

# Soldering Basics

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# Types of Soldering

- Direct heat
  - Guns, pencil irons, stations
- Solder Bath
- Resistance

# Types of Solder

- Lead/Tin 60/40
  - Different thicknesses
  - Most include one or more rosin cores
- Silver/Tin
  - Now used for water supply
  - Requires special flux
- ROHS
  - Has greatly reduce the use of Lead based solder

# Equipment

- 25-35 Watt pencil iron is the most common
  - Cheap, Long heat up, no temperature control
- Large pencil iron
  - Not used much anymore
  - Very long heat up, no temperature control
- Pencil iron – temperature controlled
  - Grounded – safe for electronics, reduce static
  - Adjustable temperature
  - Temperature held very stable
  - Can be used to solder large bus
  - Suggest Hakko 888D station. One on Amazon for \$97 with one tip.
  - [http://www.amazon.com/Hakko-FX888D-23BY-Digital-Soldering-FX-888D/dp/B00ANZRT4M/ref=sr\\_1\\_1?ie=UTF8&qid=1453982664&sr=8-1&keywords=hakko+fx888+soldering+station](http://www.amazon.com/Hakko-FX888D-23BY-Digital-Soldering-FX-888D/dp/B00ANZRT4M/ref=sr_1_1?ie=UTF8&qid=1453982664&sr=8-1&keywords=hakko+fx888+soldering+station)
- Gun - 200 and 325 watt versions
  - Fast heat up
  - Tips have shorter life
  - Good for large bus wire
- Resistance
  - Good for bonding small-medium metals

# Solder and Flux

- Solder needs flux to help it clean & bond to the metal
- The flux can be inside the solder in small cores
- Types of flux
  - Rosen – Used with electronics
  - Acid – Used with metals
- Solder has a wide range of sizes based on work being done and amount to be applied
- FastTrack turnouts require liquid acid flux to solder the nickel silver rail. Acid flux must be removed after soldering is complete. Use water and baking soda to neutralize acid.

# Connection Methods

- Joining two wires – loop and crimp, apply heat shrink to insulate
- Parallel wires – use tools to hold
- Terminal strip or connector – loop and crimp
- Large bus with small wires- wrap small wire around larger wire
- Circuit board – throw hole
- Surface mount
- Suitcase connectors – throw away

# Do's and Don't

## – DO

- Clean tip before and after each use
- Use moist sponge to clean tip
- Apply heat before solder. Not doing this can result in cold solder joint and loose connections
- Turn off Hakko station if not using for 5 minutes. Will increase tip life and save energy. Very fast warm-up.
- Use grounded tip for electronics.
- Consider using static strap on wrist to reduce static.

## – DON'T

- Don't move wires until solder cools. Will result in cold solder joint.
- Don't carry solder to job on the tip. Always apply to heated work area.
- Set the tip temperature too high. 700-750 on the Hakko is good for small to medium wires. 850 for large wires.
- Remember to turnoff power on wires since tip will short to ground
- Don't use aluminum wire
- Flux is in the solder no need to add any

# Workshops

- Tinning wires
- Solder crimped wires, apply heat shrink
- Solder feeder to track
- Solder 12 gauge with wrapped wire