Hardware Hacking Village

Intro to Soldering/Desoldering

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Ruxcon 2016

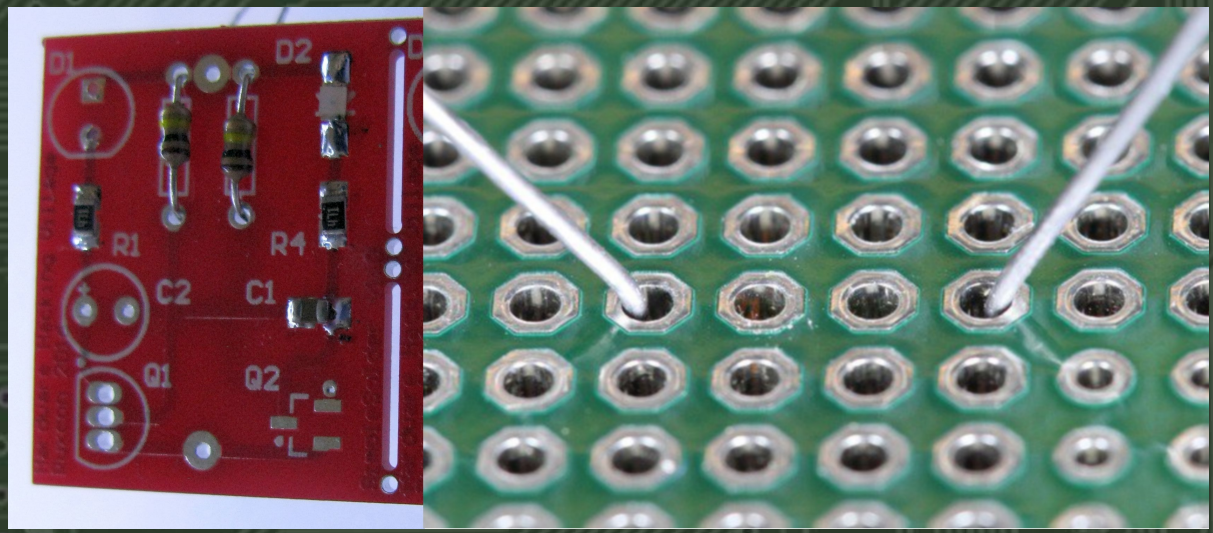
Build Docs And Badge Firmware

- Soldering Iron;
  - Temperature controlled soldering station prefered
  - Low wattage irons are bad mmm'kay
- Tip cleaner;
  - Wet sponge - works but may reduce the lifetime of your tip
  - Copper/Brass scourer - better option as no thermal shock
- Solder;
  - 60/40 Tin/Lead solder - "the good stuff"
  - PbFree solder - "less than ideal"
- Helping hands/board vise (optional but recommended)
- Tweezers/haemostats (for SMD)
- Flux Pens (optional but handy to have)

What About Desoldering?

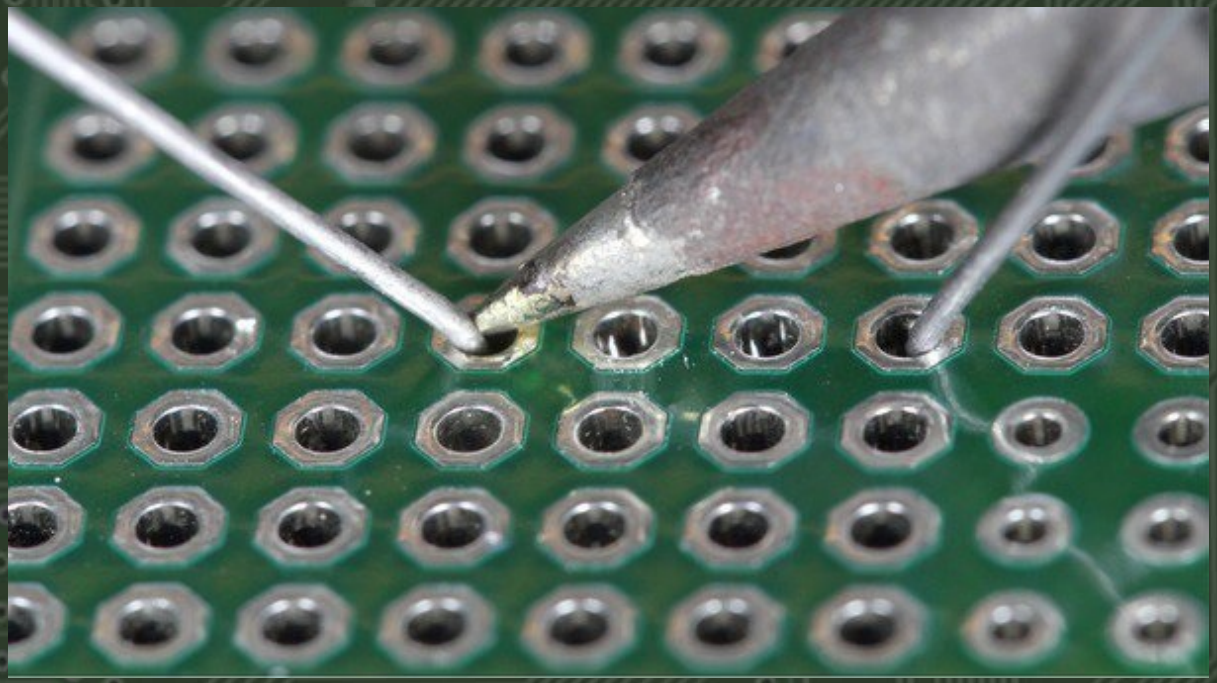
- Solder wick
- Solder sucker
- Vacuum desoldering tool
- “Chipquik”

Insert Part(s) and Imobilise



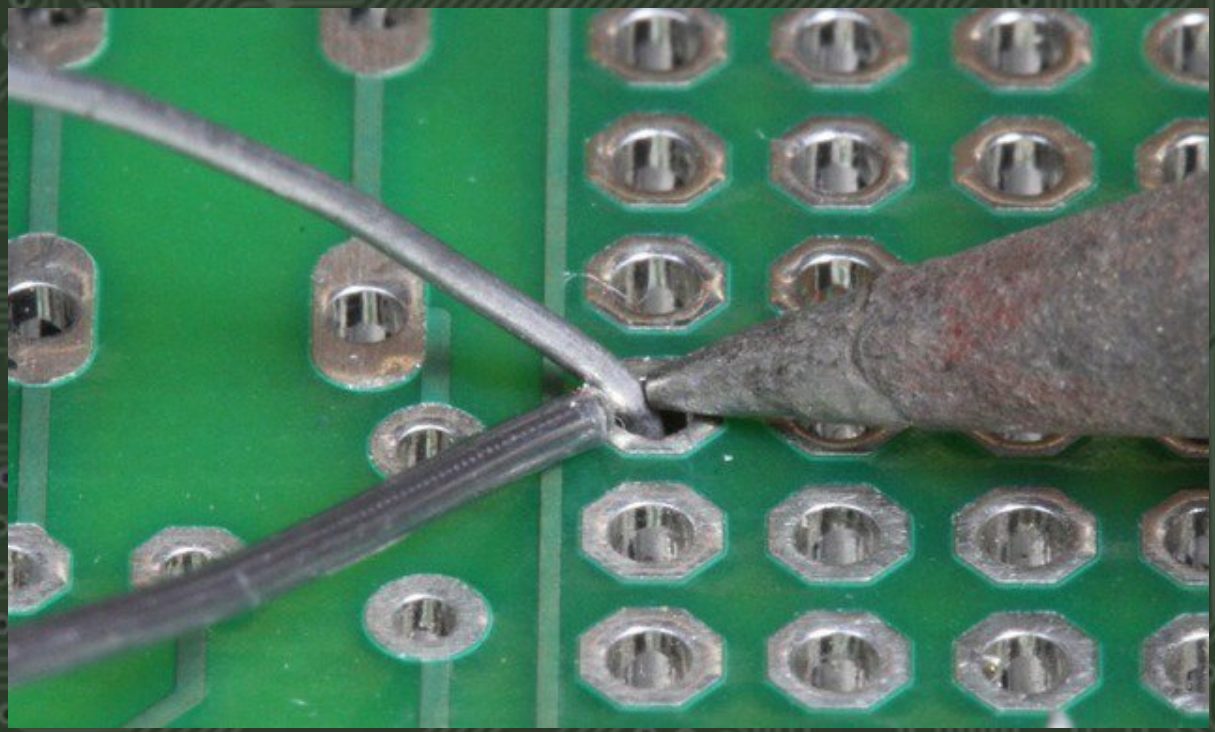
- Insert your part through the appropriate holes in the PCB
- Bend the leads out slightly so it holds itself in place

Apply Heat



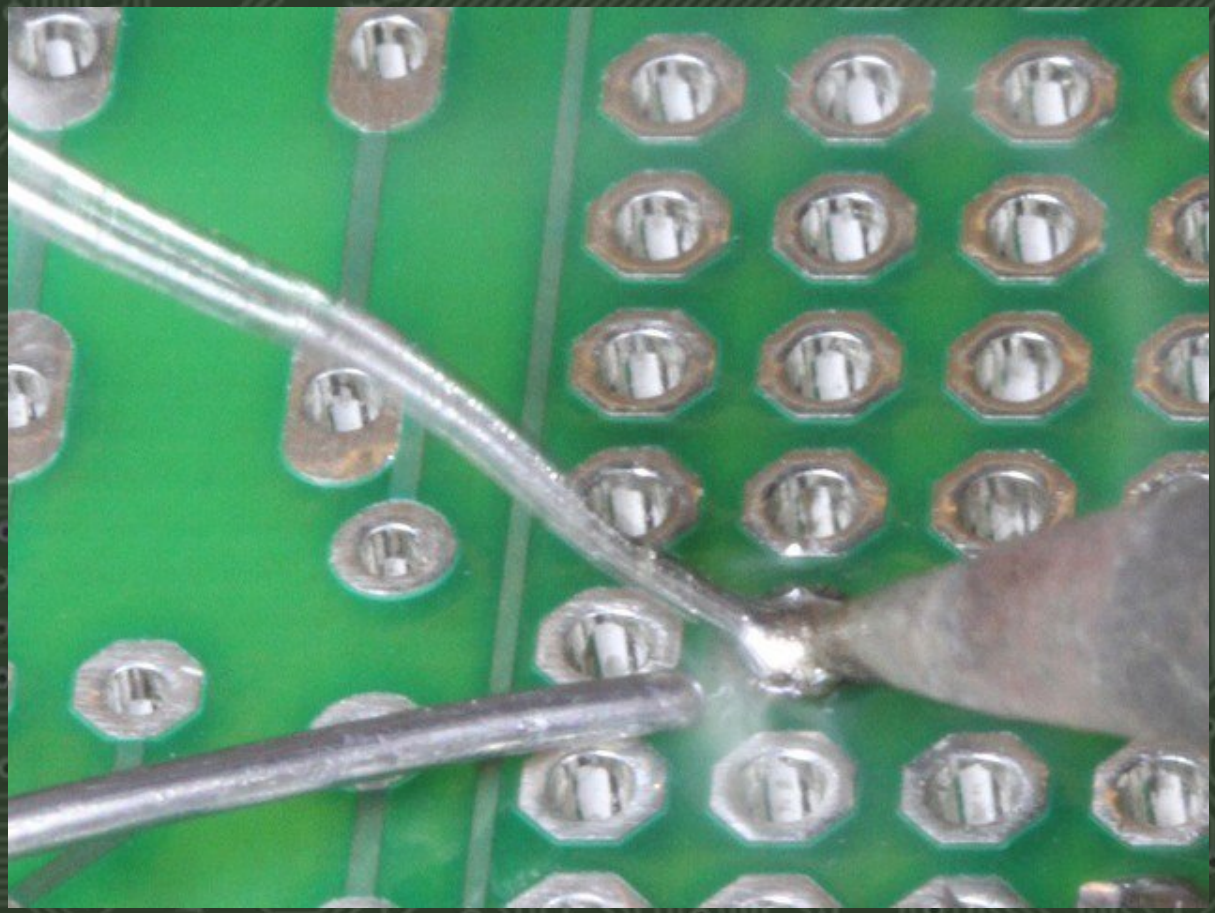
- Ensure your soldering iron's tip is in contact with the pad and the lead
- Light pressure will assist
- A small amount of solder on the iron tip aids heat transfer

Apply Solder



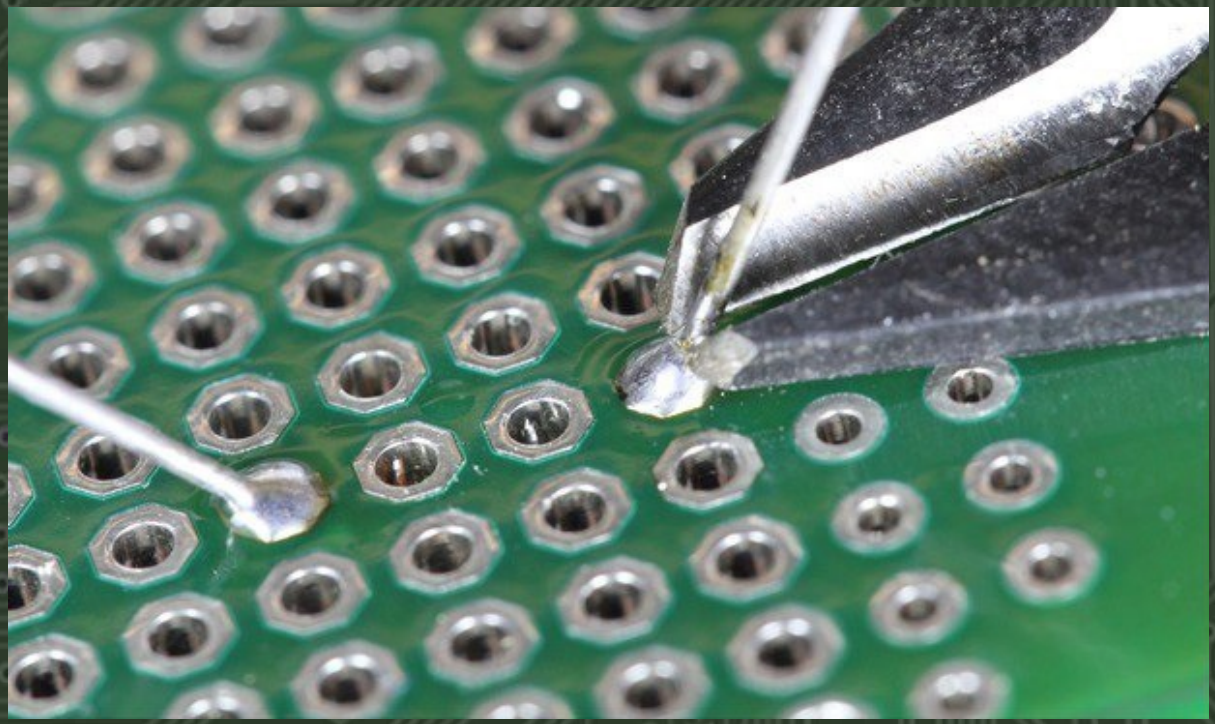
- Feed in enough solder to make the joint
- If it doesn't immediately melt, heat a little longer and try again

Allow The Joint to Flow



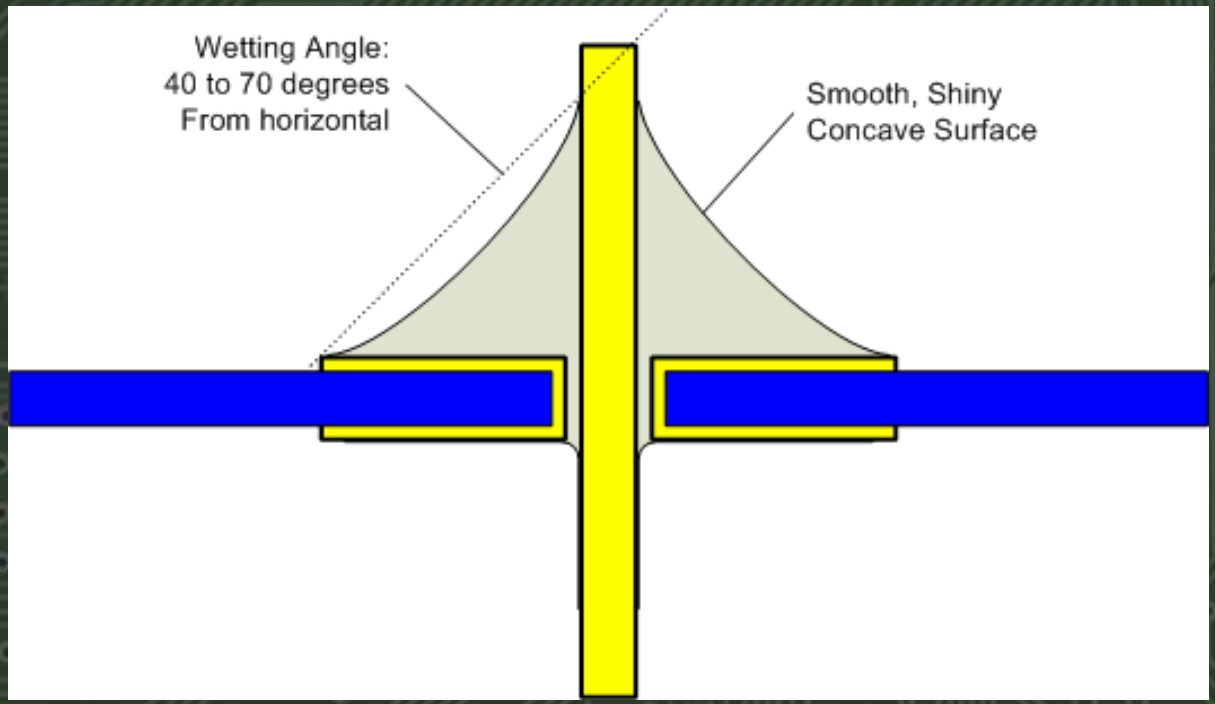
- Remove the solder from the pool
- Wait briefly while the solder "flows"

Trim Your Leads



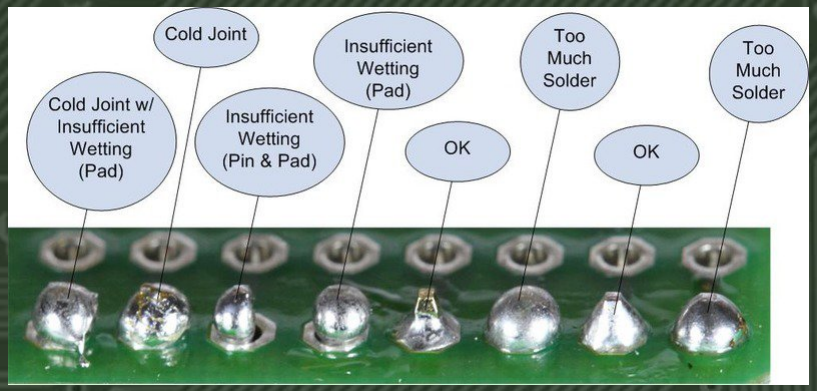
- Clip the leads off close to the board

Good Joints



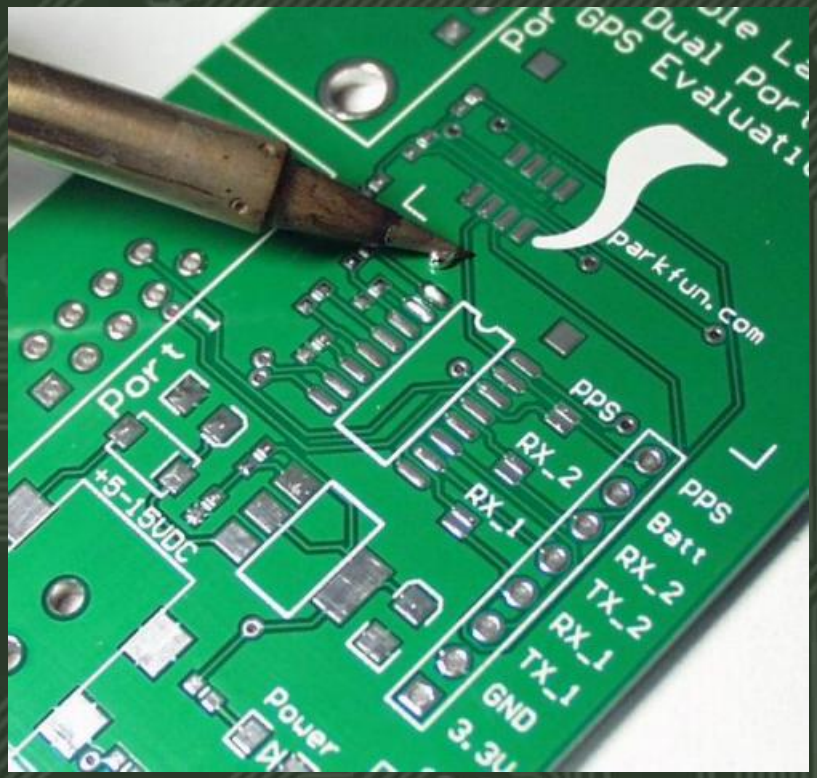
Characteristics of a “good” joint

Bad Joints



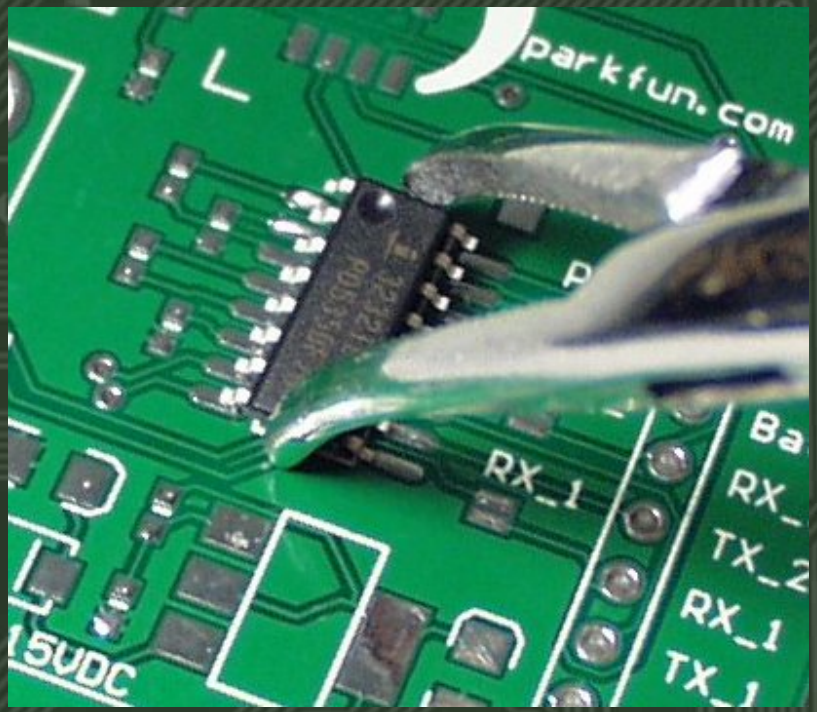
- Cold Joint - solder has not “flowed” properly;
  - Give your iron more time to warm up
  - Hold the iron on the pad longer before adding solder
  - Iron too small for joint
- Insufficient wetting - likely not applying heat to lead and pad
- Too much solder - not a big deal in most cases, use solder wick/solder sucker to remove excess if you want

Tinning the pads



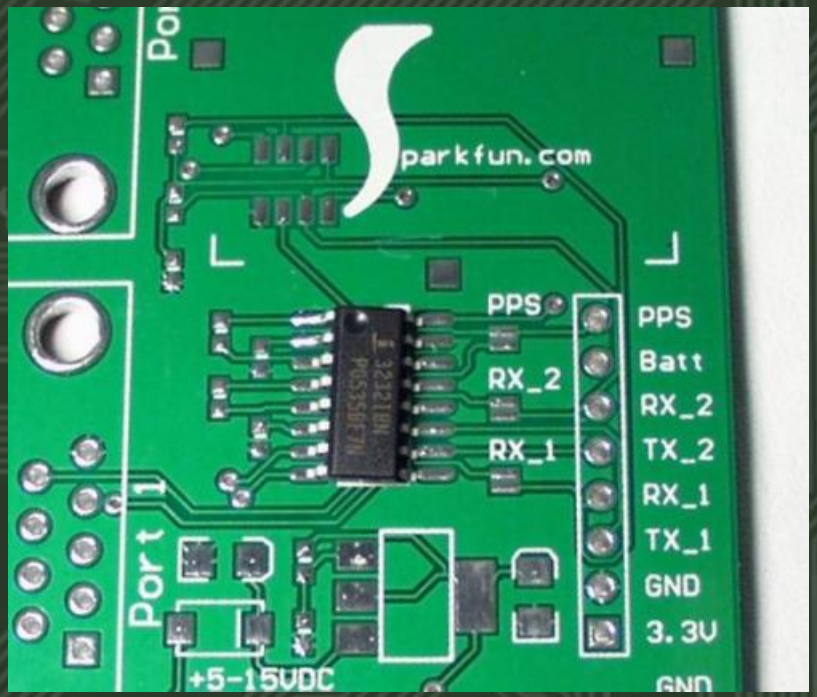
- Apply a small "mound" of solder on one pad.
  - Which ever end of two-terminal devices
  - Corner of SOIC
  - Opposing corners of QFP

Place Part



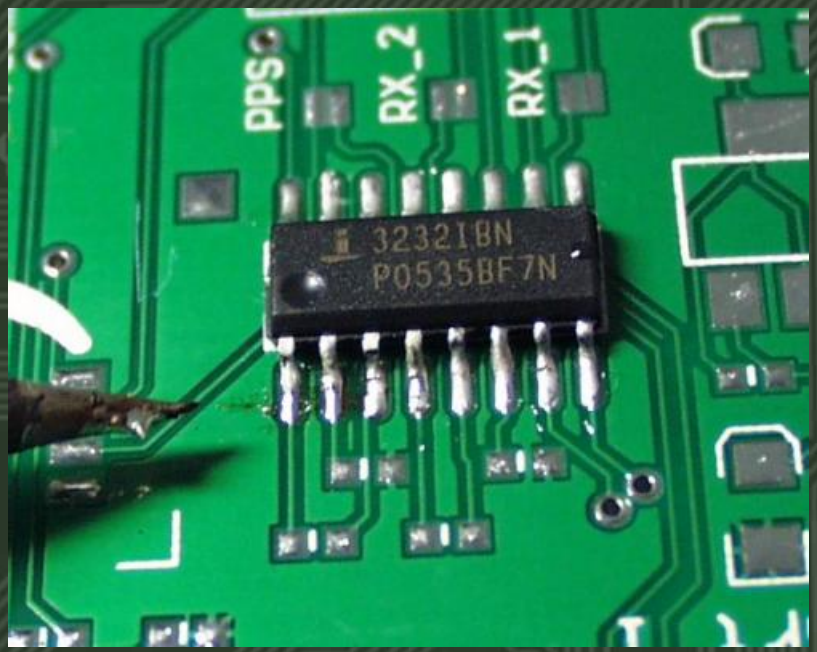
- Haemostats are good for larger parts
- Fine pointed tweezers for others

Tack The Part Down



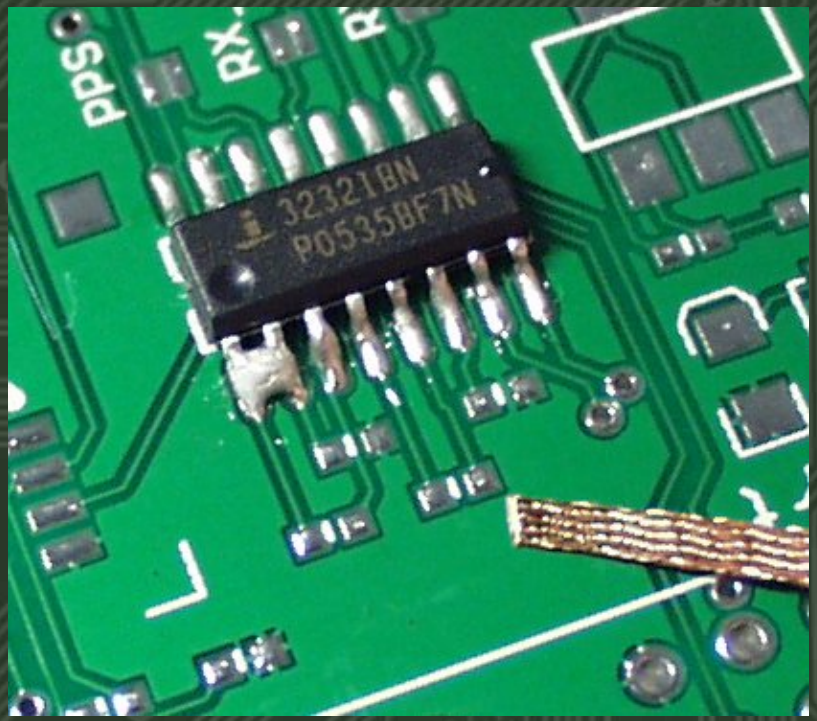
- Flow the solder by applying some heat
- Reheat and adjust if necessary

Solder Remaining Pads



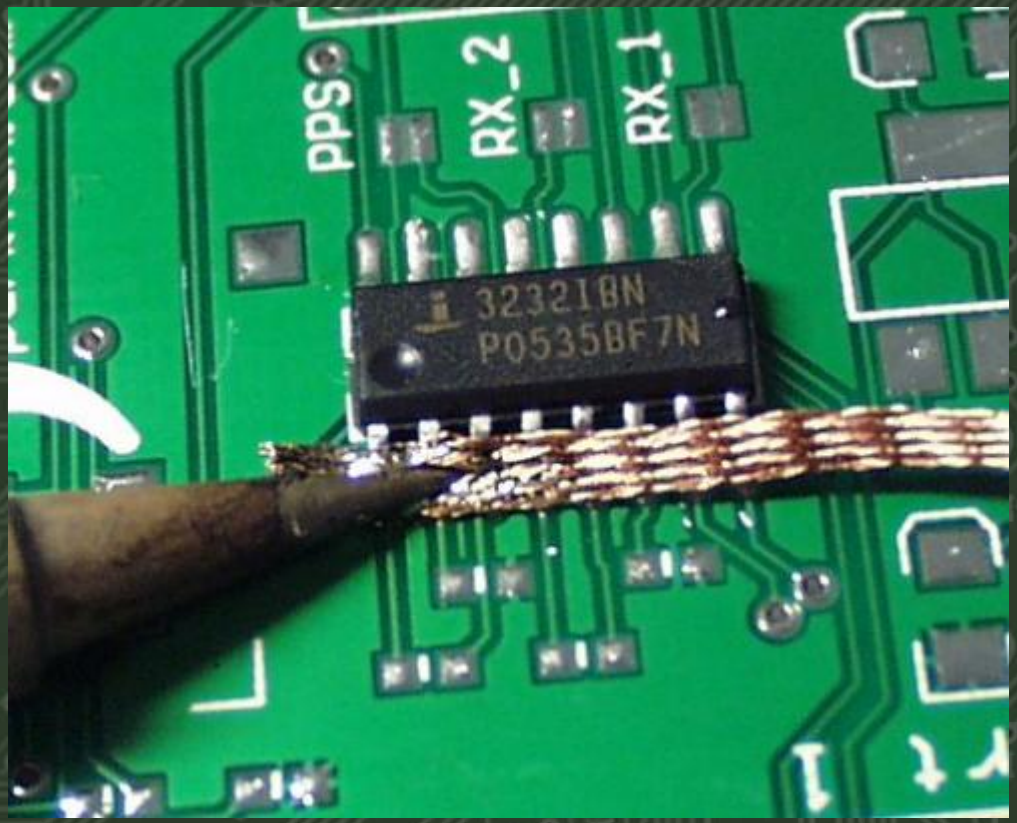
- Add just enough solder to make the connection

Help! I Bridged Some Pins



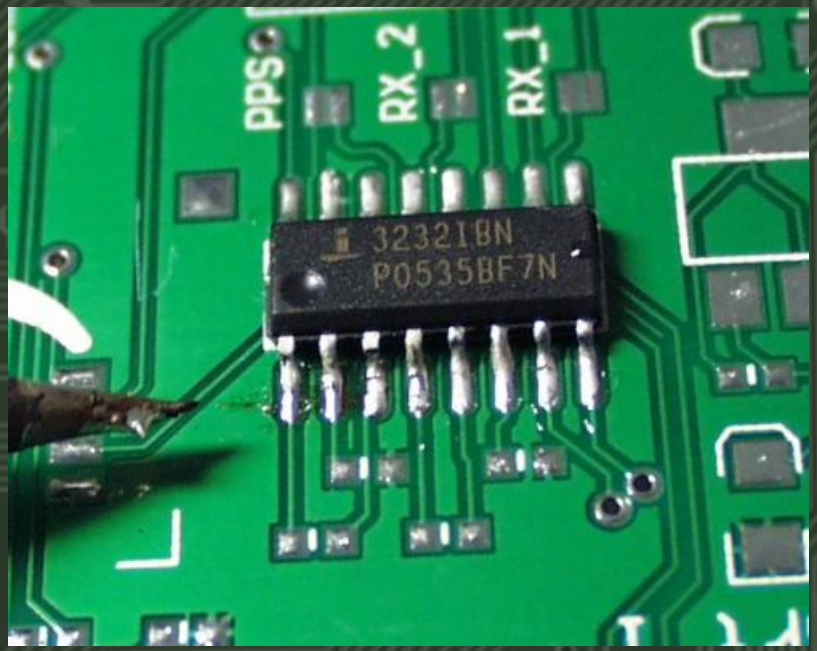
- Solder wick is your friend

How To Use Solder Wick



- Lay solder wick on bridge
- Apply heat
- Excess solder will get “soaked up” by the wick

Et Voila



- Remove iron and wick from joint and you're done
- If it didn't work, try applying flux then wicking again
- Usually there's enough solder left for the joint

Solder Wick

- Same procedure as for removing bridges
  - Need to remove ALL the solder
  - For SOIC and larger devices also need to “lift” pins as you go.
  - Works for through-hole but is not ideal

Solder Sucker

- Useless for SMD, works OK for through-hole so long as you apply enough heat
  - Push "plunger" down
  - Heat joint with iron (hold it longer than you think you need)
  - Remove iron from joint, apply tip of sucker, press button

Vacuum Desolder Tool

- Tend to be expensive
- Effective for through-hole (though a bit "knacky")
- Also available in "station" form

"Chipquik"

- Excels at removal of high-density SMD devices
- Unfortunately quite expensive
- Low temp eutectic which alloys with solder to lower its melting point allowing it to stay liquid for longer
- Need to wick off residue when done

Some Quick Notes on Other Techniques

- SMD Solder Paste/Stencils
- Hot air rework/reflow
- Wave soldering

Links

- https://learn.adafruit.com/adafruit-guide-excellent-soldering - Adafruit soldering guide (credit for most through-hole images)
- https://www.sparkfun.com/tutorials/36 - Sparkfun SMD Soldering tutorial (credit for most SMD images)