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TRANSMISSION TALK TUESDAY

Episode #94

Back to Basics

Soldering and Toolkit

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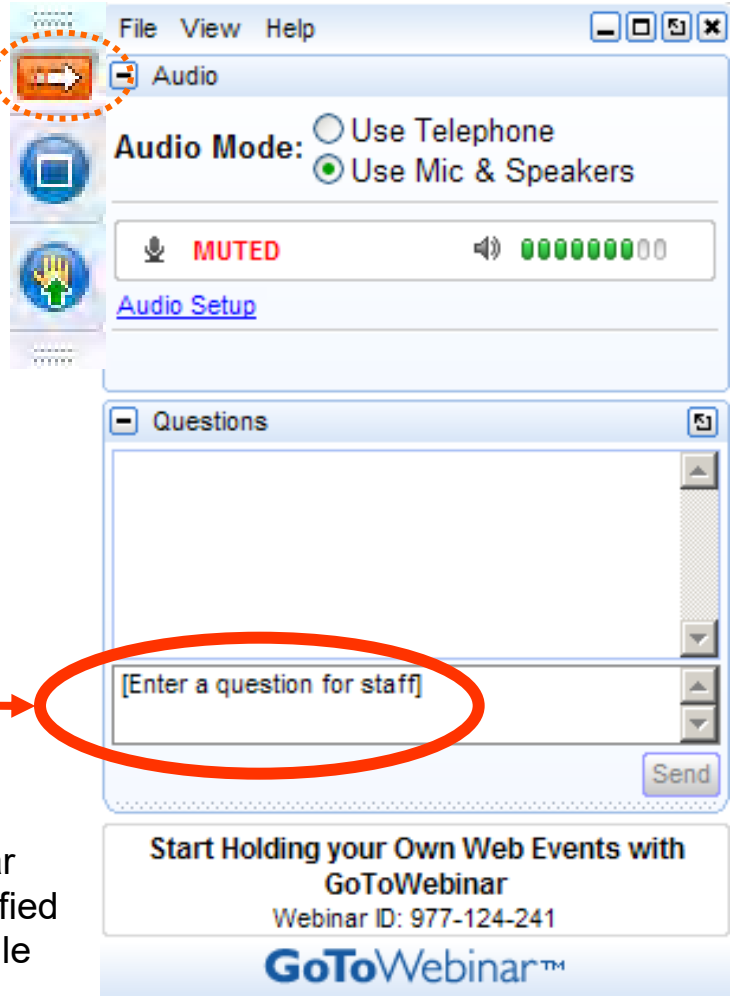
Your questions please?

(if you don't see the control panel, click on the orange arrow icon to expand it)

Please enter your questions in the text box of the webinar control panel (remember to press send)



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History of Soldering

- Mentioned in the Old Testament of the Bible in Isaiah
- Artifacts found in ancient Mesopotamia(as far back as 6000 BC)
- Ancient goldsmiths of Egypt were making jewelry by joining gold pieces (5000 BC)
- Roman aqueducts were lined in lead with soldered seams

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What is Soldering?

- Joining two pieces of metal together with molten metal
  - NOT WELDING. Welding is where two pieces of metal are melted and fused together.

- NOT BRAZING. Brazing is similar to soldering but involves much higher temperatures (900-2200°).

Methods of Soldering

- Wave soldering
- Infrared (IR) soldering
- Laser soldering
- Ultrasonic
- Hot air
- Vapor phase
- Convection (oven)
- Conduction (soldering iron)

Key essentials to Soldering

These four points are keys to the soldering process:

- SOLDER
- SOLDERABILITY
- FLUX
- HEAT

Key Essential: Solder

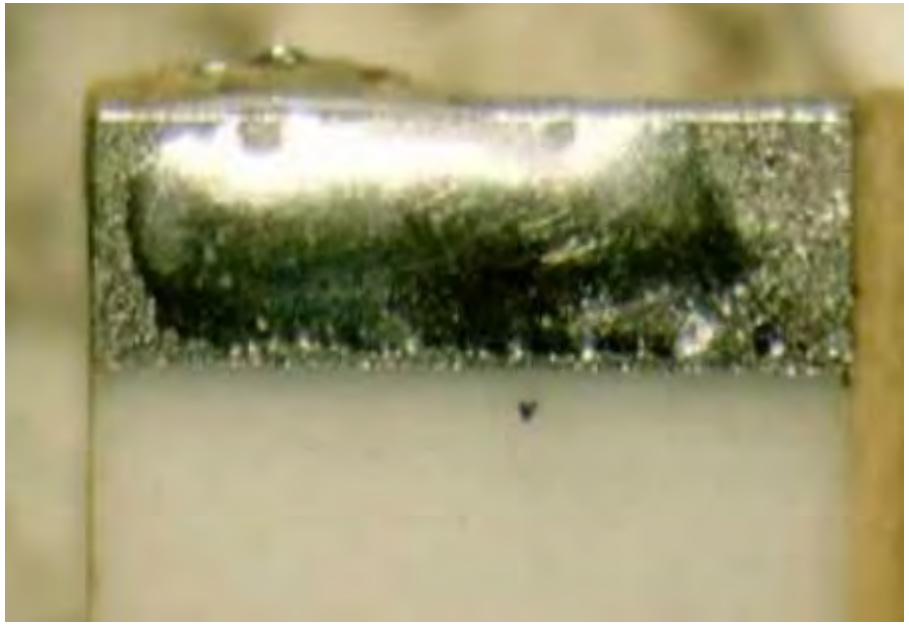
- The first use of a Tin/Lead alloy dates back to around 3000BC in Mesopotamia.
- Most common alloy was Tin/Lead eutectic alloy (SN63/Pb37) and 60-40 (Sn60/Pb40) non-eutectic.

Lead Free Solder

- Environmental movement to ban lead required the removal of lead from electronics – namely solder
- Started in 2006 in the EU as RoHS
- Common replacement was Tin-Silver-Copper (SAC)
- Most common alloy is SAC305 (96.5%Sn/3%Ag/0.5%Cu)

Key Essential: Solderability

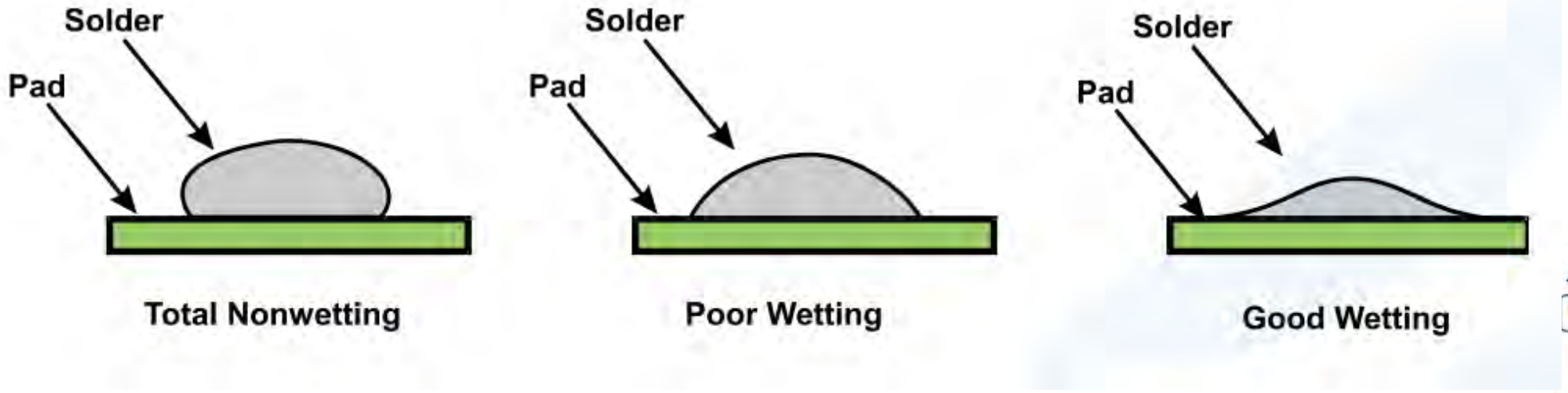
- Degree of ability of a metal to be wetted by molten solder
- Solderability is Inhibited mainly by contaminants and oxidation
  - Physical properties of the material
    - Copper, gold and nickel are solderable materials
    - Aluminum and steel are almost non-solderable
  - Handling of materials
    - Oils and grease from skin
    - Manufacturing processes
    - Age and storage conditions



Key Essential: Solderability

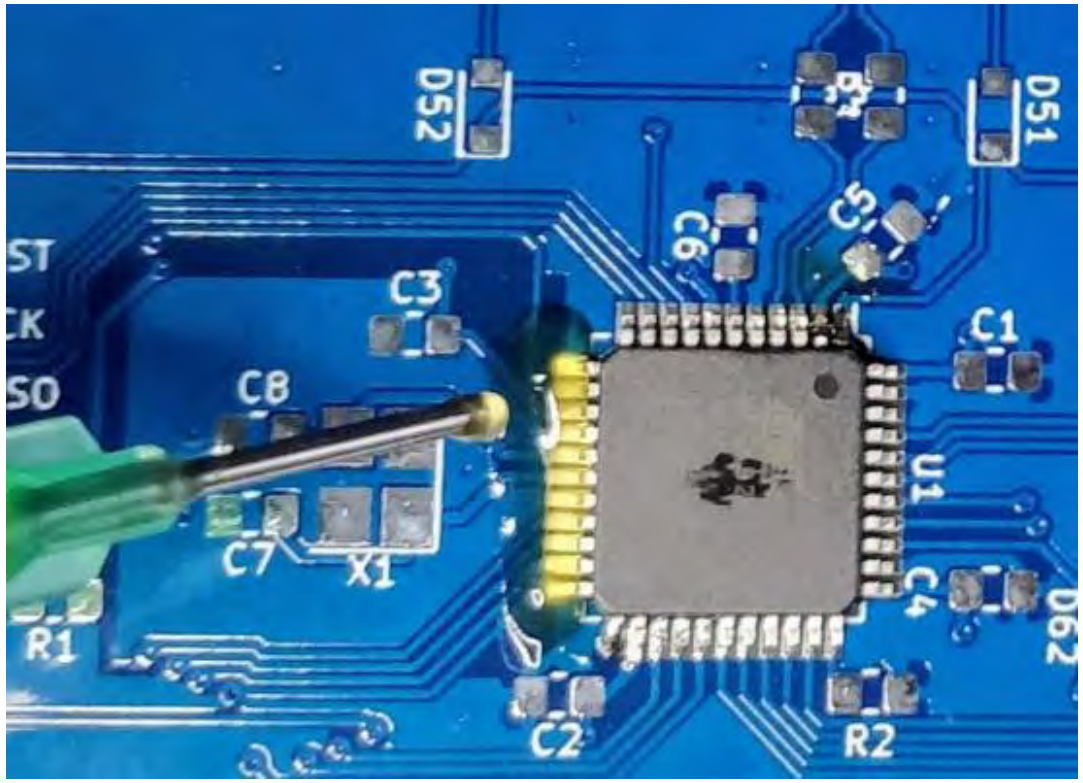
- What is wetting??
  - The wetting angle, also known as the contact angle, is the angle between a liquid's surface and the contact surface of a solid.

Low contact angles indicate good wetting



Key Essential: Flux

- Removes light oxidation and prevents re-oxidation during soldering
- In essence, it is heat-activated acid.



Flux Types and Forms

- Types
  - Rosin (or rosin substitutes)
  - Water soluble, “organic acid”
  - Low residue, “no-clean”

- Forms
  - Liquid
    - Applied by spray or foam for automated solder
    - Applied with bottle or brush for hand solder
  - Paste
    - For SMD and some PTH applications
  - Plastic
    - Used in flux cored solder

Rosin Core Solder

- Rosin Core solder is infused with flux already in the alloy
- 60/40 and 63/37 Rosin Core Solder is the standard for field work and repairs

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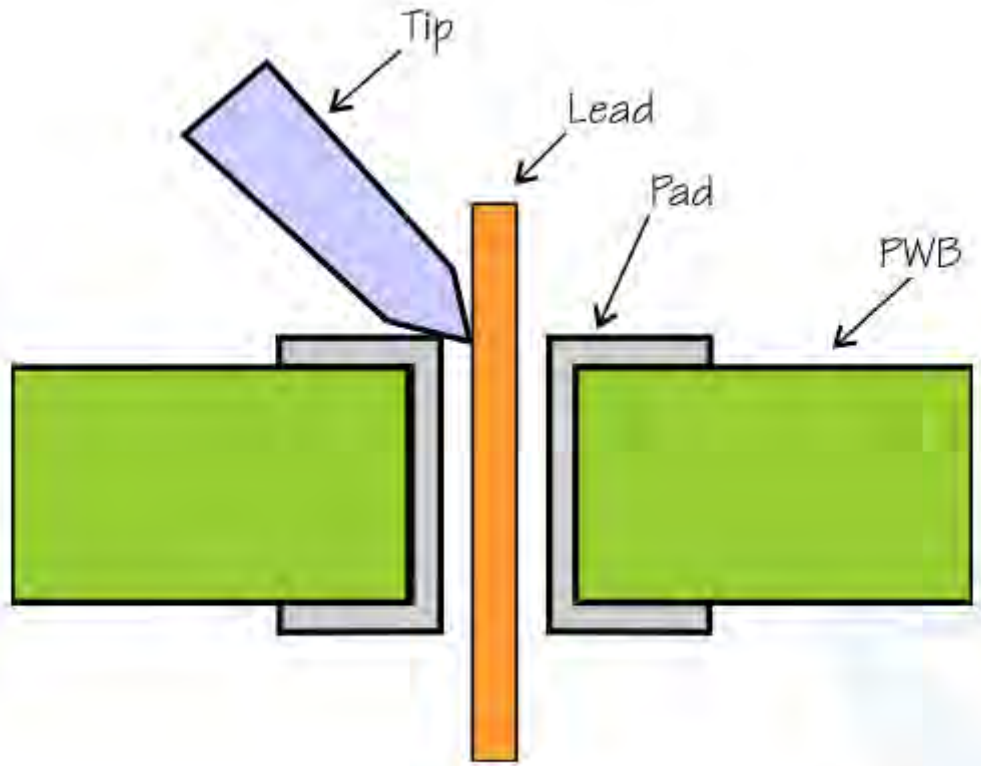
Key Essential: Heat

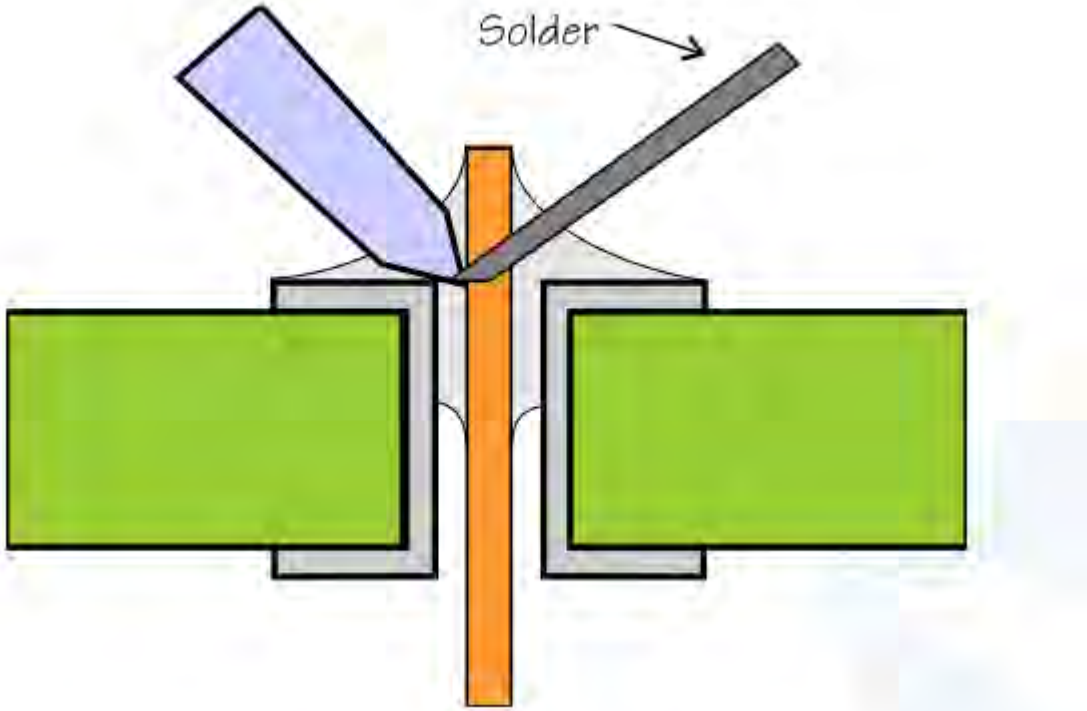
- How much heat?
  - Hakko rule of thumb: 260° C / 500° F for 2 seconds!

- Use enough tool for the job!

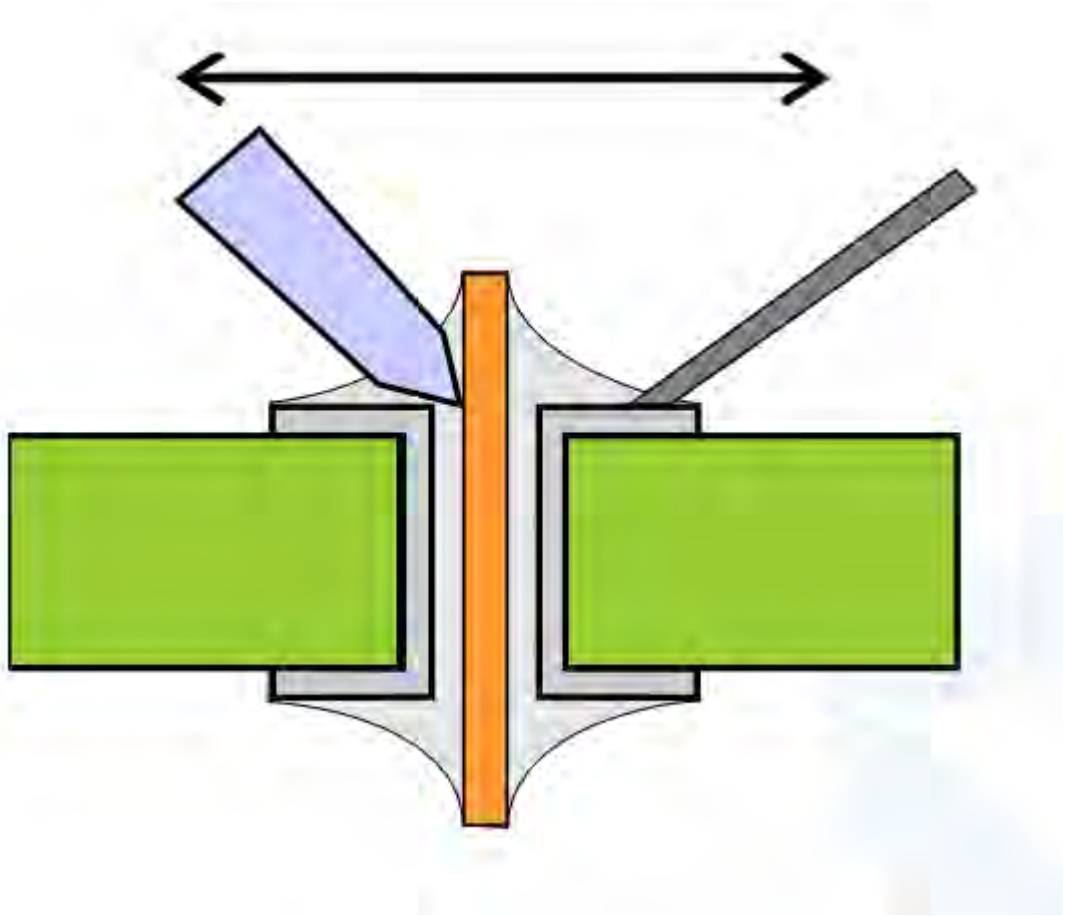
Step 1: Iron Placement



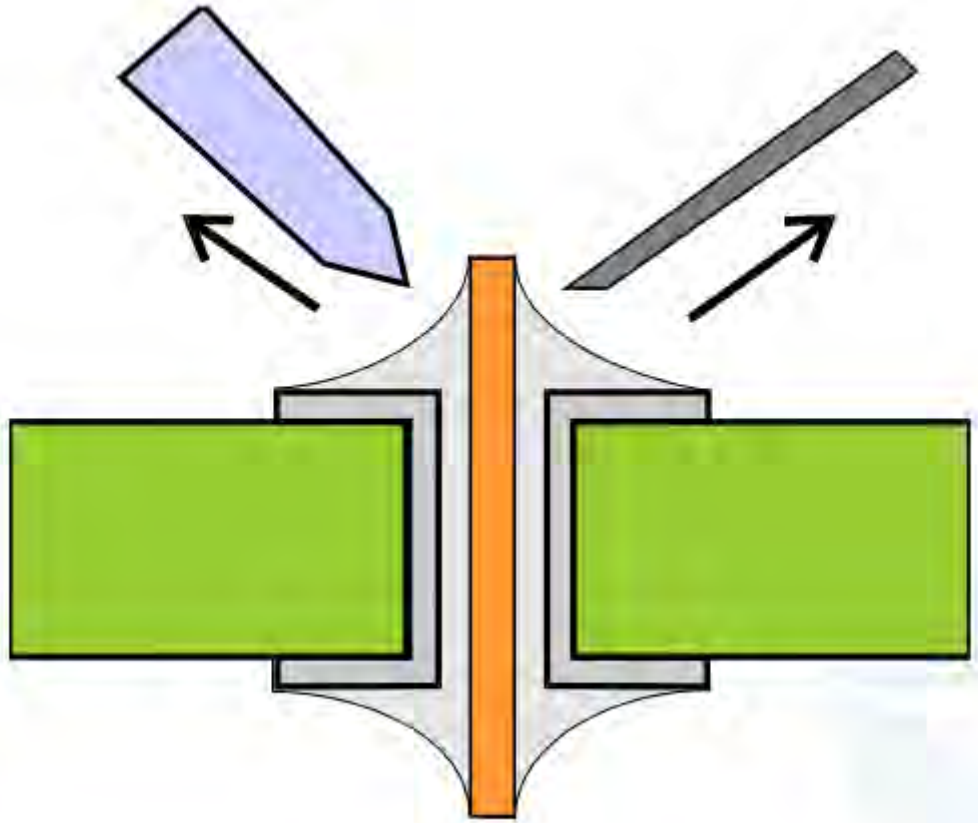
Step 2: Heat Bridge



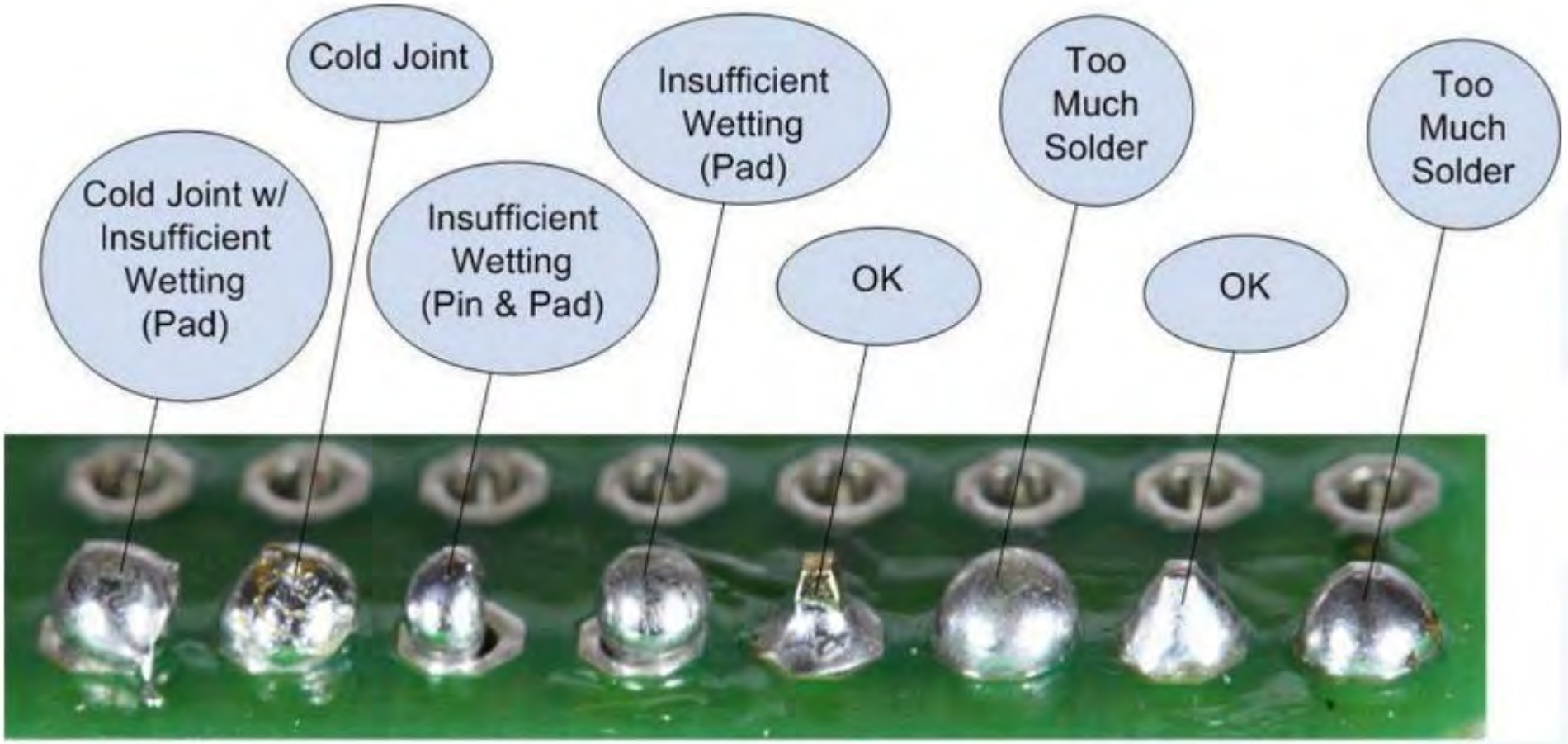
Step 3: “Paint” solder



Step 4: Remove Iron and Solder



Solder Joint Quality Examples



Soldering a Male XLR Connector

Toolkits

- It’s a personal choice!
- Kit contents can vary:
  - Job title
  - Geographic area
  - Type of equipment
  - Organization's budget
  - Likely scenarios to encounter
  - Mobile or shop use

Jeff's Travel Toolkit

- Backpack
- Travels a bunch(TSA)
- Likely scenarios
  - Transmitter setup
  - Site inspections
  - Troubleshooting

Jeff's Local Site Toolkit

- Toolbox in truck
- Needs to accommodate Metric and SAE
- Likely scenarios
  - Transmitter install/inspection
  - Site inspections
  - Troubleshooting
  - Everything that needs to be done!

Burley's Toolkit

- Over 35 years in the making and still evolving!
- The job dictates a wide array of tools
  - Audio (analog)
  - RF (solid state and tubes)
  - Networking
  - Generators
  - Electrical
  - Cleaning
  - Insects/Critters
- I can't seem to have everything I need in one kit!

What is everyone else carrying?

Mogan David
Tiger Team Engineer
iHeart Media

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What is everyone else carrying?

What is everyone else carrying?

Jim Ary
Regional Engineering Director – Ohio (Retired) iHeart Media
Staff Engineer – WOSU Radio

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What is everyone else carrying?

Gary Fulhart
Regional Engineer
Toledo, Defiance, Napoleon,
Lima (Ohio)
iHeart Media

What is everyone else carrying?

Josh McKinley
Chief Engineer
Cumulus Media
Toledo, Ohio

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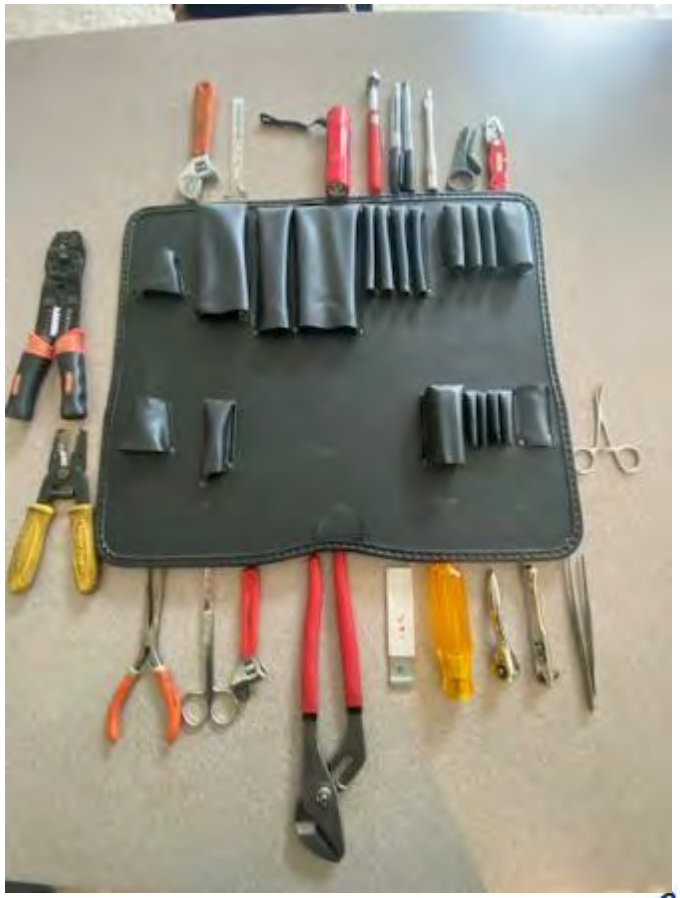
What is everyone else carrying?

Jack Didier

Director of Engineering - Federated Media, Fort Wayne, IN.

Co-Owner Kensington Digital Media, Nashville, TN.

What is everyone else carrying?



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THANK YOU!