STRETCHLEARN · WORKBOOK

# Soldering for Hobbyists — Workbook

This workbook turns the course into bench practice. Each section pairs hands-on drills, fill-in worksheets, and pre-flight checklists so you can build measurable skill at your own station. Work through it with your iron powered on, a practice board in front of you, and a loupe or USB microscope nearby.

## Station, Safety, and the Science of a Joint

Set up your bench, lock in your alloy and flux choices, and confirm your safety controls before the first joint.

### Worksheet: My Station Specification Sheet

Fill in the details of the gear you actually own or plan to buy. Keep this taped to your bench as a quick reference for set points and supplies.

Soldering station make and model

Maximum wattage

Default tip shape and width (mm)

Backup tip shape and width (mm)

Solder alloy and percentages (e.g. Sn63/Pb37)

Solder wire diameter (mm)

Flux type (no-clean / RMA / water-soluble)

Default temperature set point for through-hole (C)

Default temperature set point for SMD (C)

Cleaning supply (isopropyl alcohol purity %)

### Exercise: Alloy and Flux Decision Drill

For each scenario below, write down which solder alloy, flux, and wire diameter you would choose and one sentence explaining why. Compare your answers to the guidance in modules one.

• You are learning your very first joints on a practice perfboard. Which alloy makes this easiest, and why does

its melting behavior help a beginner?

• You are repairing a fine 0603 surface-mount resistor. What wire diameter and flux form do you reach for?

• A friend hands you a tub of plumbing flux to 'save money' on electronics. What do you tell them and why?

• Your solder will not flow even though the iron is hot. List the two most likely fixes before touching the temperature dial.

### Checklist: Pre-Soldering Safety Check

[ ] Iron is seated in a weighted stand with the tip pointing away from me
[ ] Fume extractor or fan is positioned to pull smoke away from my face
[ ] Eye protection is on
[ ] Heat-resistant silicone mat is under the work area
[ ] No food or drink is on or near the bench
[ ] Cold water and soap are available for handwashing afterward
[ ] Grounded wrist strap is on if I am handling bare ICs

## Through-Hole Soldering Mastery

Drill the five-step joint, then inspect your work against objective acceptance criteria.

### Exercise: The Five-Step Joint Drill

Solder ten through-hole joints on a practice board following the five-step method. Time each joint and record it on the practice log template. Aim for two to three seconds of iron contact per joint.

• Did you heat the lead and pad together before feeding solder, or did you melt solder onto the tip first? Be honest.

• What was your average contact time across the ten joints, and is it within the two-to-three-second target?

• Describe the shape of your best joint and your worst joint in one sentence each.

• If any joint took longer than five seconds, what will you change first: tip size, cleanliness, or temperature?

### Worksheet: Joint Inspection Log

Inspect each practice joint under a loupe or microscope and rate it. Fill one row per joint. Leave the pass/fail and the running tally columns for you to complete by eye.

Joint number

Shiny or dull

Shape (concave fillet / ball / insufficient)

Contact angle looks under 90 degrees? (yes/no)

Continuity test result (pass/fail)

Pass or fail overall

Fault type if failed (cold / bridge / insufficient)

### Checklist: IPC-Style Acceptance Check

[ ] Solder wets up the lead and out across the pad with a low contact angle
[ ] Surface is smooth and shiny (or evenly matte if lead-free)
[ ] Lead is still visible at the peak of the fillet, not buried in a ball
[ ] No bridges connect this pad to any neighbor
[ ] Hole appears filled, not hollow or starved
[ ] Continuity confirmed with a multimeter

## Surface-Mount and Desoldering

Move to surface-mount parts and practice removing components without harming the board.

### Exercise: Tack-and-Reflow 0805 Drill

Solder five 0805 passive components using the tack-and-reflow sequence, then desolder all five cleanly. Use the size reference table template to confirm you are working with the right part size.

• Which pad did you pre-tin first, and did the part seat flat when you reflowed it?

• Did any part tombstone (stand up on one end)? If so, what caused the uneven heating?

• When removing the parts, did the bridging-blob method free them in one to two seconds?

• How much flux did you use compared to through-hole work, and did it change your results?

### Worksheet: Desoldering Method Picker

For each removal job, record which method you chose and how it went. This builds your instinct for matching tool to task.

Component being removed

Through-hole or surface-mount

Method used (wick / solder sucker / add-solder / hot air / low-melt)

Did you add flux first? (yes/no)

Pad or plated hole intact afterward? (yes/no)

What you would do differently next time

### Checklist: Pad and Trace Protection Checklist

[ ] Flux applied before any desoldering attempt
[ ] Contact time kept short to protect plated-through holes
[ ] Lead gently wiggled while heated rather than yanked
[ ] Neighboring heat-sensitive parts shielded with Kapton tape when using hot air
[ ] Hot air nozzle kept moving over the part, never parked on one spot
[ ] Pads cleaned with wick and re-fluxed before reinstalling anything

### Exercise: SOIC Drag-Solder Challenge

Solder one 8-pin SOIC chip using the drag method, then inspect every pin under magnification. Record bridges and how you cleared them.

• Did you tack two opposite corners first to align the chip before flooding?

• How many bridges formed, and did flux plus solder wick clear them cleanly?

• Were all eight pins wetted with a visible fillet when you finished?

• What temperature set point worked best for the small tip and brief contacts?

## Real Repairs and Building Confidence

Apply every skill to genuine repairs and set a deliberate-practice routine.

### Worksheet: Headphone Repair Planner

Plan and document an audio cable repair before you cut anything. Filling this out prevents the classic mistake of soldering before sliding the plug shell on.

Device and connector type (3.5 mm TRS / TRRS / other)

Symptom (cuts out when flexed near plug? earpiece silent?)

Wire color found for left signal

Wire color found for right signal

Wire color or finish found for ground

Plug shell slid onto cable BEFORE soldering? (yes/no)

Enamel removed by tinning with flux? (yes/no)

Final test result (left / right / both channels working)

### Exercise: End-to-End Device Rescue

Pick one genuinely broken device from a drawer (a connector that wiggles, dead headphones, a battery-clip toy) and repair it using the course methods. Document the journey.

• What was the symptom, and what did magnification reveal at the suspected joint?

• Which repair applied: cable re-termination, cracked-joint reflow, or terminal re-solder?

• Did you raise the temperature for any high-mass terminals, and to roughly what set point?

• Did the device work afterward, and what would you check first if it had not?

### Checklist: Battery and High-Stress Joint Safety

[ ] Never applied the iron directly to a bare lithium cell body
[ ] Soldered only to holders, protection boards, or pre-welded tabs
[ ] Raised temperature for thick terminals instead of holding longer
[ ] Pre-tinned both wire and terminal before joining
[ ] Reflowed cracked connector joints with added flux to close fractures
[ ] Used a third-hand tool or clamp to hold moving parts

### Checklist: Tip and Station Maintenance Routine

[ ] Tip parked with a fresh coat of solder before powering down
[ ] Tip cleaned on brass wool only, never filed or sanded
[ ] Dull oxidized tip recovered with tip tinner and activator paste
[ ] Standby or sleep temperature used to extend tip life
[ ] Board flux residue wiped off with 99 percent isopropyl alcohol
[ ] Weekly practice drill logged and compared against last week's joints

## Your Action Plan

1. Buy or confirm a temperature-controlled station, a 1.6 to 2.4 mm chisel tip, brass wool, Sn63/Pb37 0.8 mm solder, and a flux pen.
2. Set up ventilation and run through the Pre-Soldering Safety Check before your first joint.
3. Drill 50 through-hole joints using the five-step method, logging time and inspection results for each.
4. Desolder all 50 practice joints with wick and a solder sucker without lifting a single pad.
5. Practice 20 pairs of 0805 passives with tack-and-reflow, then remove them with the bridging-blob method.
6. Drag-solder one SOIC chip and inspect every pin under magnification, clearing any bridges with flux and wick.
7. Repair a real headphone or audio cable, sliding the plug shell on first and tinning to burn off the enamel.
8. Rescue one high-stress connector by reflowing its cracked joints with added flux.
9. Adopt the tip-parking and brass-wool maintenance routine every session.
10. Repeat the weekly practice plan for four weeks, photographing joints and comparing them against the IPC acceptance criteria.