

# Building Fast Track Turnouts

By Lee Dobyms

# Outline

- Tools needed.
- Cost, Pro's and Con's.
- Inspect Assembly Plate.
- PC board ties.
- Cut and file long rails.
- Install two long rails.
- Cut, file and install frog points.
- File and install point rails.
- Cut and install guide rails.
- Install throw bar.
- Wash turnout and assembly plate.
- Cut Frog gaps. Add jumpers for inside exit rails.
- Test turnout.
- Glue on Quick Stick.
- Add frog wire and feeders.

# Tools

- Good soldering iron with small tip. Suggest Hakko 888D. \$100. Dedicate tip for acid soldering. Low-end not ok. Must be temp controlled tip.
- Rosin cord solder. Standard. 60/40
- Liquid Acid Flux. Small plastic container and plastic paint brush.
- 6" flat file and small narrow file.
- Xuron track cutter.
- Track gauge and four wheel truck.
- Meter and hook-up wire 22 gauge.
- Plastic wash pan 12x16. Tooth brush. Baking Soda.
- Small wire cutter and needle nose pliers.
- Fast Track assembly plate, Frog/Point rail tool, Stock Aid tool.
- Micro Engineering rail. ~ 4-5' per turnout.
- Quick Sticks and Contact Cement.
- Black small tip Sharpie pen.
- Dremel tool with narrow diamond disk.

# Cost, Pro's and Con's

- Cost for #6, Code 83 Turnouts
  - Assembly plate \$113. Makes a Left and Right. Code 70-100.
  - Point/Frog tool \$54. Code 70-100.
  - Stock Aid tool \$76. Code 70-100.
  - Quick Stick \$8.
  - PC board Ties \$13. Bay of 100. ~9 per turnout.
  - Micro Engineer Code 83 rail.
- Pro's
  - No rail joiners in the point rails. Can't lose power.
  - Can't melt ties while soldering. Can't have loose rails.
  - Indestructible. Can move if needed. May need to repair Quick Stick.
  - Strong. Will last a lifetime. Great tolerances. Looks good.
- Con's
  - Initial cost of tools. Takes 2-3 hours to build each turnout.

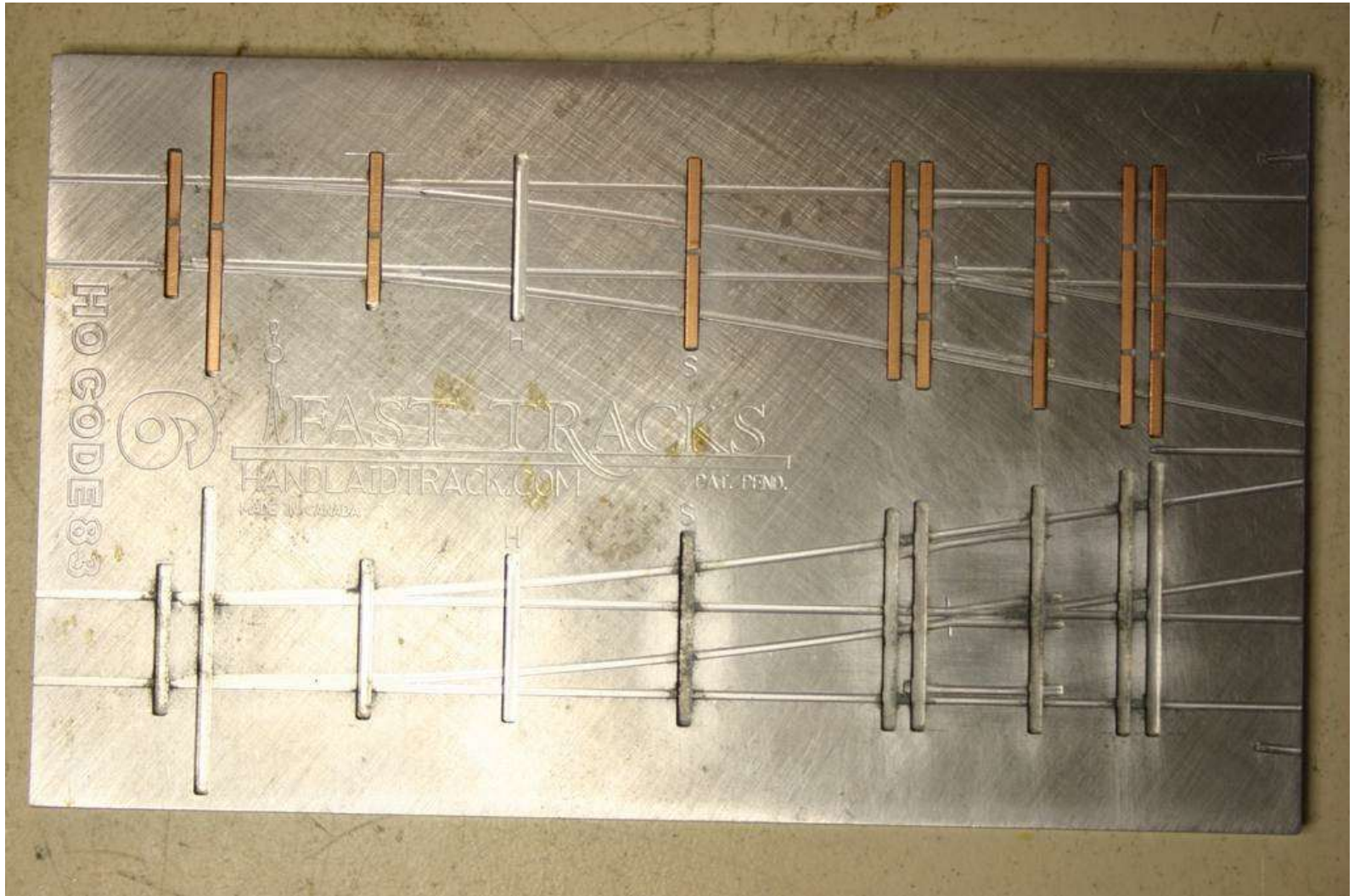
# Assembly Plate

- Check assembly plate for debris. Clean if needed. Must be clean. Always wash plate and completed turnout with backing soda and water mixture to neutralize acid flux. Do not delay washing the turnout or plate after use. Acid flux will eat away at the metals. If you take a 30 minute break, wash plate and turnout to that point.

# Scoring PC Board Ties

- Use the supplied turnout diagrams to mark the PC Board scoring locations. Notice gaps in the pictures. The diagrams are on the CD and FT website. Also can be used for track layout and design as they are full size exact images.
- If you center mount the tortoise to the throw bar then you will not file in the center of the PC board tie. File off center.

# Scoring the ties



# Cutting and Scoring PC Board Ties

FAST TRACKS TEMPLATE			
Turnout			
Scale	H0	Size	#6
Outside Radius		Inside Radius	
Produced Using NMRA RP's & Standards	June 2009	V 2.01	
<b>Printing Instructions:</b> - Select the Print option in the Adobe toolbar. - Be sure that all page scaling, and fitting options are turned off. - Setup your printer to use the highest possible quality settings. - Select 8-1/2" X 14" (Legal) paper in landscape mode. - Confirm that the template has been printed at the correct size by measuring the scale with a ruler or vernier caliper. - If the template is printed on multiple pages, use the targets to align the pages and fasten them together.			
<b>Notes:</b> 1. The location of the rails is for reference only and should not be used for the placement of rail. 2. We are always updating and refining our printable tie templates. Always be sure that you are using the most recent version. 3. For a complete selection of up-to-date templates, visit us on the web at <a href="http://www.handlaidtrack.com">www.handlaidtrack.com</a> . 4. Shaded ties indicate the location of the PC Board ties. 5. Gaps that are needed for DC and DCC compatibility are indicated with a blank area on the shaded ties and rails.			
Purchase all of the tools & supplies that you need to build this trackwork at <a href="http://www.handlaidtrack.com">www.handlaidtrack.com</a> or call us toll free at 1-888-252-3895			
<small>DISCLAIMER: While we have made every effort to ensure that this template is accurate, we cannot guarantee it to be 100% free from errors or inaccuracies. This template is provided "as is" without warranty of any kind, either expressed or implied. FAST TRACKS &amp; OUTBACK DEVELOPMENTS, INC. AND ANY OF THEIR EMPLOYEES SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR OTHER LOSSES ARISING OUT OF THE USE OF OR INABILITY TO USE THIS TEMPLATE. Of course, if errors are discovered, we certainly do appreciate it if you bring them to our attention.</small>			





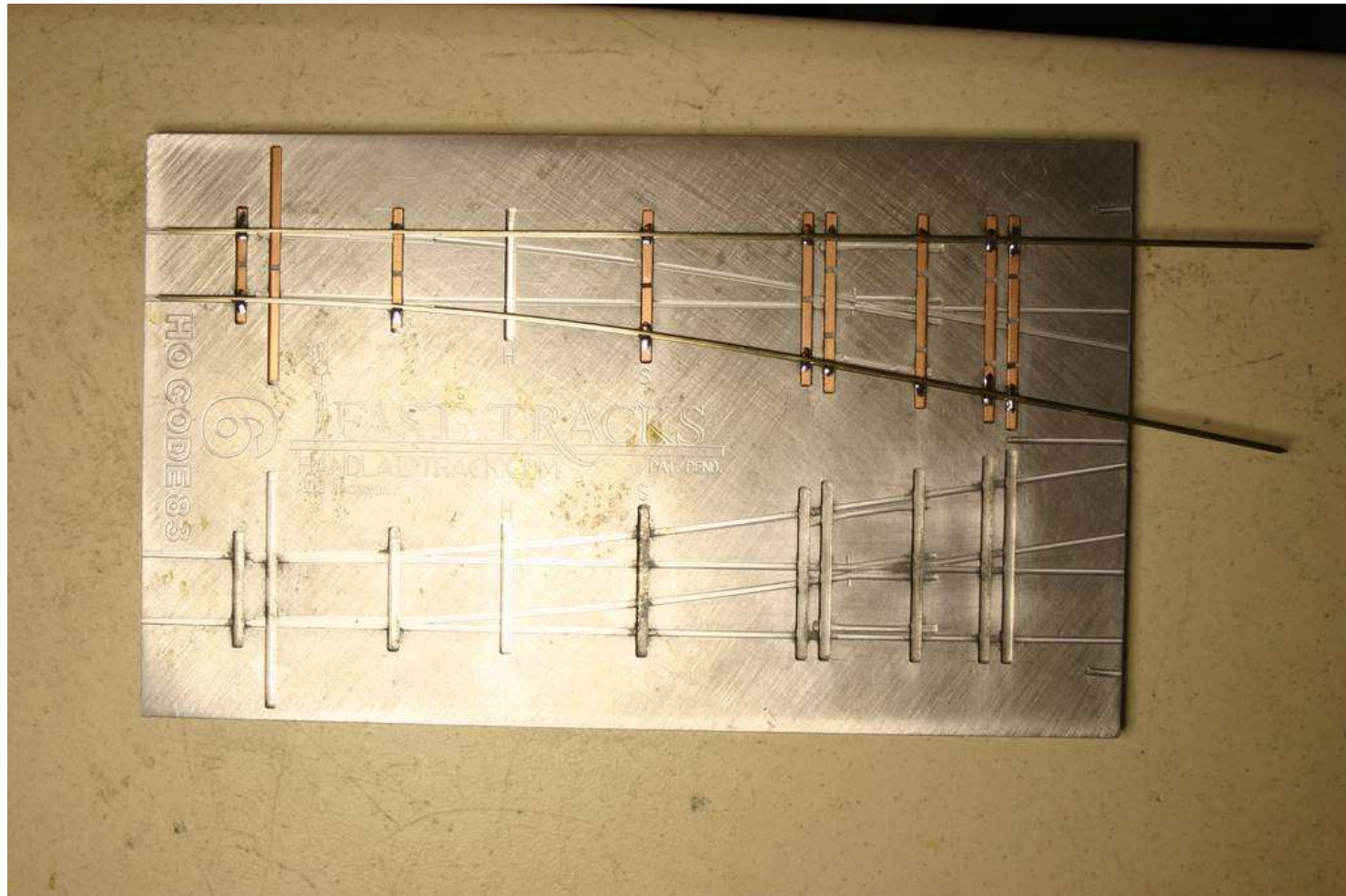
# Cut Long Rails

- Cut two long outside rails to length. Hold Quick Stick over assembly plate to determine length. I add  $\frac{1}{2}$ " to  $\frac{3}{4}$ " beyond the Quick Stick.
- Place rails in plate and mark the cut points for the Stock Aid tool for filing. You will see small arrows on the plate.
- Place rail in Stock Aid tool and file out material. Make sure it's the correct side of the rail and don't leave a crown, must be flat.
- Stock Aid tool is harder metal and stands up to filing much longer. Expect you could build 300+.

# Install Long Outside Rails

- Flux the outside PC board ties with the liquid acid flux via a plastic paint brush.
- Place both outside rails in the assemble plate and check alignment to the Stock Rail arrows.
- Use the two heavy tools to weight down the rails while soldering. Move the weights around to press down the rail during soldering. You can only solder the outside rail near the stock rail cut out and guide rails. Set Hakko at 700-800 degrees.
- Using the weights will give you a flat and level turnout. Keeps rails from twisting. Also catches any code 100 rail if you are working with code 83. Happened to me. Can get mixed up.

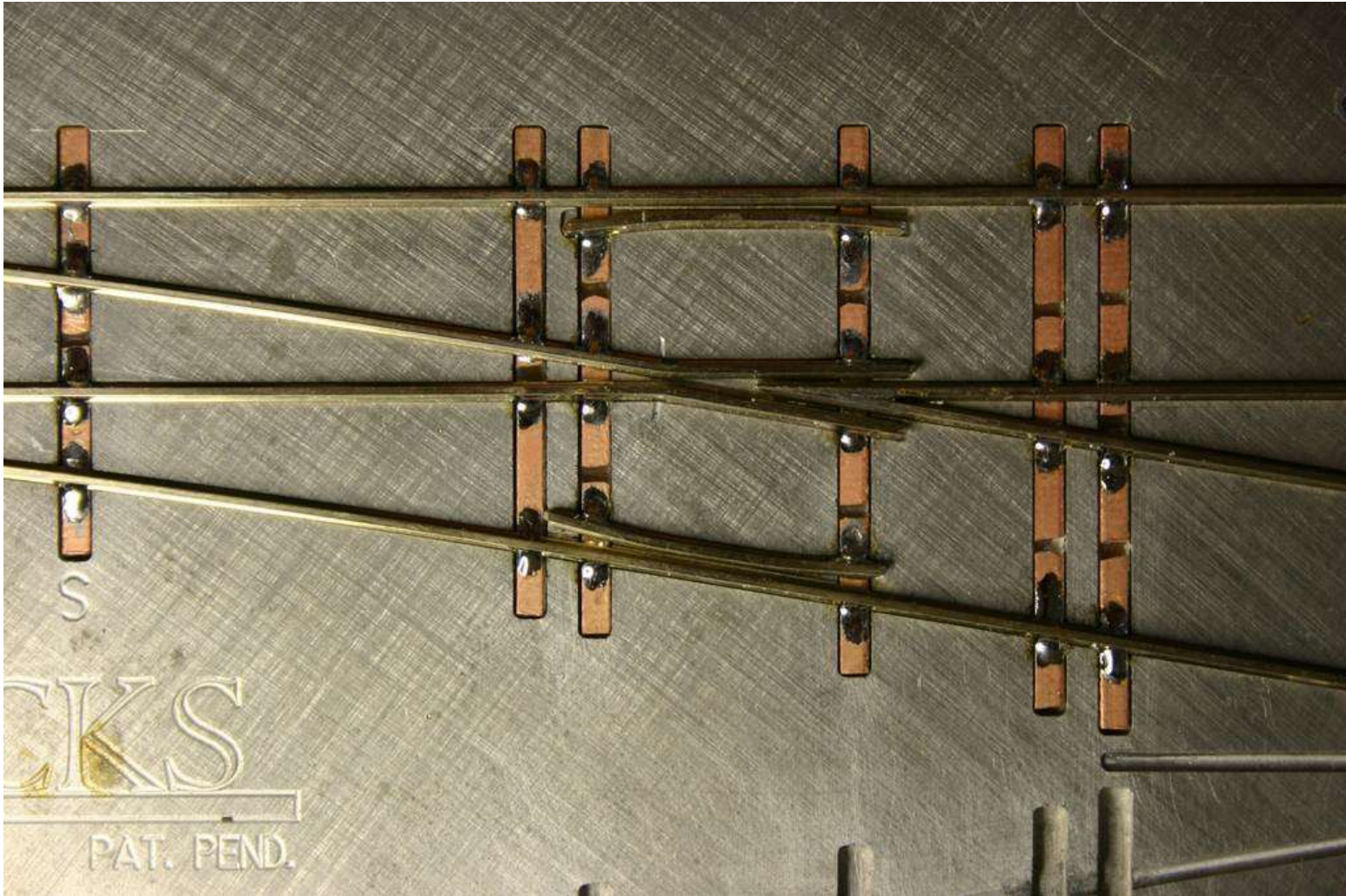
# Stock Rail Picture



# Cut and Install Frog point

- Use the Frog tool to cut both pieces needed to form the frog. Use a long piece of rail. Once it's filed and soldered in place you can cut it the correct length reducing waste. Small pieces of rail can be used for the guide rails. Use the Quick Stick to help measure rail length. Use each sides of the Frog tool to cut the two rail pieces.
- Flux under the frog rail area on the PC ties.
- Place the two filed rails in the assembly plate, slide them forward until they form a even point with no gaps. Apply some flux and flow the solder the rails watching it flow down. Use the tools as weights again.
- Next solder the frog to the ties. Make sure the solder flows under the frog point for good connection. This is important.

# Frog area

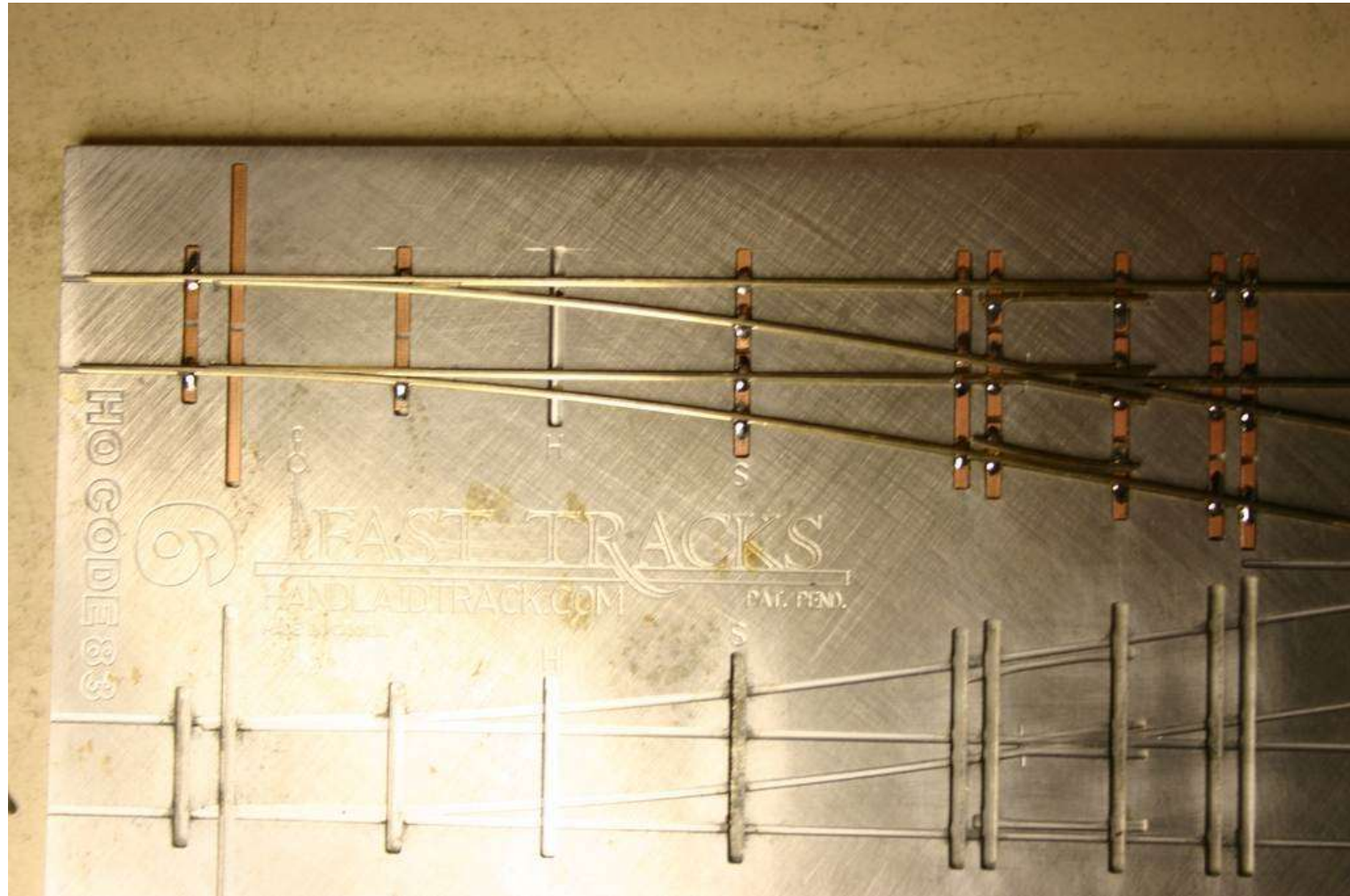


# Cut and Install Point Rails

- Start with two long pieces of rail. Don't cut the unfiled end until you fit it to the assembly plate.
- Use the Point tool to file the side of the point rail that closes into the stock rail. Look at it several times to make sure it's correct. You use one side of the tool for each point rail. File away. Leave enough to keep the vertical rib of the rail some material. If you do too much, slide the rail down in the tool and go again.
- Remove the point rail and place in the assembly plate. Align the front of the point rail just short of the slot cut out in the stock rail. Mark the point rail where you see the arrow on the assembly plate. This is the filing point.
- Use the small narrow file and cut a notch where you marked the rail. File the lower flange to the vertical rib. This allows the rail to bend.
- Now slightly bend where you filed to enable the rail to fit into the assemble plate. Once you have the angle close, cut the rail to length to fit down into the plate. Adjust the angle to fit the plate. Now do the same for the other point rail. One requires a slight curved bend to fit the plate.
- Fit the rails to the plate and solder. Do not solder the points rails in the center of the turnout, it must flex. You'll see. Again use the tools as weights.
- Alignment of the bend points of the point rails is critical to the assembly plate.
- Always use a flat file to dress the ends of the rail.



# Installing Point Rails



# Guide Rails

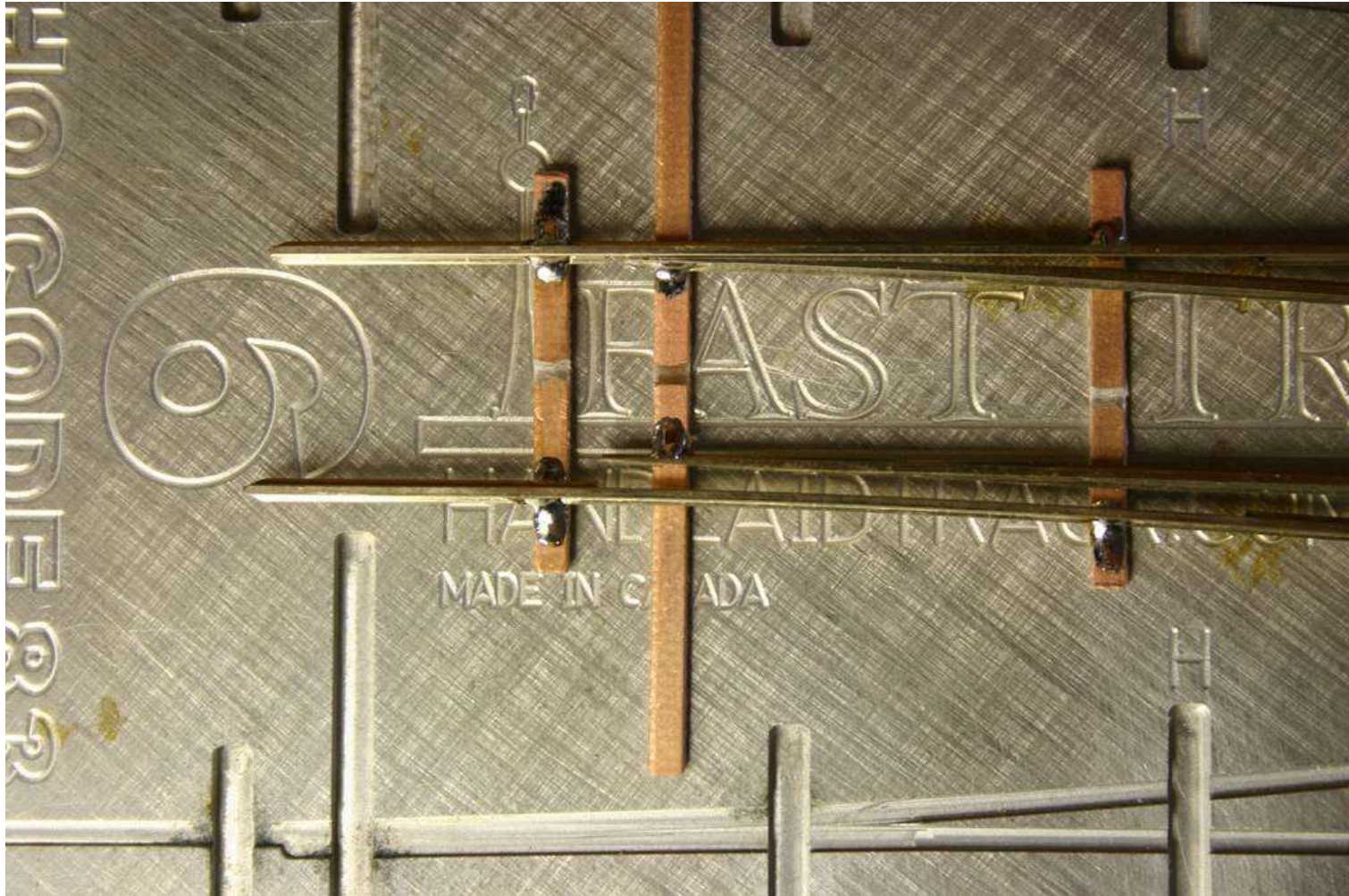
- Using scrap rail, use the slot at the end of the plate to cut two guide rails to length.
- Next, dress the edges with the flat file.
- Place the straight guide rail in the angled slot and bend until it's perpendicular to the plate.
- Then use the other angle to bend the other end.
- Repeat for the other guide rail.
- Now flux the ties, fit the guides in place and solder the open side of the rail only. Use the tool weights to level the guide rails.



# Install Throw Bar

- Decide where you are mounting the Tortoise switch machine. Is it centered or off to one side. I center mount mine and cut off the outside pieces. Your choice. Plan ahead.
- Drill the hole in the throw bar PC tie. Very small drill bit, easy to break.
- Notch the throw bar somewhere between the two rails staying just away from the rail (1/8") to allow soldering. I don't like to notch at the Tortoise hole as it can become weak and break.
- Remove the turnout from the plate. May need to wiggle it out the first time. Put the throw bar PC tie in the plate and reinstall the turnout.
- Put a small spacer between the stock and point rails on both sides to create a small gap. I use scrap PC board ties.
- Put the metal tool near the ends of the points rails to hold them down level.
- Solder the inside of the point rails very quickly. Do not allow solder to flow under the rib. If it does you will need to file it flat later to allow proper closing.
- Remove from assembly plate and test point rail gap and alignment. If the point gap is not enough re-solder to adjust outside the assembly plate.

# Throw Bar



# Dealing with the Acid Flux

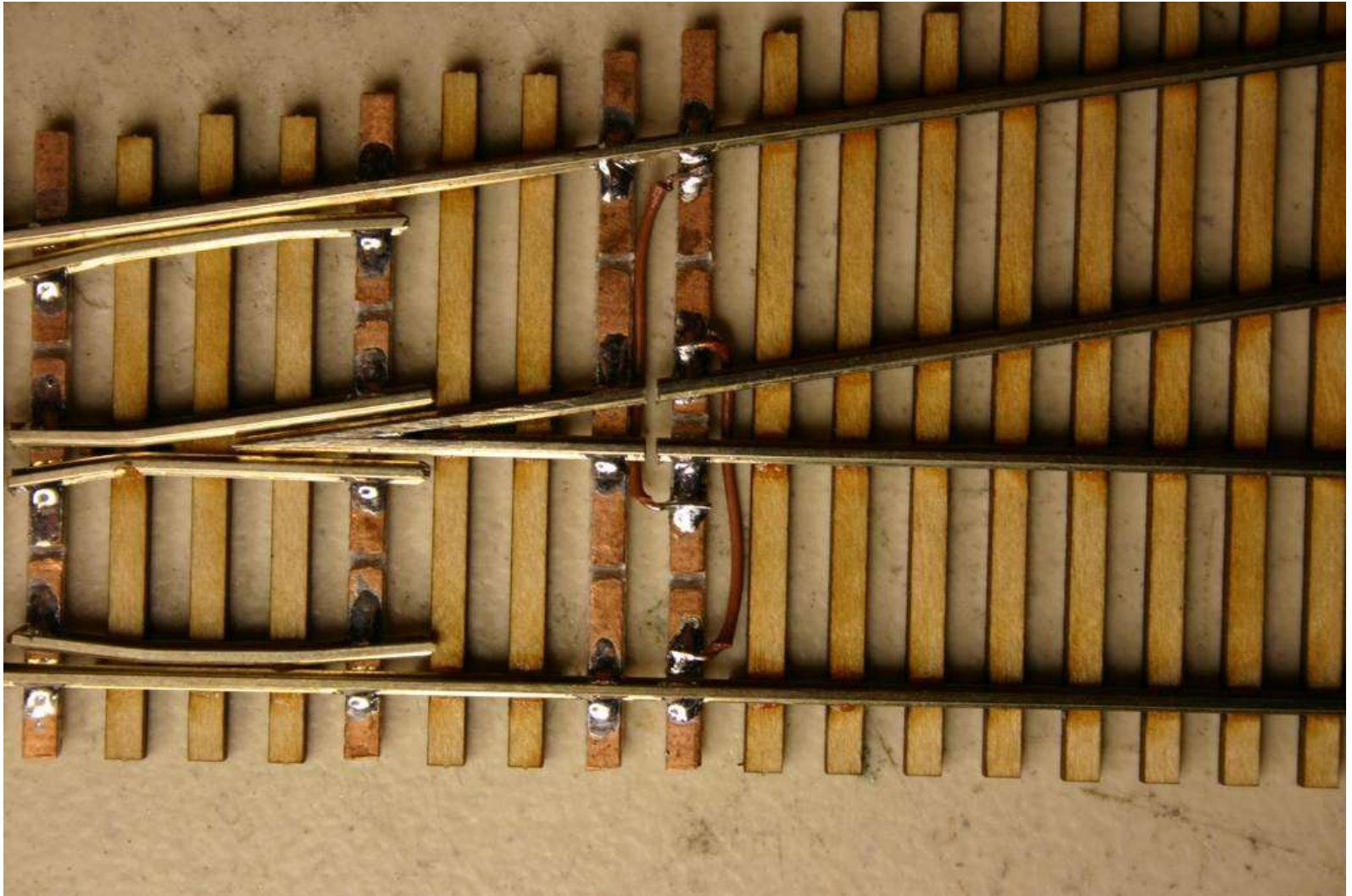
- Mix a teaspoon of baking soda with water in your wash pan. This can last for days.
- Place the assembly plate in the bath and clean the cut areas with a tooth brush. Rinse and dry.
- Place the turnout frame in the bath and clean the soldered and fluxed areas with the tooth brush. Rinse and dry. You can lightly bang the turnout against a towel to remove any extra water. At this point the turnout is very strong.
- Clean the assembly plate in the bath.
- Using rosin core solder will not cause problems. The problem is the Acid flux.

# Cut Frog Gaps

- Using a Dremel tool to cut the two sets of gaps for the Frog boundary. Use the printed template for the correct areas. The gap is between the two close sets of PC ties.
- Make the cuts as narrow as possible.
- Hold turnout while pressing on the rail and use high RPM to reduce vibration. Poor soldering will not holdup.
- Add two jumpers to power the center exit rails.



# Exit Rail Jumpers



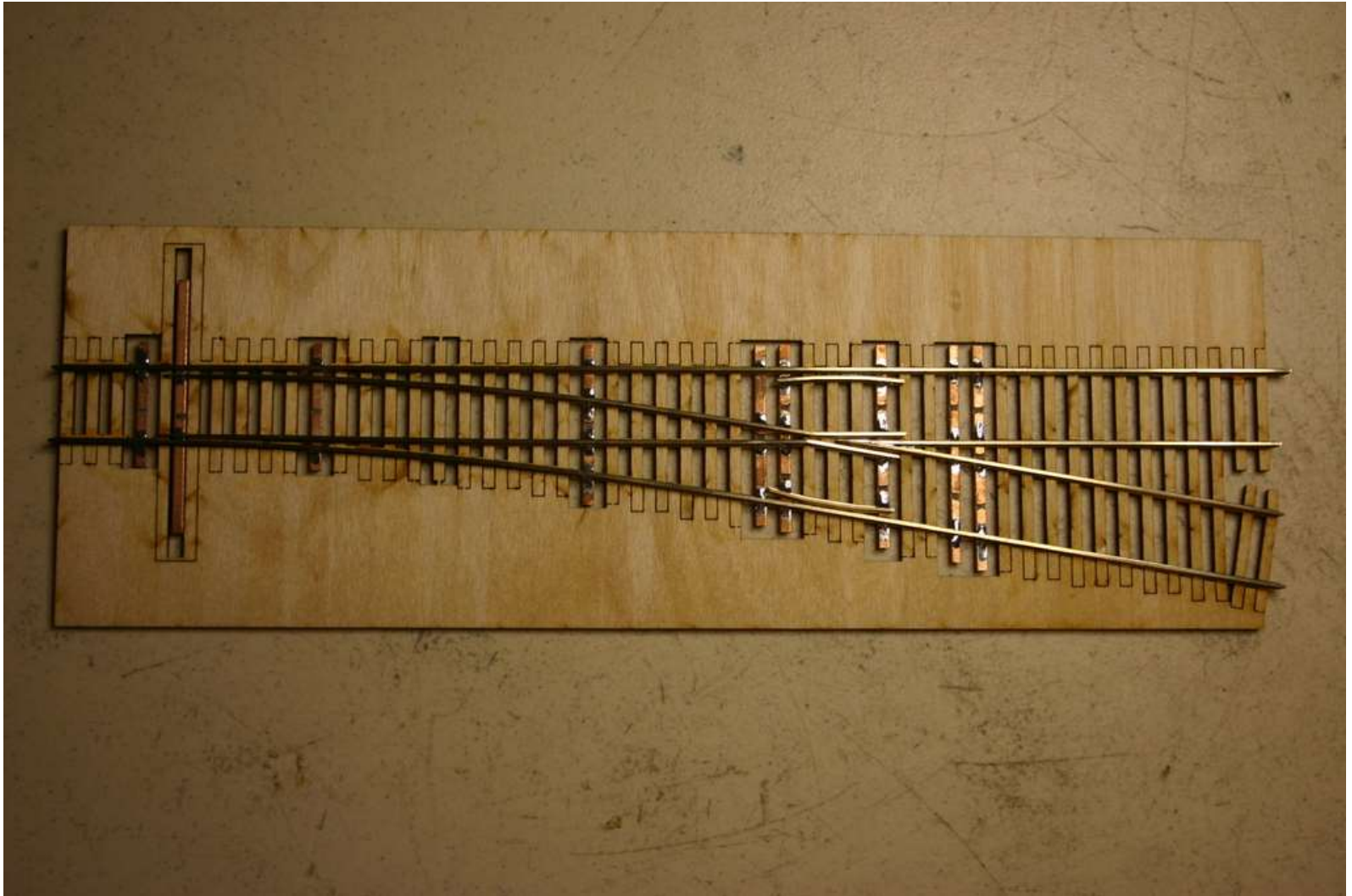
# Test Turnout

- Test final turnout with standards gauge.
- Use meter to make sure you have no shorts between the two rails. Prior to cutting gaps you will have a Rail A/B short!
- Make sure Frog is isolated.
- Make sure two parts of Frog are connected.
- Make sure point rails are connected to the outside rails.
- Make sure the center exit rails are connected to the correct outside rail.
- Remember that PC board ties have copper on the underside. You will cause a short if you put two track nails in a the wrong locations in the same tie.

# Quick Stick

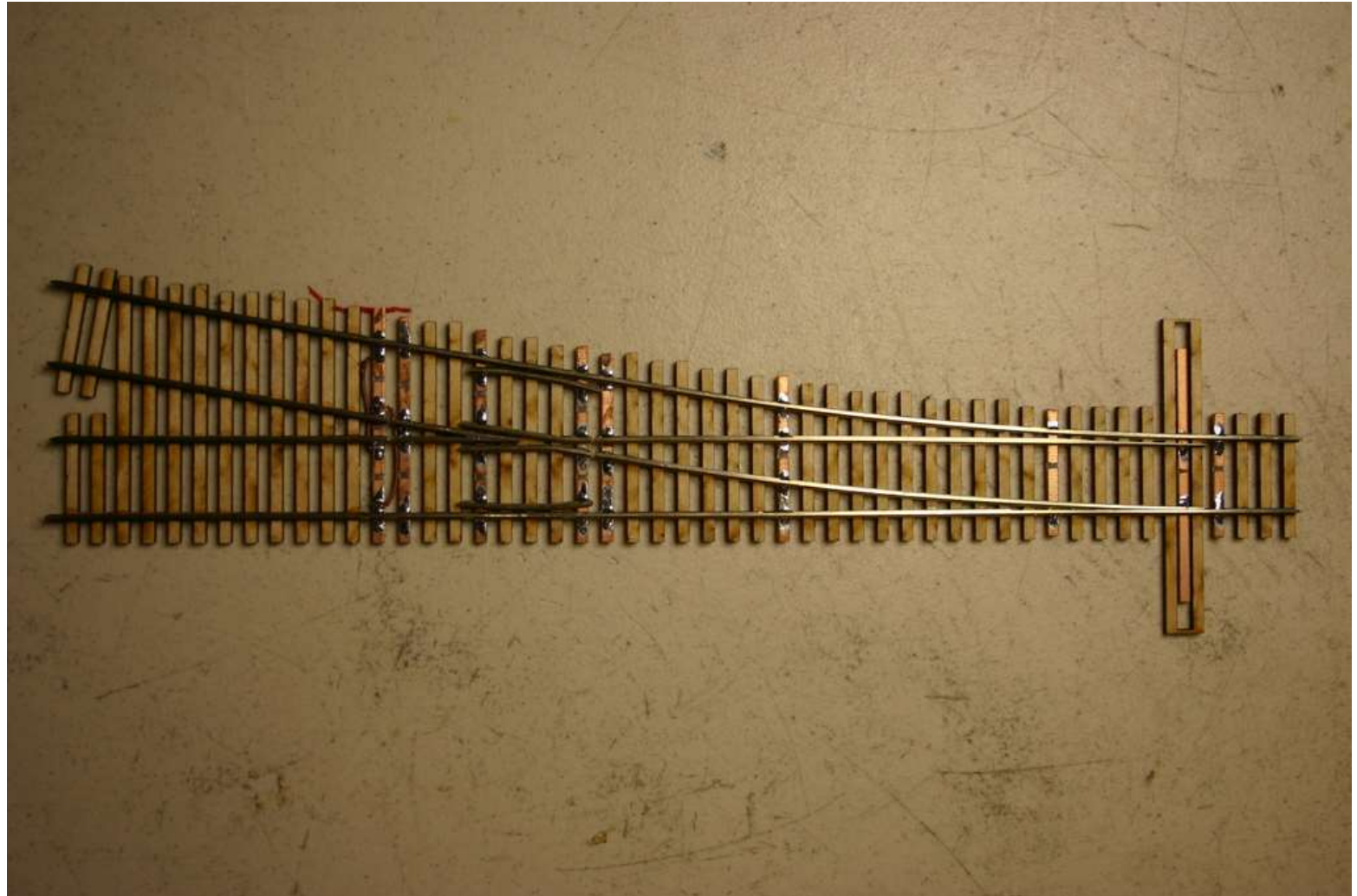
- Remove tie in Quick Stick tie that supports a solid flexible point rail.
- Some people are adding PC tie in the center of the turnout to make it stronger. If you do that you will need to remove the Quick Stick tie too.
- Apply a thin bead of contact cement to the quick stick. Many areas. Not too much. Less is more.
- Apply a very thin bead of contact cement to the turnout rails that contact the quick stick. Setting up ahead is good.
- Keep cement away from the throw bar and point rail/stock rail area. This will cause sticking. Center the throw bar to keep the glue away.
- Place the turnout down into the Quick Stick and center. I put the assembly plate on top with tool weights or books to hold it down. Let dry for 4 hours. Over night for final drying.
- Remove weights and test operation. Clean out cement if needed.
- Now snap off the side pieces for the completed turnout. Be gentle, they will break off as they are laser cut.
- If you center mount the Tortoise then cut off the side pieces of the ties.

# Quick Stick glued





# Quick Stick Sides Removed



# Wiring

- Add Frog wire and Rail A/B feeders now if you like.
- I add them later as it hard to align the wires and drill holes.
- Colors
  - Green – the Frog
  - Red – Rail A
  - White – Rail B
  - Your choice.
- Standards
  - Create a standard for your layout and stick to it.
  - If you move track and the feeders are the wrong color them change them now.
  - Use stranded #22 hook-up wire for feeders.
  - Use #12 stranded for buses.
  - **Every turnout and section of track should be powered.**
  - **Never rely on rail joiners for power.**
  - Solder only when no other choice. Soldering keeps track from being able to expand and contract. Lesson from lower Helix at club.