens up with use, as is typical of every soldering iron I have used. Unfortunately, when you tighten it the entire barrel rotates. This worries me because I do not want the power cord to twist when I tighten the collar. This iron requires two tools to tighten the collar.

HEATING THE IRON

The temperature adjustment knob is calibrated by a color scale yellow to orange to red. This seems quite intuitive and practical, but does require some feel to get to the temperature you find works well for your work.

I used this station on several projects. The tip that came with the unit seemed to be a reasonable size for most of the

work. It would be too big for some of the fine pitched lead systems used today, but if you are soldering those items you will most likely use a smaller tip or better equipment.

A better soldering system often uses a low voltage isolated heating element. This system relies on the high temperature insulation and the safety ground wire to prevent damage to sensitive components.

The big advantage of a temperature-controlled iron is that the sensor in the tip is used in a feedback circuit to keep the tip at a constant temperature. My standard Weller WLC100 variable temperature system does not do this. That is why Tim starts it off at the highest setting. A controlled iron would turn on at full heat and then reduce the power to the iron tip automatically as it heats up. The control knob would set the temperature for the size of work and type of soldering you are doing. If you place a well-controlled tip on a larger surface, more power is delivered to keep the tip hot. Let the iron sit and less power goes out, the tips last longer, and less energy is wasted.

The Velleman VTSS5V did not seem to heat up as fast as I expected for a 50W iron. I tried turning up the heat when I first turned it on to see whether it would heat faster. It did! That was not right for a temperature-controlled iron. I opened up the base and there were only three wires going from the control card to the iron. There were two wires for power and one for ground. That's two wires short for a feedback sensor! The unit is not a temperature-controlled system, but just a variable temperature system. That explains the low price.

Old Colony also carries a spare tip for this system. . . only one size. Because this is not a high-end tool, I do not think that this should be a problem for most users, because Velleman does list other tips as available.

Despite its low cost, the poor water well, the bad stand, the short iron cord, and not quite living up to its description make this a *not* recommended product. If you want to save money, try a simple 20 or 25W iron, which will do just about everything this system does for even less money! *ax*

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