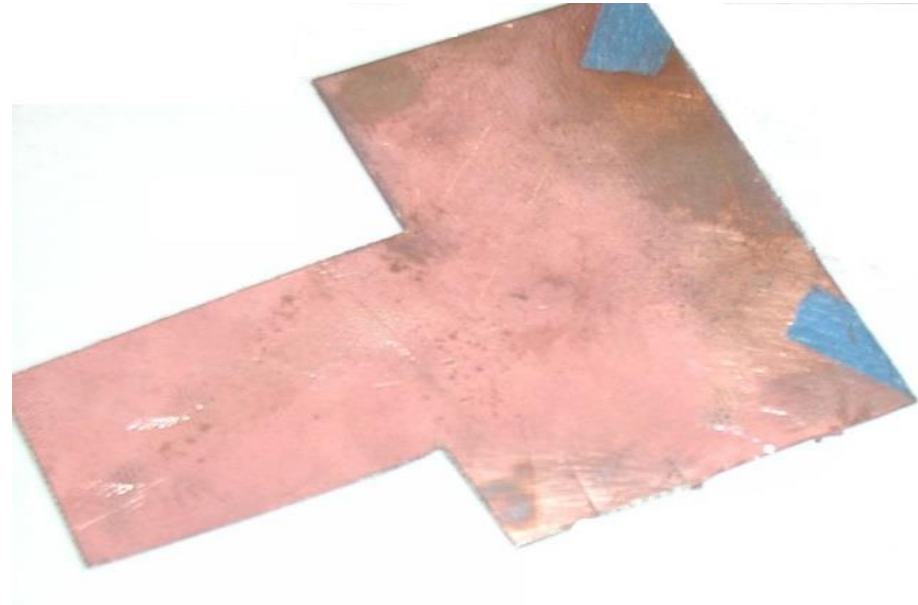


Soldering

Soldering – Circuit Board Preparation.

- Is it clean and bright (for good soldering, the board should almost look like a bright shiny penny)
- Are there any oils on the board (i.e. do you have any kind of lotion on your hands?)



Soldering – Circuit Board Preparation.

- To clean the board using fine steel wool or Scotch-Bright.
- For a very dirty or tarnished board, steel wool will work the best. If you use steel wool, make sure that you wipe the board off with a soft cloth.
- Avoid washing the board with any kind of detergent. The detergent will leave a residue.
- There are special washing solutions that you can purchase for clean boards, but they are not necessary for Senior Design projects. Also they tend to be costly and can have safety equipment requirements (goggles, gloves, ventilation systems, etc.).

Tools of the Trade

- <https://www.elexp.com/collections/soldering-irons-guns>
- Solder irons – depends on the budget- Weller vs. Hakko



\$8.50
24W
with
130W
Boost



The Weller WX2024 Ultra MS is a two channel soldering station with digital controls, capable of powering one 200 watt, or two 120 watt tools simultaneously. \$830.00



Pace 8007-0203
Solder/Desolder Station MBT-
250SD w/SX100 & PS90

\$2311.30

Soldering – Tip Size and Shape.

- What size tip should you use on the soldering iron, what should the wattage be of the soldering iron and what should the temperature be set at?
 - Are you soldering a large component?
 - Do you have a large copper area you are soldering?
 - Is the circuit board single layer, double layer, or multi-layer?

Soldering – Tip Size and Shape - Chisel

- With its broad tip, the chisel tip helps to evenly deliver heat to component leads and pads. This tip is great for soldering wires, through-hole components, large surface-mount components, and for desoldering as well.

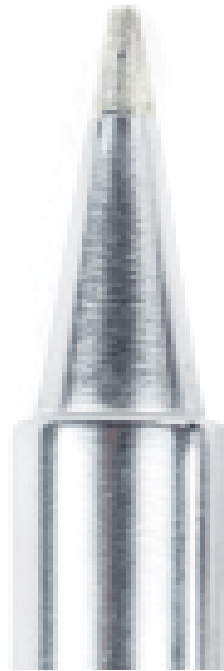


TIP CHISEL 2.4MM FOR WSP80
\$5.90



Soldering – Tip Size and Shape - Conical

- Conical tips are usually used for precision electronics work, though they're also often used for general soldering. The pointed tip helps deliver heat to small areas, such as tiny surface-mount components.



WELLER ST6 0.031 IN
SOLDERING SCREWDRIVER
TIP \$4.80 each

Soldering – Tip Size and Shape - Bevel

- While not as common as the chisel and conical tips, the bevel tip can be used for solder jobs that require pre-loading the iron with solder. The large flat surface can hold more solder than most other tips, and it's helpful when soldering small-gauge wires together or dragging solder across surface-mount chips to solder multiple pins at once.
- TIP GULL WING FOR WSP8



TIP GULL WING FOR
WSP80 \$5.70

Soldering – Solder

- What type of solder is being used?
 - Lead
 - No-Lead

Soldering – Solder Characteristics

Solder Alloy	Melting Point (°C)	Melting Point (°F)
5Sn-95Pb	307	585
0.5Sn-92.5Pb-2.5Ag	280	536
Sn/5Sb	243	469
100Sn	232	450
99.3Sn-0.7Cu	227	440
96.5Sn-3.5Ag	221	430
Sn/3.0Ag/0.5Cu	219	426
Sn/3.8Ag/1.0Cu	217	423
Sn/3.5Ag/1.0Cu/3Bi	213	415
50In-50Pb	209	402
45Sn-55Pb	204	400
55Sn-45Pb	193	379
60Sn-40Pb	186	368
63Sn-37Pb	183	361
62Sn-36Pb-2Ag	179	354
97In-3Ag	143	289
Sn/57Bi	139	282
52In-48Sn	118	244
Sn => Tin	Pb => Lead	Ag => Silver
Cu => Copper	Bi => Bismuth	In => Indium



Leaded Rosin Activated (RA) Wire
Solder Sn60Pb40 (60/40) 22 AWG, 23
SWG Spool, 1 lb (454 g) **\$54.64 #**

Soldering – Solder Flux

- A good bond requires two things,
 - a solder that is metallurgically compatible with the metals being bonded and
 - good metal surfaces, free of oxides, dust, and grime that prevent good bonding.

Soldering – Solder Flux

- Oxides form on almost all metals when oxygen reacts with the metal.
- Oxides make soldering much more difficult or even impossible, preventing a metallurgical bond with the solder.
- Oxidization happens all of the time, but happens much faster at higher temperatures, like when soldering.
- Flux cleans metal surfaces and reacts with the oxide layer, leaving a surface primed for a good solder bond.
- Flux remains on the surface of the metal while soldering which prevents additional oxides from forming due to the high heat of soldering.

Flux Pen



Kester 186 Flux-Pen is specifically designed for leaded and lead-free rework of conventional and surface mount circuit board assemblies

Soldering – Solder Flux

- There are several types of solder flux, each with key uses and some limitations as well.
 - For many applications, the flux included in the core of the solder wire is sufficient. (the flux is the wisp of smoke you see when you melt the solder)
 - There are several applications where additional flux is extremely beneficial, such as surface mount soldering and desoldering.
 - In all cases, the best flux to use is the least acidic (least aggressive) flux that will work on the oxide on the components and result in a good solder bond.
(Never use Acid core solder) use Rosin Flux

Soldering – Rosin Flux

- Rosin flux is acidic when liquid, but when it cools it become solid and inert.
- Since rosin flux is inert when solid, it can be left on a PCB without harming the circuit unless the circuit will warm to the point where the rosin may become liquid and start eating away at the connection.
- For this reason it is always a good policy to remove rosin flux residue from a PCB.
- Also, if a conformal coating will be applied or PCB cosmetics are important, flux residue should be removed.
- Rosin flux can be removed with alcohol.

Flux Remover-



Product Description

The Flux-Off Rosin formulation is a fast drying aerosol that quickly and completely removes R, RMA, RA, and synthetic flux residue. With its low surface tension and superior wetting properties, Flux-Off Rosin removes harmful residues in tight tolerance areas. \$27.58

Removes R, RMA, RA, and synthetic flux residues

- ☑ Penetrates hard to reach areas
- ☑ Evaporates quickly
- ☑ Leaves no residue
- ☑ Removes oil, grease, ionic and non-ionic residues
- ☑ Has low odor
- ☑ Non-corrosive formulation
- ☑ Contains no CFCs or HCFCs

Soldering – Organic Acid Flux

- One of the more common fluxes used is water soluble organic acid (OA) flux. Common weak acids are used in organic acid flux, such as citric, lactic, and stearic acid among others.
- The weak organic acids are combined with solvents like isopropyl alcohol and water.
- Organic acid fluxes are stronger than rosin fluxes and clean the oxides off much quicker.
- Additionally, the water soluble nature of the organic acid flux allows the PCB to be easily cleaned with regular water.
- Cleaning organic acid flux is required since the residue is electrically conductive and will greatly impact the operation and performance of a circuit, if not lead to damage if the circuit is operational before the flux residue is cleaned off.

Soldering – Inorganic Acid Flux

- A stronger option than organic flux is inorganic flux, which is typically a blend of stronger acids like hydrochloric acid, zinc chloride, and ammonium chloride.
- Inorganic acid flux is targeted more towards stronger metals such as copper, brass, and stainless steel.
- Inorganic acid flux requires complete cleaning after use to remove all of the corrosive residue from the surfaces which will weaken or destroy the solder joint if left in place.
- Inorganic acid flux should not be used for electronic assembly work or electrical work.

Tools of the Trade



SOLDERING IRON TIP TINNER - PROLONGS
TIP LIFE - LEAD FREE, ESD SAFE \$6.75
designed for the removal of all flux or
metal contamination on your soldering tip



this useful aid holds your PCBs, hobby
models, and other projects in the
exact position that you need. \$7.50

Solder Wick- Braided Copper to aid in the removal of solder.
Place over solder, heat it with an iron, wicks solder away with capillary action



Helping Hand Soldering Third
Hands Vise with 6 Flexible Arms
LED Flashlight Magnifying Glass



Desoldering Solder Sucker
Aluminum Soldering Iron
Suction Removal Tool \$5.79