



Guide to Soldering XLR Cable

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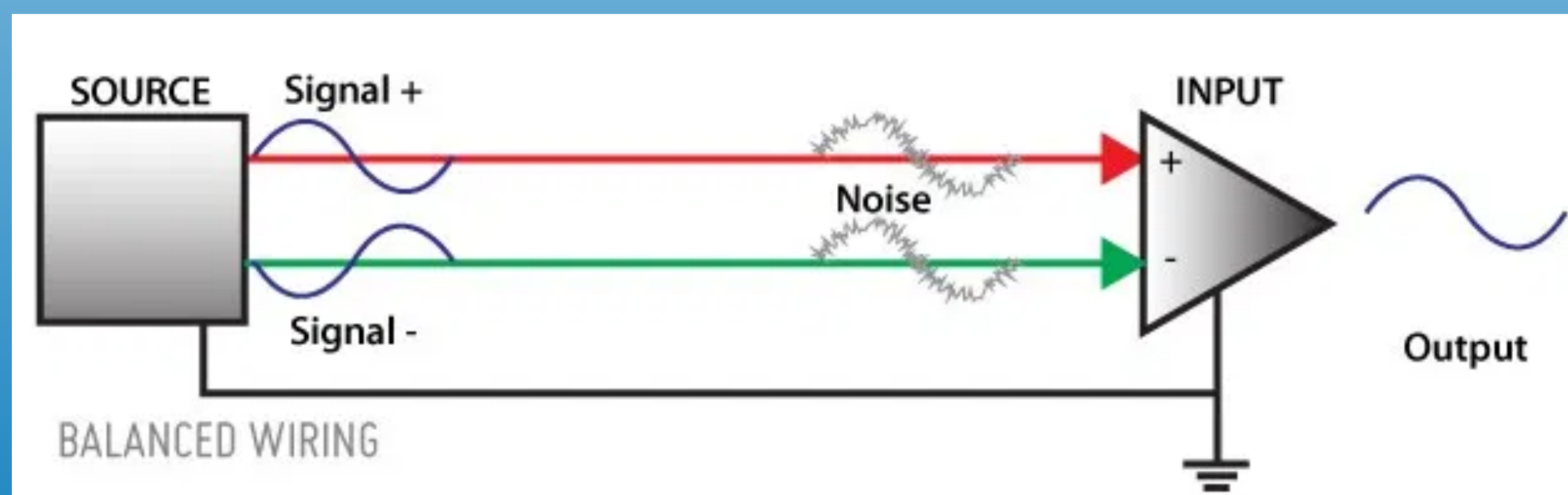
Materials

The Cable

To make a XLR cable we will need standard 3 wire analog cable.

The configuration of this balanced cable is signal (+), signal (-), and shielded common (ground). The (+) wire carries the in-phase signal and the (-) wire carries the inverted signal. This balanced cable has good noise rejection because the noise is always in-phase. This means once the cable is plugged in the (in-phase) noise will be subtracted out.

The recommended maximum length of an XLR is a 100 feet (30 meters).



Analog audio cable

Model	Conductors	Conductors	Conductor gauge, (strand #)	Shield type, % coverage	Capacitance' (pf/ft, m)	Capacitance' (pf/ft, m)
Whirlwind Accusonic+2	Flexible, polyethylene insulation	2	22 AWG (26)	Braid 78%	19 (62)	35 (115)
Belden 8412	Flexible, rubber insulation	2	20 AWG (26)	Braid 85%	30 (98)	55 (180)
Belden 8413	Flexible, EPDM insulation	2	24 AWG (45)	Braid 56%	30 (98)	55(180)
Belden 8451	Hookup, polypropylene insulation	2	22 AWG (7)	Foil 100%	34 (112)	67 (220)
Belden 1266	Hookup, polypropylene insulation	2	22 AWG (7)	Foil 100%	30 (98)	54 (177)
Belden 1192 (Starquad)	Flexible, polyethylene insulation	4	24 AWG (42)	Braid 95%	40 (131)	36 (118)

(belden.com)

The Connector

XLR stands for 'External Line Return'.

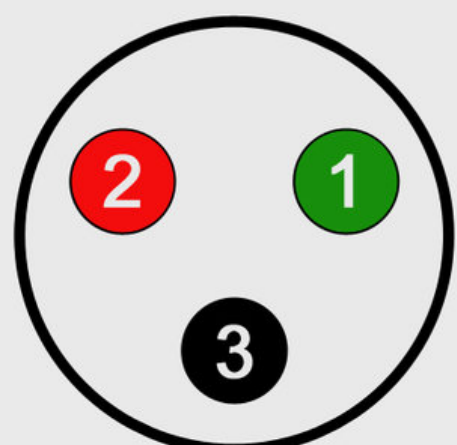
The socket was called Female.
The plug was called Male.
Both XLR socket and plug connectors have 3 pins:

- Pin 1 = common**
(ground, shield)
- Pin 2 = + signal**
(in-phase, 'hot')
- Pin 3 = - signal**
(inverted, 'cold')

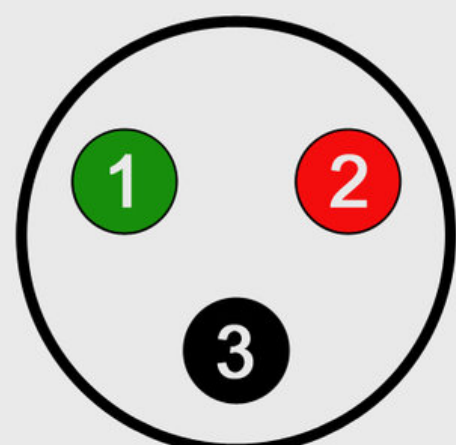
XLR Connector Pinout - Pin 2 Hot

Rear View

(The side with cup terminals for soldering)



Male



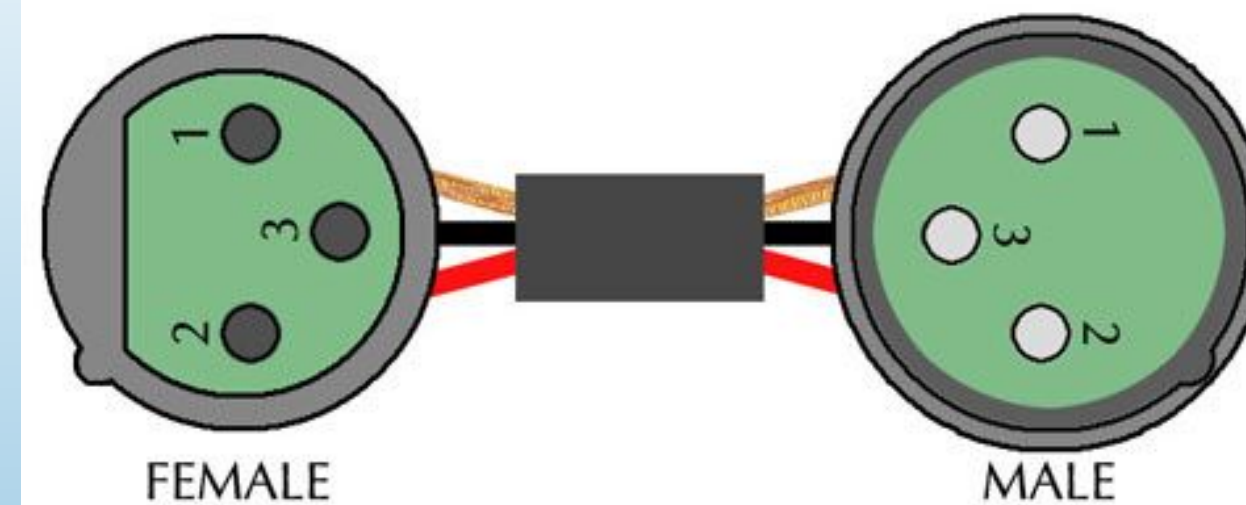
Female

- Pin 1: Ground/Shield
- Pin 2: Positive/Hot
- Pin 3: Negative/Cold



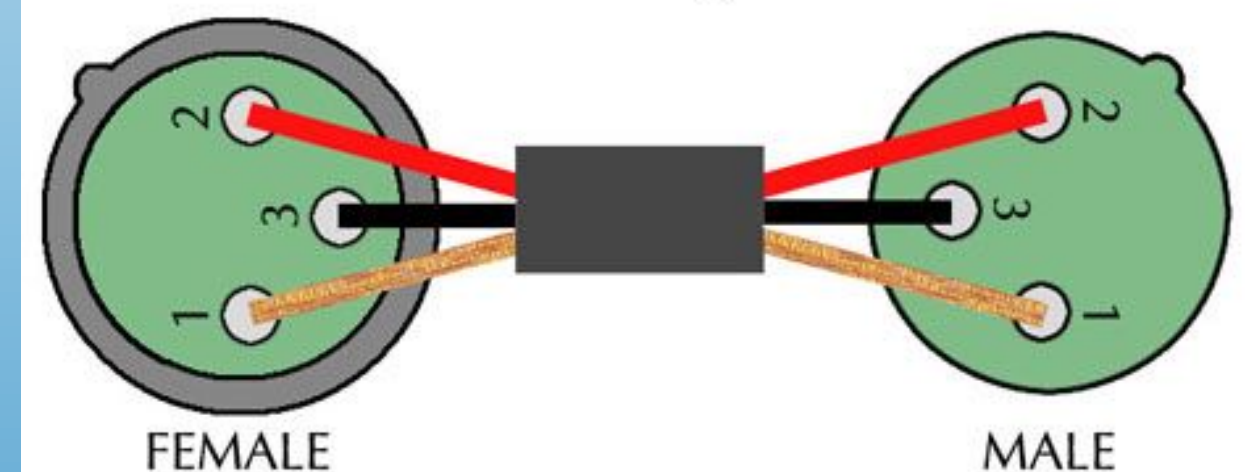
CORRECT PINOUT OF AN XLR CABLE

Viewed from Front of Connectors



CORRECT PINOUT OF AN XLR CABLE

Viewed from Back (Soldering Points) of Connectors



LEGEND

- + / hot / in-phase
- - / cold / out-of-phase
- † / shield / drain wire

Do not send signal (AC or DC voltage) down the ground wire.

Audio signals are alternating current.

Phantom power (needed for condenser microphones and active Di boxes) is direct current and is carried between Pins 2 and 3.

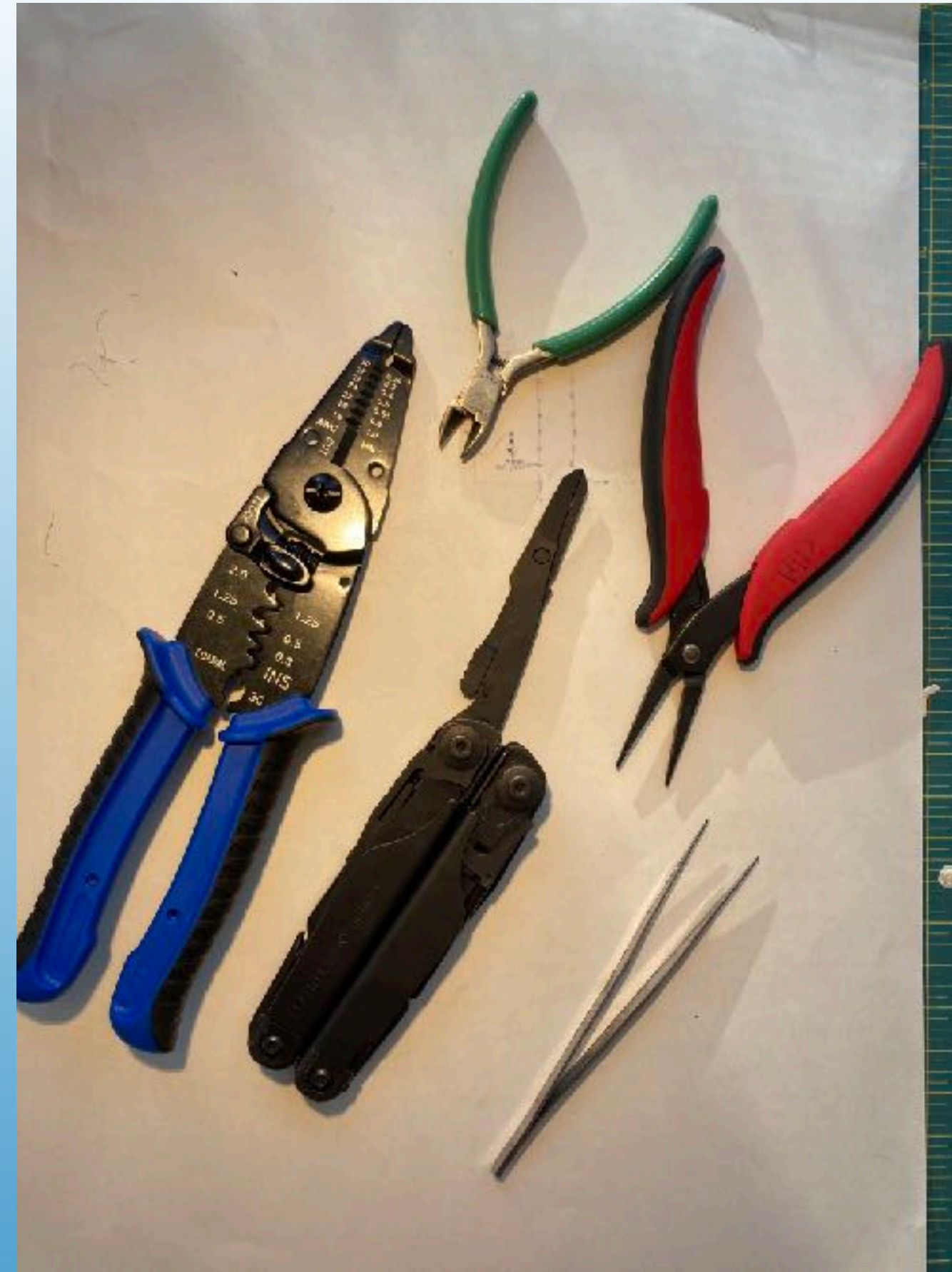


Tools

The main tools needed to make an XLR cable are a soldering iron, solder, wire strippers, and flush cutters. A panavise 'helping hand', needle nose pliers, a utility tool (Leatherman) and a solder sucker or solder wick are also very useful.



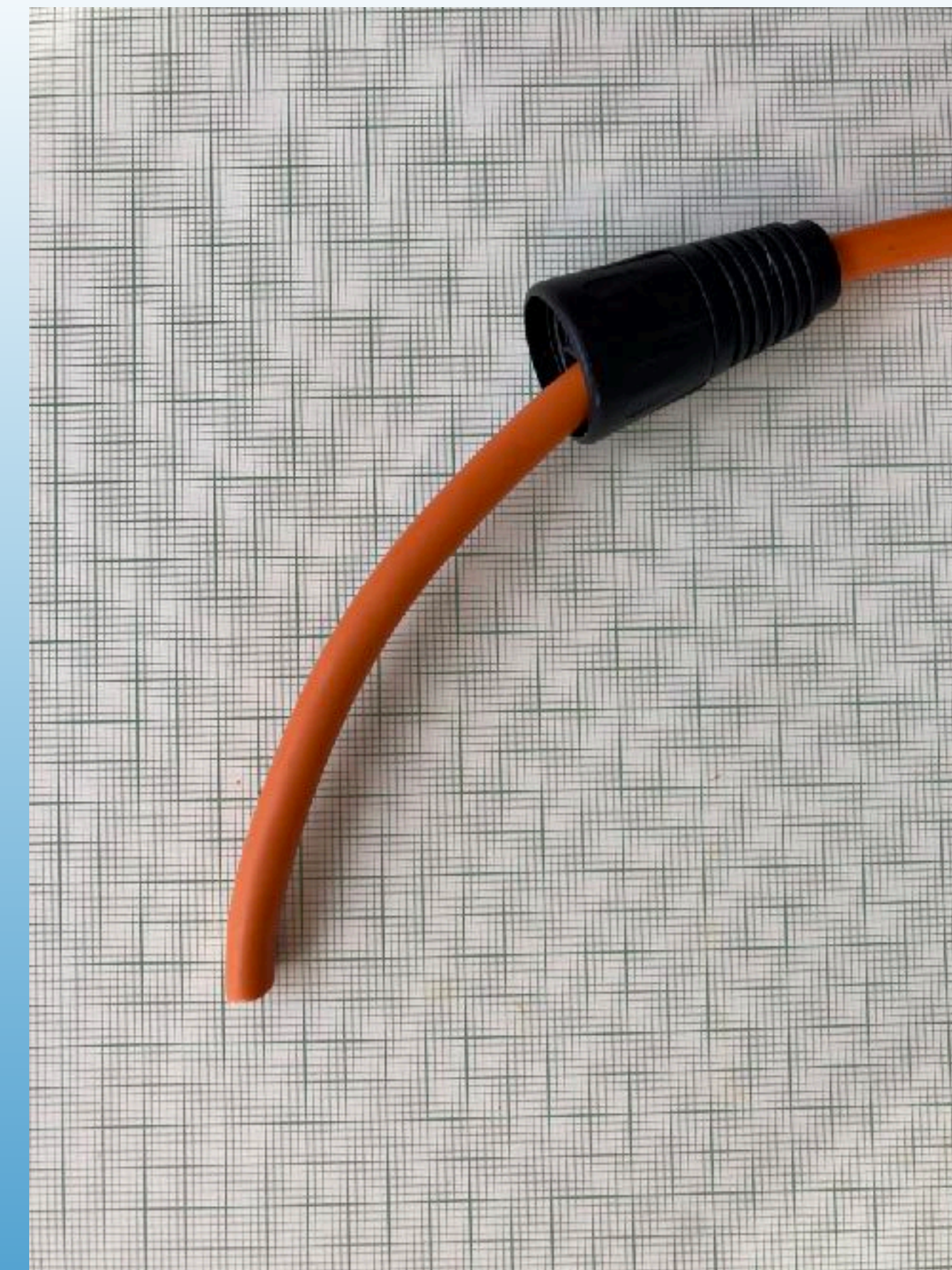
Wire strippers have different slots for various gauges of wire.



A Leatherman and tweezers are often invaluable tools.



Solder wick and solder sucker, in case we make mistakes.

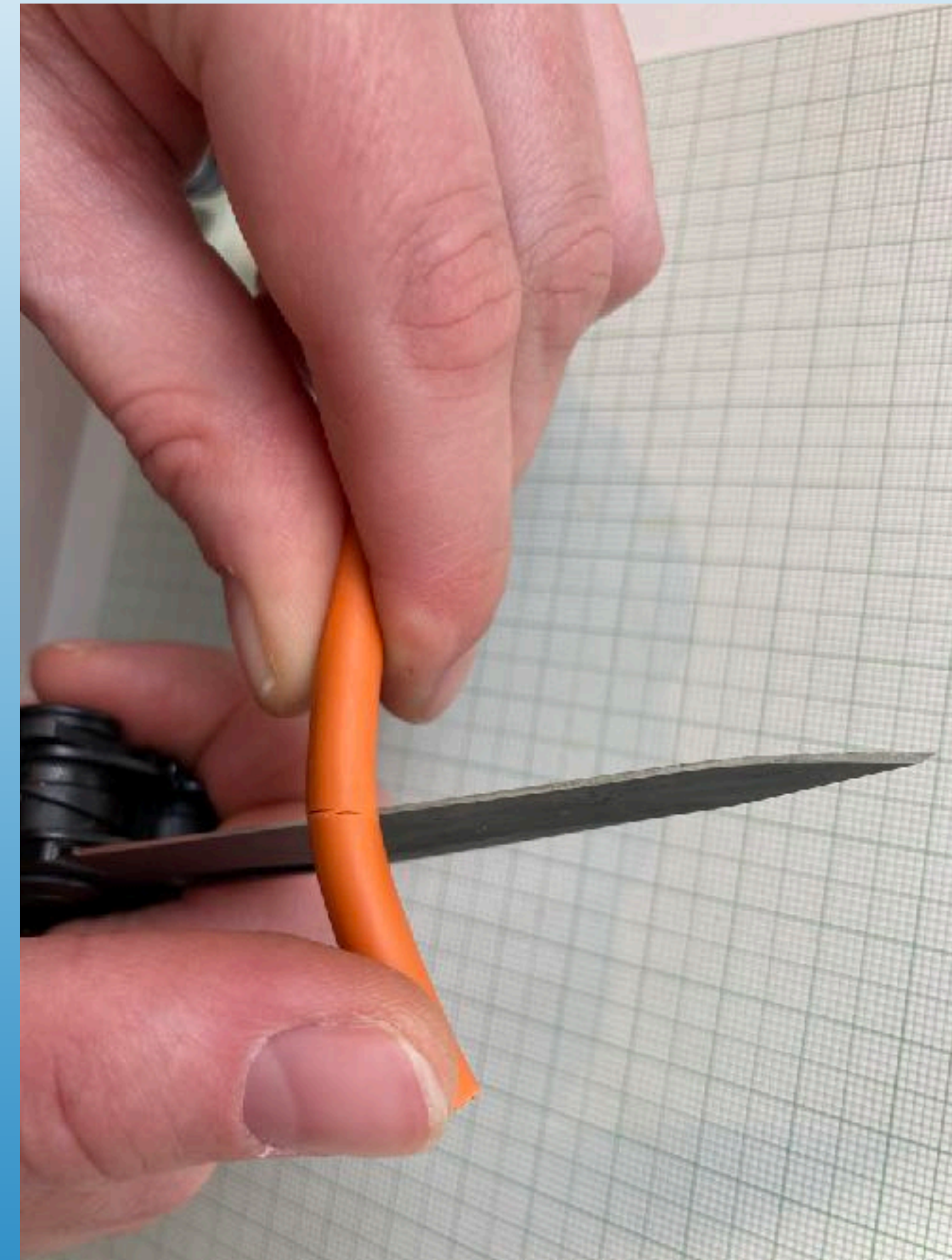


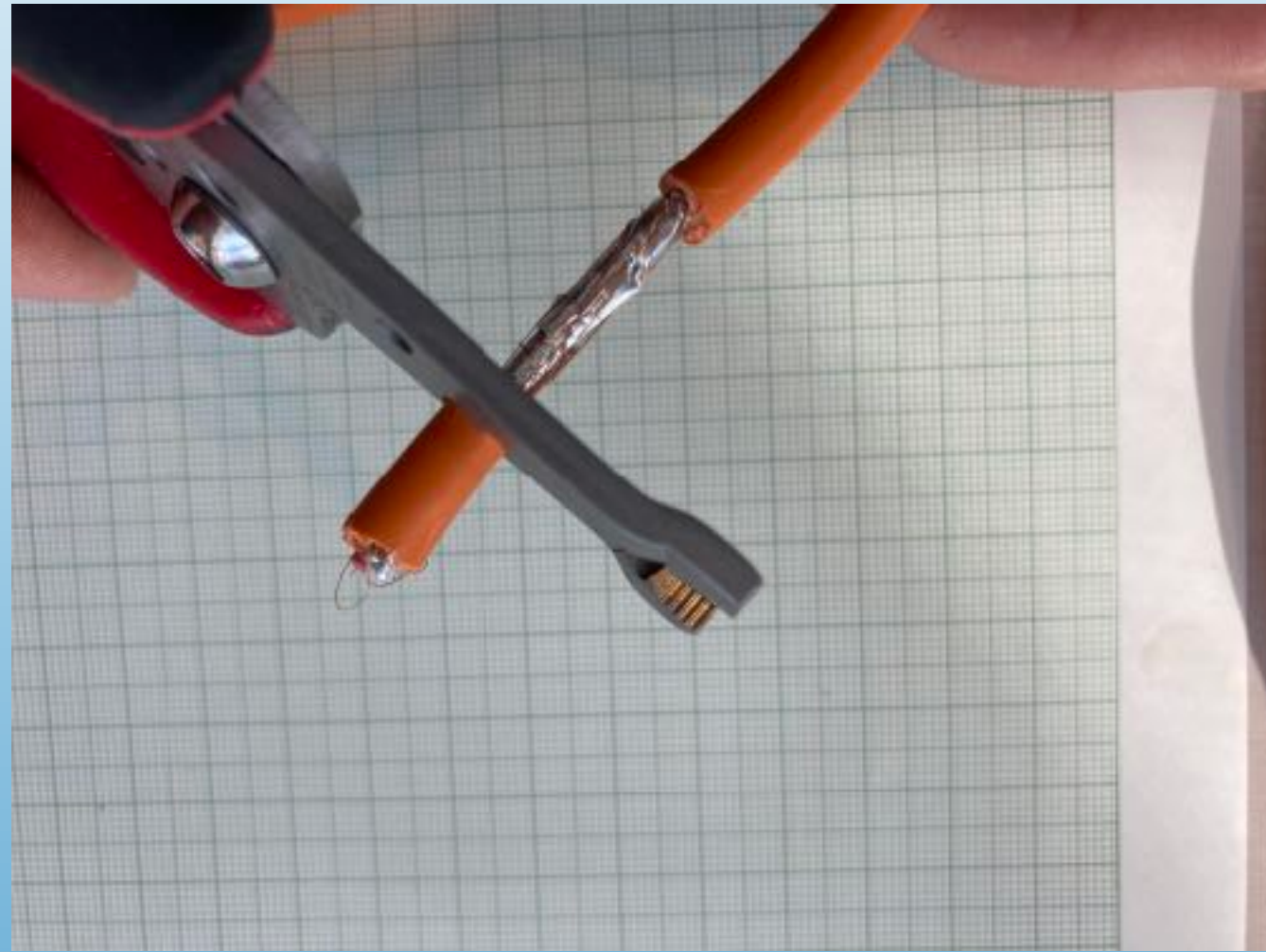
Take apart either the plug or socket XLR connector.

I strongly recommend putting the bushing (collar) in the correct orientation on the cable at this time!



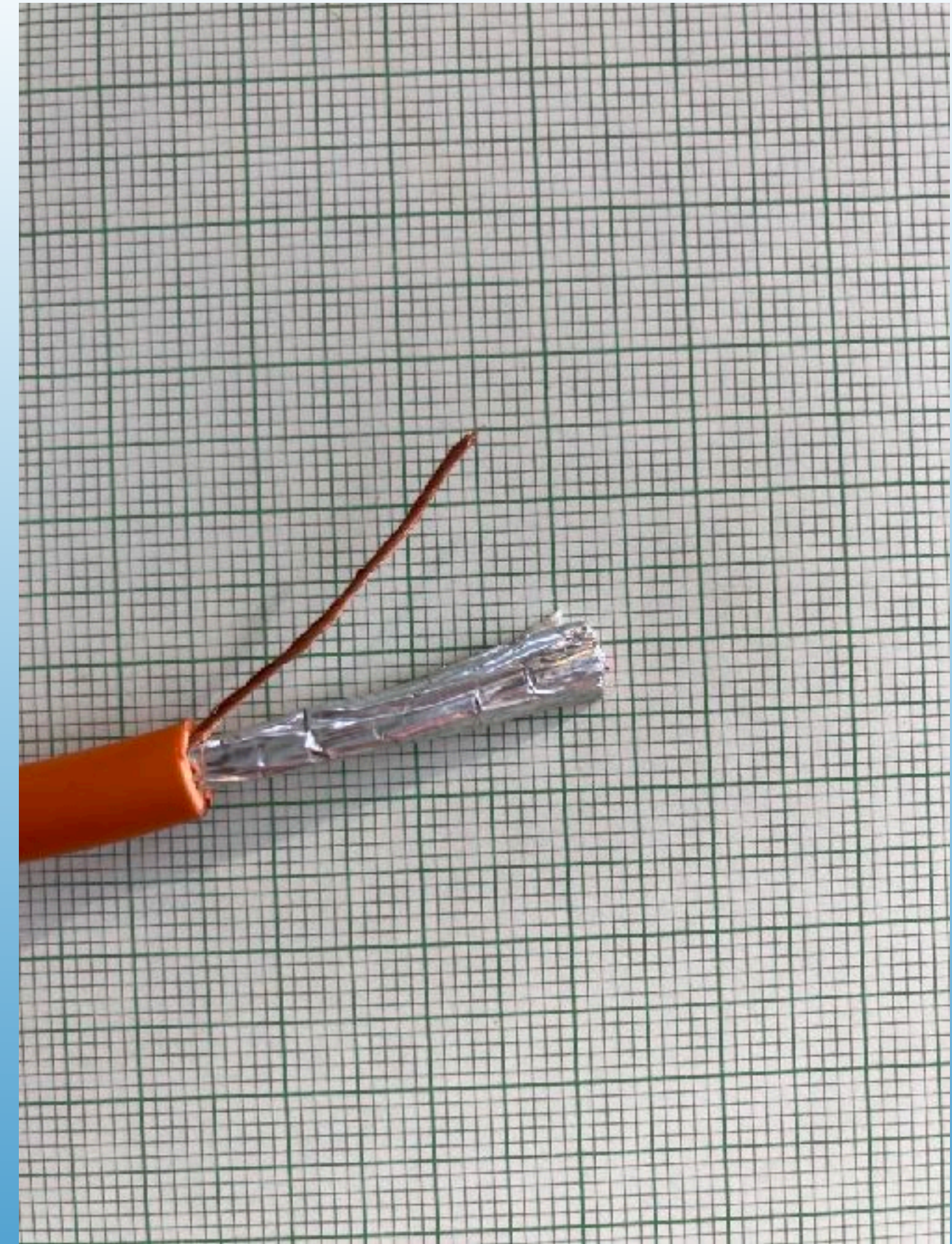
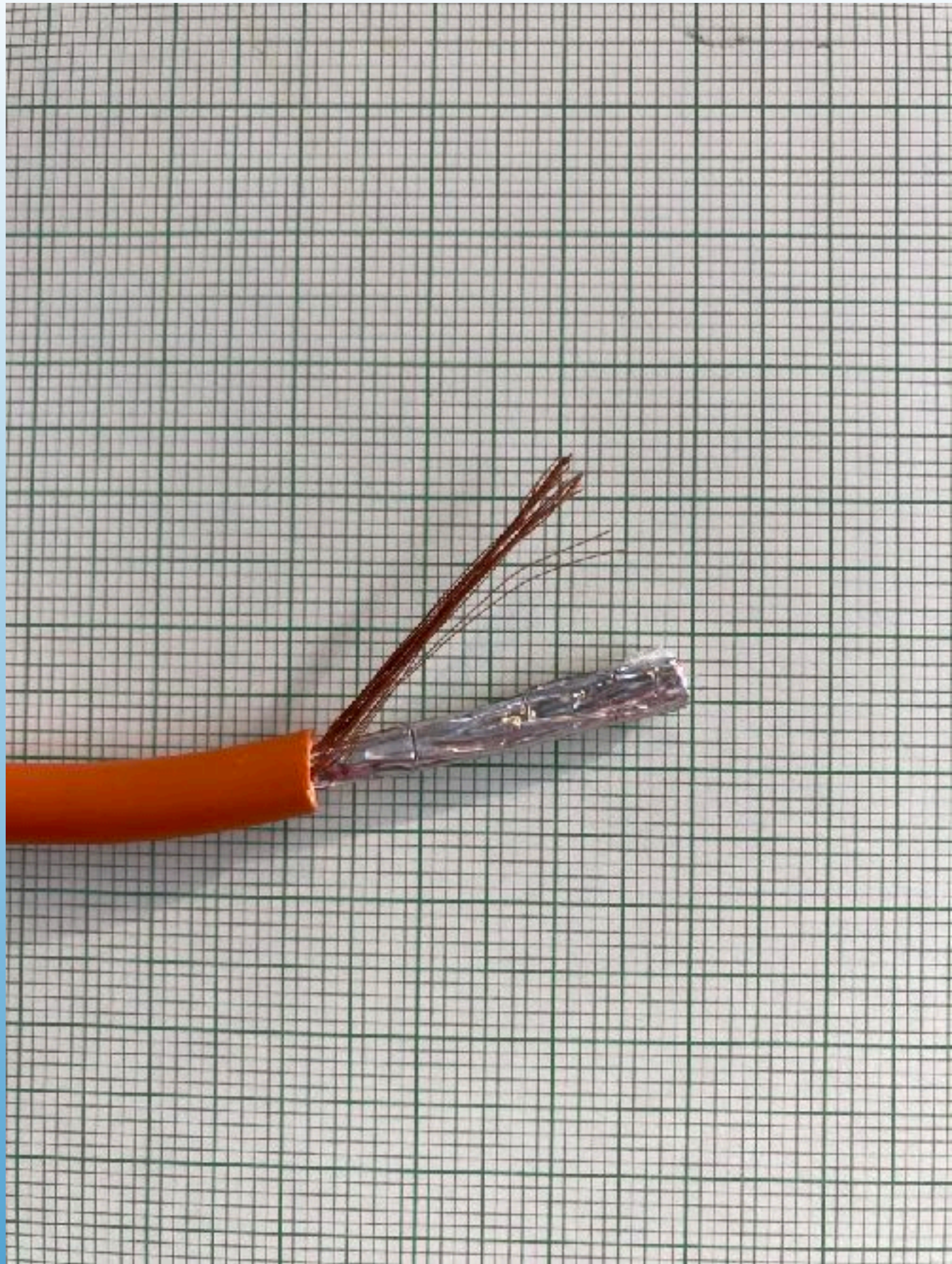
Use wire stripper to remove insulation or a multi-tool to score the insulation before removal.



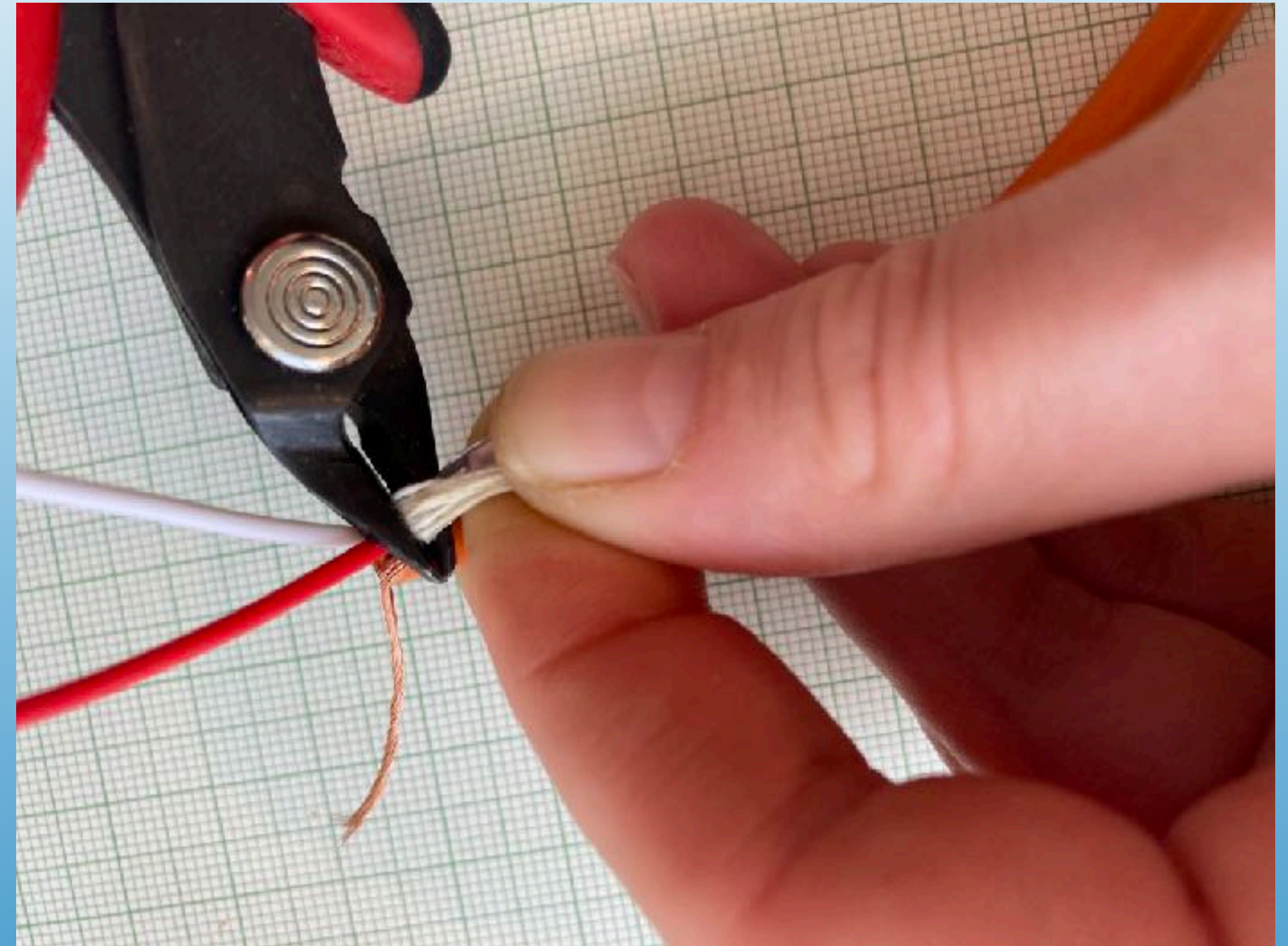
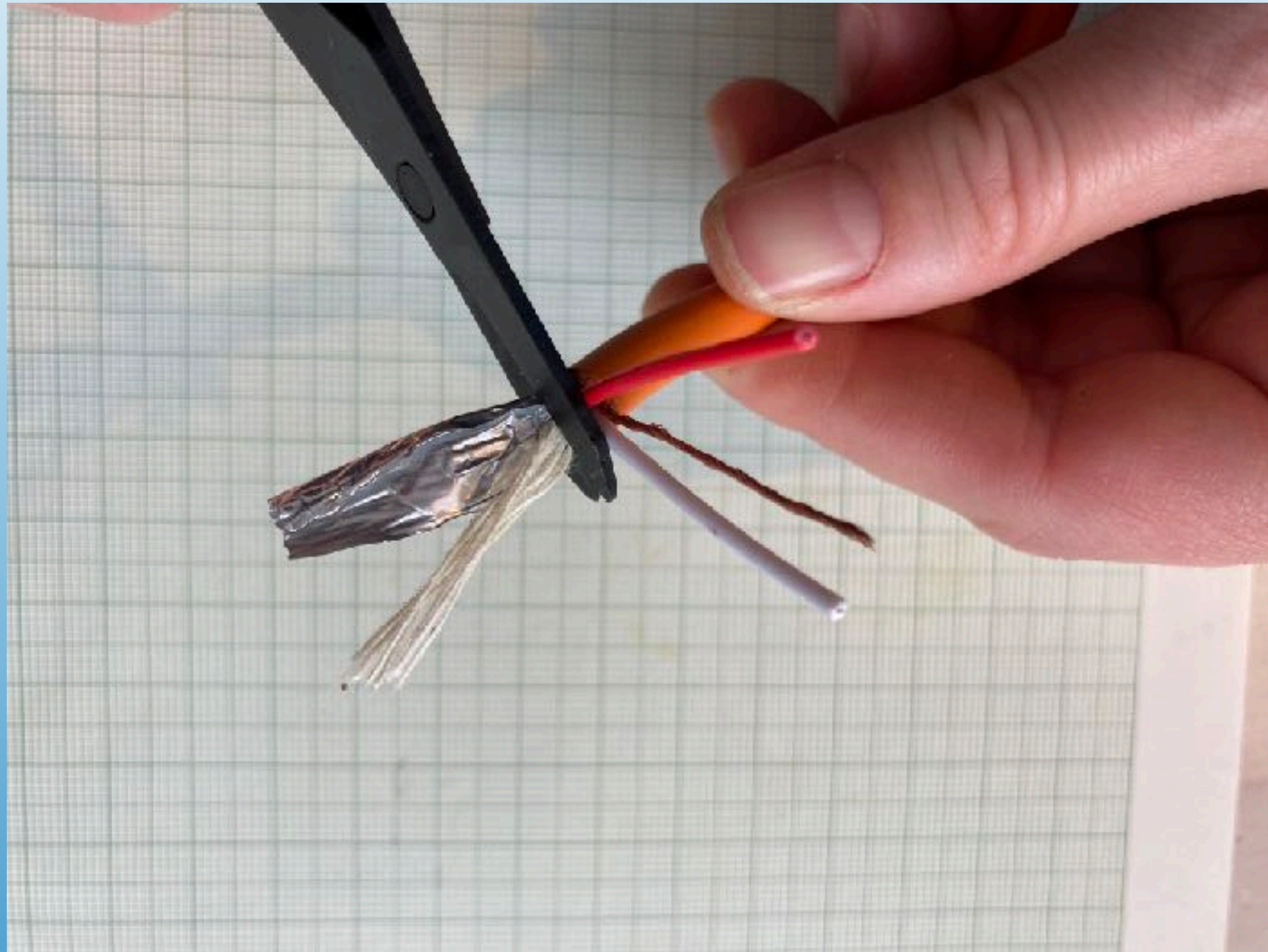


After removing insulation examine the wire's strands to ensure wires have not been cut or damaged.

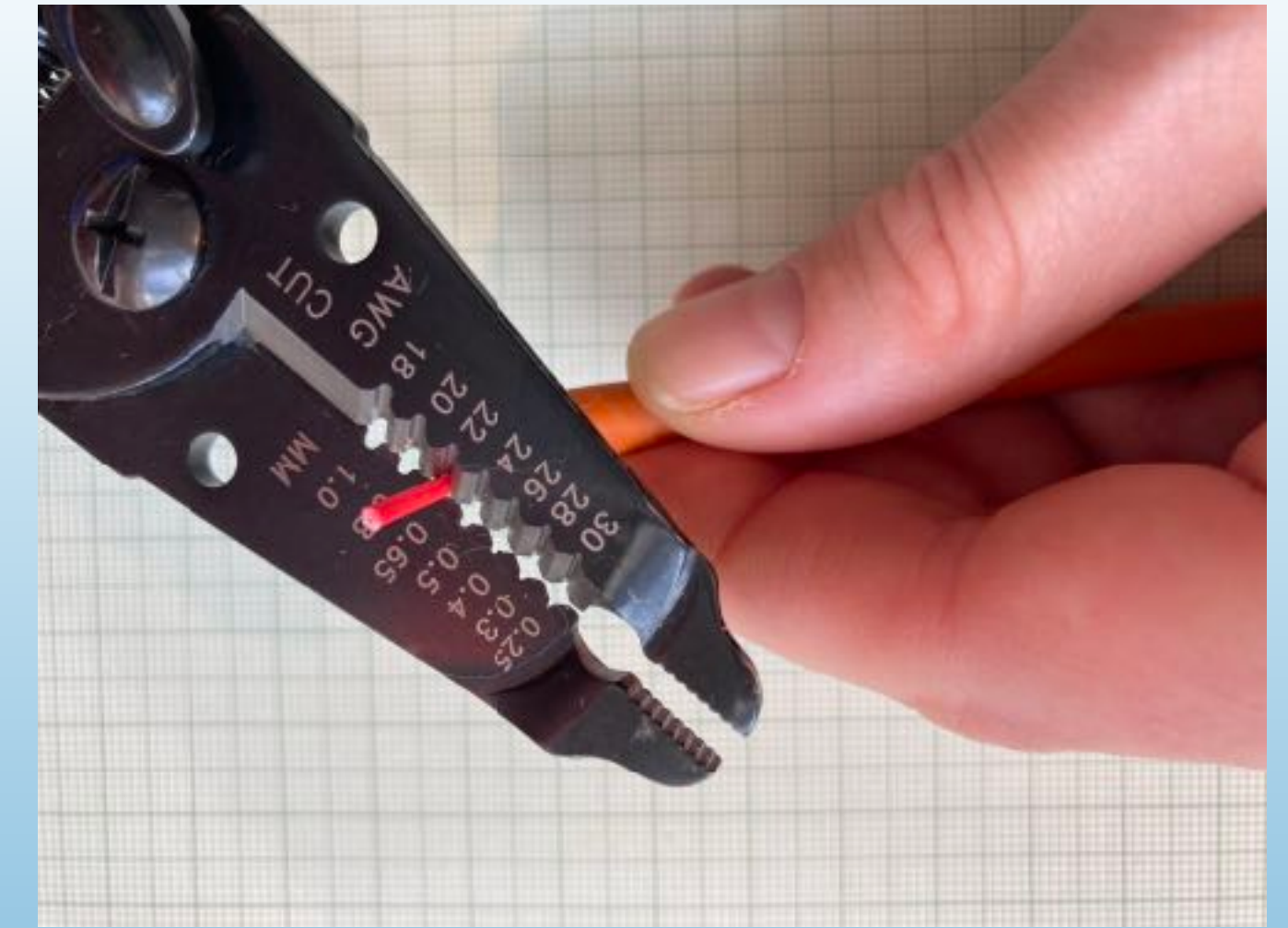
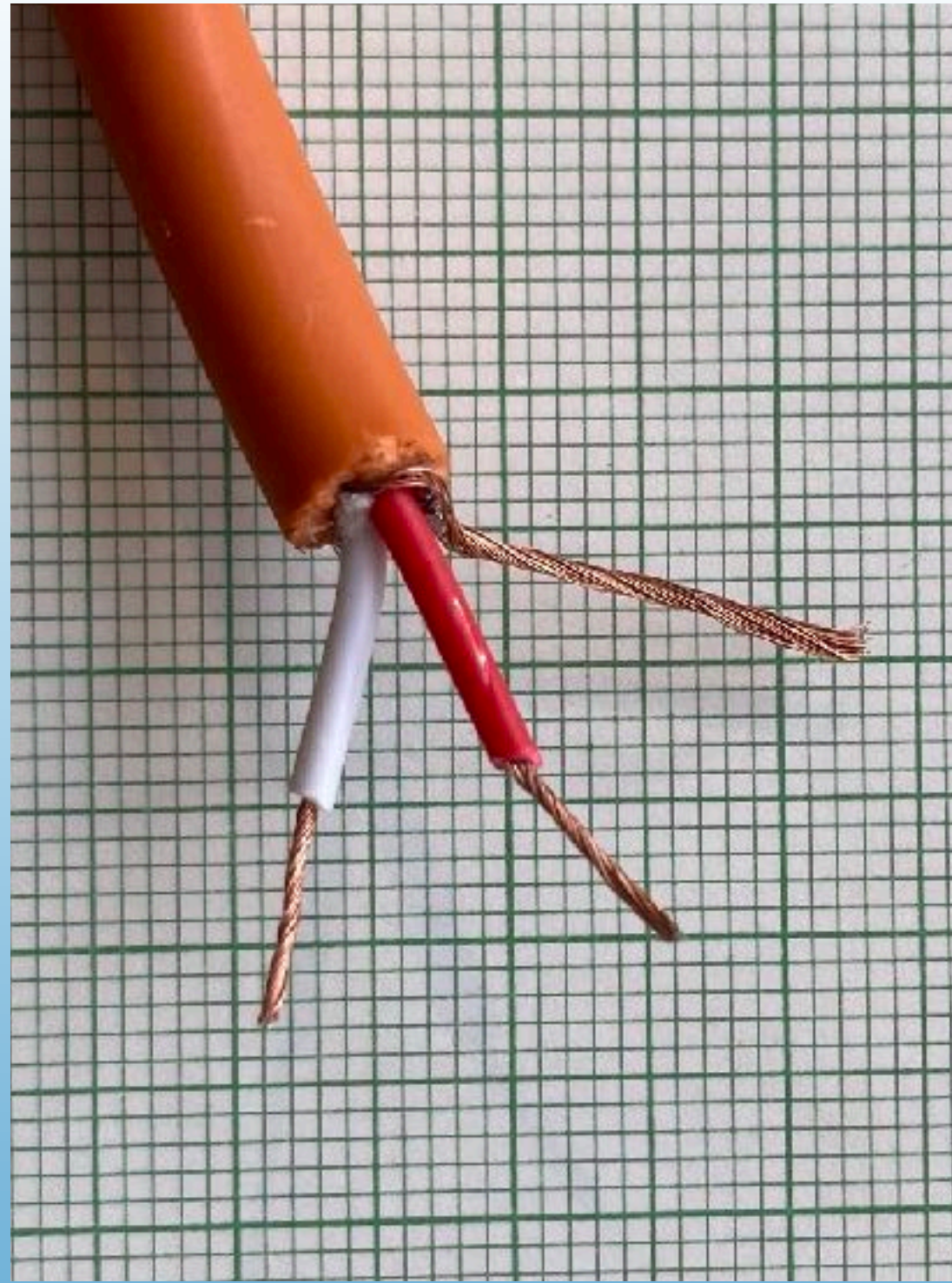
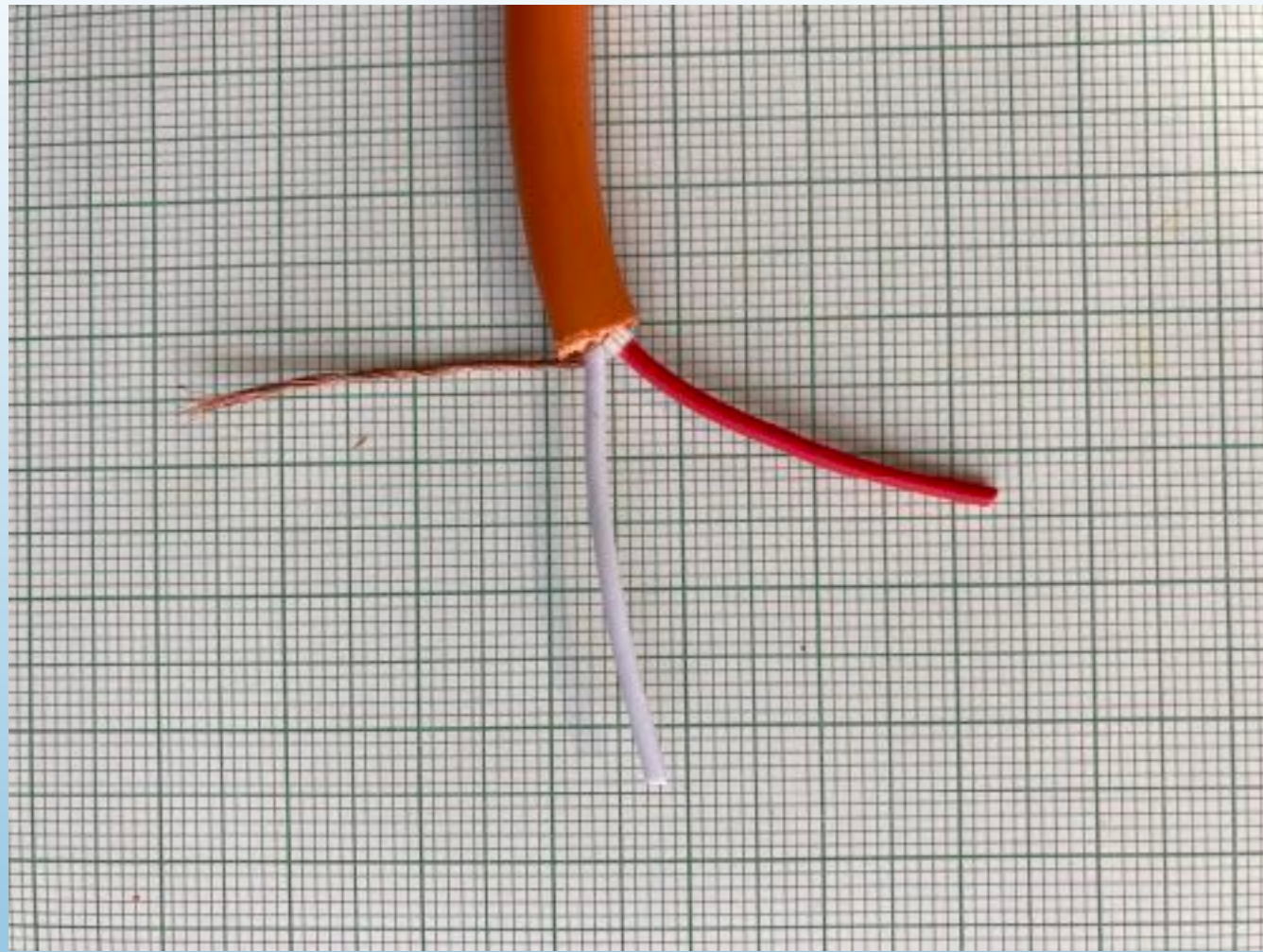




Twist the ground wire strands together.



Remove the foil and thread with scissors or flush cutters.



Remove the insulation from the two inner wires. These wires will carry the (+) and (-) signals. Note it doesn't matter what colour you use for what signal, only that both ends of the XLR maintain consistent pin assignment. Typically red is used for the (+) signal.

Avoid stripping off excessive amounts of insulation. I aim for about 1/8 of an inch. If you remove too much insulation you will have exposed wire that can cause shorts.



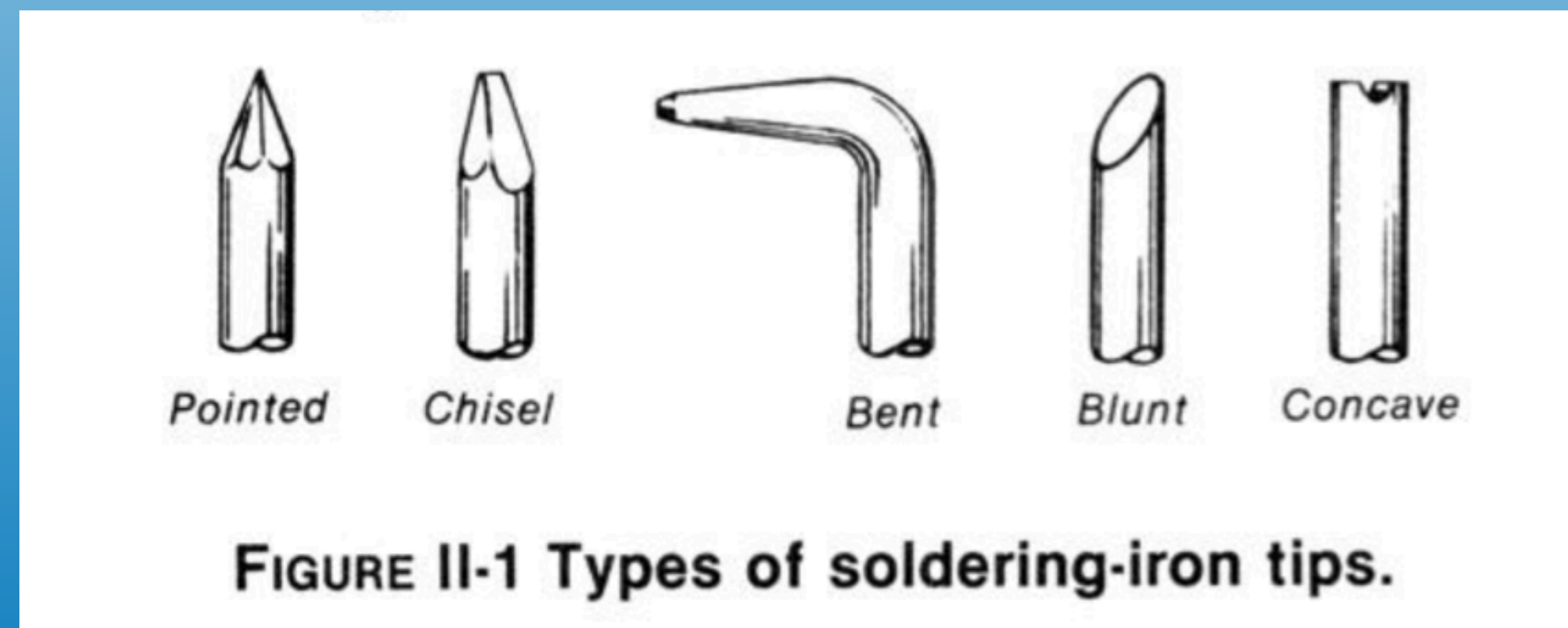
Getting ready to solder!

Soldering-Irons and Tips

A 35 Watt soldering-iron is recommended for general electronic work.

Soldering-iron tips have various shapes and sizes. Chiselled and pointed tips are the most commonly used for cable making.

Soldering-iron tip should be kept clean by either a damp sponge or brass wool.



Solder

Solder comes in different gauges; for an XLR cable 0.040 inch diameter will work.

The composition of solder is designated by 2 numbers, for example 60/40. The first number indicates the percentage of tin.

Most solder has a core containing flux. Flux cleans the components being joined together. Flux melts at a lower temperature than the solder itself and flows ahead to remove oxides from components.

Solder is not a glue that just sticks components together. When solder melts it forms a new alloy with the materials being soldered; when it cools a strong bond is created between components.

Soldering Best Practices

There ought to be no direct contact between soldering-iron and solder itself. Heat up wire, component leads or metal pads on circuit boards before adding solder.

Do not try to 'paint' or drip the solder onto the component.

Do not melt the solder on the iron and then try to put in on the component or cable.

When soldering wire, heat the wire up first then touch the solder to the opposite side of the wire, the solder will run up the wire this way.

Do not move the components while the solder dries, keep them still until the junction settles and then check the integrity of the connection.

Connections ought to appear shiny. A dull appearance suggests a cold solder joint that could break.

Soldering Safety

Work in a ventilated area or have a fume absorber running if you are soldering for long periods.

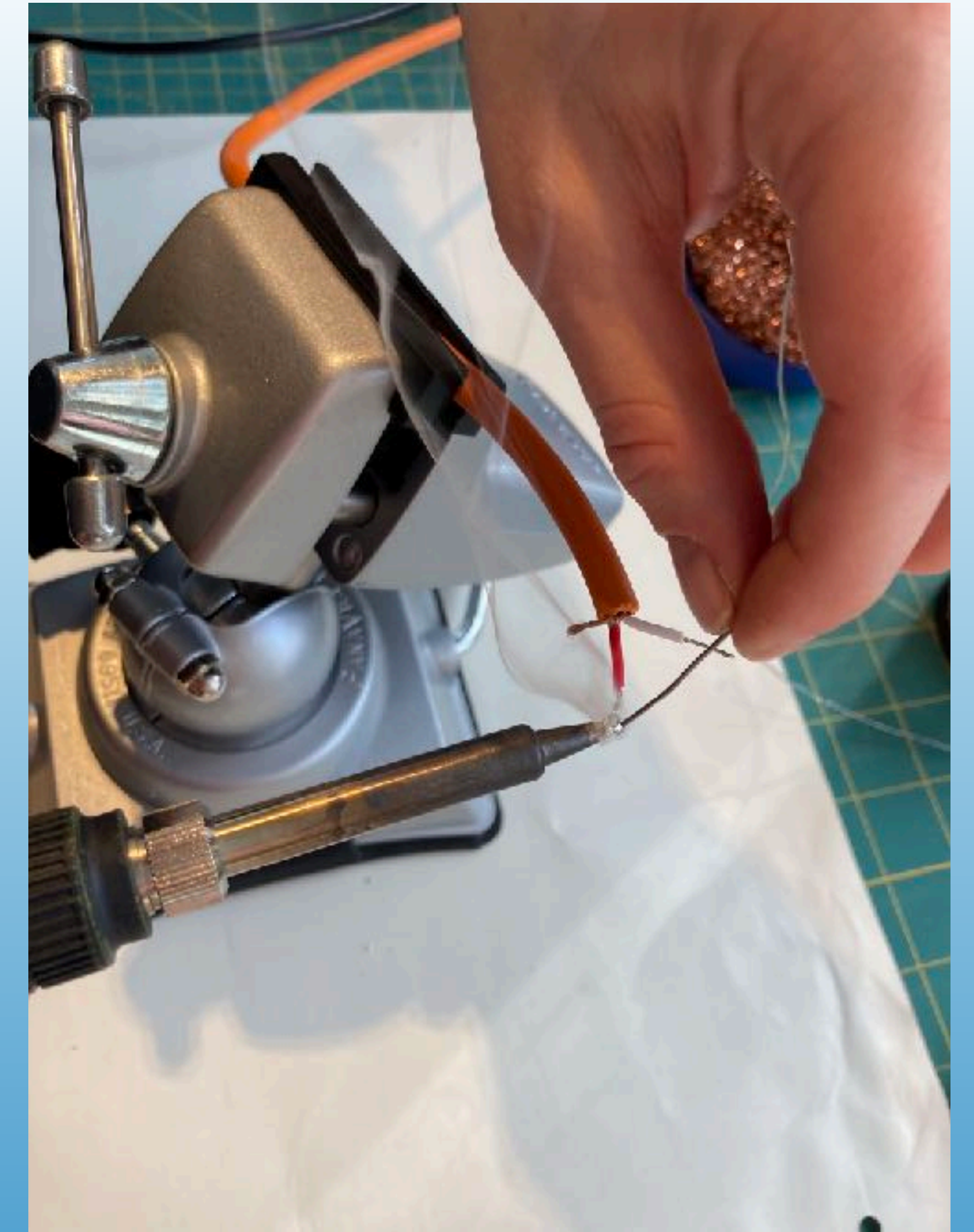
Wear safety glasses when cutting wire and soldering.

Wash hands after touching solder (some solders still contain lead).

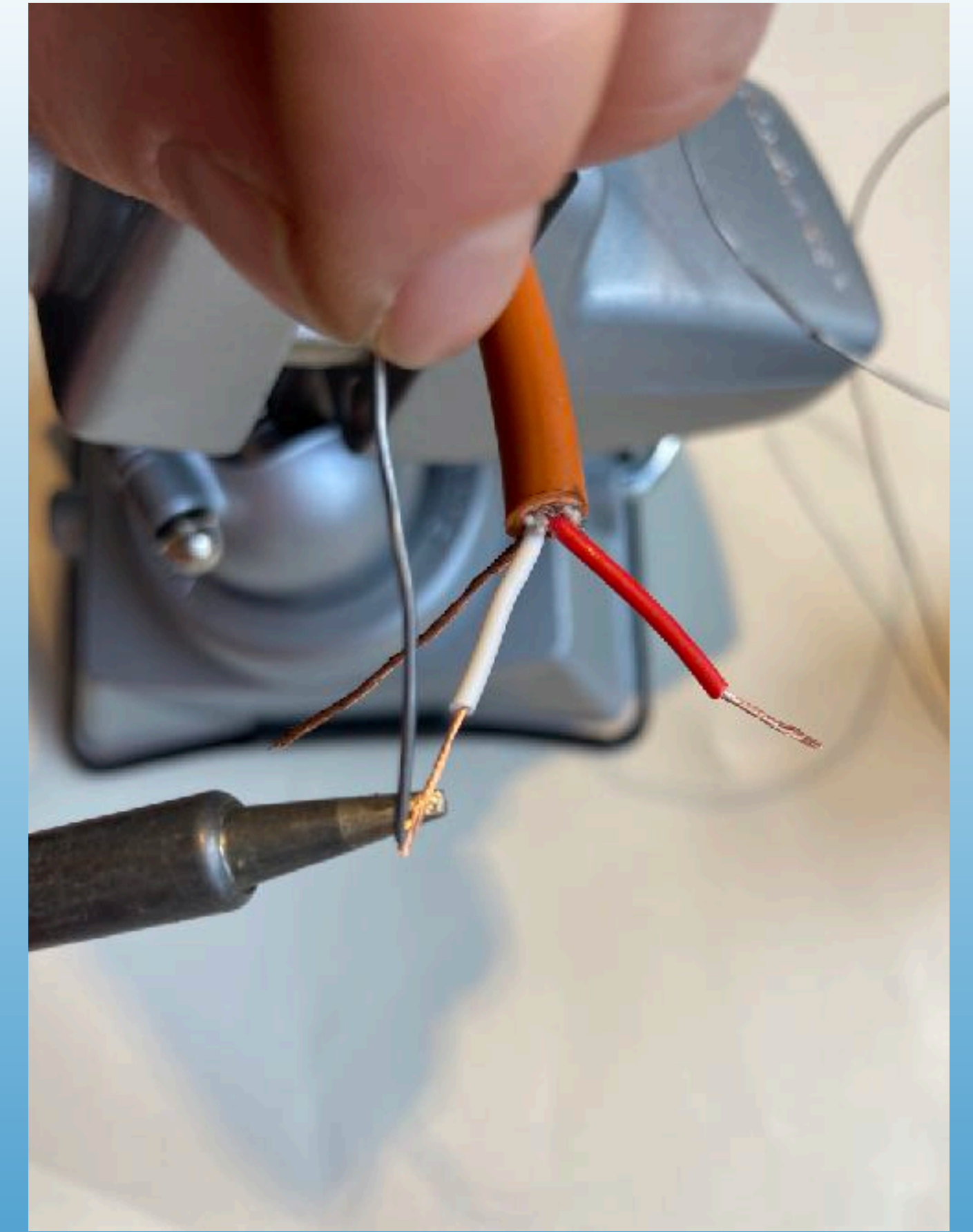
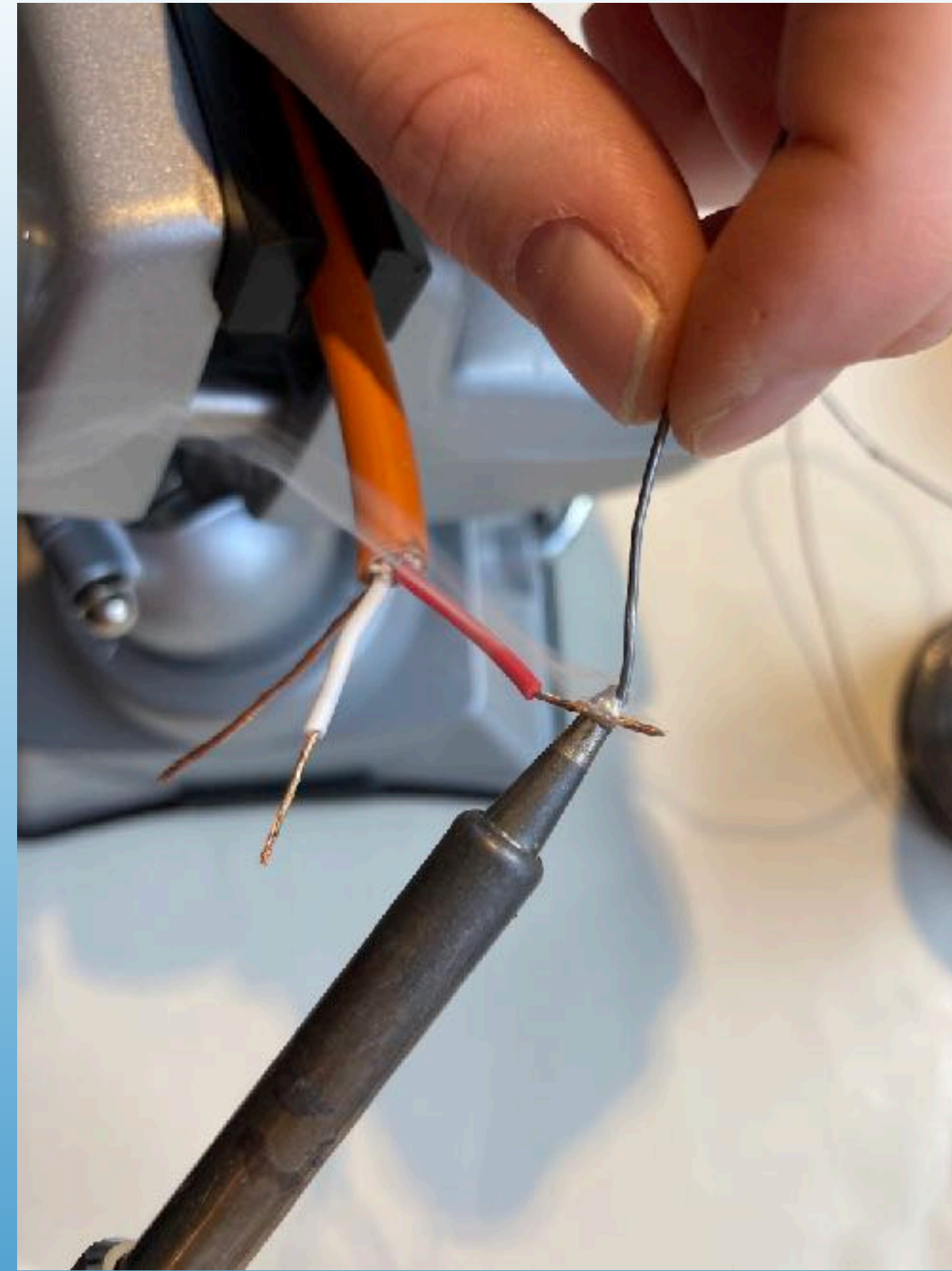
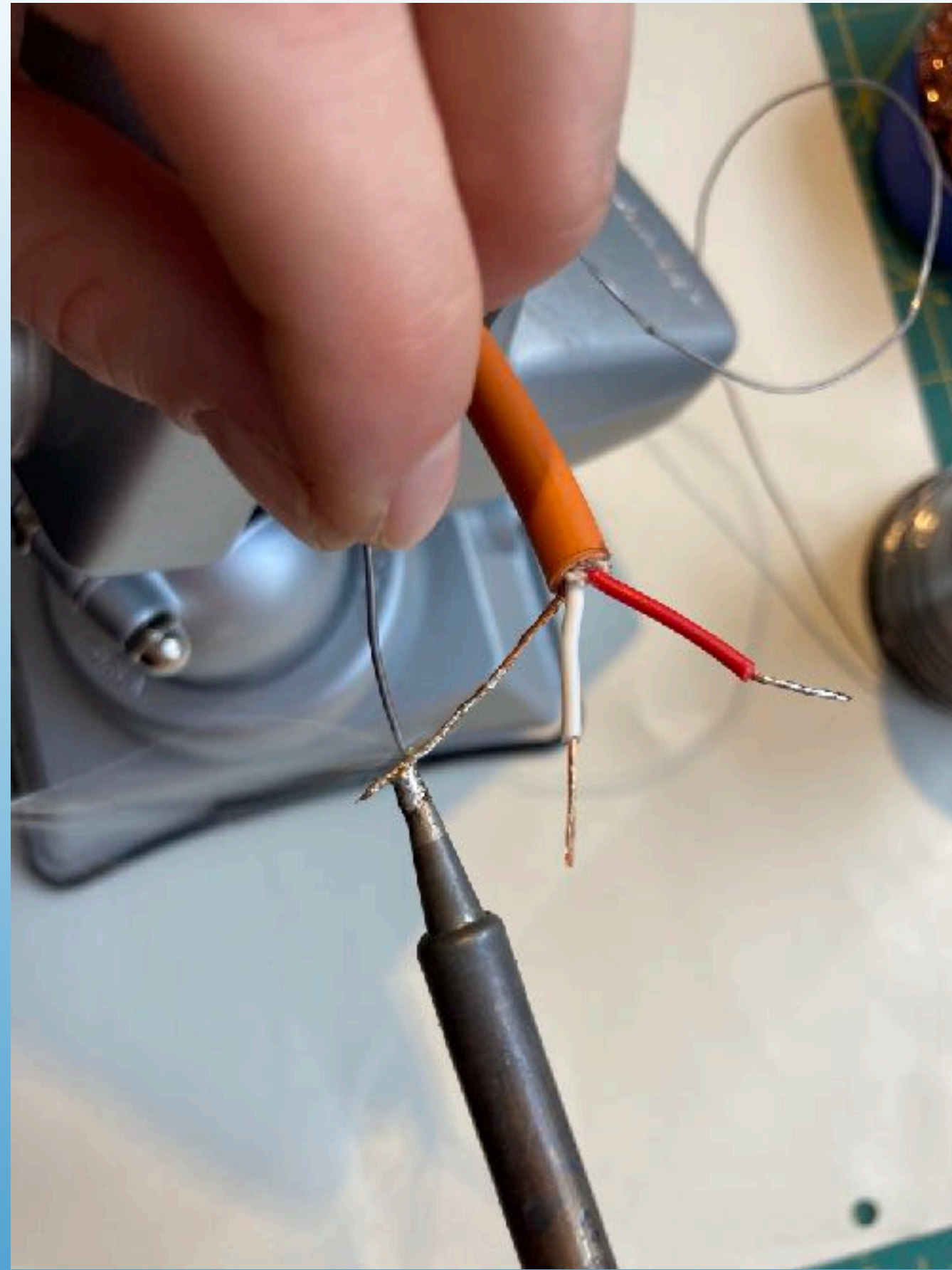
Be cautious using a soldering iron because even a 15W or 30W iron heats up to extremely hot temperature (380°C).

Make sure you have solid connection but avoid using excess solder that can create short circuits or prevent connectors from fitting properly.

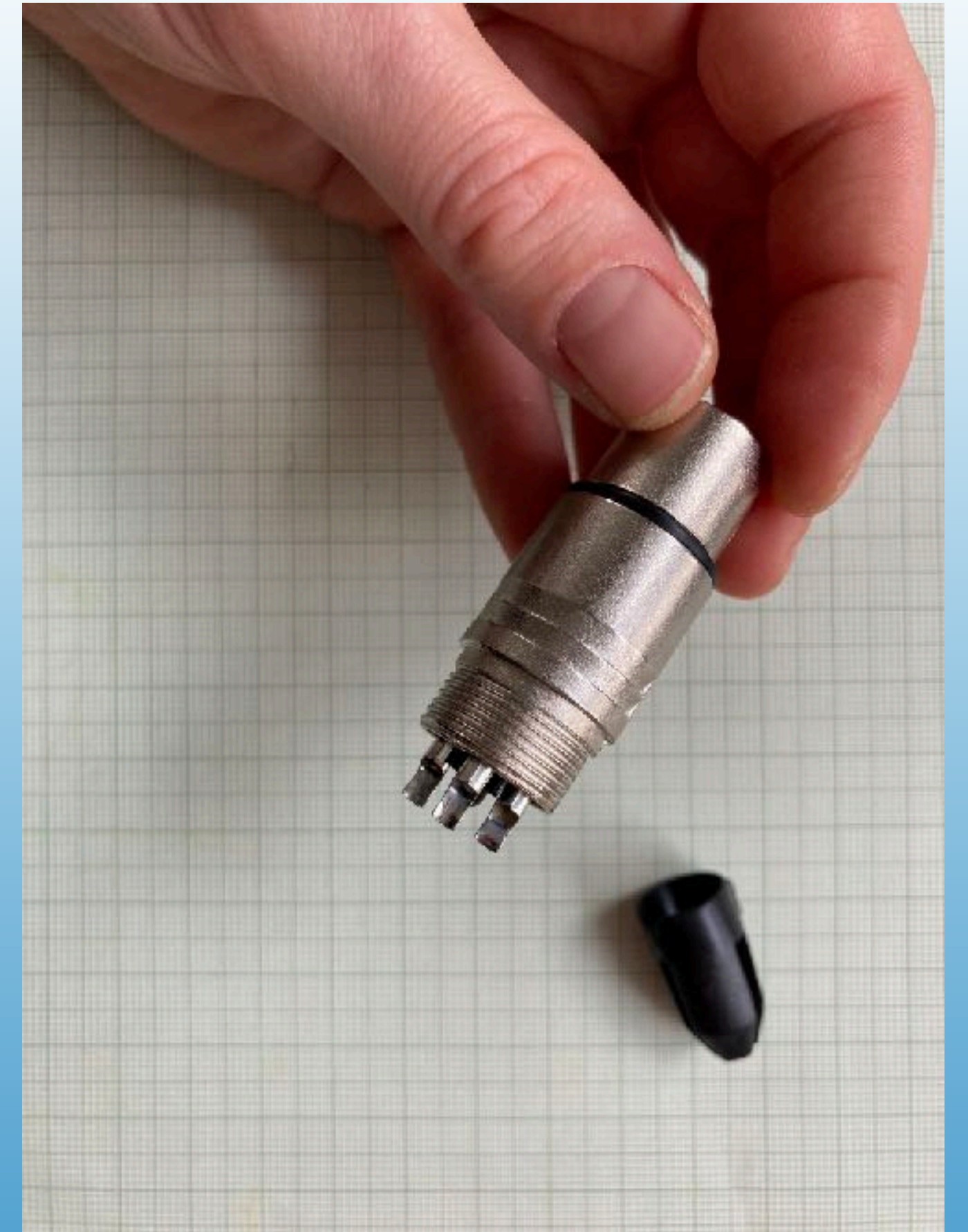
It will take practice and patience, but you will have fun!



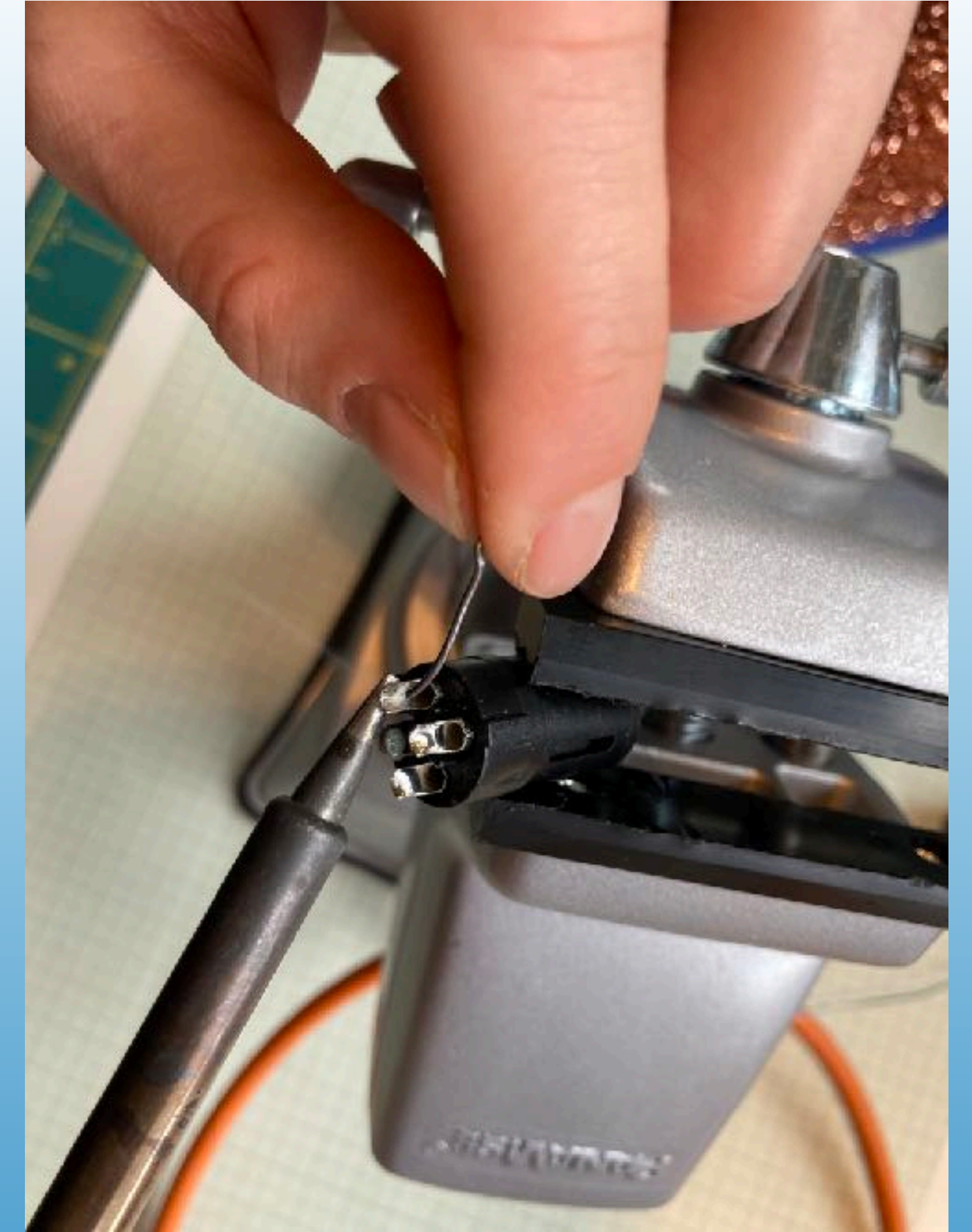
You only need to tin the part of the wire that comes into contact with the solder joint. Tin all three wires.



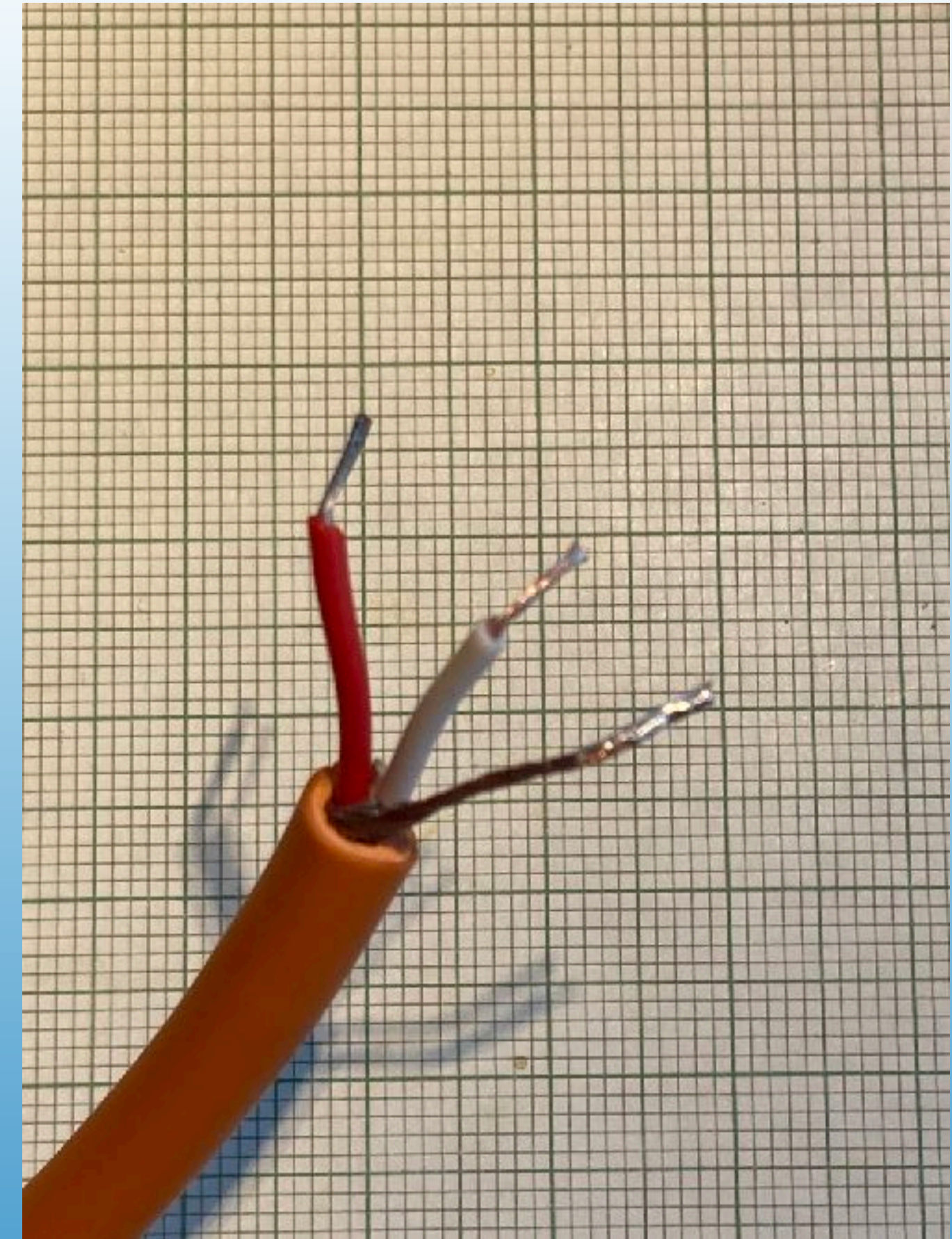
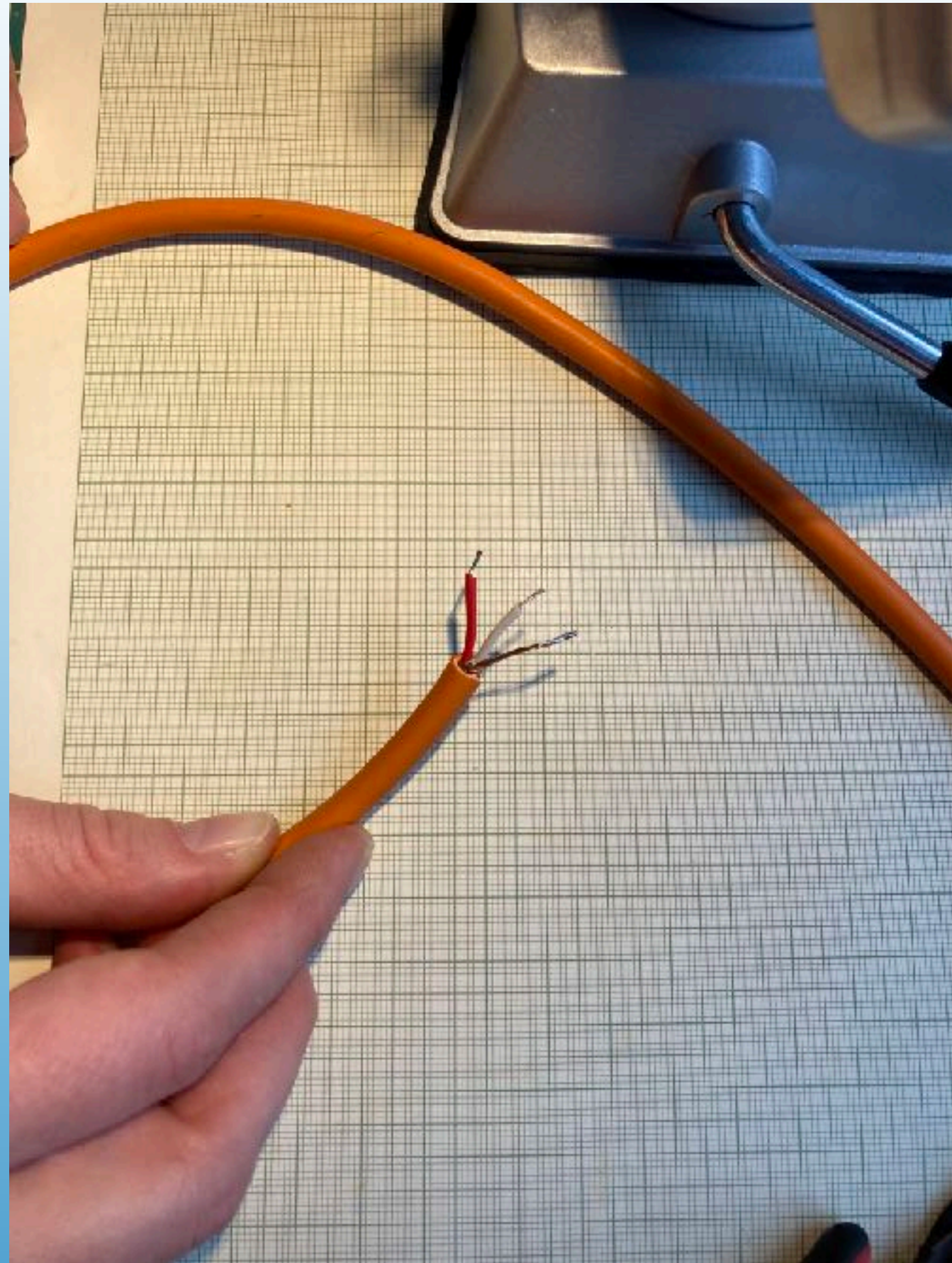
Heat up the wire first, then touch the solder to the wire. The solder will flow up the wire due to capillary action, permeating between strands.



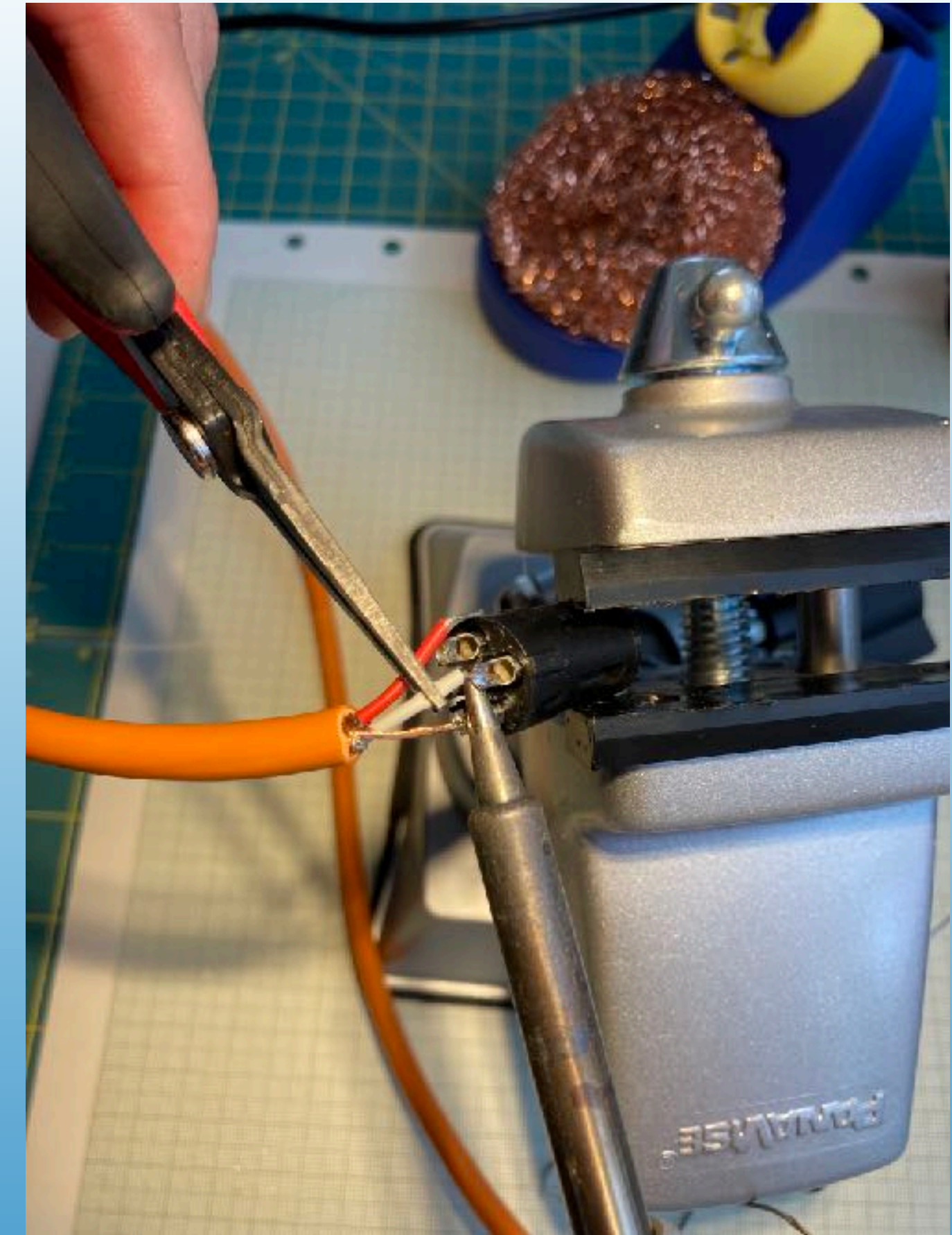
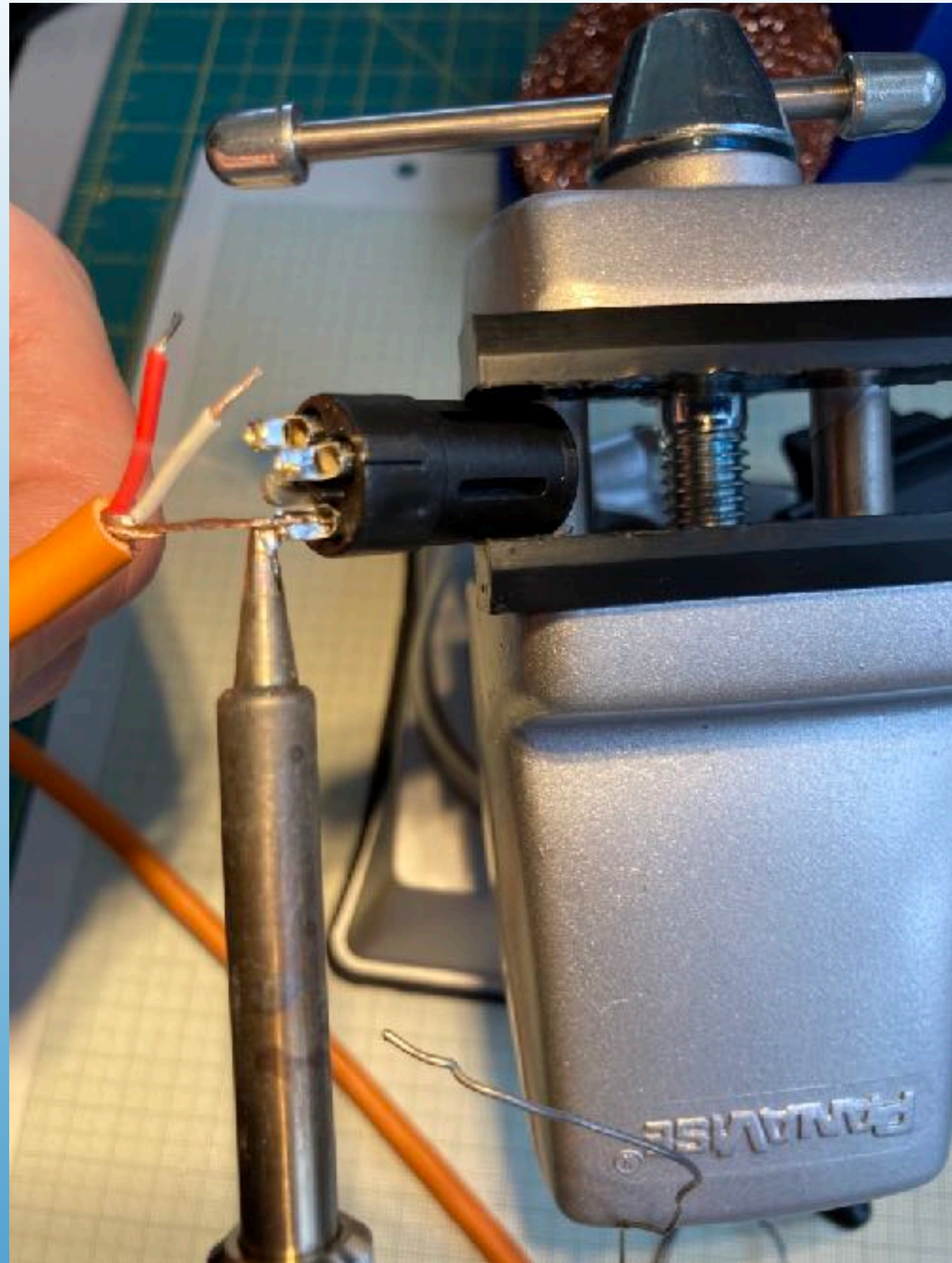
Take apart the socket
XLR end.



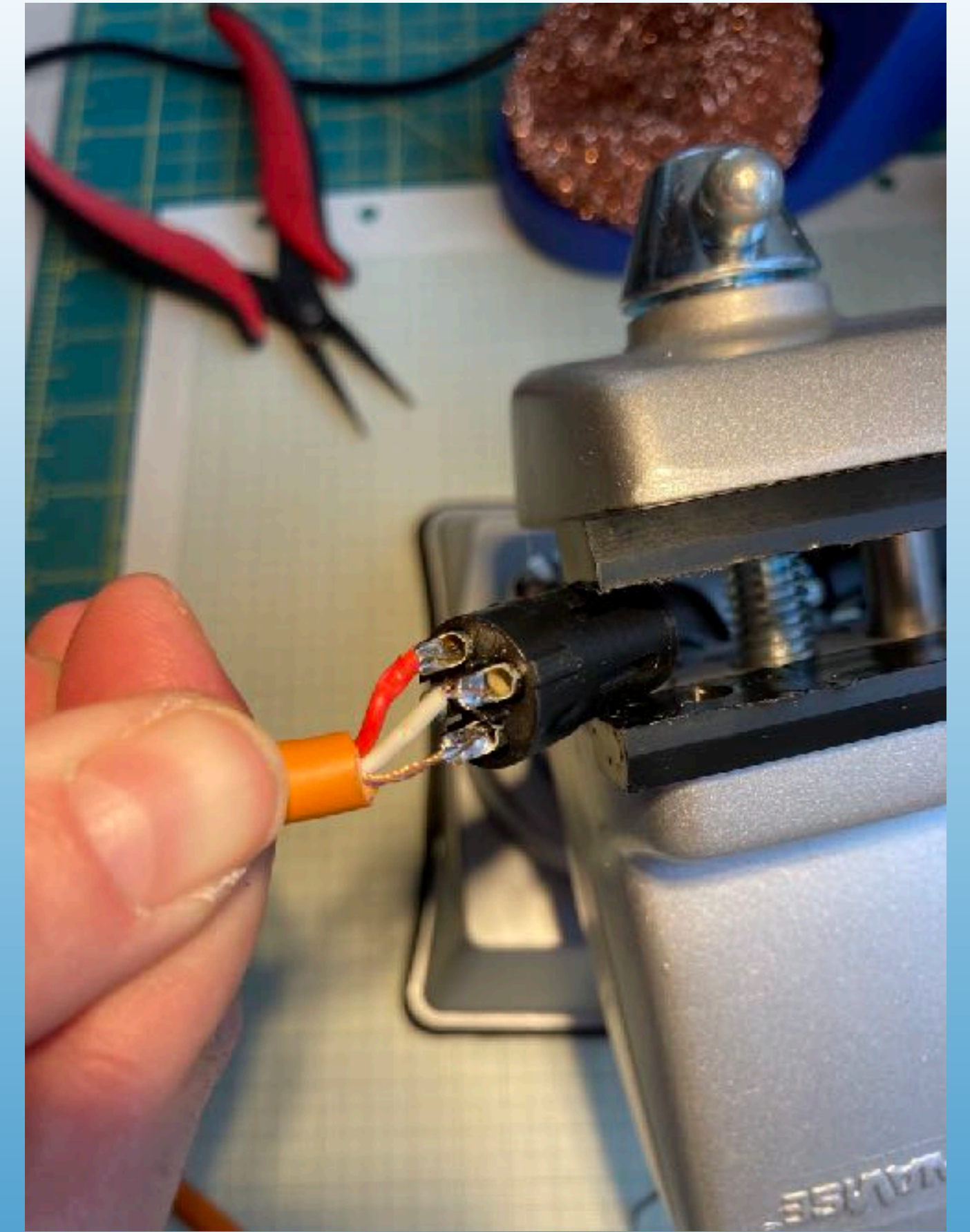
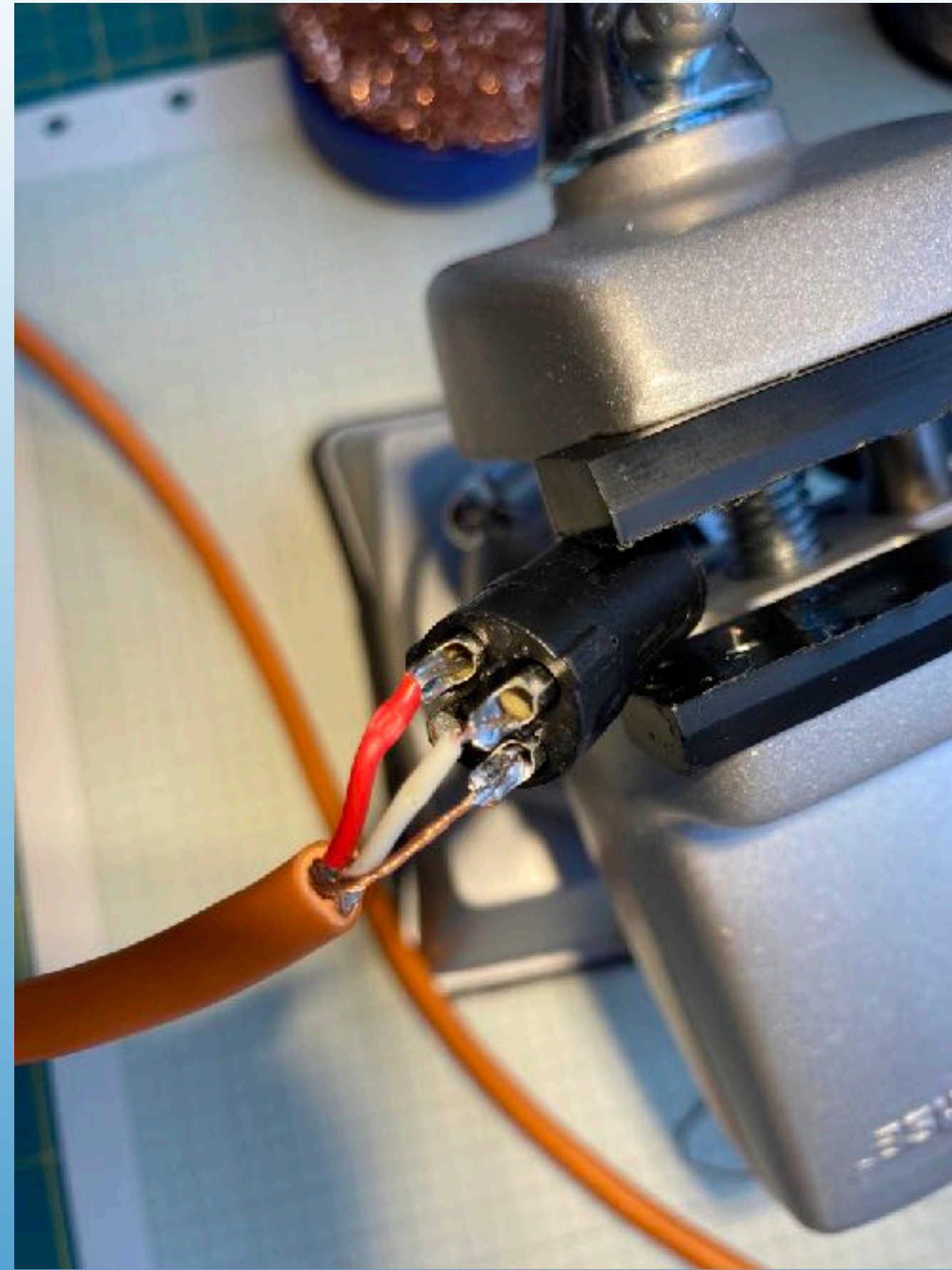
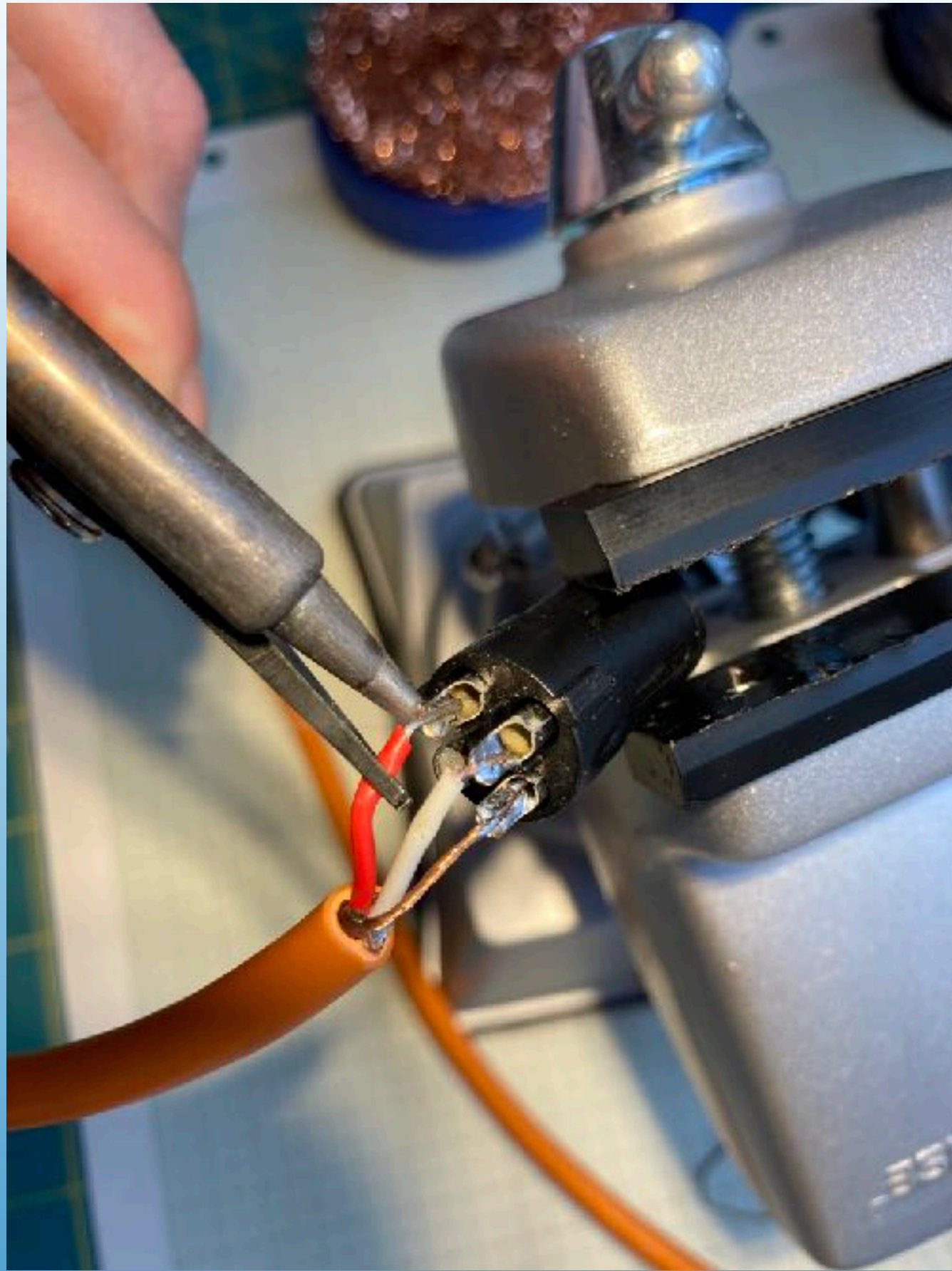
Prepare the socket XLR end by putting a little bit of solder
in each of the three-pin cups.
Heat up the cup and touch the solder to the cup.



Prepare the three wires so they are in the correct pin configuration for the socket XLR.
This will look like a crow's foot or claw.

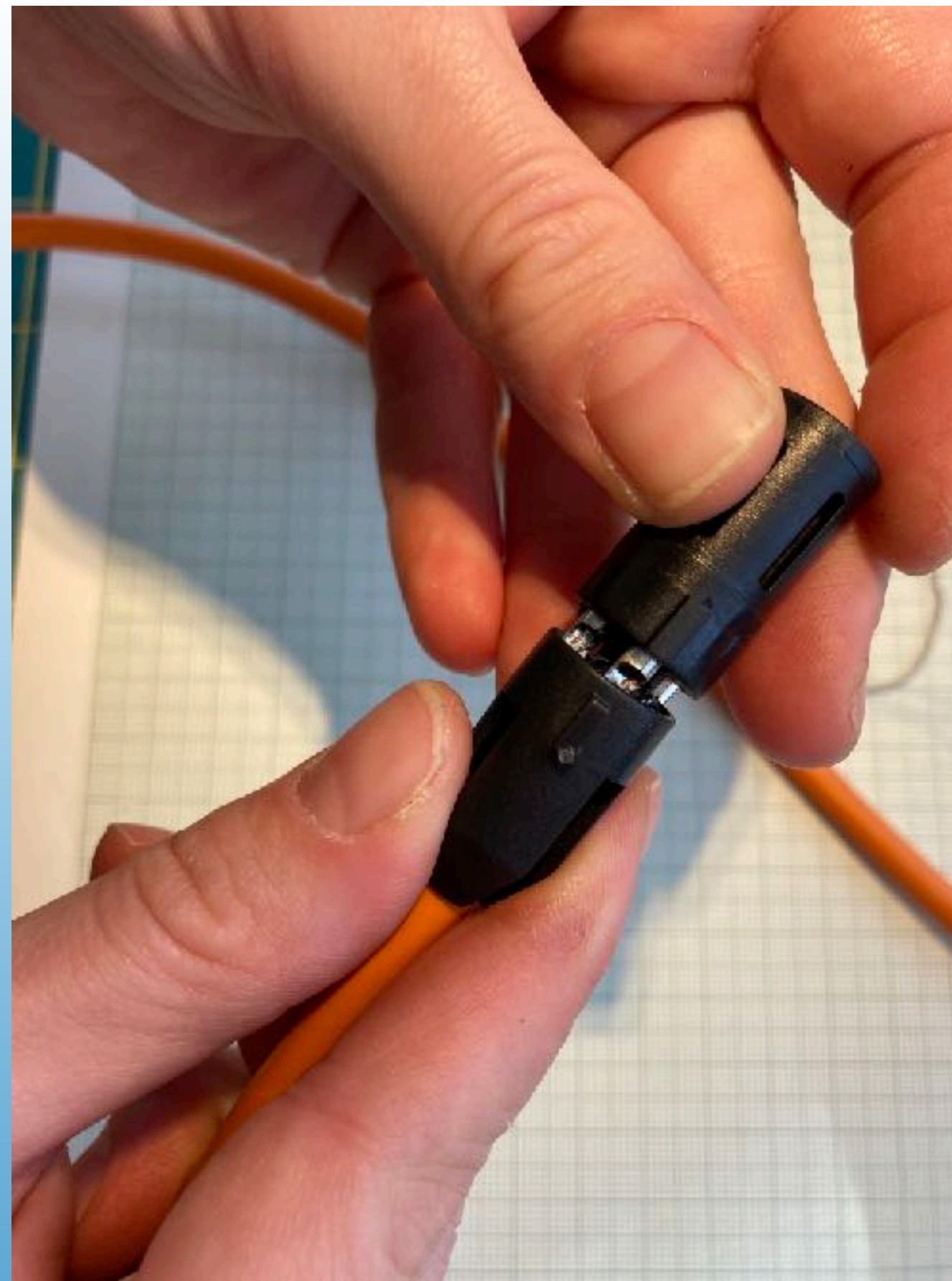


Solder the wires to the socket XLR cups.



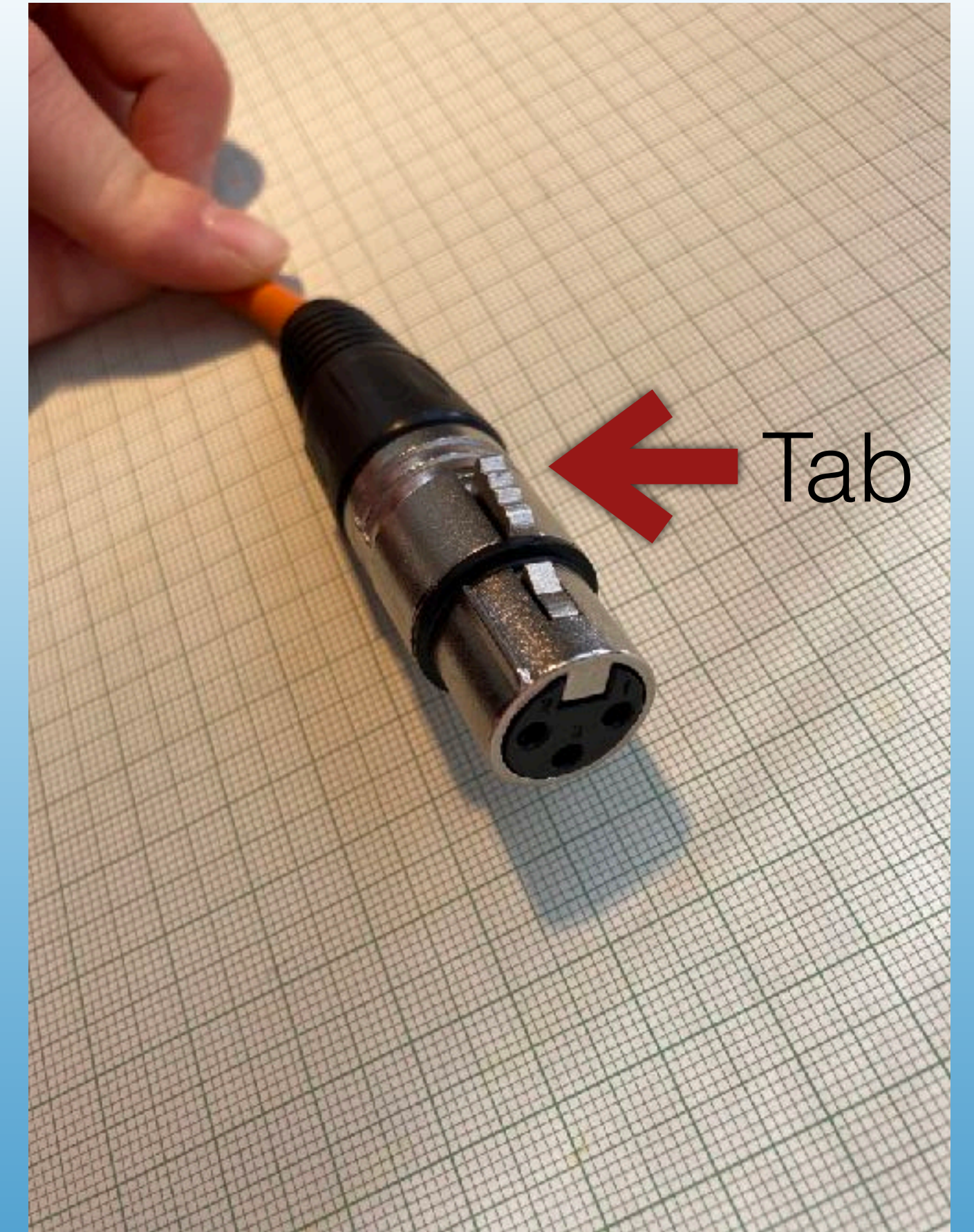
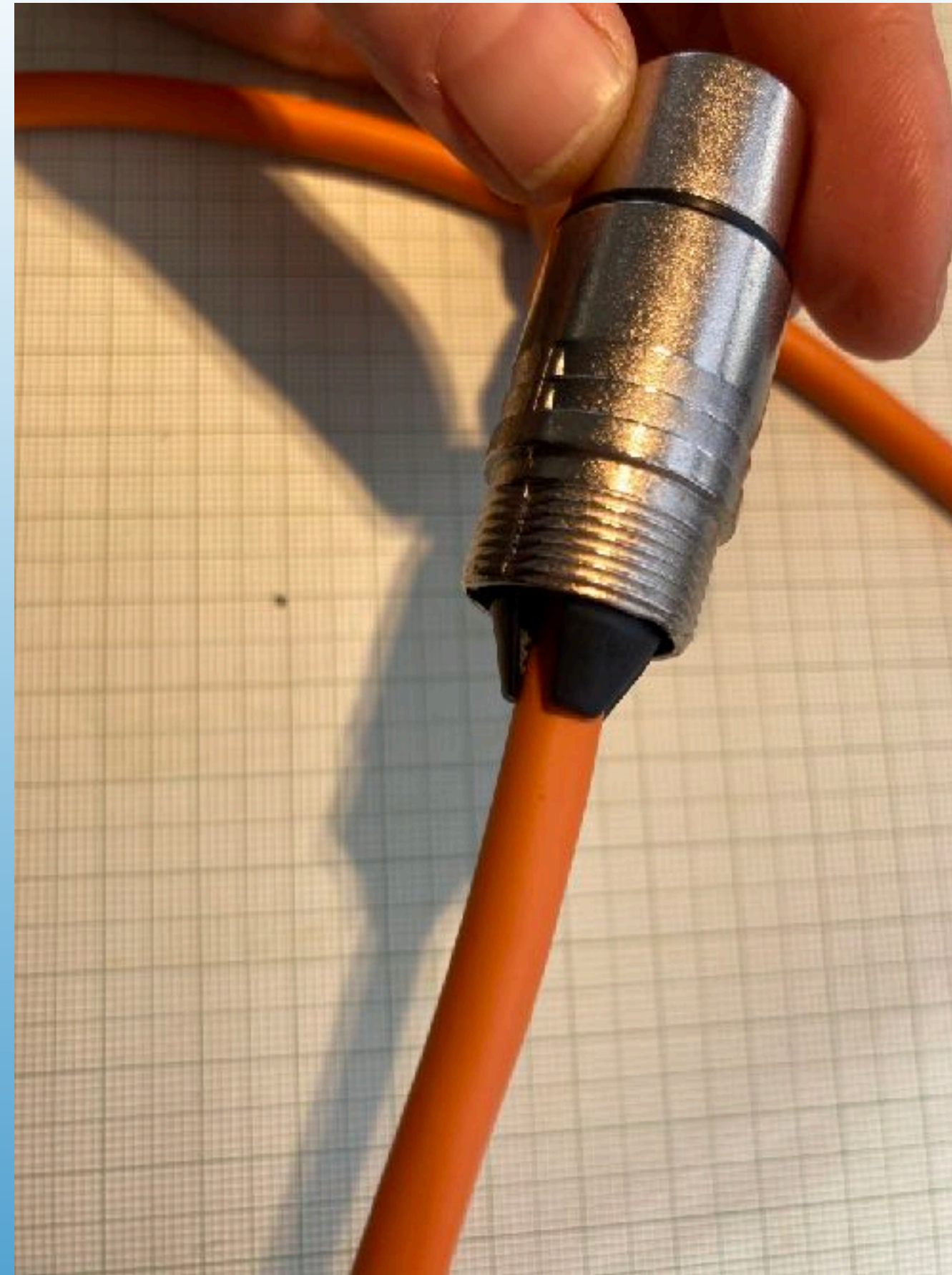
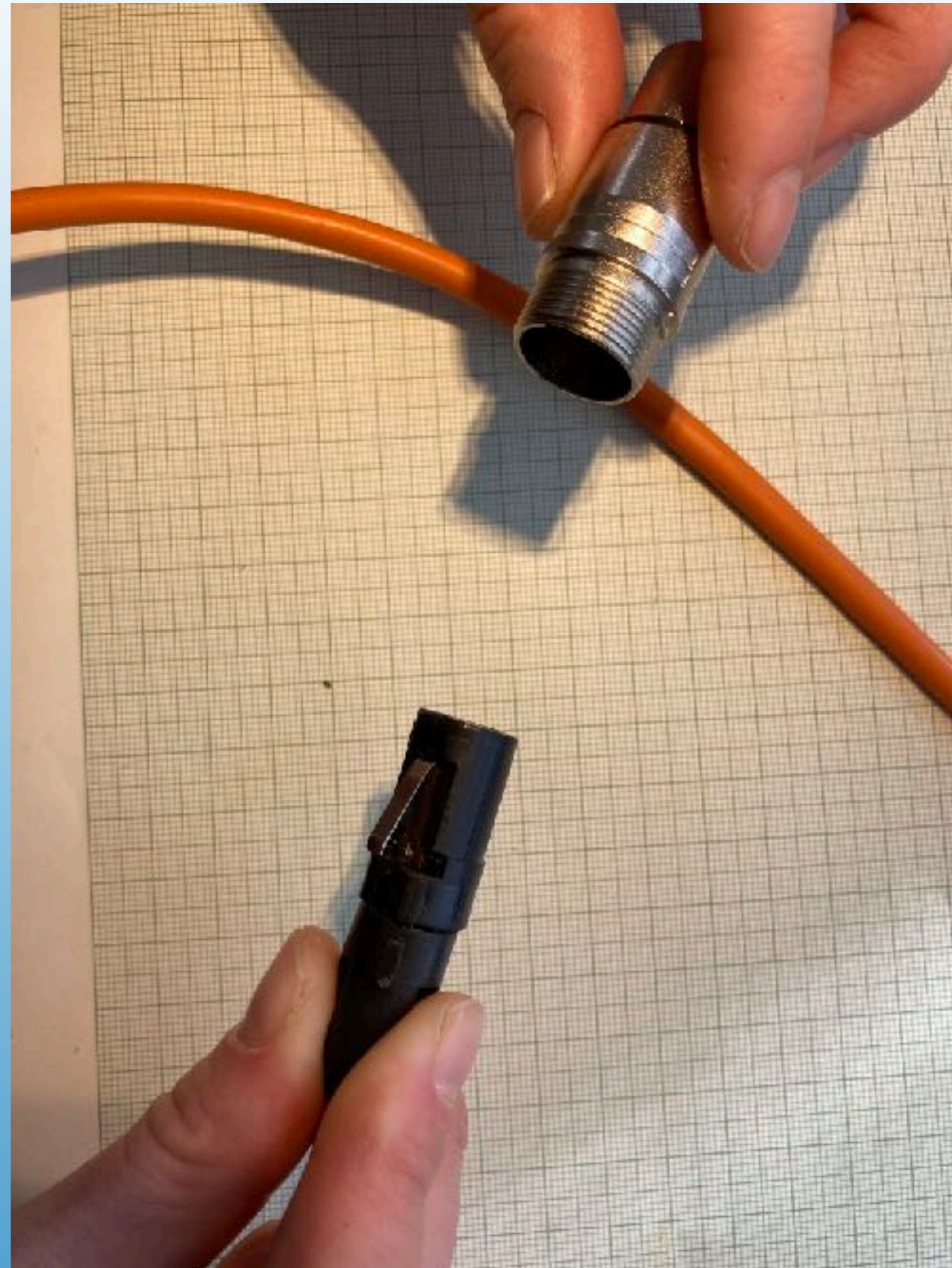
When all three wires are soldered to the XLR connector check to make sure each wire is securely attached.

Use you thumb and forefinger to push the main cable insulation towards the connector.



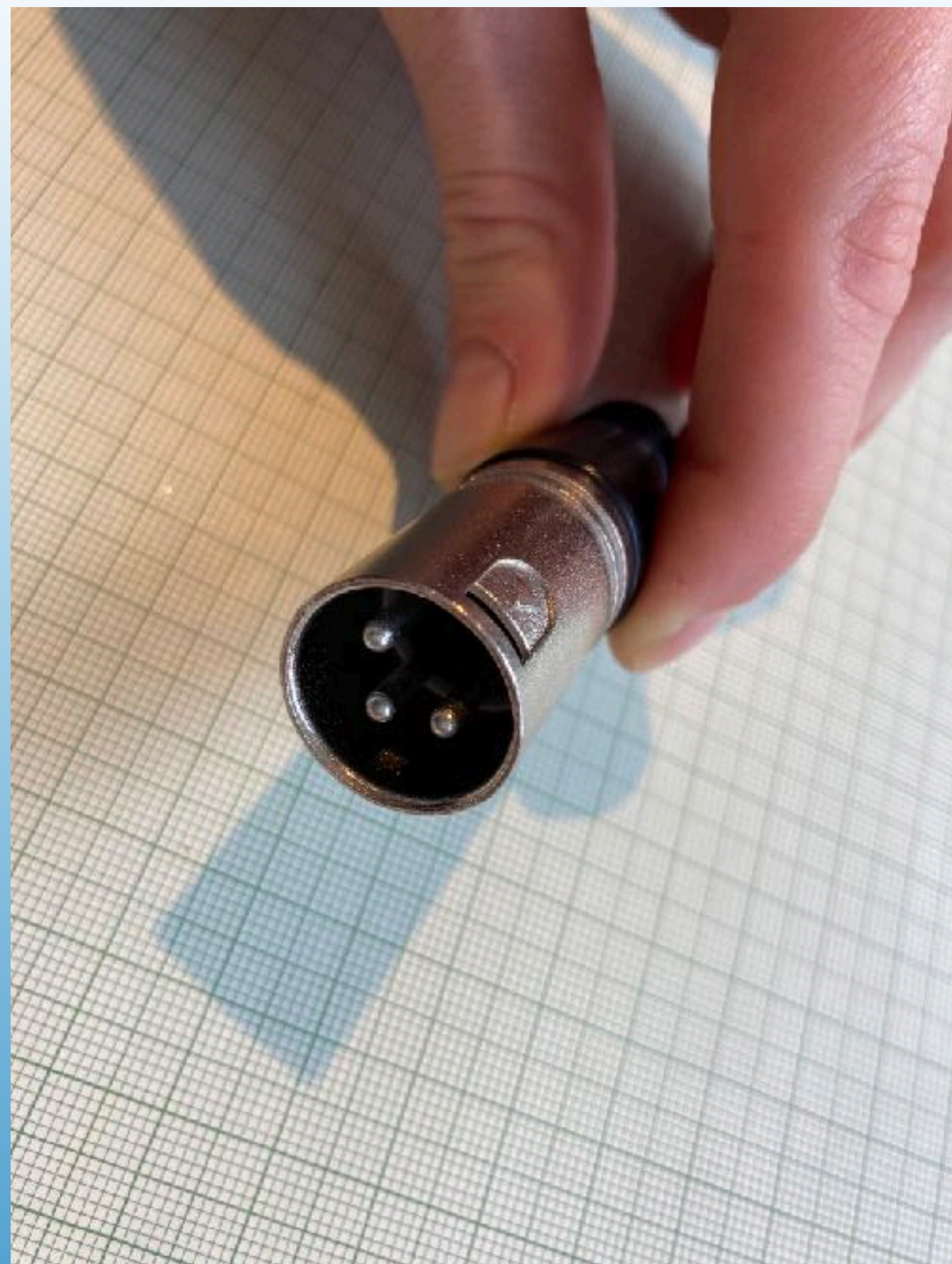
Snap the strain relief on the cable.

Line up the socket XLR connector and strain relief so the notches match up.

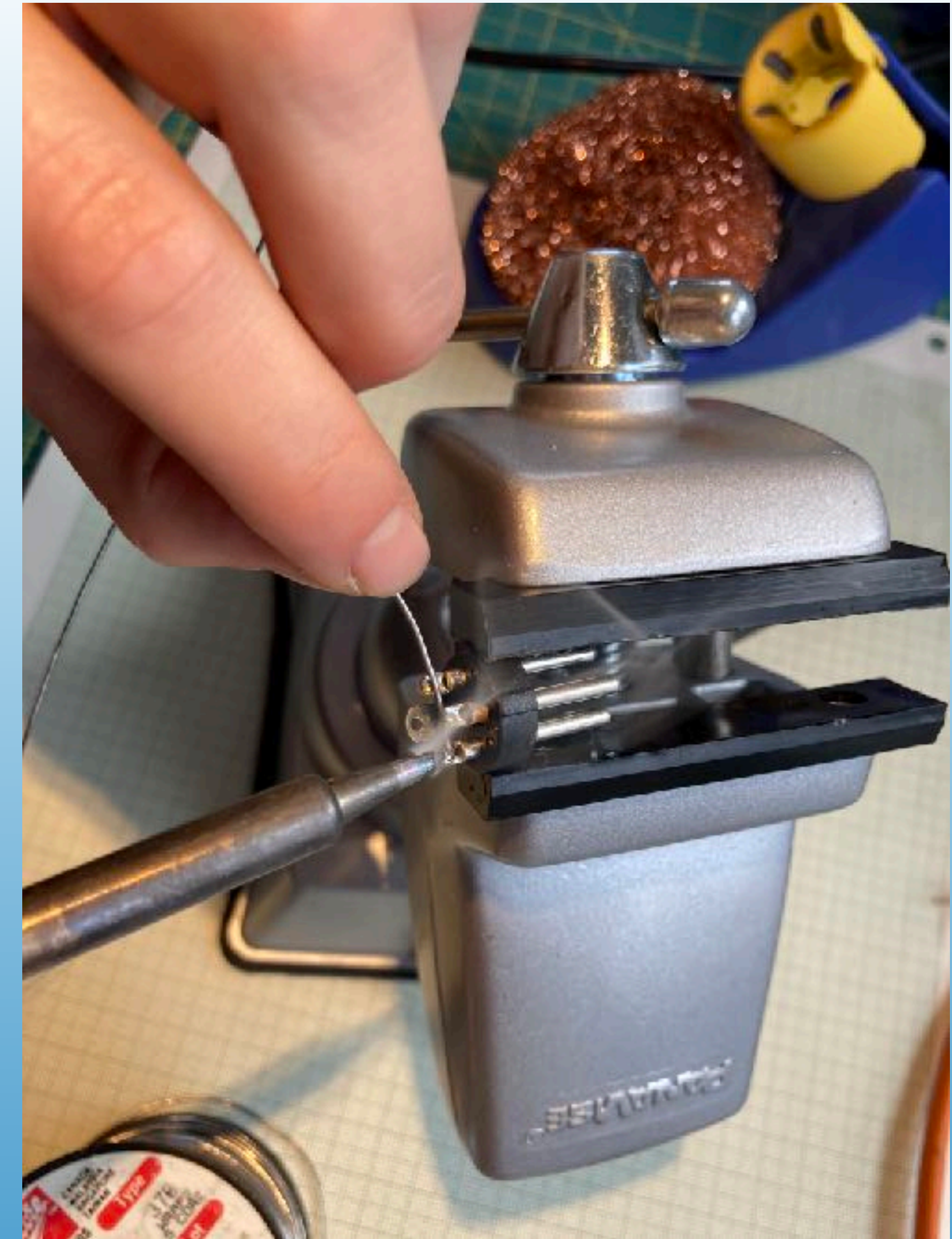
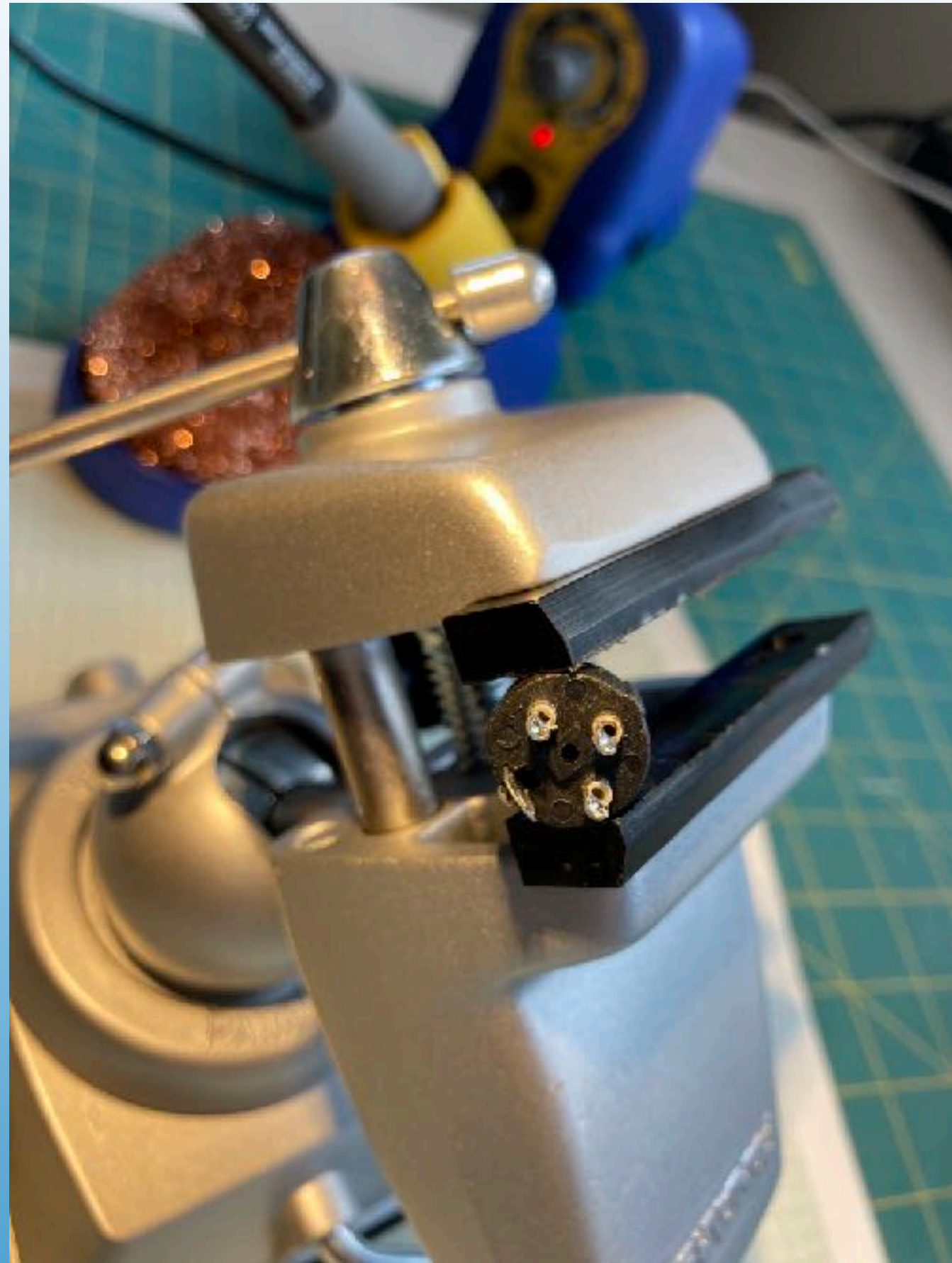


Make sure the tab on the barrel is not pushed in.

Put on the barrel and then thread the bushing onto the barrel.

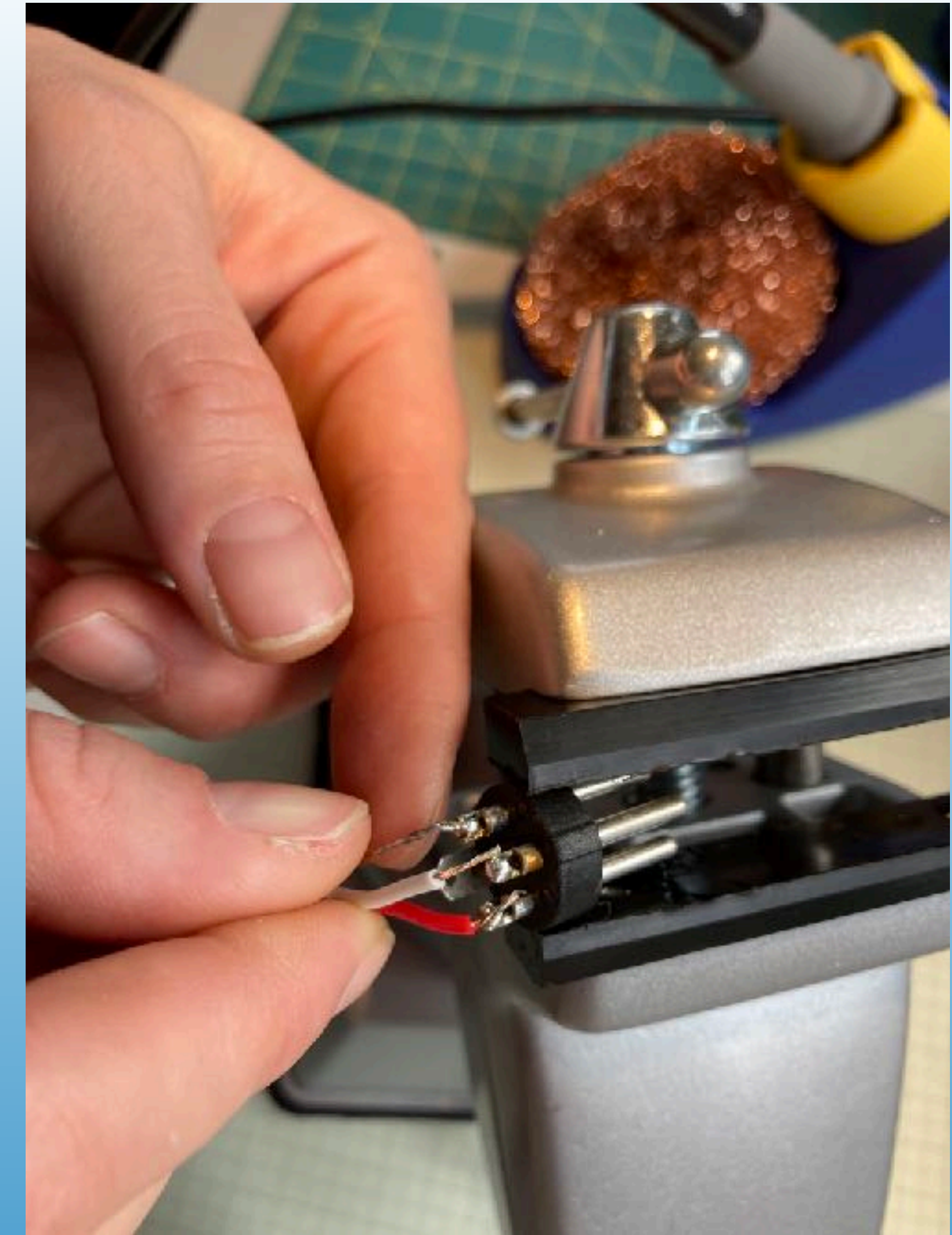
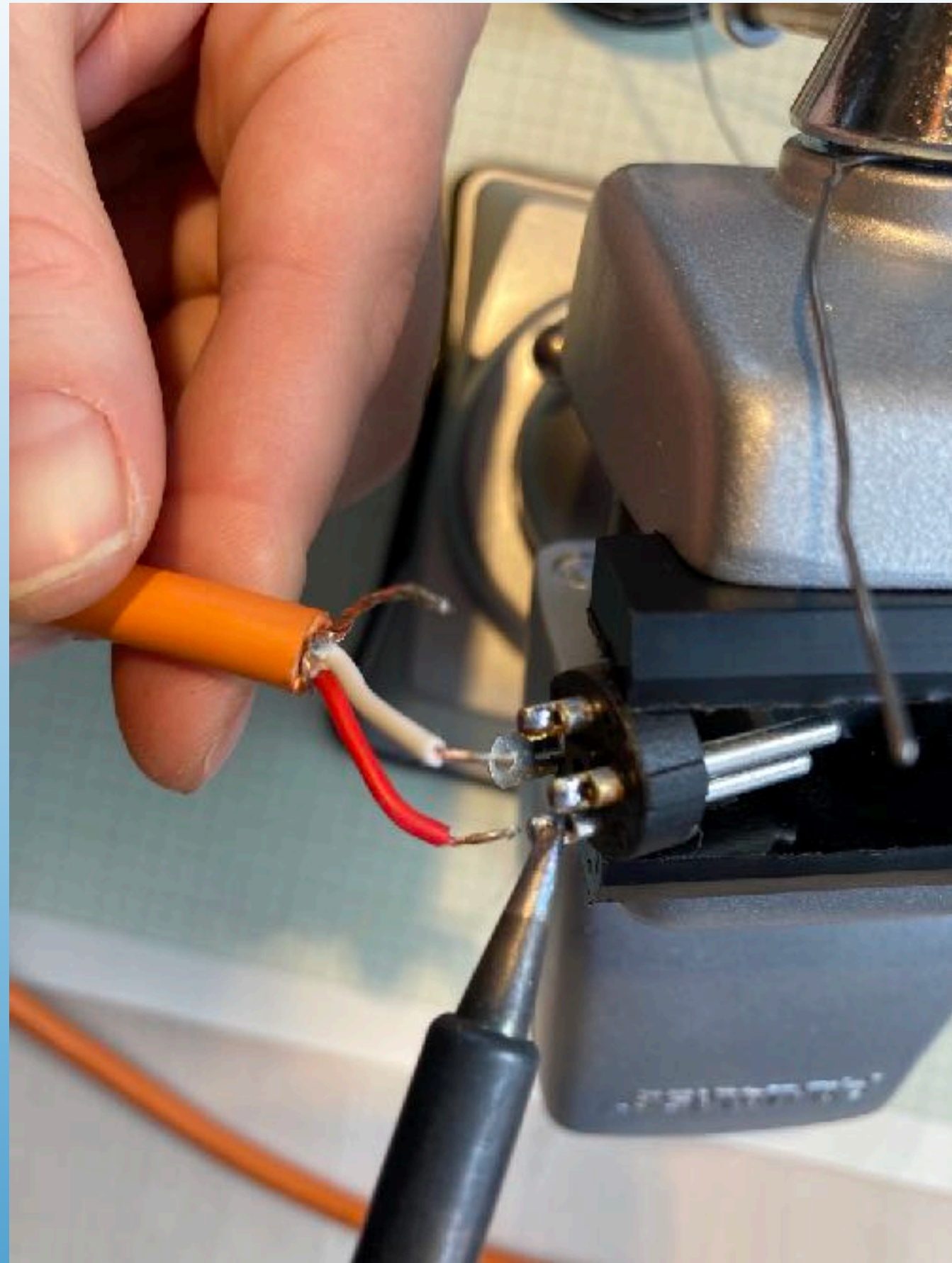


Take apart the plug XLR end for the other end of the cable.

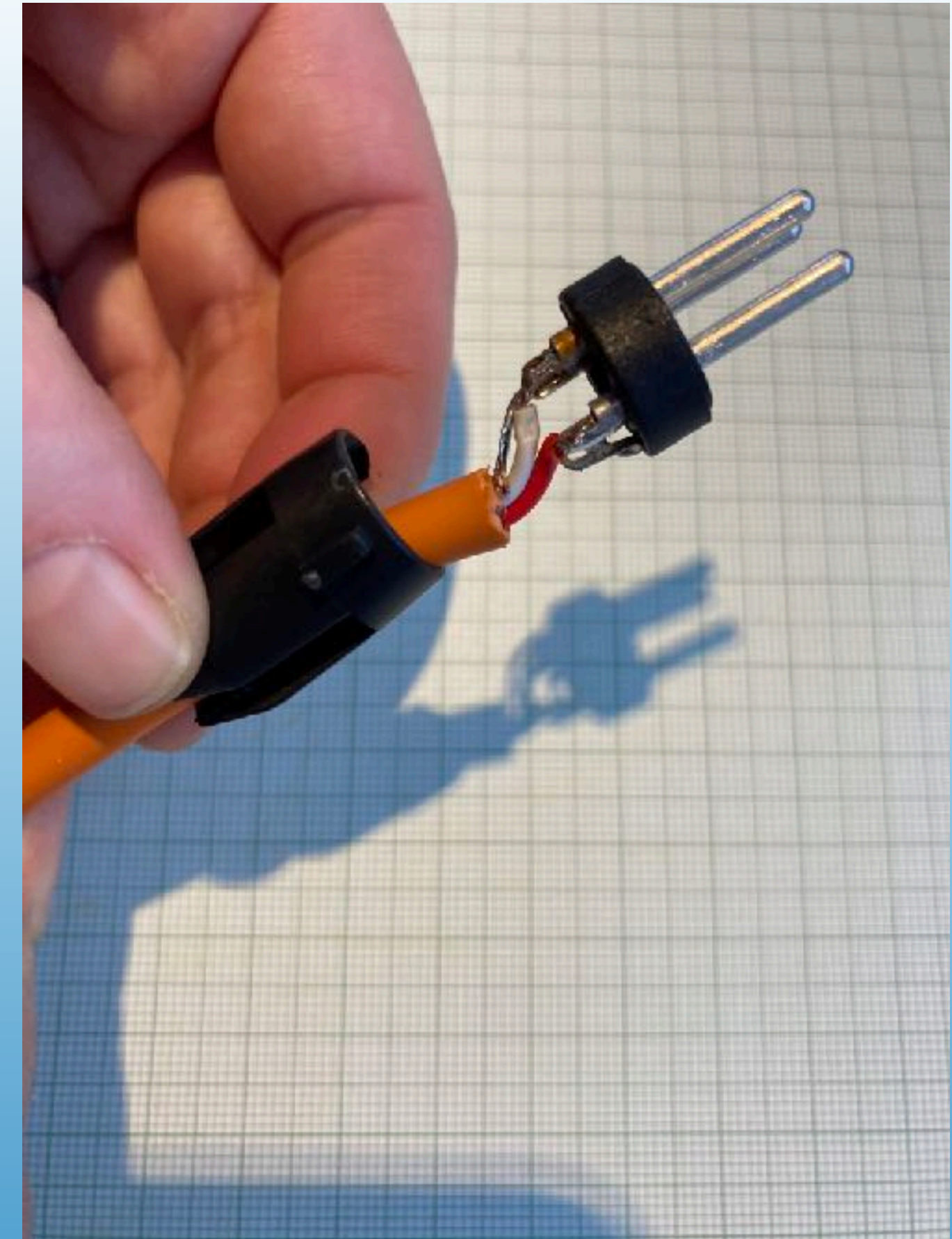
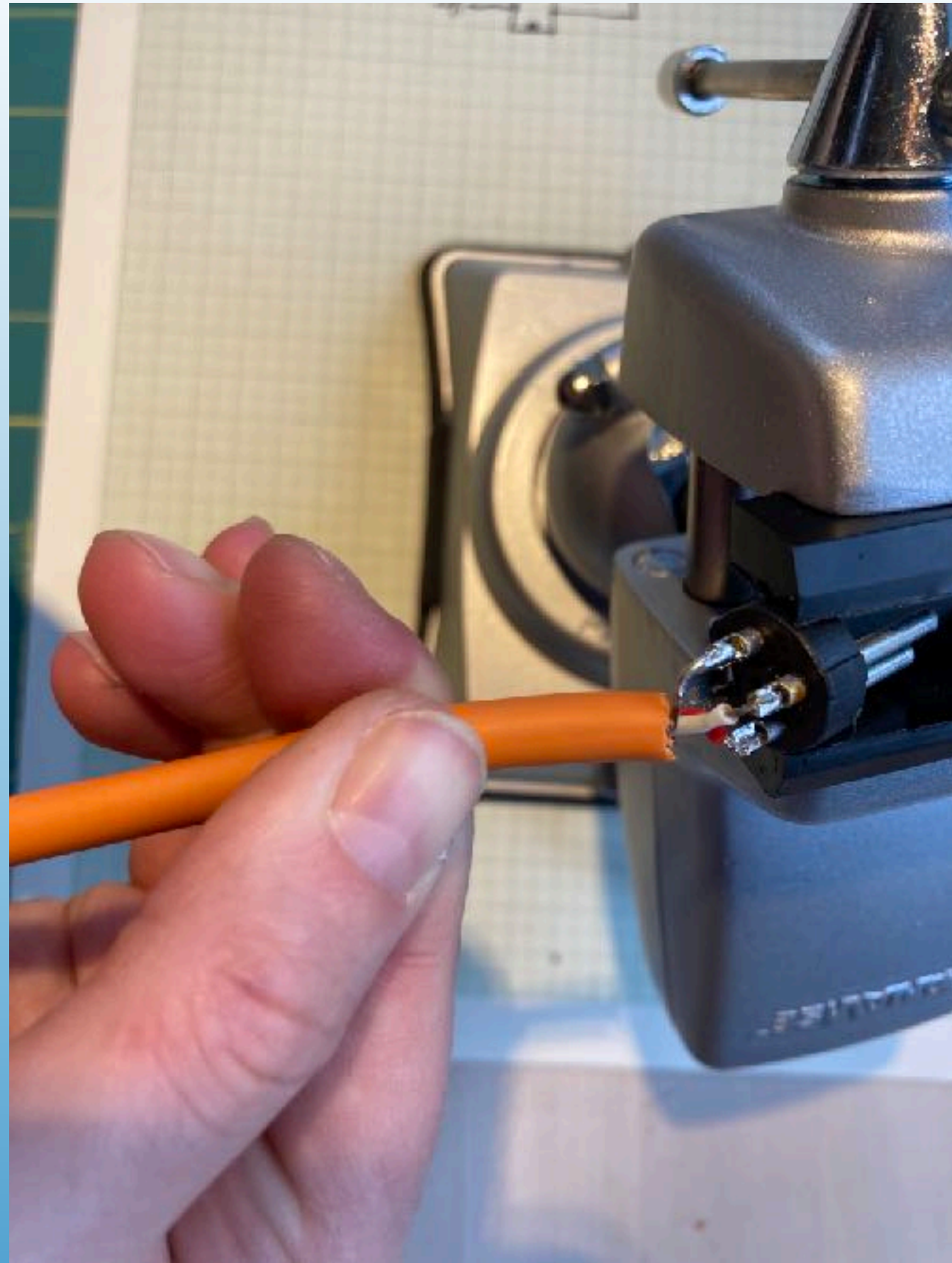


Prepare the plug XLR end by putting a little bit of solder in each of the three-pin cups.

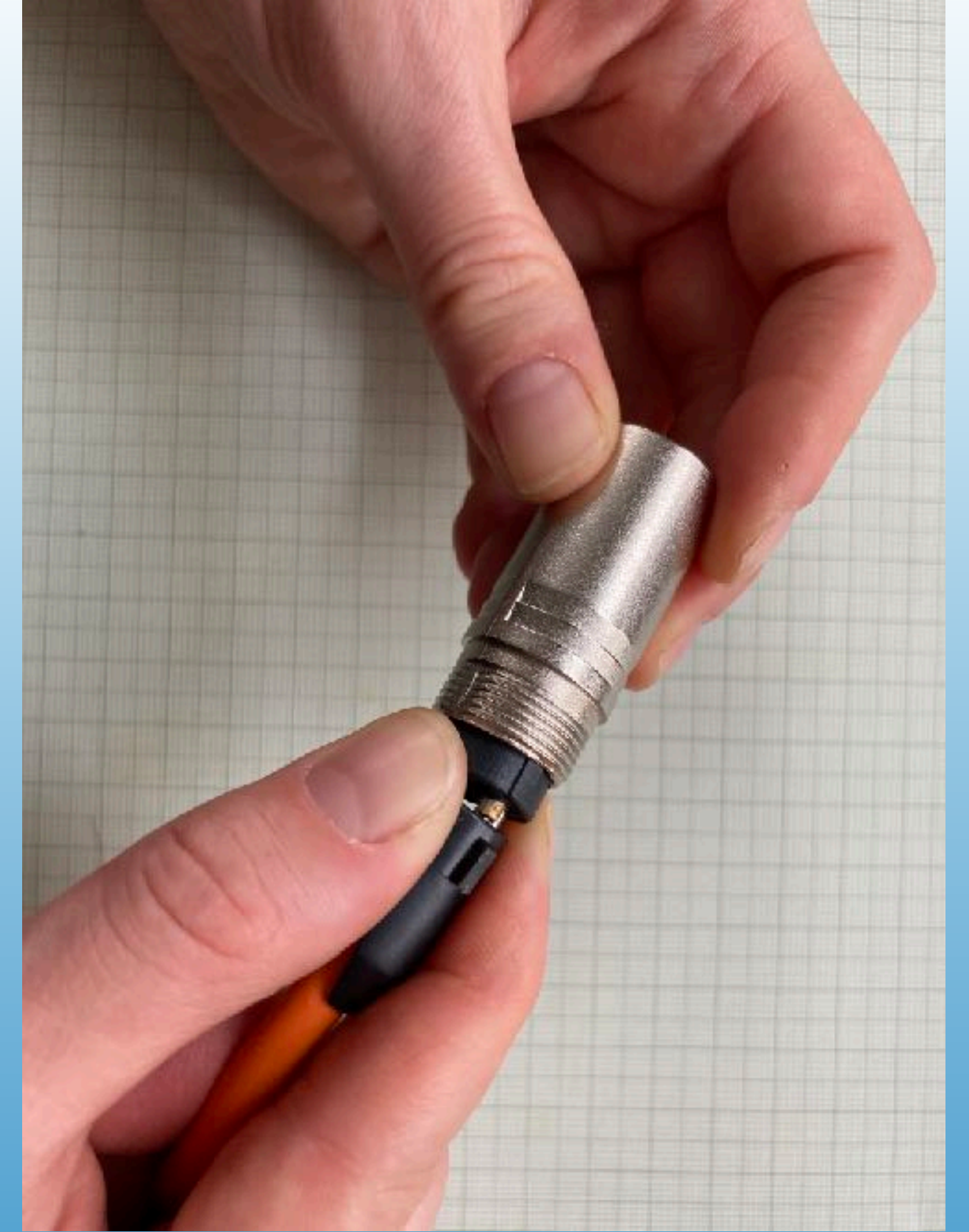
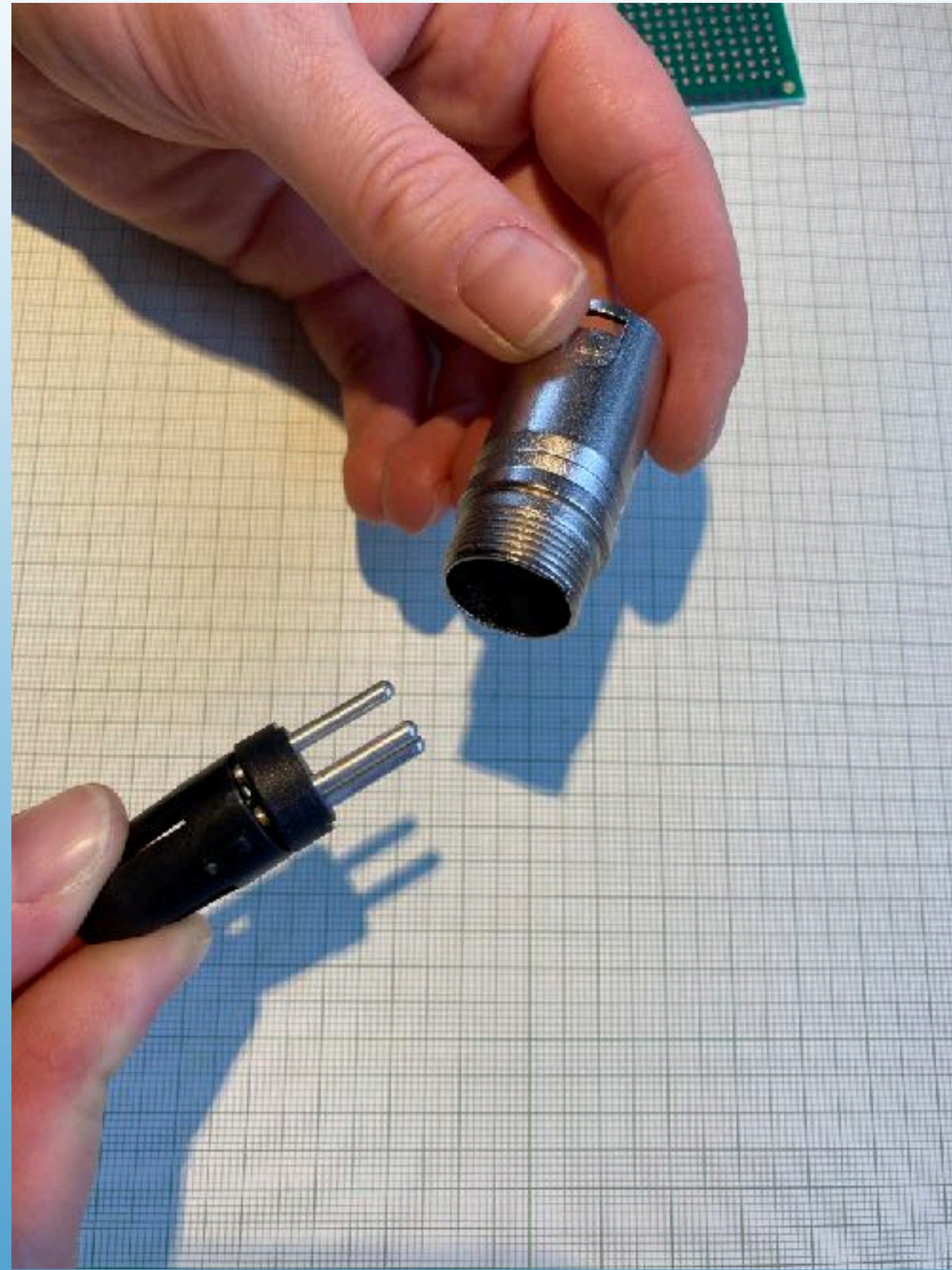
Heat up the cup and touch the solder to the cup.



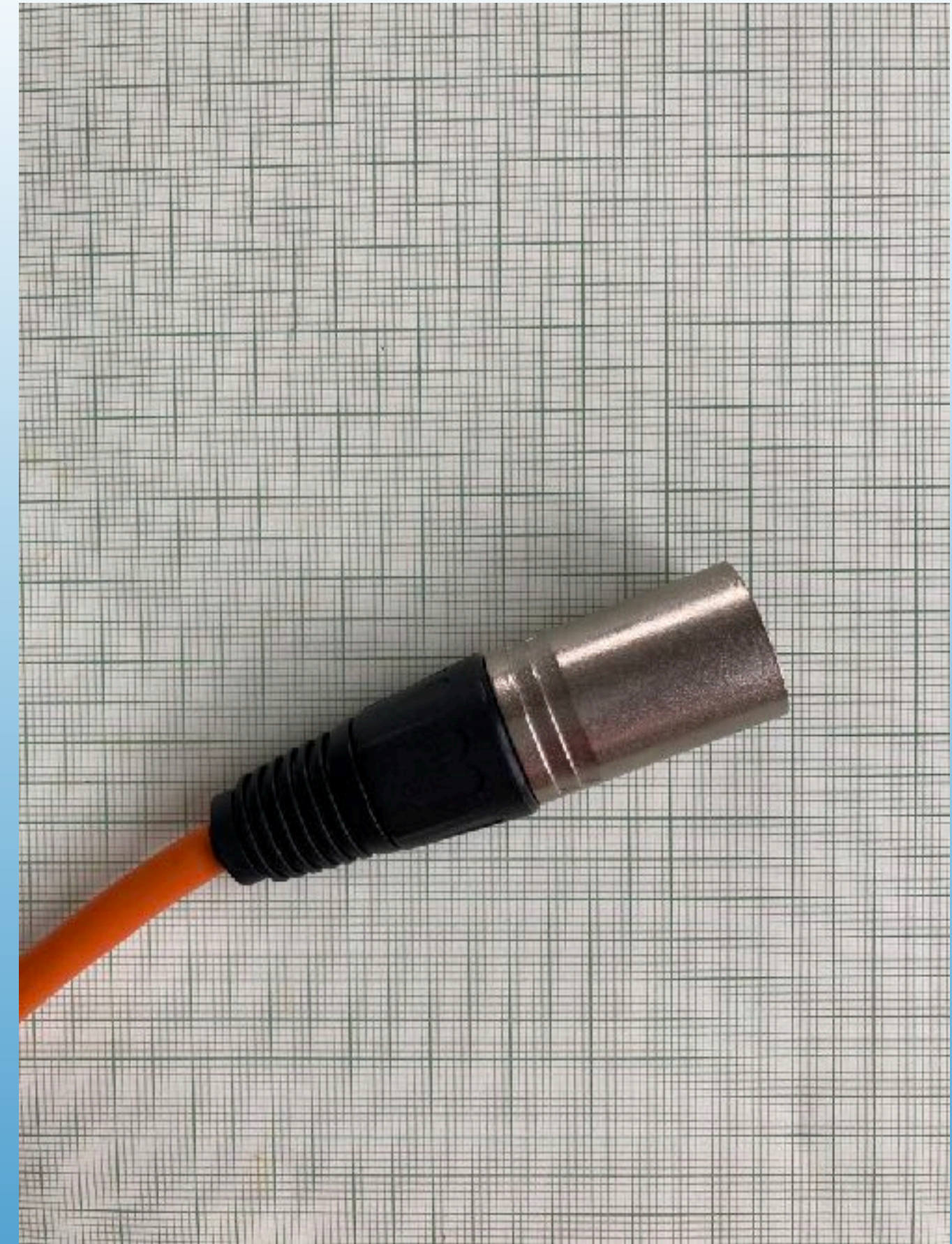
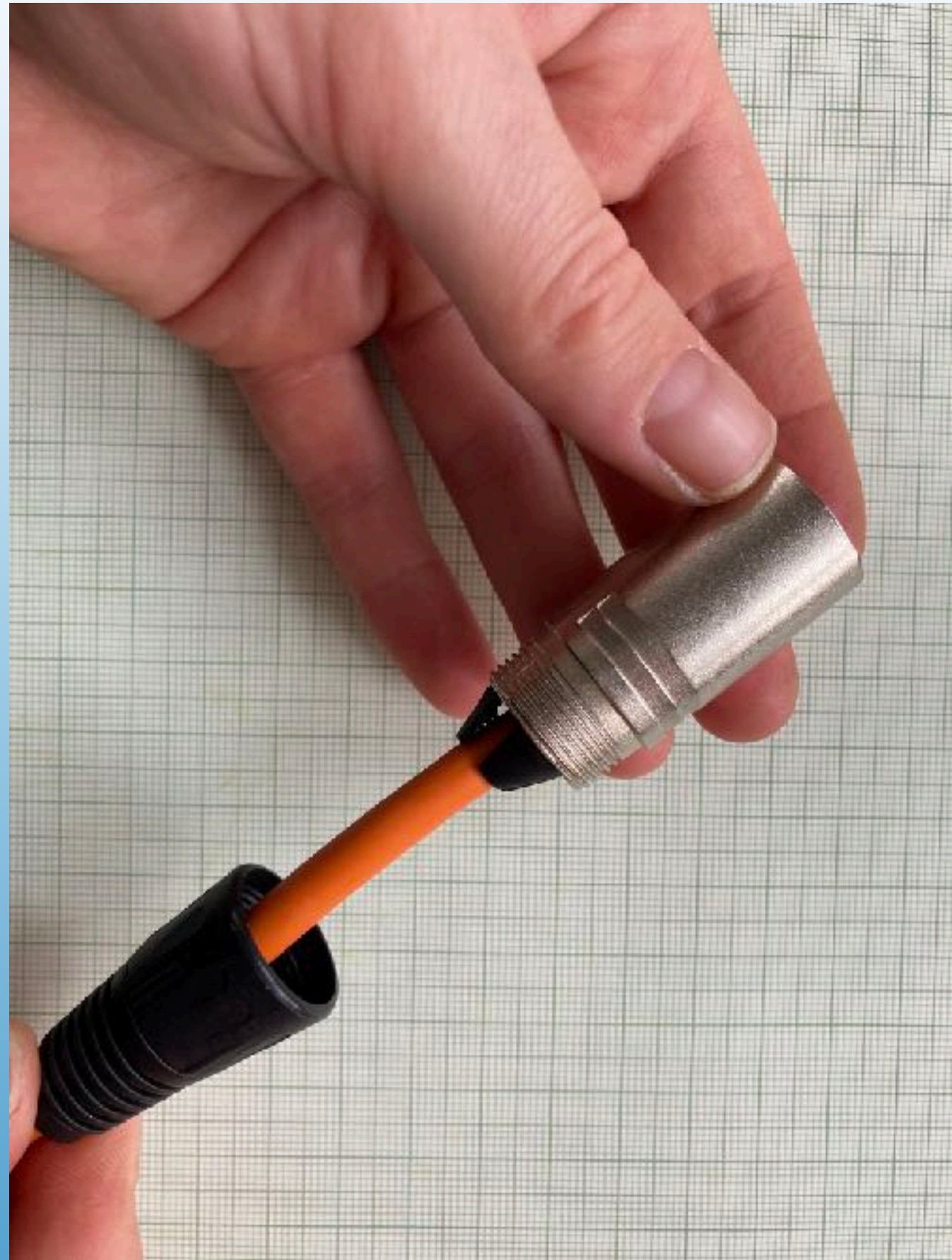
Prepare the three wires so they are in the correct pin configuration for the plug XLR end.
Solder the wires to the plug XLR's solder cups.



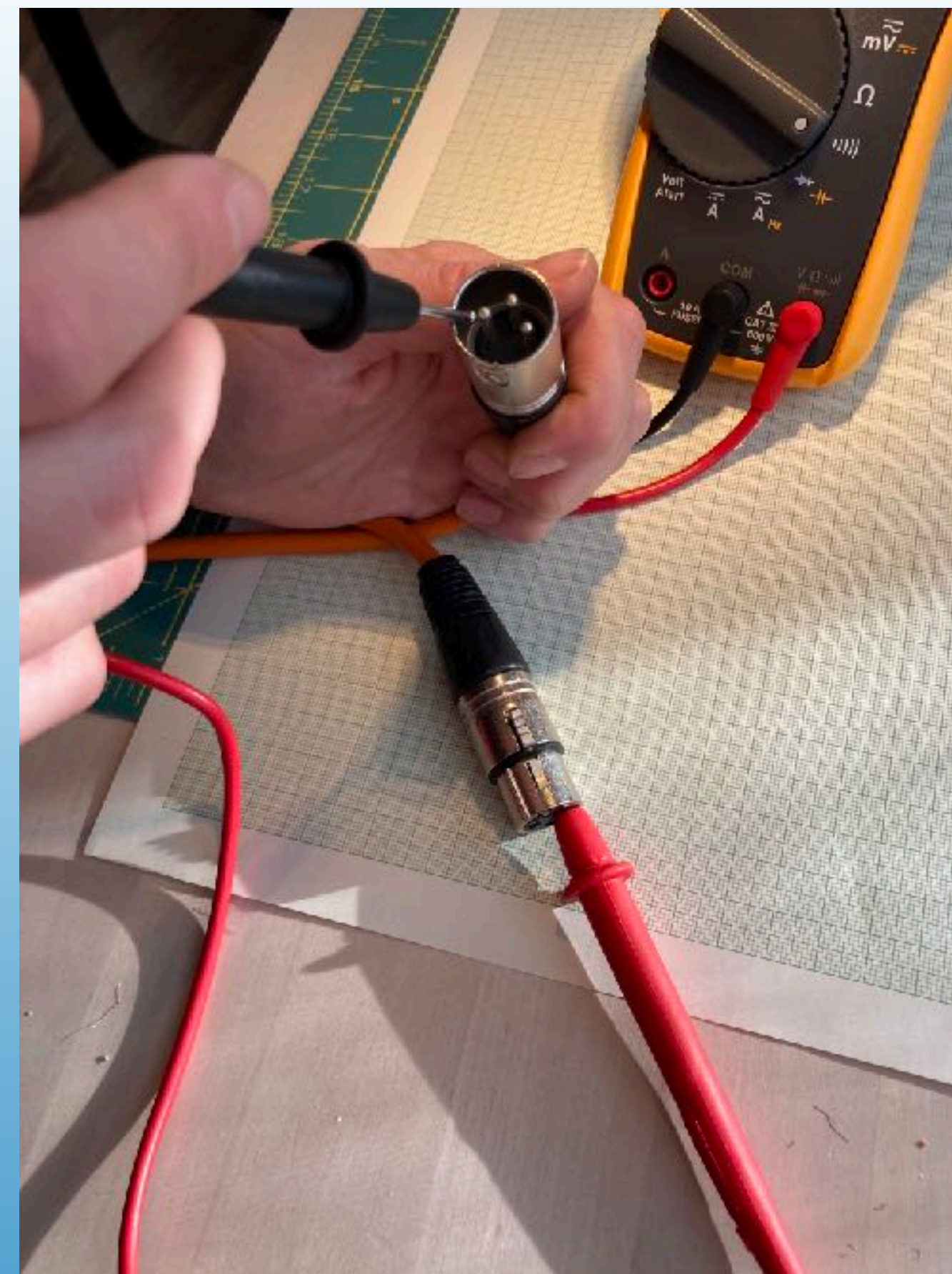
Check to make sure connections are solid.
Snap the strain relief on the cable.



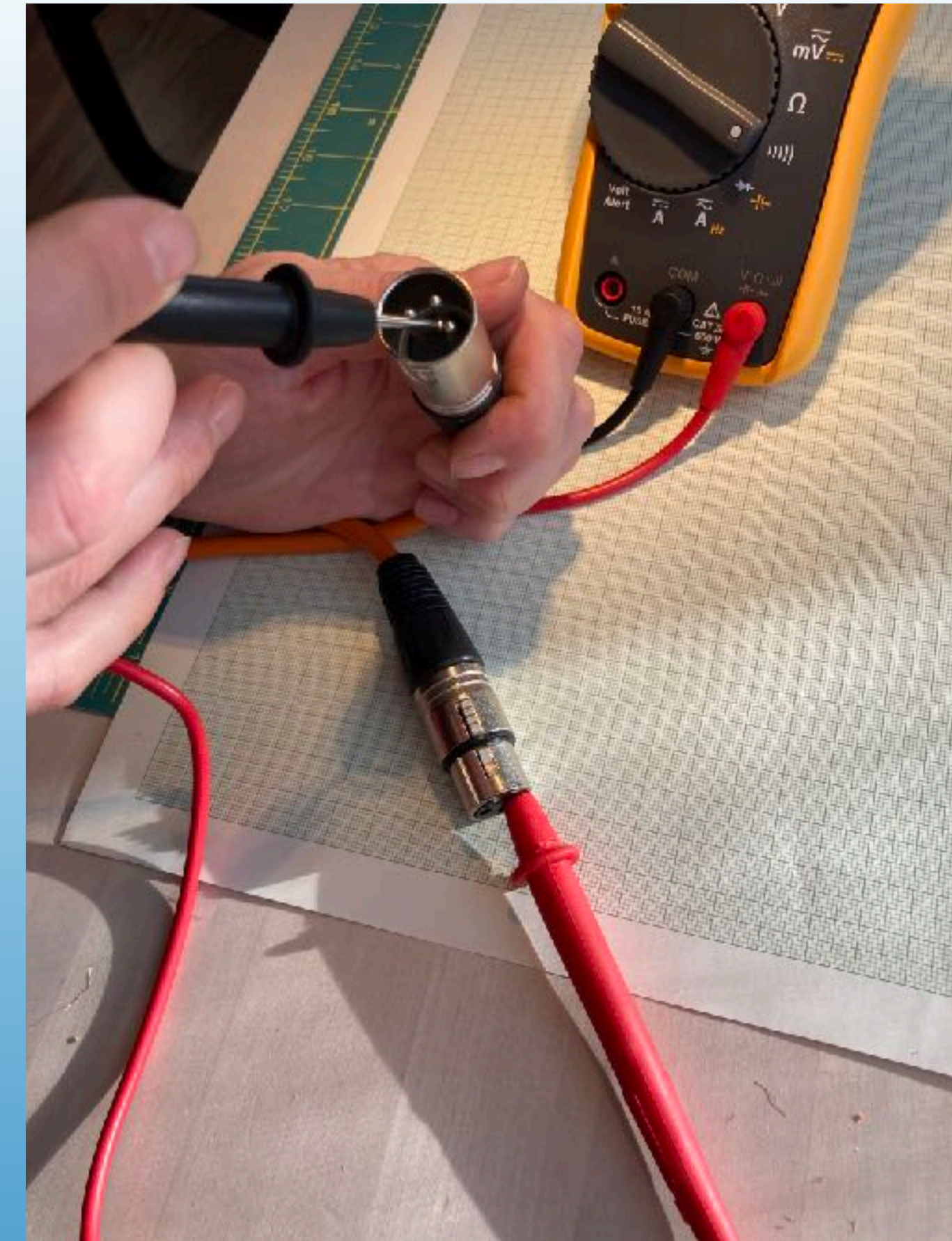
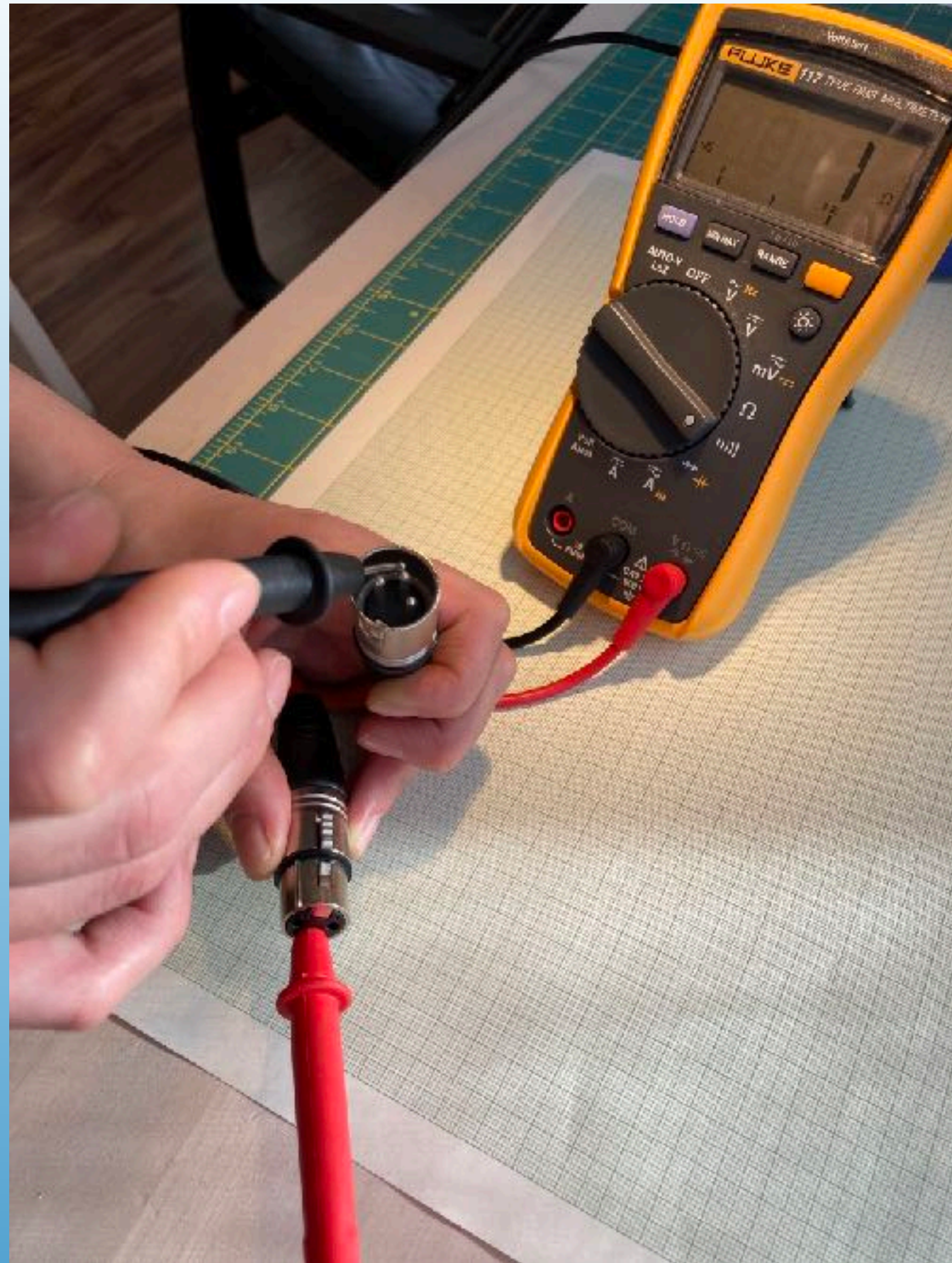
Line up the plug XLR connector and strain relief so the notches match up.
Put on the barrel.



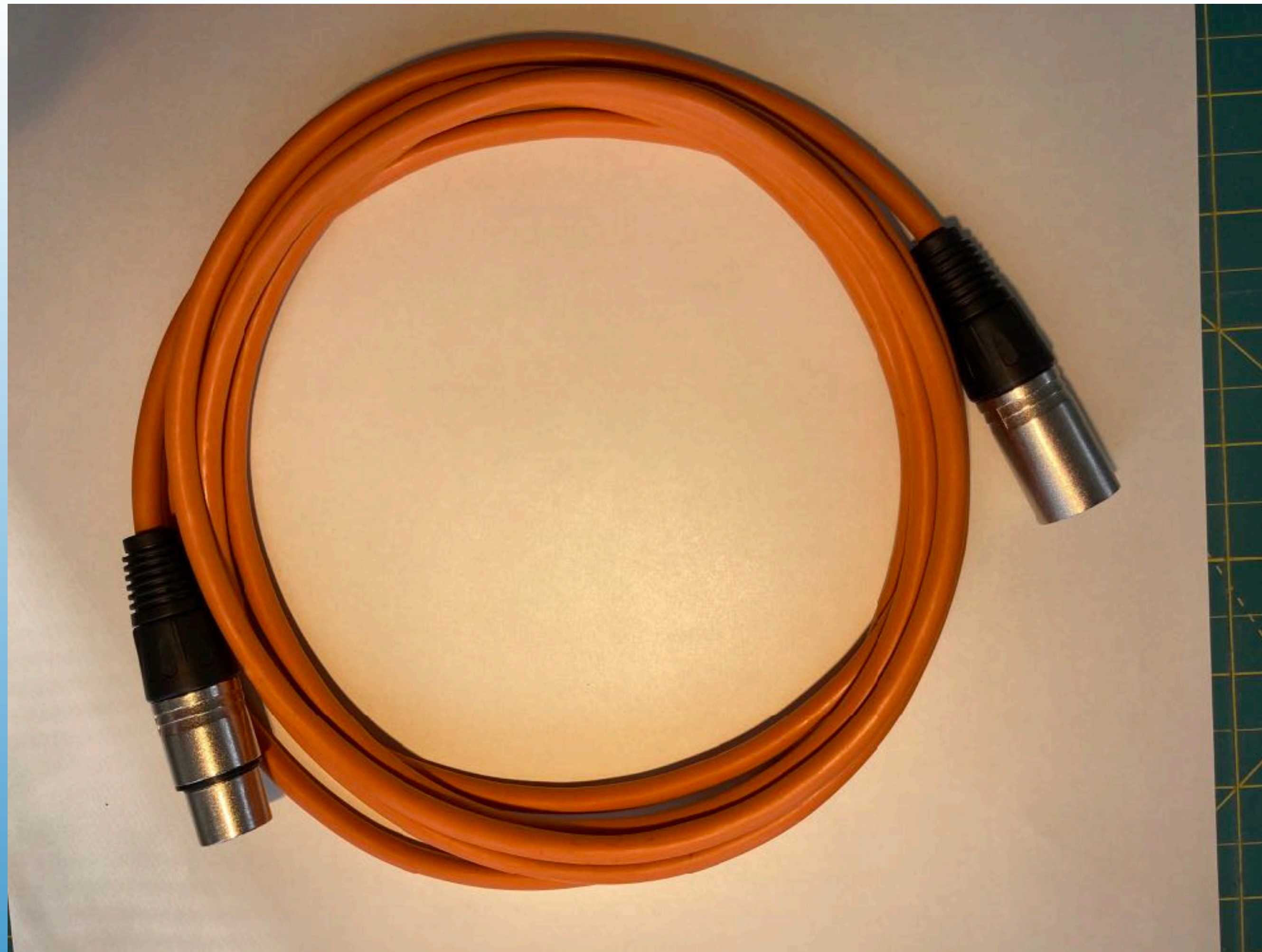
Thread together the barrel and the bushing.



Test the XLR cable for continuity.



Check between all three pins to make sure there are no shorts.
If you do not have a multimeter you can use a cable tester for this
final step.



Your XLR cable is now ready to be put into service.
Enjoy!

Thanks to @trondtronsen for photographing this project and to SoundGirls for organizing this event!