

S4

SMALL SATELLITES FOR SECONDARY STUDENTS

Soldering 101



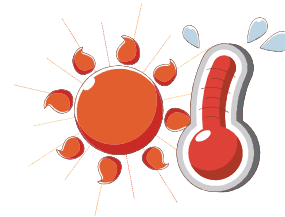
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What is Soldering?

- **Soldering** is a process in which two or more metal items are joined together by melting and flowing a filler metal (solder) into the joint.
- Solder is usually composed of a Tin alloy, the one you are using is 96% Tin and 4% Silver

Careful it is HOT!



Solder melts between 185–215 °C (365–419 °F)



Terminology

Flux - is a chemical cleaning agent, flowing agent, or purifying agent.

PCB – printed circuit board

Component – the electronic item to be attached

Lead – connection point of the component

Pad – connection point of the PCB

Via – a electrical path between layers of the PCB

Trace – electrical conductive paths between pads and vias

Solder Joint – region where the pad and the component lead connect

Tip - part of the Soldering Iron that is physically in contact with the solder joint.

Tinning (Tin)- the process of applying solder to a object before making a solder joint

Wetting - The behavior of a liquid when the liquid contacts a solid surface

Tools



Helping Hands



30W Solder Iron



Sponge



Diagonal Cutters



Electrical Tape

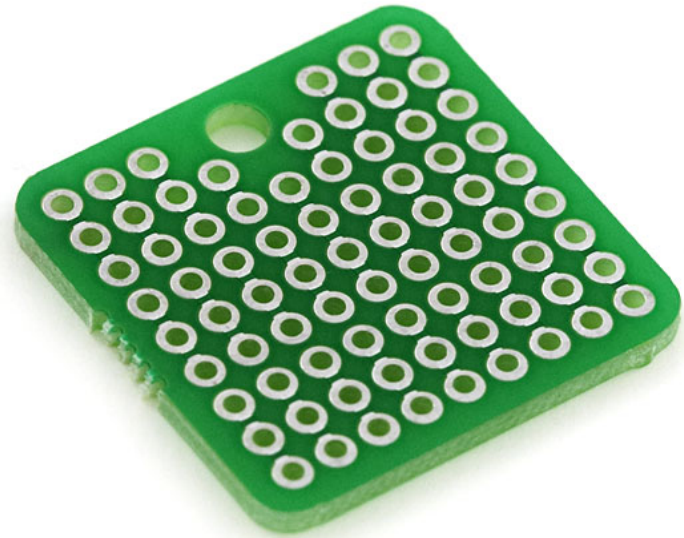


Lead-Free Rosin Core Solder

Components



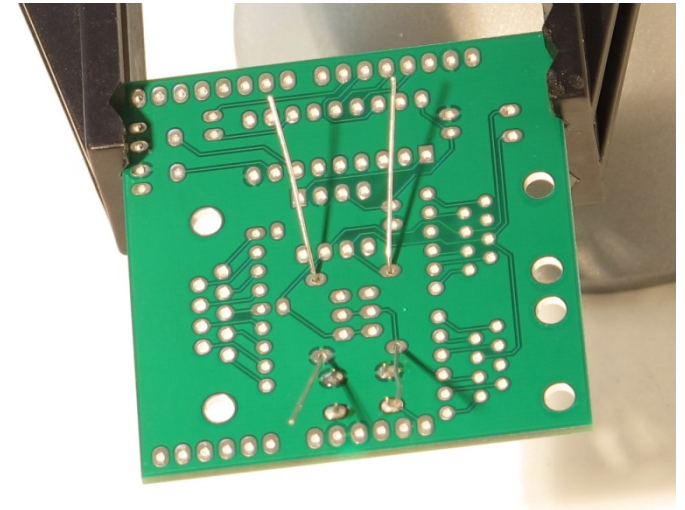
10K Ohm Resister
(10,000 Ohms)



ProtoBoard

Preparation

- Turn on Iron
- Clean Tip
- Tin Tip with solder
- Insert Component
- Hold Component
- Hold the Board



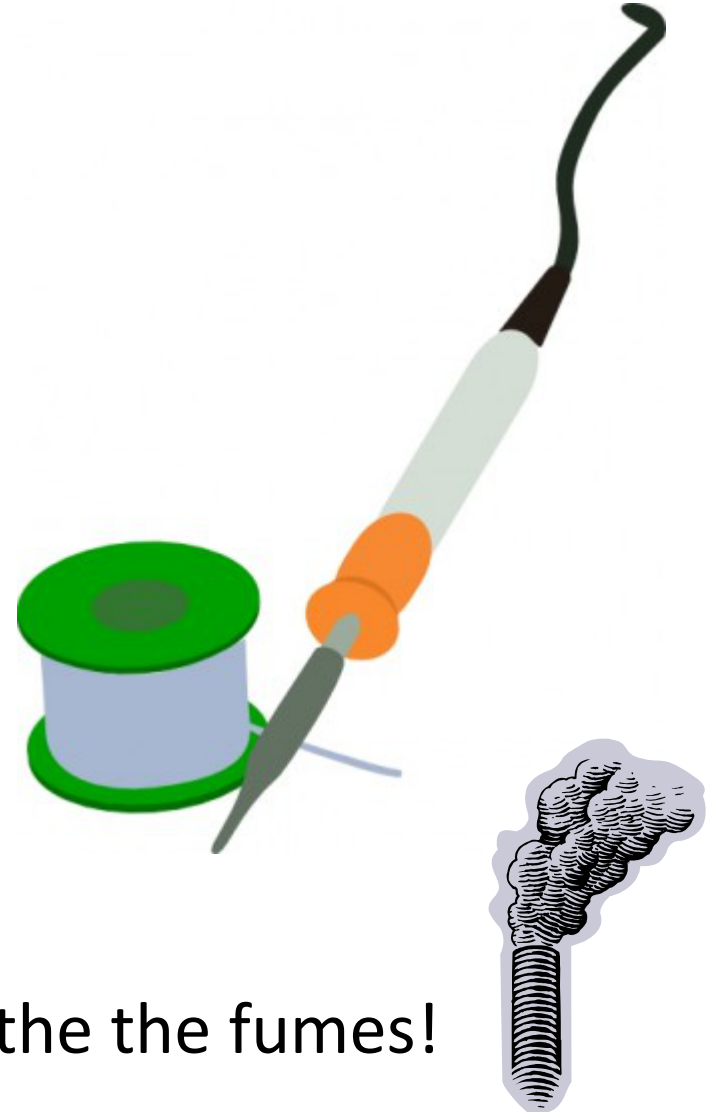
Remember: Always work on a solid surface!

Making a Solder Joint Overview

- Heat Joint
- Flow Solder
- Let Cool
- Check Solder Joint
- Trim Lead
- Move to the Next!



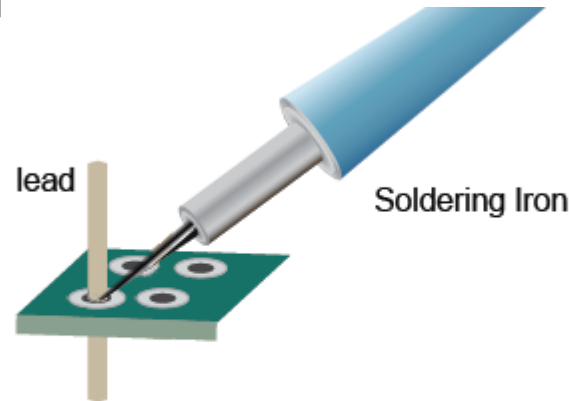
Don't breathe the fumes!



Heat Joint



To do: Heat junction of component and pad with tip on soldering iron



Note: It can take a few seconds for the joint to reach the melting point of solder

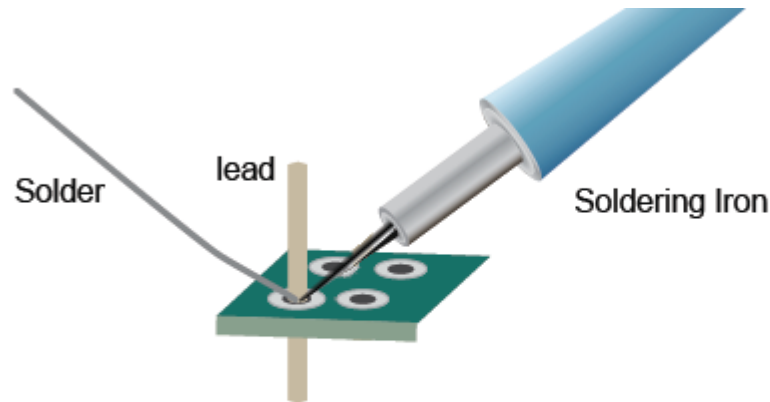
Remember: the larger the thermal mass the longer it takes to heat! (bigger lead, longer time)

Flow Solder



To do: Flow the solder, place solder on opposite side of the tip

The solder should wick around the joint and create a cone or volcano shape



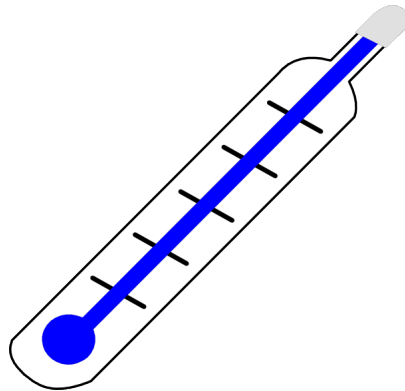
When there is enough solder in the joint, remove the solder wire and then remove the iron!

Note: If solder does not flow, try cleaning and re-tinning the tip and starting over again.

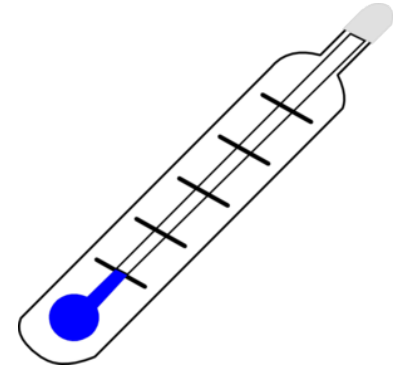
Let Cool



To do: Let the joint cool, this will take about one to two seconds



~ 1 - 2 seconds



Warning: Do not move anything! If the lead is moved as the solder cools it will be a bad solder joint

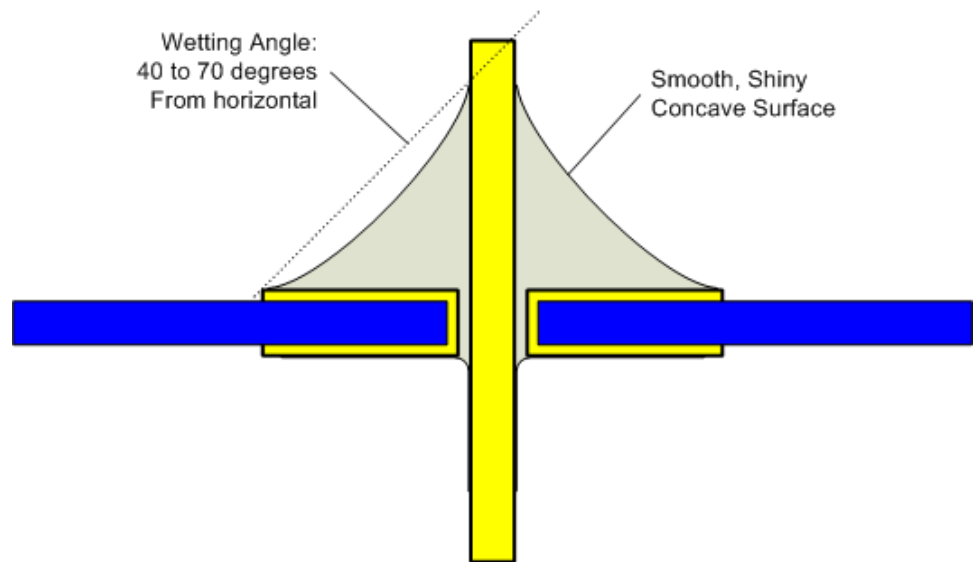


Check Solder Joint



To do: Check the joint

Should look like this!



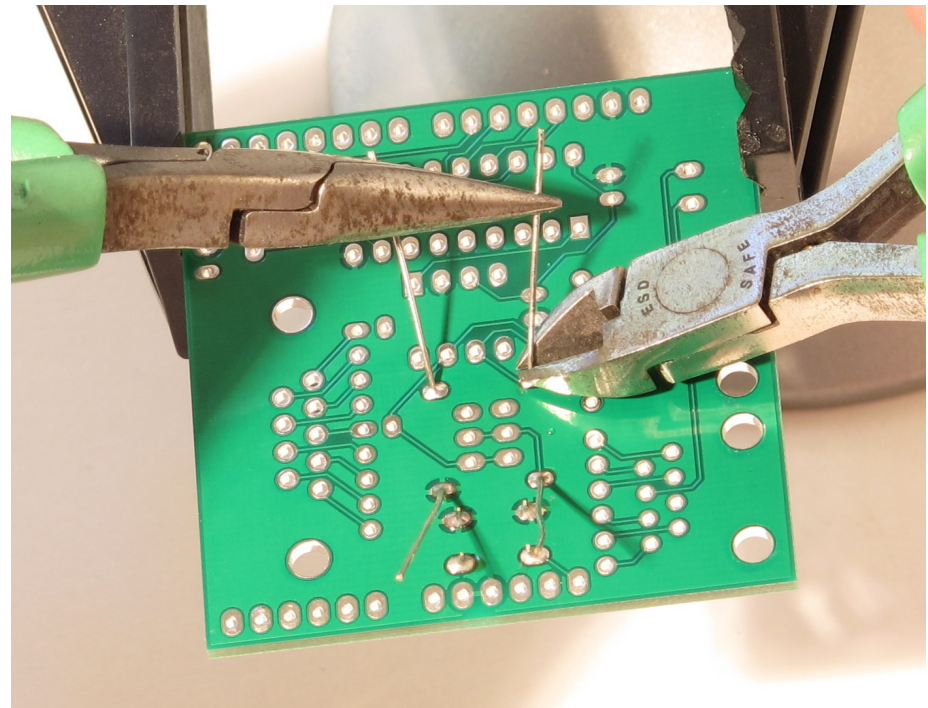
Note: If the joint is bad, it is OK to reheat and try again

Trim the Lead

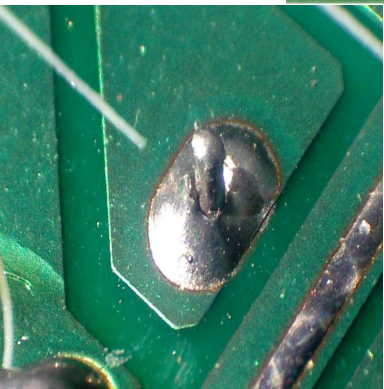
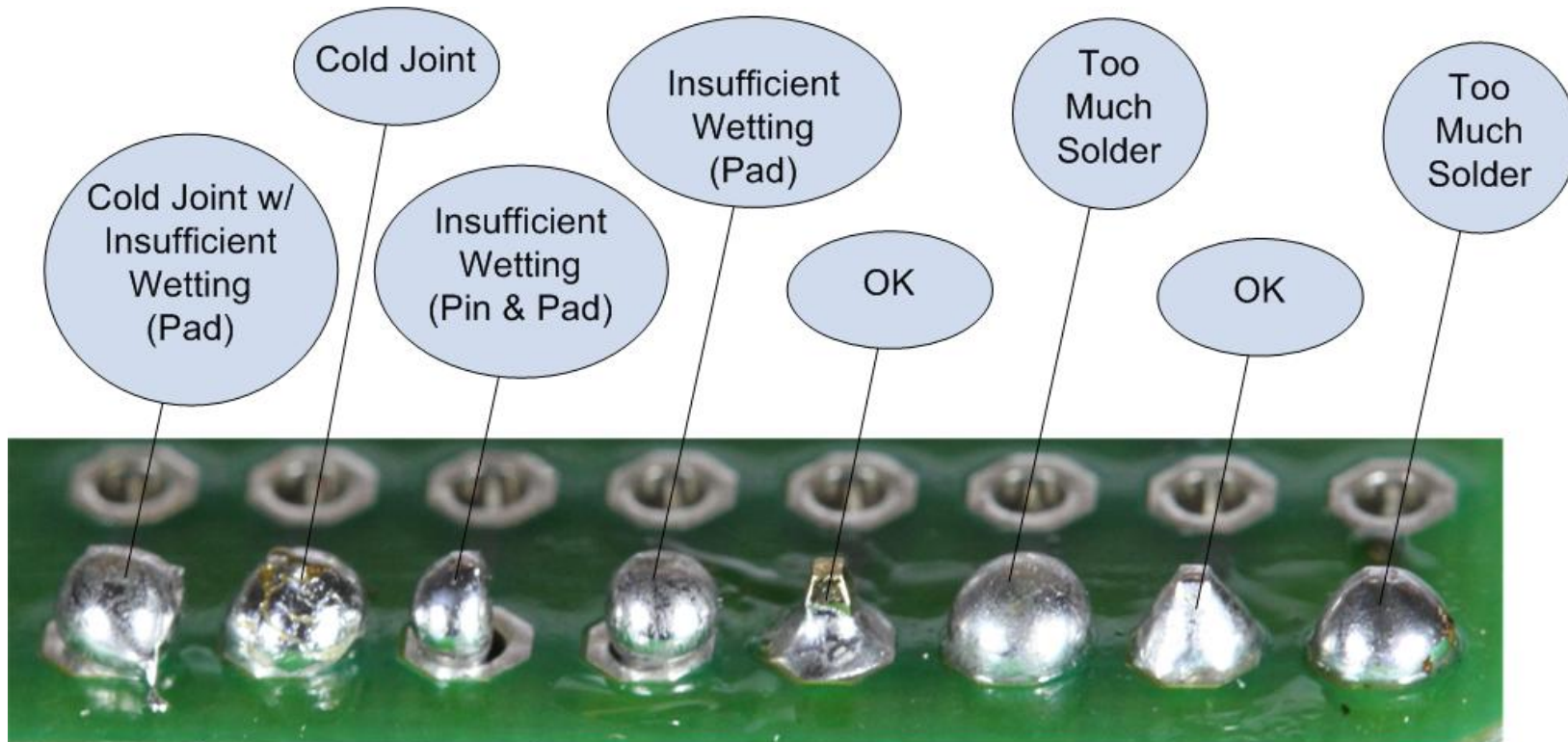


To do: Trim the Lead with the diagonal cutters

Note: Don't try to cut it flush with the board, cut on TOP of the cone

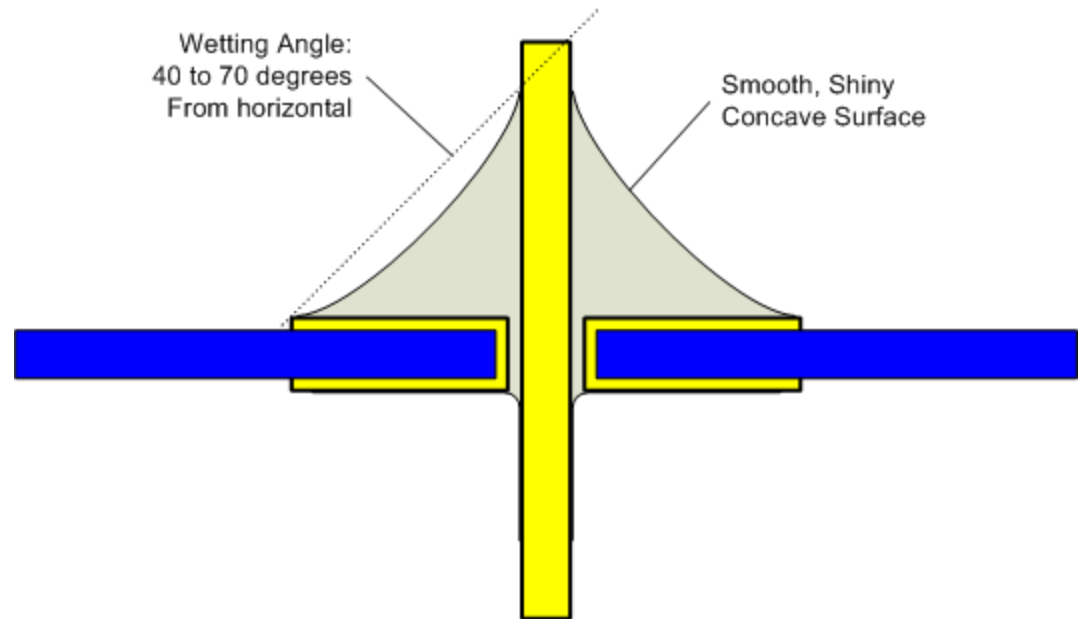


Bad Solder Joints





Good Solder Joints





Recap

1. Securely attach component to protoboard
2. Clean tip
3. Tin tip
4. Apply heat to joint
5. Apply solder to joint
6. Remove solder wire
7. Remove solder iron
8. Let cool
9. Check joint
10. Trim Lead