Soldering for Model Railroaders

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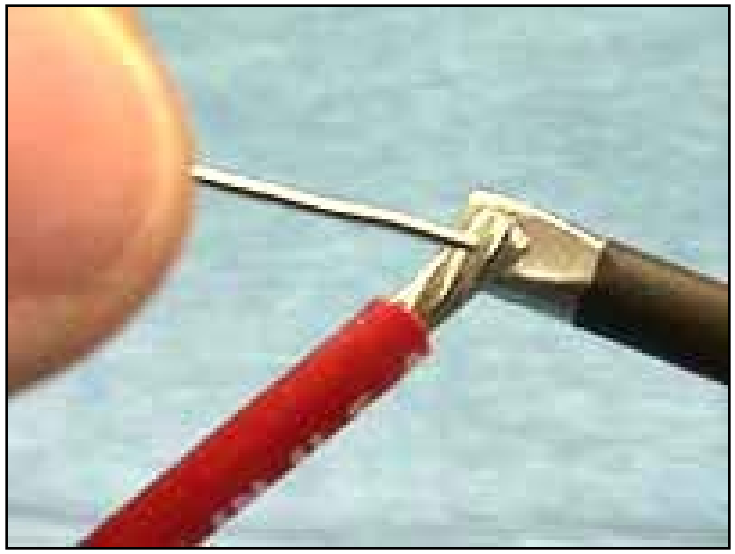

Soldering Clinic - Introduction

- Introduction - Why bother with solder?
- Safety First!
- Tools and Equipment
- Characteristics of a good Solder Joint
- Soldering 101 (Let’s do it!)
- Soldering applications for MR’s
- Resources

Soldering Clinic - Introduction

- Introduction - Why bother with solder?
  - A properly soldered joint has a lower resistance, and is a more reliable electrical connection than almost any other method.
  - Best for permanent, non-moving joints.
  - Once you get the hang of it, soldering is fun! (A good solder joint is a work of art!)

Soldering Clinic - Safety

- Safety First!
  - Rule #1: Protect your eyes! Use safety glasses!
  - Molten solder is HOT! (>250 degrees C)
    - Solder “splash” will burn your eyes and skin.
    - The hot soldering iron will burn your flesh too.
    - Don’t change tips while the iron is hot!
  - Solder away from combustibles
    - Gas cans, loose paper, heaps of oily rags, leaky natural gas appliances, etc.

Soldering Clinic - Tools and Equipment

- Tools and Equipment
  - Soldering Iron or Soldering Gun
    - Radio Shack - Y.G.W.Y.P.F! ($20)
    - Weller – good quality, very popular ($30-$100)
    - Metcal – best quality ($250+)
  - Solder
    - 60/40 tin/lead general purpose (e.g. Kester)
    - RMA flux core is good. Never use acid core!
  - Flux
    - Paste or liquid, it cleans the hot wires. (Kester)
    - Use “electronic” flux, never acid-based plumbing flux. (It will keep on eating the cold joint.)

Soldering Clinic – Tools and Equipment Cont'd.

- Tools and Equipment
  - Sources of Supply
    - Digikey (www.digikey.com) Great catalog!
    - Newark (www.newark.com)
    - Allied Electronics (www.alliedelec.com)
    - Radio Shack - "Huh? You want a what?"
    - Tip of the Day: Resistance soldering station tips for American Eagle (www.techni-tool.com)

Soldering Clinic – Characteristics

- Characteristics of a good solder joint
  - Shiny (not dull and cracked)
  - Wicked into tight spaces (not balled up – no blobs, drips, fingers, stringers, spider webs, etc.)
  - Clean and free of foreign material, such as insulation, melted tie plastic, burned flesh, etc.

Soldering Clinic – Soldering 101

- Soldering 101 (Let's do it!)
  - Everything MUST BE CLEAN!
    - Soldering iron tip, wires, rails, joiners, etc.
    - Use a damp solder sponge to clean the iron.
    - Use sandpaper, brite-boy, Scotch-Brite pad or similar to clean the wires, rails, etc.
    - UNCLEAN parts are the #1 cause of BAD solder joints and <u>EXTREME FRUSTRATION</u>!
  - Establish a good mechanical joint first.
    - Wrap the wires tightly, if possible.
    - Solder by itself is a very soft alloy and is NOT very strong.

Soldering Clinic – Soldering 101 (Cont'd.)

- Add a drop of flux to the connection.
- Clean the hot soldering iron tip by wiping it on a damp sponge. Do this for every joint! The tip should be bright and shiny.
- "Tin" the hot soldering iron by melting some fresh solder on the tip. (Sometimes it is best to "tin" the pieces too.)
- Heat up the joint by touching the <u>molten solder</u> on the tip to <u>BOTH</u> pieces to be joined. The molten solder conducts heat into the joint much better than a "dry" tip.
- After a second or two when the joint is hot, run a <u>small</u> amount of fresh solder *into the joint*, NOT onto the soldering iron!
- The solder should wick its way into the joint and form fillets, NOT solder balls! If the solder beads up the joint is not clean - Start over!

Soldering Clinic – Soldering Applications

- What can be easily soldered?
  - Copper wire, brass, silver (with special solder).
  - Most electrical wiring that does not move or flex. (If it moves use crimp terminals.) Track power, DCC, signaling wires, accessories, lighting. Circuit boards.
  - Nickel silver rail joints and joiners. (A good practice for track laying.)
  - Brass tubing and structural shapes for signals, signal bridges, etched metal kits, handrails, expensive locomotives, etc.
- What can’t be easily soldered?
  - Tin, aluminum, steel, iron. Screws, rivets, washers and other metal fasteners are generally not solderable unless they are brass.