

Soldering notes and vocabulary:

- saw-der (the “l” is silent)
- **solder** – what is it?
 - essentially it is metallic hot-glue
 - “**radio solder**” is for making electrical connections (avoid counting on solder joints for structural support)
 - one can also solder together copper plumbing fixtures (using a propane torch and different kinds of solder – called “**sweating**” pipes together)
- **safety** – soldering involves working with hot liquid metal – be aware!
 - the soldering iron, solder, and the components get hot and stay hot (for a while)
 - when a liquid, solder can splash – the comic recommends doing this (perhaps in jest)
 - cover up, especially eyes and exposed skin
 - if you get burned, treat it (and report it)
- **rosen-core vs lead-free** solder -- lead-free sounds healthier but it has a higher melting temperature and is harder to use
- solder comes in various diameters – we’ll usually use 0.025” or 0.032” diameter solder
- solder wire is flexible, not brittle – good
- solder wire conducts heat – beware!
- use a **soldering iron** to melt the solder – ours are adjustable temperature – keep setting mid-range
- **tip tinning, tip cleaning** (wet sponge or metal sponge) – keep tip of iron shiny, but not drippy
- component **pre-tinning** (before connecting) – especially stranded wire
- key idea: don’t melt the solder on the iron and try to apply it to components – instead, heat the component and let it melt the solder – the solder will only spread as far as the surface is metal and is hot enough
- let solder **flow** (AKA **flash**) over **soldering pads** and make **fillets** around wires
 - if need be you can “**rework**” (i.e. move around) solder with a hot iron
- **pcb – printed circuit board** has holes and soldering pads for component connection plus surface (and/or subsurface) wires called **traces**
- don’t apply so much solder that it forms a **solder bridge** over any plastic areas on the pcb and touches another trace
- clip off excess **leads** when done (hold leads or at least cover with a hand so they don’t fly across the room!)
- remove excess solder with a **desoldering braid** (which likes solder more than the pcb) or with a **solder-sucker**
- learn to strip (insulation off) wires with a **wire stripper** – use 22-gauge solid wire for (**solderless**) **breadboards**
- use the **helping-hands** to hold components – your hands will hold the iron and the solder wire
- learn to be quick – some electronic components, especially **ICs (chips)**, can be damaged if they get too hot for too long
- especially when soldering **headers**, use the helping hands to **heat-sink** the pins so the plastic doesn’t melt
- cover exposed metal with **electrical tape** or **shrink-wrap** (might have to put that on in advance; don’t get it hot too soon)