

Soldering & Soldering Irons

Bob DeVance, K5CRX, August 30, 2011

Yahoo made a splash by asking, “Do you Yahoo?” It served its purpose to get individuals to look at their internet and e-mail usage. A variation, “Do you solder?” should cause us to ask questions. First, “Who cares anyway?” is a good question. Likewise, “Isn’t that the domain of techies with pencil holders and horn-rimmed glasses?” is a fairly common response. Actually, as radio amateurs, all of us should at least take a passing interest in the subject. How often do we find we need a custom length power or coax cable to go with that nifty gadget we just purchased? As we look at a local vendor’s connector selection, we discover that most need some solder support! Now what to do?

Let’s look at the prospects of buying soldering equipment and then at using it properly. When looking to buy a soldering iron and solder, what should we consider? Once we have the necessary items in hand, how do we use them safely and effectively? Let’s explore those topics.

Important points

Surface mount components – Don’t attempt soldering/unsoldering these components unless you’re an expert and have the correct equipment! Surface mount is a subject for another article.

Static electricity – Use care on static-sensitive components! A wrist strap ground or grounded work surface may be necessary. Some irons have static ground built in.

Safety –

- Be aware of solder fumes – Good ventilation is a must.
- Eye protection – Use it!
- Burns!! Let it cool completely before touching the solder joint or iron.
- Don’t sling solder from a hot iron to clean it quickly! The bit of flying molten solder can do a lot of unanticipated damage to carpets, plastics, pets, and people!
- Use a heat sink on delicate components.

Buying soldering equipment

These questions will help determine what type of soldering equipment to consider. What kind of work am I likely to do? Will I use it indoors or out? How big is the item(s) to be soldered? How precise is the work?

The following list provides an overview of some of the soldering equipment available.

Kinds of Irons –

- Pencil corded 110 Volt iron
- Soldering station
 - Non-temperature regulated
 - Temperature regulated (controlled)
 - Adjustable temperature
- Soldering Gun
 - Great for PL-259 COAX connectors
 - Great for outdoors work
 - NOT good for small or precision work!
 - May overheat or melt components
- Gas-fired (butane)

- Good ventilation is a MUST!!
- Great for PL-259 COAX connectors
- Great for outdoors work
- NOT good for small work!
- Keep gas supply handy!
- Use caution as some do not show a flame. You can't see the heat!

Solders –

- 60/40 is the most common mix. It is 60% tin, 40% lead. Melts between 361 and 374 degrees F. May not be available for purchase much longer as lead-free is currently being produced in its place.
- 63/37 is not as common and has a different melting characteristic called “eutectic” meaning that it melts at 361 degrees and does not have a fluid state as 60/40 does.
- Silver solder – “hard solder” – is used for higher temperature applications. It is often used for jewelry repair, etc.
- Lead-free solder – made of tin and various other alloys. This is replacing the tin/lead combination.
- Flux is needed to carry away impurities and boost adhesion.
 - Rosin flux is most common. It may be included inside the solder wire or applied topically.
 - NO acid core solder or acid flux should ever be used unless you're doing plumbing repair!

Solder and Component Removal - Desoldering

- Common tools
 - Solder Wick or braid
 - Solder sucker (hand-held vacuum device)
 - Dental picks are great! These are good for lifting leads in tight places and for opening component lead holes in circuit boards.
- Specialized tools
 - Powered vacuum solder sucker
 - Surface mount removal tools and stations

Soldering Techniques –

Once we have suitable soldering equipment and solder for the task at hand, what guidelines will help ensure a beautiful, shiny solder connection? The following list is a good starting place.

1. Keep the solder iron tip clean. Use a damp sponge or wire mesh. Most soldering stations include one or both of these items. If an iron does not come with either, purchase as replacement sponge pad. These are available both as the refill sponge pad and as a tray and sponge holder combination.
2. Allow the iron's tip to come up to its temperature and stabilize. Don't get in too big a hurry to start soldering! The soldering experience is much less frustrating if the iron has time to heat and stabilize.
3. Keep the tip tinned with solder. Melt a very light coating of solder to cover the tip of the iron. This aids in heat transfer and protects the tip from rapid oxidation.
4. Use enough heat to get the job done but don't go overboard. Too much heat can easily cause circuit board traces to lift from their boards.

5. Use a heat sink on delicate parts. Small alligator clips make great heat sinks to keep heat from travelling up a lead and into the component.
6. A good connection will be bright and shiny, not dull and powder-like.
7. A shiny connection implies that the parts were not moved during soldering and that adequate heat was available.
8. An inexpensive “third hand” can be invaluable. These little gadgets are available from several of the tool stores. They consist of a weighted base and small flexible arms with clips at the end that can be used to hold components steady during soldering.
9. Tinning a wire or component lead can ease making a good solder joint. Tinning is the process of melting a small amount of solder onto and/or into a bare wire end or component lead.
10. Use a small amount of solder between the tip and the work to aid in heat transfer.
11. Try to avoid soldering in the wind or under a fan. This cools the tip quickly and makes soldering without cold solder joints difficult.
12. Be sure to have good ventilation. Avoid breathing the fumes from soldering.
13. Small alligator clips and hemostats make good heat sinks.
14. BE SAFE!!!

When all is said and done, why not just let someone else do it when it comes to soldering? There's no reward quite like doing it yourself. And who knows – you may be the one who salvages a bad or emergency situation by being able to effect an on-the-spot repair that saves the day!