

Soldering

A hands-on introduction

Two hours · Bring the iron you have · We will sort it out together



How the two hours go

Irons on now

0:00

Welcome and setup

Quick safety word, irons on and heating

0:10

Bench check

Your iron, your tip, your solder, your flux

0:30

Why solder works, then a demo

Short. Then watch my hands

0:45

Hands-on: the ladder

The bulk of the class. Go at your pace

1:40

Inspect and grade

Yours, then your neighbor's

1:55

Where to go next

Handout, and what to buy

Bench check

Ready to Work

- Temperature control, or at least a dial
- Tip is shiny and silver all over
- A chisel tip, not just the pointy one
- 0.6 – 0.8 mm rosin-core solder
- Brass wool or a damp sponge

Not Recommended

- Tip is black, pitted or crusty
- Fat 1.5 mm solder off a big spool
- Acid-core or plumbing solder — not for us
- No stand, iron resting on the bench
- Unknown iron from a drawer

Loaner stations at the front. Take one — a bad iron is not a bad solderer.

Look after the tip

1

Tin it before first use

Melt solder over the whole working face before you use it.

2

Wipe, then re-tin

Every time, before it goes back in the stand. Leave it wet.

3

Rescue a black tip

Tip tinner and fresh solder. If it still will not take, replace it.



650 – 750 °F

340 – 400 °C

A place to start with leaded solder,
not a rule. Watch the joint, not the
number.

What is on the spool

63 / 37 tin-lead

361 °F

Eutectic — liquid straight to solid, no mushy stage. The most forgiving thing to learn on.

START HERE

60 / 40 tin-lead

361 – 374 °F

A narrow plastic range where it is neither. Move the joint in that window and it sets cracked.

Lead-free SAC305

423 °F

Hotter, wets less willingly, and dries dull. That dull look is normal here — do not read it as a cold joint.

Diameter matters: 0.6 – 0.8 mm for board work. Thick solder is how pads get flooded.

About flux

Rosin, No-clean, Water?

● Rosin (R, RMA, RA)

Pine resin. This is what is inside most cored solder.
Leaves a sticky amber residue — isopropyl removes it.

● Water-soluble

Fast and aggressive. Must be washed off completely, or the residue corrodes the joint it just made.

● No-clean

Milder. Leaves a small clear residue that is fine to leave on the board for hobby work.

● Acid core / plumbing

For copper pipe. It will keep eating your board long after the joint is cold. Never on electronics.

Cored solder carries its own flux. Add a pen or paste where it runs out — rework, heavy joints, wicking.

What is actually happening



Solder wets metal. It does not glue it.

It flows toward heat

And only onto metal that is clean and hot. Cold metal repels it.

Flux clears the oxide

That is the smoke. It is consumed as it works, so a long joint runs out.

Mass eats heat

A ground plane or a big connector needs more time, not more solder.

So: heat the joint, then feed the solder to the joint — solder carried on the tip has already lost its flux.

The move, five counts

1

Touch both

Tip contacts the pad
and the lead at the
same time

2

Count one

Let the heat get into
the metal

3

Feed the far side

Solder goes into the
joint, opposite the
iron

4

Watch it flow

It runs around the
lead and forms a fillet

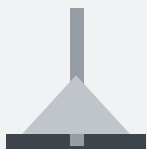
5

Solder, then iron

In that order. Then
hold still while it sets

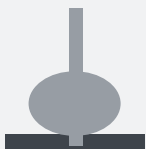
Two to three seconds for a small through-hole joint. Longer than that and you are cooking the pad.

Reading a joint



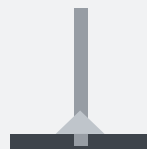
Good

Shiny, smooth, concave.
Wets the pad and the
lead both.



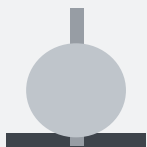
Cold

Dull and grainy. Not
enough heat. Add flux
and reheat.



Starved

No fillet, lead barely
wetted. Needs more
solder.



Excessive

A ball that hides the
joint. You cannot inspect
it.



Bridge

Two pins joined. Wick it
out, do not chase it
around.



Disturbed

Moved while cooling.
Cracked inside. Reheat it.

Drawings are shorthand — pass the real sample board around, it teaches the eye faster.

The ladder

1

Blobs on scrap

Tin the tip, make a few puddles. Just feel it.

2

Resistors, through-hole

The bread-and-butter joint. Clip the leads after.

3

A row of header pins

Close spacing. Expect bridges — that is the point.

4

Wick the bridges out

Flux the wick, heat through it, do not scrub.

5

One heavy joint

Barrel jack or a ground-plane pad. Give it time.

6

Wire splice

Heat shrink goes on FIRST. Everybody forgets once.

Your own pace. Hand up if you are stuck — I am coming around.

Where to go from here



Buy this next

A temperature-controlled station. A chisel tip. A flux pen. In that order.



When it will not stick

Dirty · cold · oxidized · no flux · not enough time. Check in that order.



Read further

IPC-A-610 is the real standard. The handout has channels worth watching.

Every joint you have made today, you made yourself. Go break something and fix it.