

Soldering for Earbuds 101 – A Practical Approach

There are various soldering irons available, from simple to temperature controlled and so on. Which ever type you choose is up to you. The only suggestion I have for a more versatile iron is that the iron tips are interchangeable to match the type of soldering you will do.



The tip at the bottom was the original tip which is flat with the corners rounded. I've used that tip for years and can solder practically anything with it. I've soldered SMD components onto a PCB with it, but that's only because I'm very familiar with that tip. The 2 tips above that are very pointy and would be used for pin point precise soldering, but in my opinion not very useful for earbuds because the heat transfer at the pointy end is not sufficient. I've found that a tip that is somewhat pointy with a rounded blunt end is ideal for soldering work on earbuds.

The solder is small diameter (.050 inch / 1.27mm) 60/40 rosin core solder which can get into tight spaces if required.

In addition to the soldering iron you'll need a soldering iron rest. If you bought a soldering iron station the iron rest is built in. Hopefully the iron you bought came with a rest. Here's a partial picture of mine with some brass wool tip cleaner. I've used old kitchen sponges cut to size or folded wet paper towels for a tip cleaner for years (the good old standbys).



Helping hands with magnifier is useful to hold small objects like MMCX connectors while soldering wires to the (-) negative / common and (+) positive center post. The magnifying lens makes it easy to see small soldering points on the connector.



Here's an MMCX connector with 2 different size lead wires.

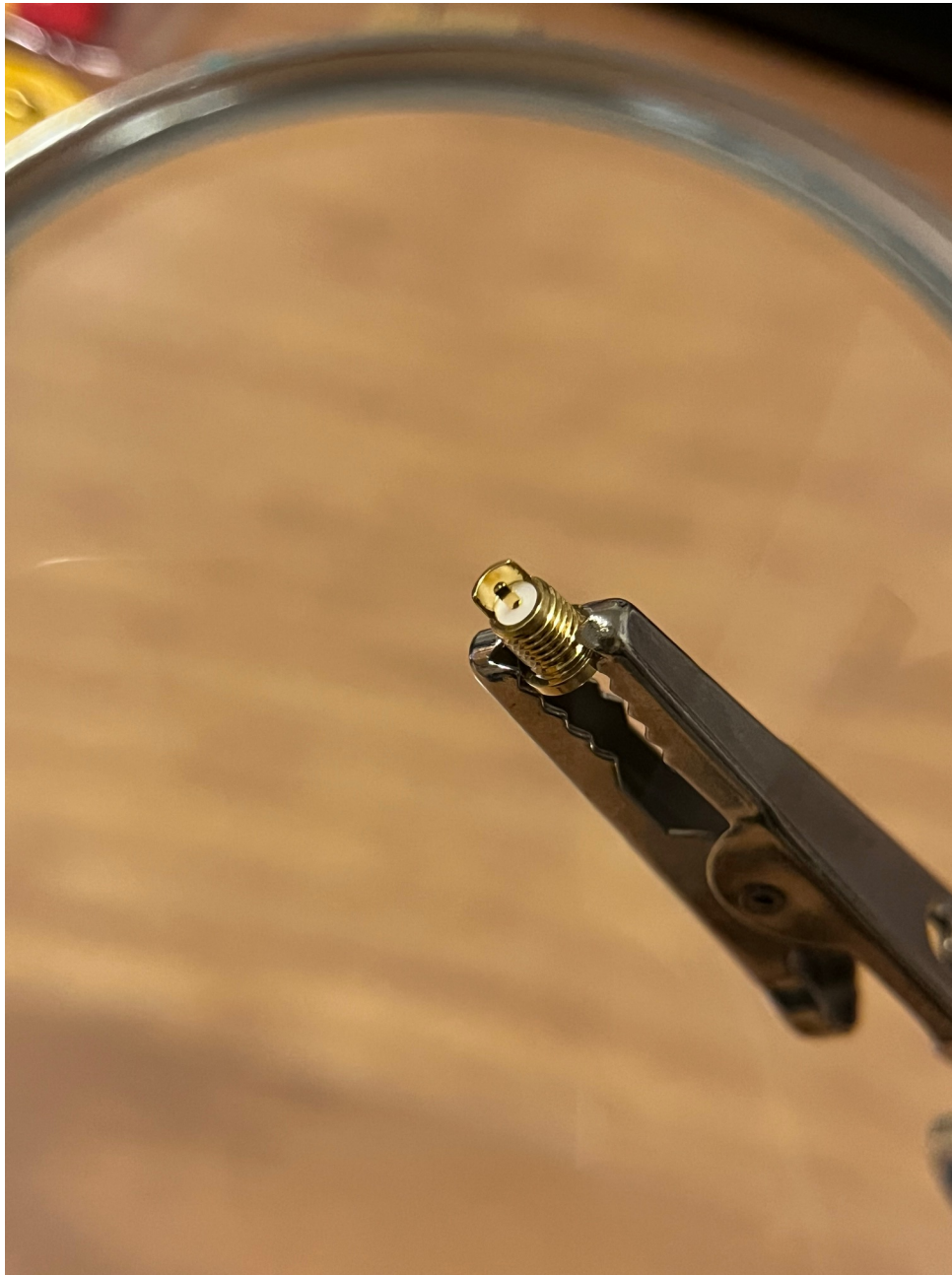


Soldering prep work. Make sure your iron is hot and clean the tip by pushing / rubbing it into the brass wool / wet sponge / wet paper towel. Afterwards tin the tip of the iron with solder. You want only a small blob of solder on the tip. You are tinning the tip which protects the tip and aids in heat transfer when you solder. Clean the tip again, it should become a shiny silver color.



Tin the lead wires. Touch the iron to the solder to melt a small blob of solder onto the tip. Touch both ends of the lead wires to the solder blob. Might be a good idea to hold the wire with tweezers because heat will transfer through the wire and burn your fingers. So why tin the wires when they are already tinned? Good question. You want to re-tin the wires because there could be an oxidation layer on the pre-tinned wires which could lead to a bad solder joint. Do good prep work and get good solder joints.

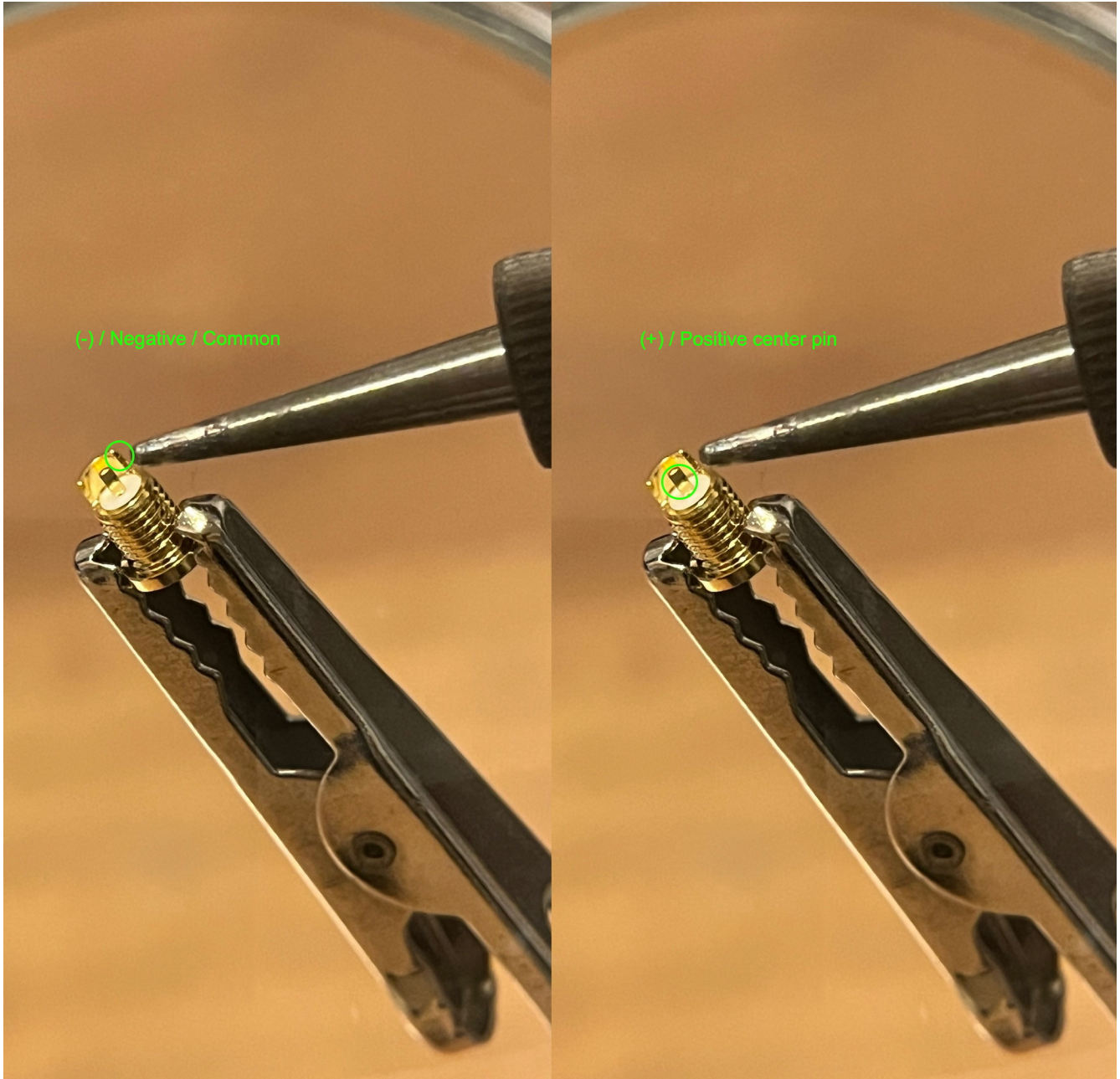
After tinning the lead wires you need to tin the MMCX connector. I usually complete one MMCX connector first before moving onto the second set of wires and connector. I do this because after I've positioned the MMCX connector in the helping hands alligator clip to tin the connector, it's already in the correct position to solder the wires on.



Tinning the MMCX connector. There are 2 ways to tin the connector. I clean the tip and then touch the iron to the solder (the previous picture shows the solder on the table with the iron hovering above solder) and melt a very small blob of solder at the very end of the tip. Then I briefly touch the (- inside edge) area and then the (+ facing surface) area with the small solder blob in the following picture. That is usually enough to tin the small areas. TIP: One trick I use is to rest my forearm on the edge of the table while I'm soldering / tinning the connector. I really don't shake much when I'm soldering, but having a stable arm position really helps to prevent sloppy soldering / tinning.

2 - The text book method of soldering / tinning is to heat the area near where you want to solder / tin and touch the solder to the area. A small amount of solder will melt and cover the area you want to tin. For the (-) I would touch the side edge with the iron and apply the solder to the inside curve next to the edge. Hopefully you don't melt too much solder and create a solder bridge between the (-) and the (+) center pin. You'll need to melt the solder and use a solder sucker to clear the solder bridge.

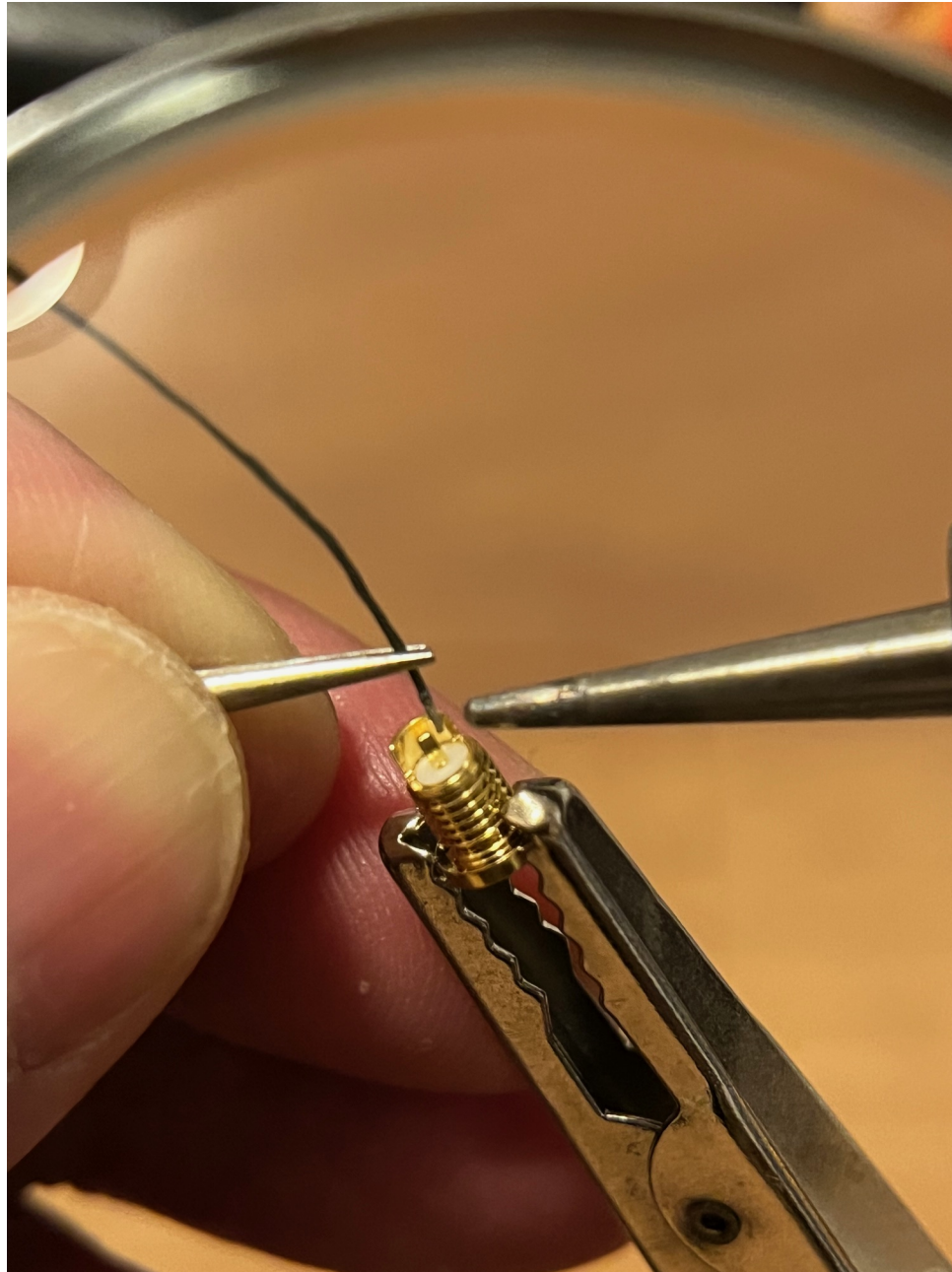
TIP: If using method 2, lean the forearm of the hand holding the solder as well as the forearm of the hand holding the iron against the edge of the table. You want to build a solid base to prevent movement of the hands if possible.



Now you're ready to solder on the lead wires. Work back to front, meaning solder the (-) wire first followed by the (+) wire. If you solder the wires in the opposite order (front to back) then the (+) wire can block your view and also there is the risk that when you solder the (-) wire you may inadvertently touch the center post and desolder the (+) wire.

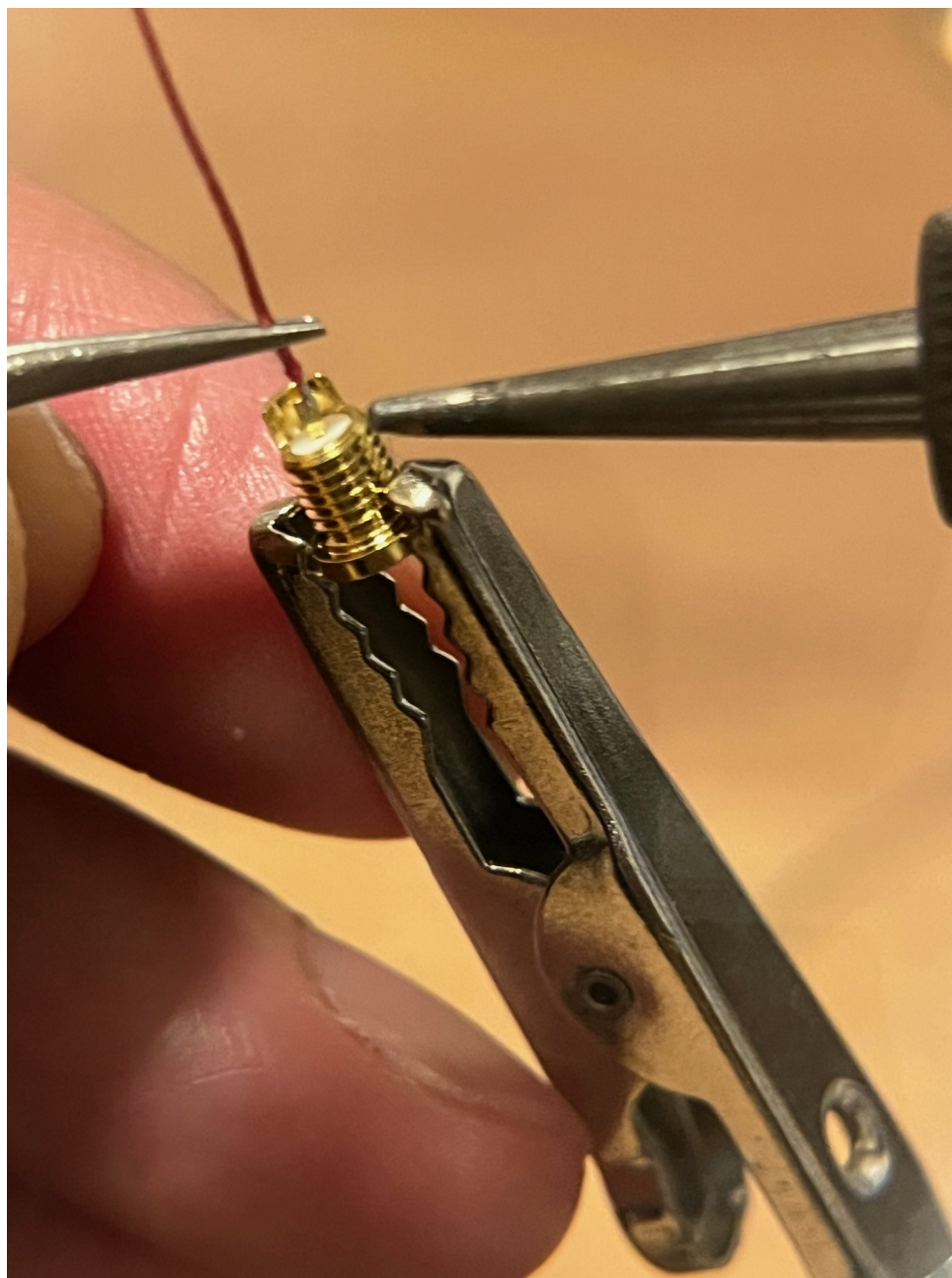
Getting ready to solder the wires on. Use tweezers to hold the (-) wire. Try to angle the wire so it matches the angle of the connector. Do a dry run with the wire and adjust as needed. TIP: Hold the tweezers with your thumb and forefinger and rest at least one of your other fingers on the alligator clip when you solder. Also be sure to rest both of your forearms on the edge of the table (wire hand and soldering iron hand) to be as stable as possible when you solder.

Usual steps... clean the iron, touch the iron to the solder to melt a very small blob of solder, touch the very edge of the connector at the (-) area and let the solder in the tinned areas of both the connector and wire melt together. Hold the wire as steady as possible and pull the iron away. The solder will solidify and you should have a clean, sturdy solder connection. Do the (+) wire next.



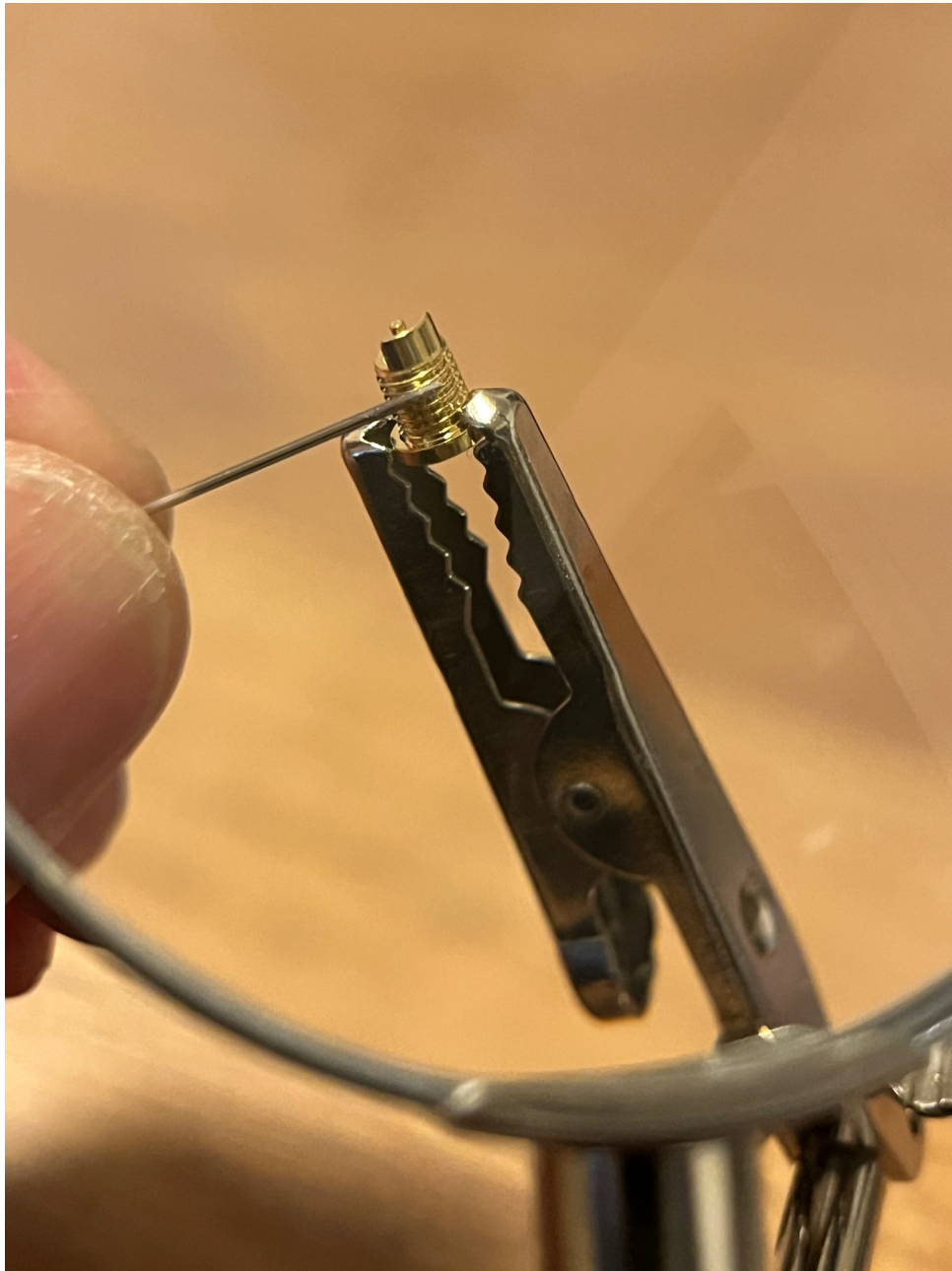
For the (+) wire follow the same procedures as for the (-) wire, except I usually touch the iron directly onto the wire and press into the center post. Do that for the briefest of moments to melt the solder. Hold the wire hand steady and pull the iron away. You should have a solid solder connection after the solder cools. Remember the TIP to build a solid base to prevent unwanted movements. So now you're done with one connector. Repeat for the other connector.

By the way, I'm right handed, so the pictures show the (-) area of the connector I would solder. If you're a lefty, it would be easier to switch the (-) tinning and wire to the left side of the connector. Also you've probably noticed I didn't actually tin or solder anything in the pictures. That's because for safety I didn't want to have a hot iron while trying to take pictures.



When you're ready to screw in the MMCX connectors into the earbud shell apply a little glue to the connector threads with a needle, pin or toothpick. I'm using E6000 glue which does hold and dries tacky so I can remove the connector if I need to later.

TIP: Before screwing in the connector to the shell hold the end of the two wires with one hand and the end of the connector in the other hand. Now twist the connector counter clock wise (like loosening a screw) for 5 or 6 revolutions. The wires will be twisted around each other. Make sure the wires aren't twisted too tightly. Insert the twisted wires through the connector port in the shell and tighten the connector. The wires should then kind of untwist. You may want to take your time tightening the connector as you help the wires untwist themselves. If you don't do the initial left turn twist of the wires and then do the right turn untwisting as you tighten the connector you run the risk of twisting the wires too tight at the connector solder points and end up ripping one or both of the wires off the connector. The shell in this guide has this particular problem, with other shells this step may not be needed.



Let's move on to soldering the drivers.



In most cases the drivers will be marked with a red mark to indicate which side is (+) positive. You can just see the red mark on the left side of the driver. The two upper solder pads is where you want to solder the wires, the lower solder pads are used for the voicecoil connection and are protected with glue. The small notch at the very bottom is where the voicecoil wires pass through to the underside of the speaker diaphragm. Be very careful in that area, you don't want to damage the voicecoil leads.

To successfully solder the wires to the driver you'll need to secure the driver from moving around. Also the strong magnets in the driver can cause the driver to lift off the table when your soldering iron gets close. Best to secure the driver. On AliExpress you can find small speaker vises, but I don't bother with that. I use painter's masking tape. It's used to mask off areas or edges where you don't want to paint and the adhesive is weak enough for the tape to be pulled off your wall without wrecking the finish. I don't really need to explain this, you guys know what I'm talking about.



Once secured you're ready to proceed. You made that mental note on which side to solder the (+) wire right? You measured the resistance of the voicecoil to be sure the driver is good. If the voicecoil has the wrong resistance or is bad (open), STOP! Log into AE and go to your order and send a message to the seller.

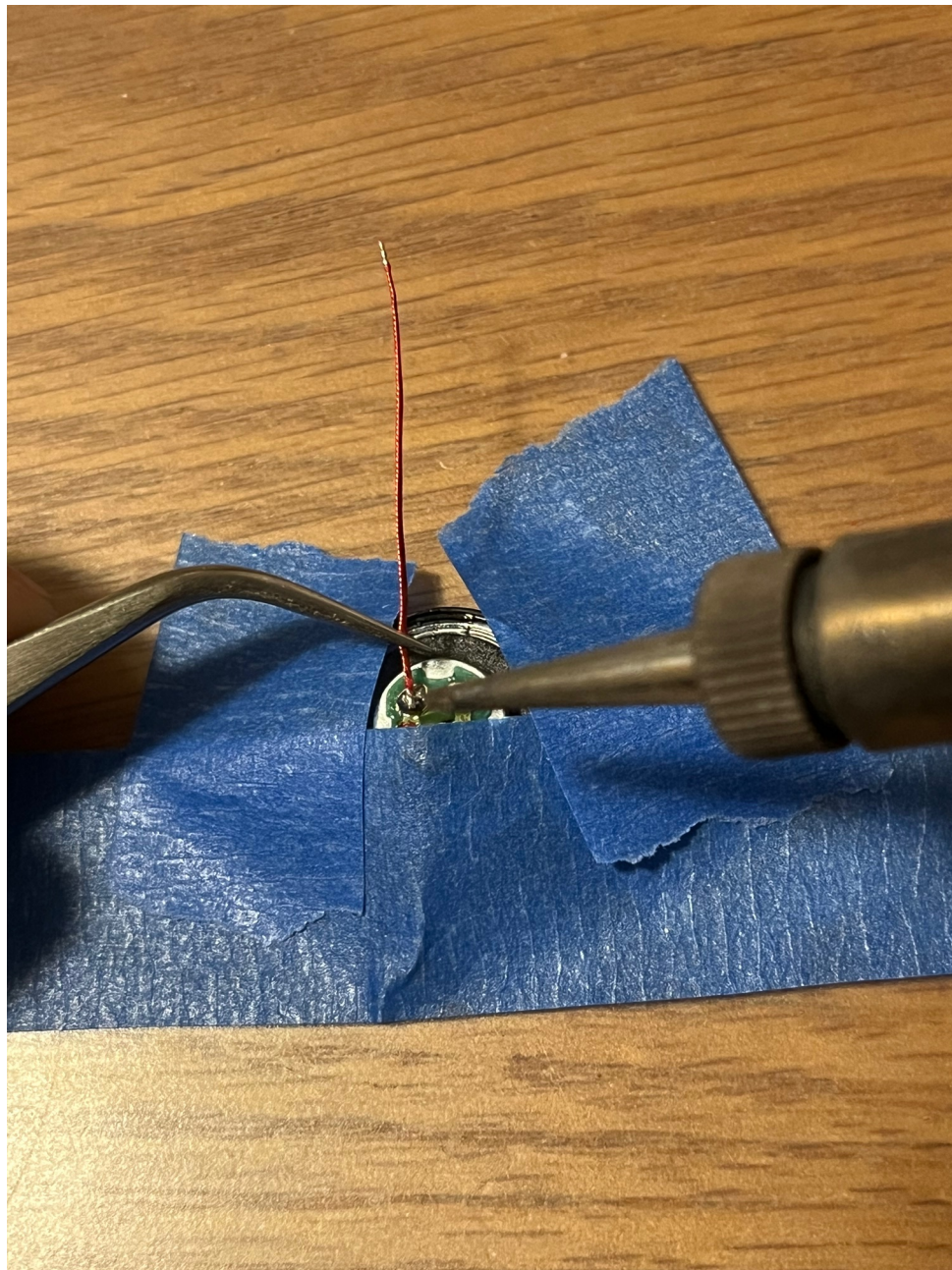
TIP: It's best practice to measure your drivers when you receive them. That way you can be sure everything is good and if not then contact the seller immediately for a replacement. The usual routine is the seller wants a picture of the meter test probes on the driver with the meter showing the measurement as proof of a bad driver. When you compose your message, upload the picture(s) to beat them to the punch for a faster resolution / replacement.

The picture below is without the wires sticking out of the shell, just imagine the wires are passing through a shell... Let's move on.

Do the usual maintenance... clean the iron, touch the solder with the iron and melt a very, very small blob of solder...

Hold the (+) wire with the tweezers, press the end of the wire to the (correct) solder pad and very briefly touch the tip of the iron onto the wire and solder pad. The solder on the pad will melt and the wire will sink into the molten solder. Hold the wire steady and immediately pull the iron away. All of that soldering action takes maybe one second or less, which is good because you don't want to keep the iron on there any longer than needed. Repeat for the (-) wire. (I didn't take a picture of the (-) side.) After the driver cools down take a resistance measurement to be sure the driver is ok. Same procedure for the other driver.

TIP: For the most steadiness while soldering, rest your hands on the table, don't free float your hands above the work, you're just asking for an accident to happen and the driver to be ruined. AE sellers will not be responsible once any soldering of the drivers occur. Protect your ASSets!



Congratulations! You've built your first buds, but it's not over yet. Some final pictures and thoughts.

All soldered up and ready to close the buds up for a listening test...



Twist the face cover to spiral wind (corkscrew) the wires (loosely). The wires will fit into the shell better and less risk of pinching them as well.



Align / center the voicecoil opening with the center of the bottom of the shell and gently press the face cover on. Attach your cable, experiment with different density foams and enjoy!

