

Tech Notes Soldering

Tools and Processes

The need for soldering goes back a very long time. The idea is to heat two metals to a point at which the bond. As field techs were almost always working with the repair of a broken wire or the installation of a replacement connector and what's important to us is the electrical connection.

Let's take a look at the tools and processes involved in getting the best possible job insuring the best possible connection and use the tools you've got available while looking at the new tools.

I've got soldering tools in my collection of antiques along with tools I've bought and used over the last 40 years working in Ag-Electronics. Within my company today, "we do a LOT of soldering" and own the tools to do the job correctly.



The irons shown to the left are from my collection. The iron to the far left could/ can be used by heating the tip with a touch of wood or coal fire for that matter. The other irons are electric and I would imagine build back in the 1930s. I actually plugged in the largest iron and couldn't believe it still works.

The soldering tools shown to the right are tools I've used for many years as a field tech. Soldering guns are great but the need for a power connection is a real issue in

field work. The other iron in the photo is a portable butane iron that did an amazing job for me 30 years ago. I was surprised at the performance let alone the convenience.



Taking care of the tools you own

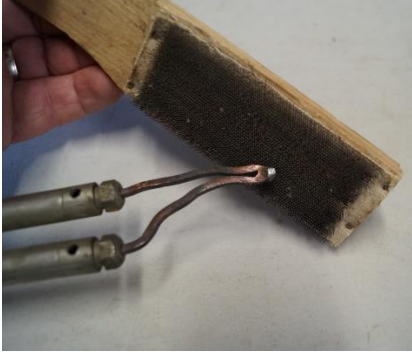
You probably have at least one soldering gun or iron around the shop or in the toolbox. *Let's look at getting the tools ready for use.* The tip must be clean and able to get hot enough to heat the metals and bond the solder joint.



Lots of times you'll find after time, your soldering iron or gun just won't get hot anymore. Tightening the tip will fix that problem almost all the time. The tip will be attached with either a slotted screw or a locking nut. Be careful not to overtighten the screws. They can be pretty easy to break.

If the iron gets hot the next step is to clean the tip. The bigger the iron, the more aggressive you can be with the cleaning process. Once the tip is in good shape it is pretty east to keep clean. Use common sense with the cleaning tools.

On the older copper and many current “copper” tips you can be pretty aggressive. Wire brush, steel wool, file, steel wool, sandpaper and others. There are lots of cleaning methods. The goal is to wind up with a bright copper tip. Be sure



there is enough tip there to create the solder joint. Tips wear out and need replaced. When ordering replacement tips, make absolutely sure you’re ordering for the correct model.

The cleaning process required to make a solder joint requires “flux”. Flux is a cleaning agent that normally is inside of the solder you select. Flux is used in plumbing for “sweating” or soldering copper pipes. A can of flux is a great aid in keeping you soldering tips clean and is available about any hardware or home store.

Tinning the Tip



Tinning the tip is a simple process of heating the iron and covering the clean tip with coat of clean, smooth flowing solder. When right, the tip will be bright and shiny. You must use a solder with rosin flux as a core and may also want to use the plumbers flux.

When you touch the solder to the tip the solder should start to “flow” along the tip area. This assumes good heat and it’s clean. Coat the entire tip, then you’re pretty well ready to go!

Not Too Hot

The general rule is the higher the wattage of the iron, the hotter it will get. It’s important to have enough heat to get the metals hot enough to bond while not so much as to melt the insulation or connector. Smaller wattage irons can be used on larger materials but you’ll need to heat the connection for a longer period of time.

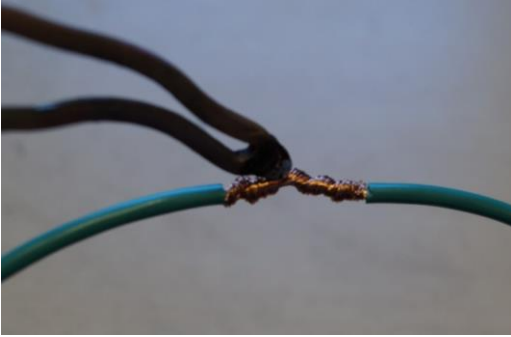


Most small irons have a switch allowing selection

of wattage for heat. We use in building circuit boards and attaching small connectors a “soldering station” which allows the user to directly dial in the temperature needed to do the job without overheating. Soldering guns in many cases have a trigger with a center position. Pulling the trigger completely sets it to the lowest power where centering the switch is used for maximum heat.



The Soldering Process is always the same



1- Heat the connection

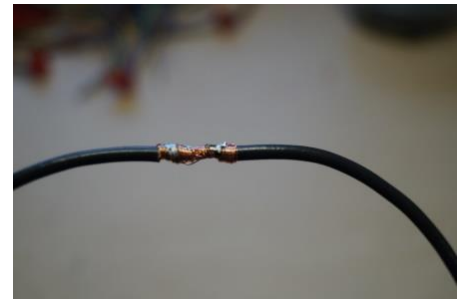
2- While holding the heat to the connection touch the solder to the tip and connection until you see the solder start to flow.

3- While leaving the iron in place, move the solder away from the iron across the connection to insure the entire connection is hot enough for the metals to bond.

The Finished Connection

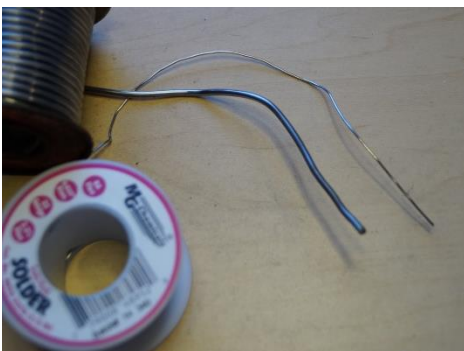


A good solder joint will appear bright and shiny. A bad solder joint is referred to as "cold". That won't do it for a good electrical connection. You may see blobs of solder indicating the metals were not hot enough to bond.



Selecting the Solder

Buy solder that has a 60/40 metals blend. It is 60 percent lead and 40 percent Zinc. Be sure it has a Rosin Core. That's the cleaning flux. Acid core solder is used when bonding galvanized metals and will ruin connectors and wires.



Solder is available in a lot of diameters or sizes. I like to use solder .050 inch diameter for the big stuff and .030 for the small wires and circuit boards. Thin solder for small connections, and larger solder for bigger connections.

Selecting the Best Soldering Iron for the Job



First try to use what you already own. As Field Techs the portability of the Butane Irons is very nice. I bought the iron shown as a kit for \$30.00 from Circuit Specialists just to see what's available. It gets plenty hot, has a heat control and can also be used as a torch for attaching big connectors like those used for battery terminals. Once I figured out the "child proof" operation, I was impressed.

If you've not had experience soldering, take a little time to practice using pieces of wire around the shop.

Remember, air flow drastically reduces the heat so try to shield your connections when in the field.

Also remember the metals must be as clean as possible. If you strip back a wire for repair and it's black, "clean it"! Many times in the field I've simply used my pocket knife and scraped the wires until they are bright copper.

Good luck out there! Hope this was helpful!

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