

SOLDERING FOR ELECTRONICS

BASIC GUIDELINES FOR GOOD SOLDERED CONNECTIONS



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TOPICS



- Credentials and References
- What is Soldering?
- Safety Guidelines
- Equipment Needed
- Soldering Electronic Components
- Soldering Electronic Connectors
- Soldering Wires
- Post Soldering Practices
- Inspection Criteria
- Summary

CREDENTIALS AND REFERENCES

J-STD-001 Certified IPC Specialist (CIS)

- Requirements for Soldered Electrical and Electronic Assemblies

IPC-A-610 Certified IPC Trainer (CIT)

- Acceptability of Electronic Assemblies

IPC-A-620 Certified IPC Trainer (CIT)

- Requirements and Acceptance for Cable and Wire Harness Assemblies



WHAT IS SOLDERING?

Soldering is the process of joining two or more metal components together by melting a filler metal (solder) into the joint. The filler metal has a lower melting point than the workpieces, so the components themselves do not melt. Key Points:

- **Purpose:** To create a strong electrical and mechanical connection.
- **Used In:** Electronics, plumbing, metalwork, and jewelry making.
- **Solder:** Often made of a tin-lead alloy (though lead-free versions are common now), and it melts around 180–190°C (360–375°F).
- **Tools:** Soldering iron (~~or gun~~): a heated tool to melt the solder.
- **Flux:** a chemical used to clean metal surfaces and improve the bond.

In Electronics: Soldering is essential for attaching components to circuit boards. It ensures good electrical contact and keeps parts securely in place.

SAFETY GUIDELINES

- Always work in a well-ventilated area.
- Avoid inhaling solder fumes.
- Wear Eye Protection
- Keep soldering iron in its stand when not in use.
- Unplug and cool down iron before storage.



EQUIPMENT NEEDED

- **Essential Tools**

- Soldering iron or soldering station (temperature-controlled)
- Solder wire (Sn60/Pb40 recommended)
- Flux (liquid or paste) to clean and prepare surfaces
- Soldering iron stand with sponge or brass tip cleaner
- Wire cutters and strippers
- Tweezers or small pliers
- Helping hands / PCB holder

- **Safety & Maintenance**

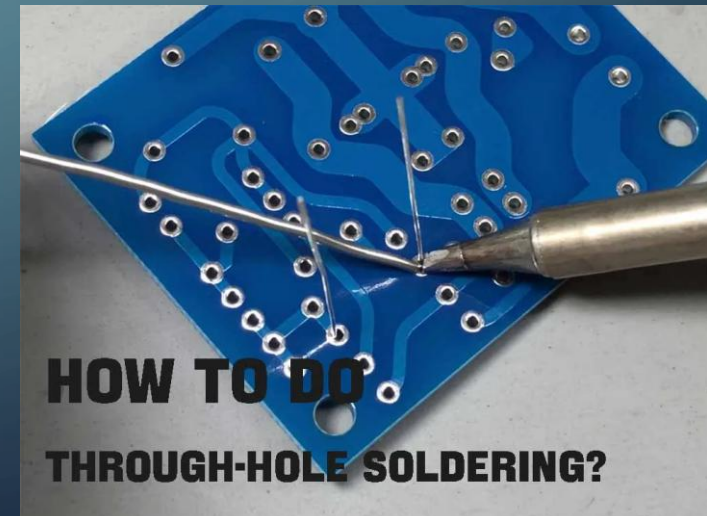
- Fume extractor or fan
- Heat-resistant mat
- Safety glasses
- Isopropyl alcohol and brushes for cleaning



SOLDERING ELECTRONIC COMPONENTS (THROUGH-HOLE)

- **Optimal Technique**

- Insert the component leads through PCB holes.
- Heat both the **pad and the lead** simultaneously.
- Apply solder to the joint (not directly to the iron).
- Remove the solder, then the iron.
- Allow joint to cool naturally.



DEMONSTRATION VIDEO

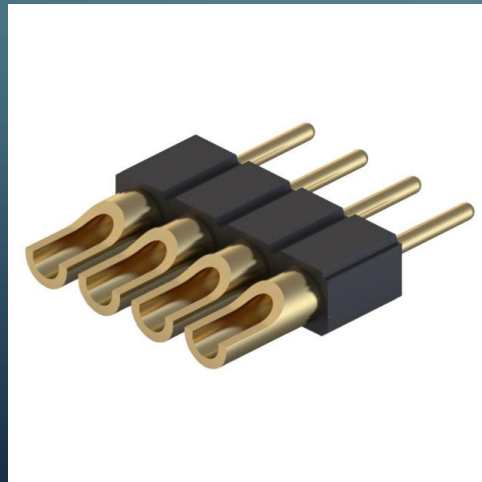


<https://youtu.be/Qps9woUGkvl>

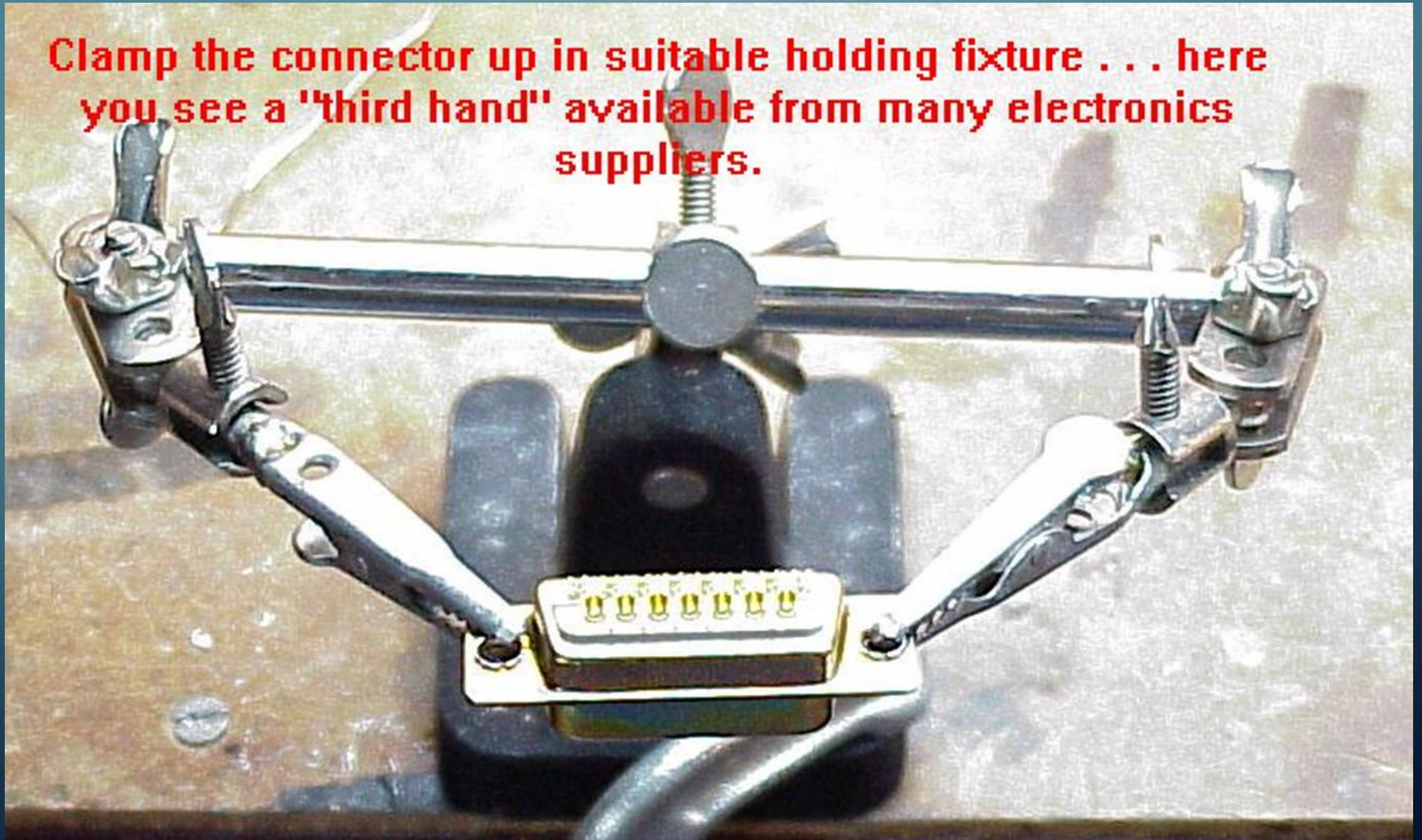
SOLDERING ELECTRONIC CONNECTORS

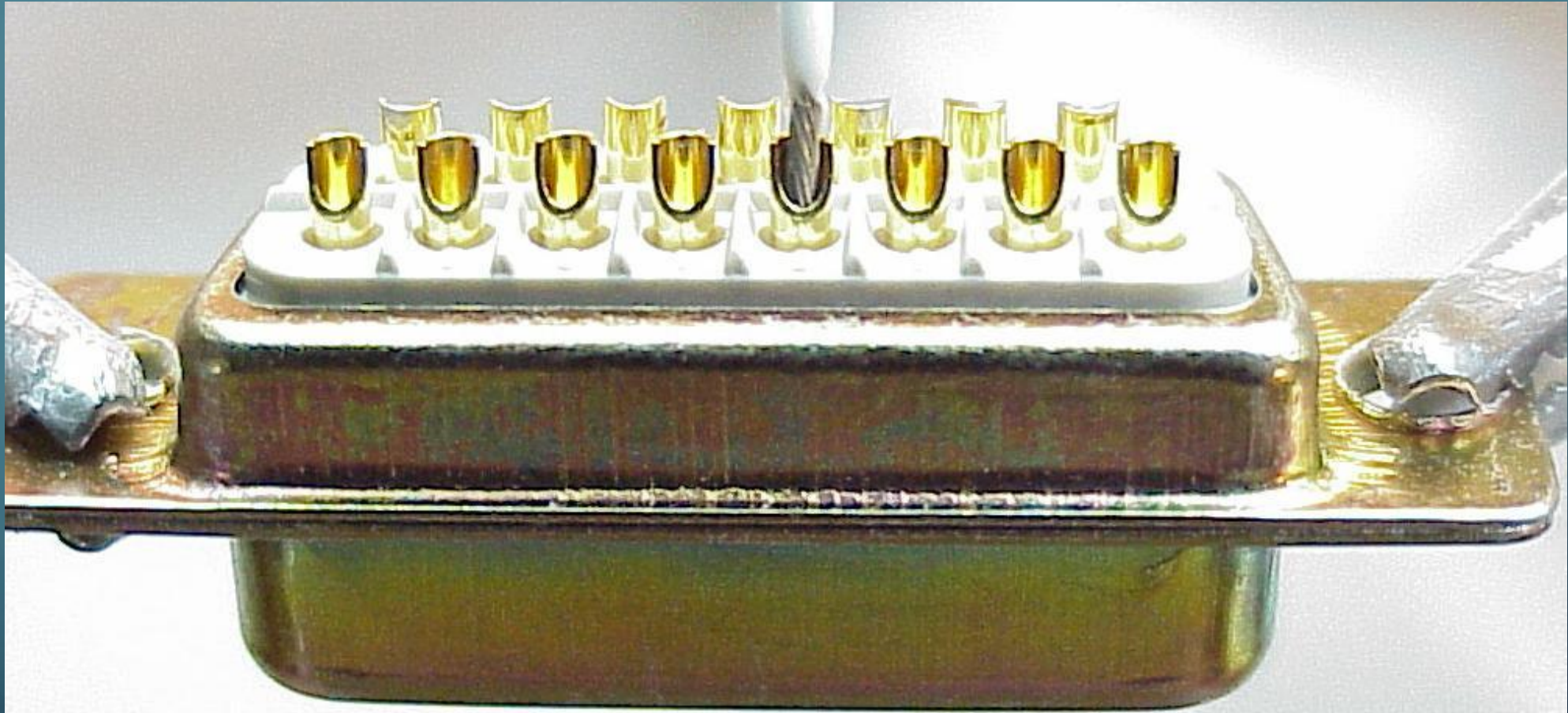
- **Optimal Technique**

- Use a **higher-wattage iron** (more thermal mass) for larger pins/shells.
- Pre-tin both the connector pins and PCB pads.
- Solder each pin individually, ensuring full wetting.
- Inspect for bridges between closely spaced pins.



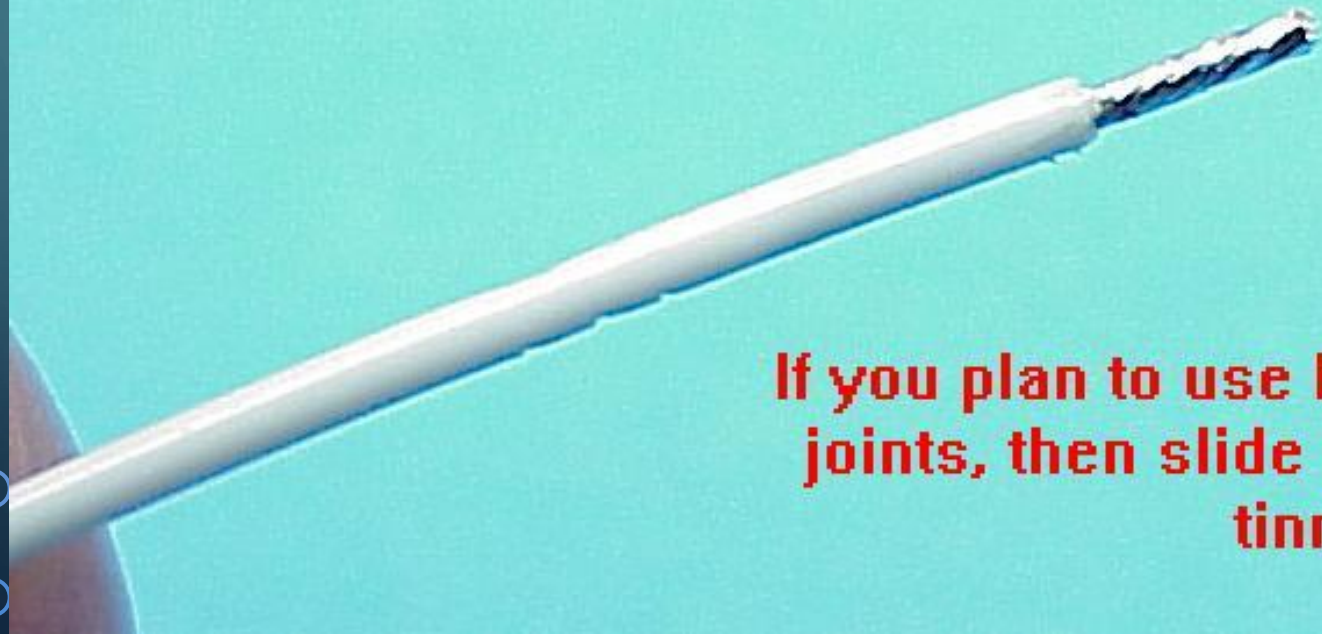
Clamp the connector up in suitable holding fixture . . . here you see a "third hand" available from many electronics suppliers.



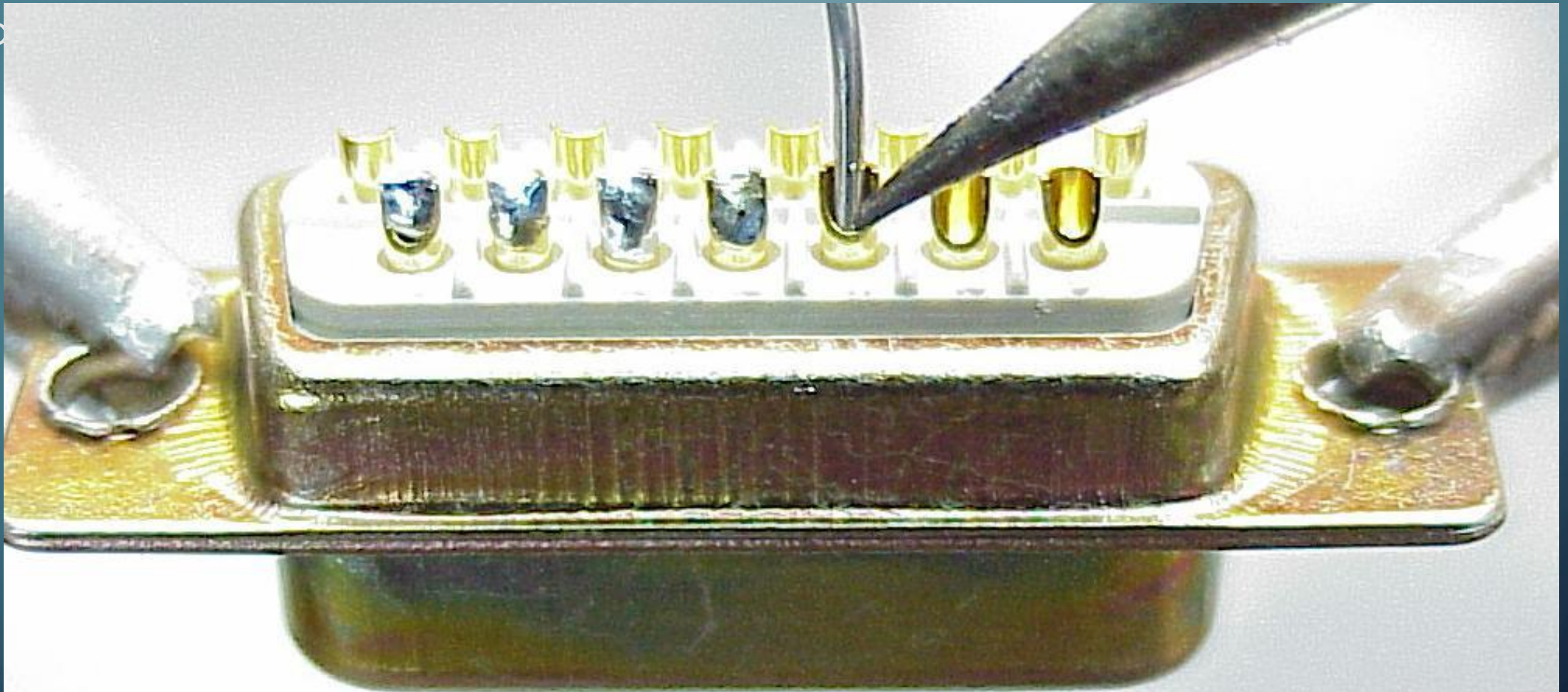


Strip the end of wires to be soldered into connector. Try to trim all the same amount and just enough so that about .030" gap will exist between end of insulation and end of solder cup . . .

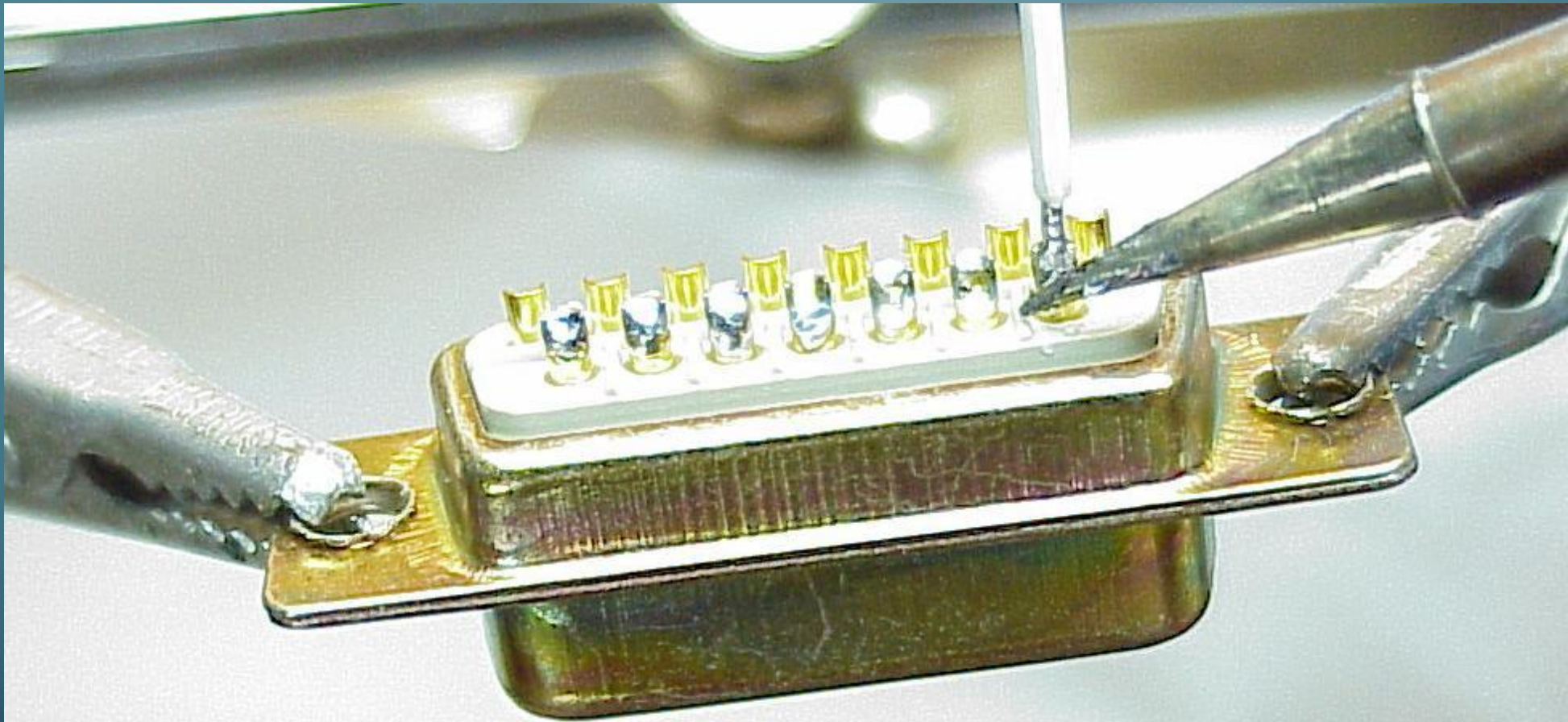
Next step is "tin" the end of each wire to be attached to the connector. It doesn't take a lot . . . just enough solder to turn your stranded wire into a "solid" wire



If you plan to use heat-shrink over the finished joints, then slide pieces of sleeving over the tinned wires . . .



Put some solder into each of the connector's solder cups. You're not trying to fill it up, just have some solder coat the inside surface. This operation takes about 2 seconds of heat per pin . . .



Poise the tip of the wire in the partially solder filled solder cup and apply heat to the wire . . . when the temperature of the joint is right, the wire will slip into the solder cup and bottom out. Remove heat immediately

The finished solder joint will look like this. Sparing application of solder when pre-filling the cups and tinning the wires will come out just right when it all goes together . . .

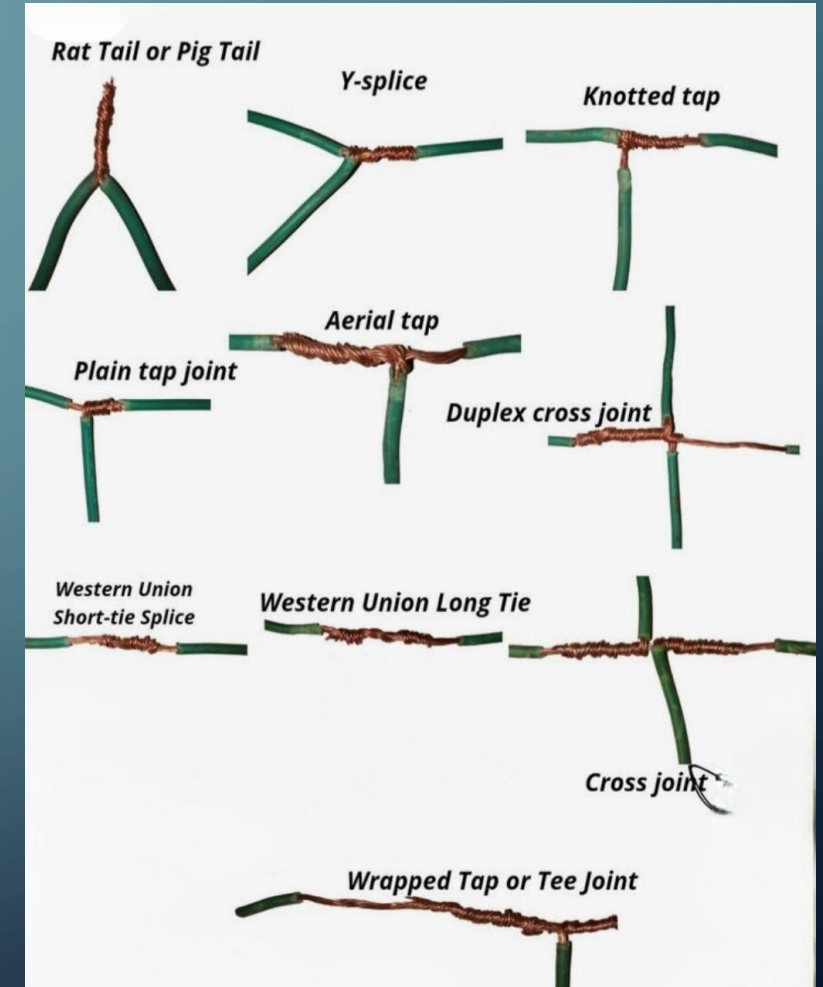
Using this technique, you can finish a solder joint to a connector with less than 4 seconds (probably closer to 2 seconds) of heat applied to each connection.

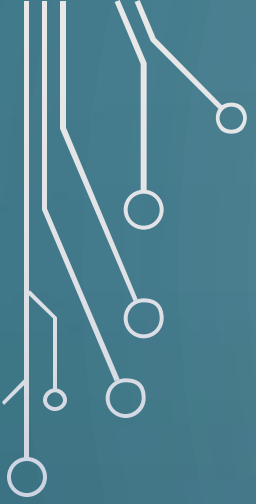


SOLDERING WIRES

- **Optimal Technique**

- Strip ~3–5 mm of insulation from wire ends.
- Twist stranded wire ends to prevent fraying.
- Pre-tin wire ends and pads/lugs.
- Heat and join, then cover with heat shrink tubing or insulation.

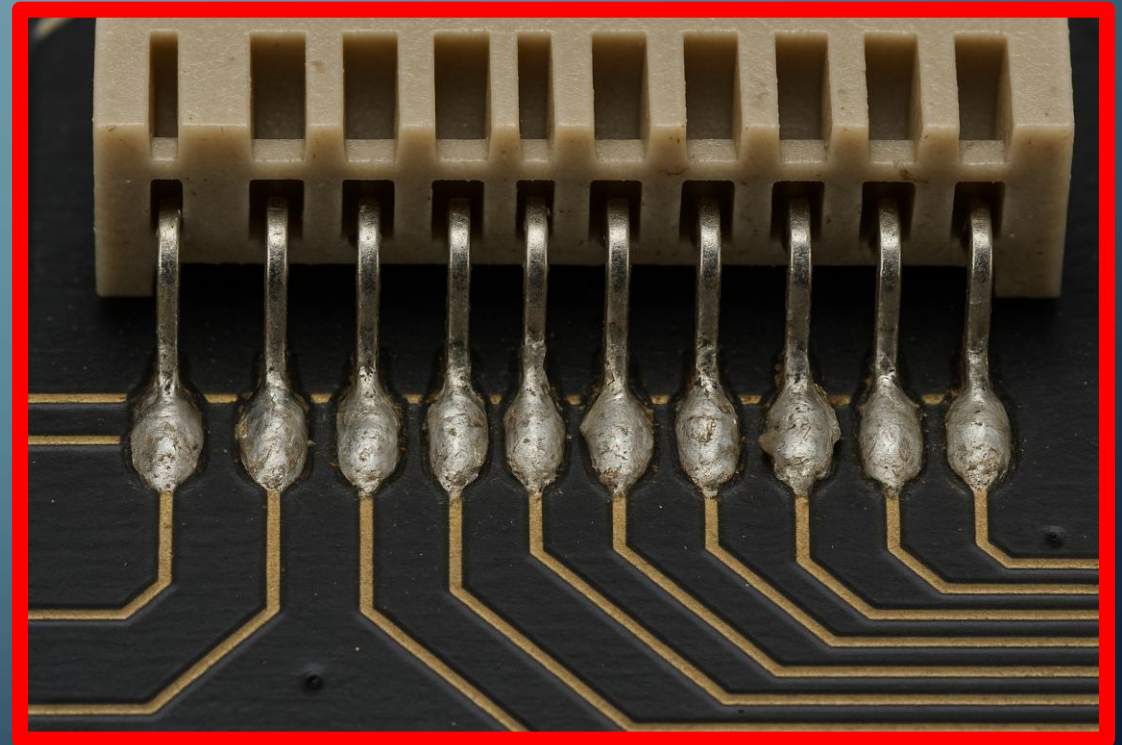
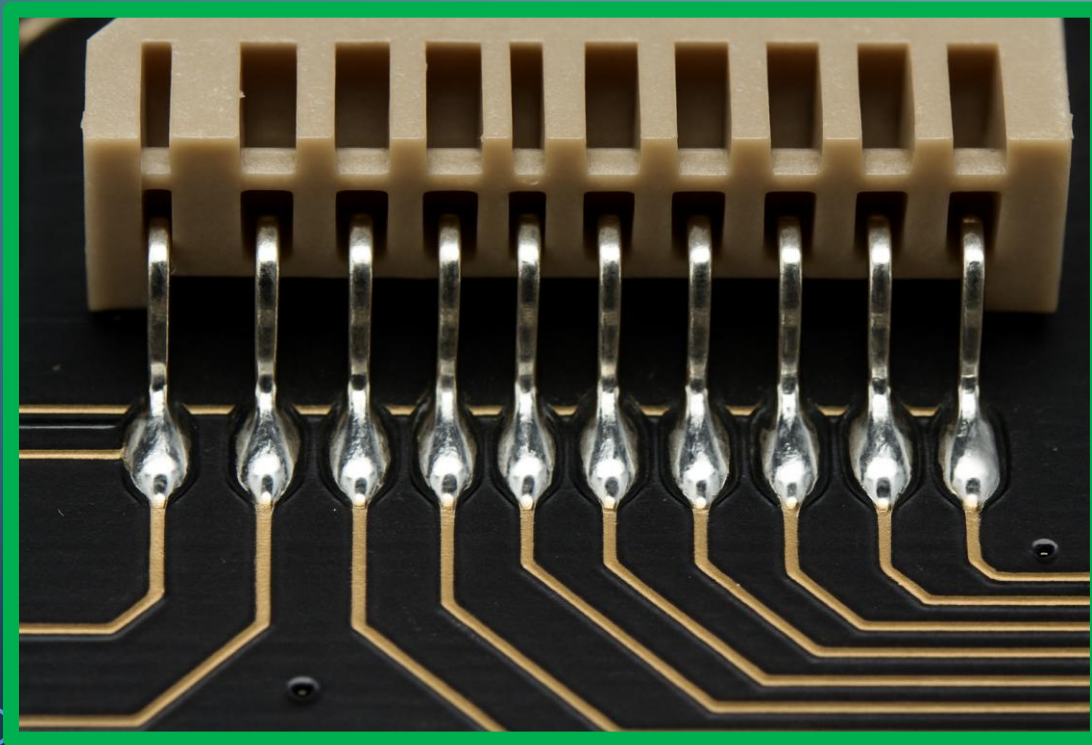




POST-SOLDERING PRACTICES

- Clean flux residue using isopropyl alcohol and brush.
 - Inspect joints under magnification.
 - Perform continuity and resistance checks.
 - Anchor wires and connectors with strain relief if needed.
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INSPECTION CRITERIA



SUMMARY

- Use the **right tools and materials.**
- Apply **heat to the joint, not the solder.**
- Make joints **shiny, smooth, and secure.**
- **Inspect and test** every soldered connection.

