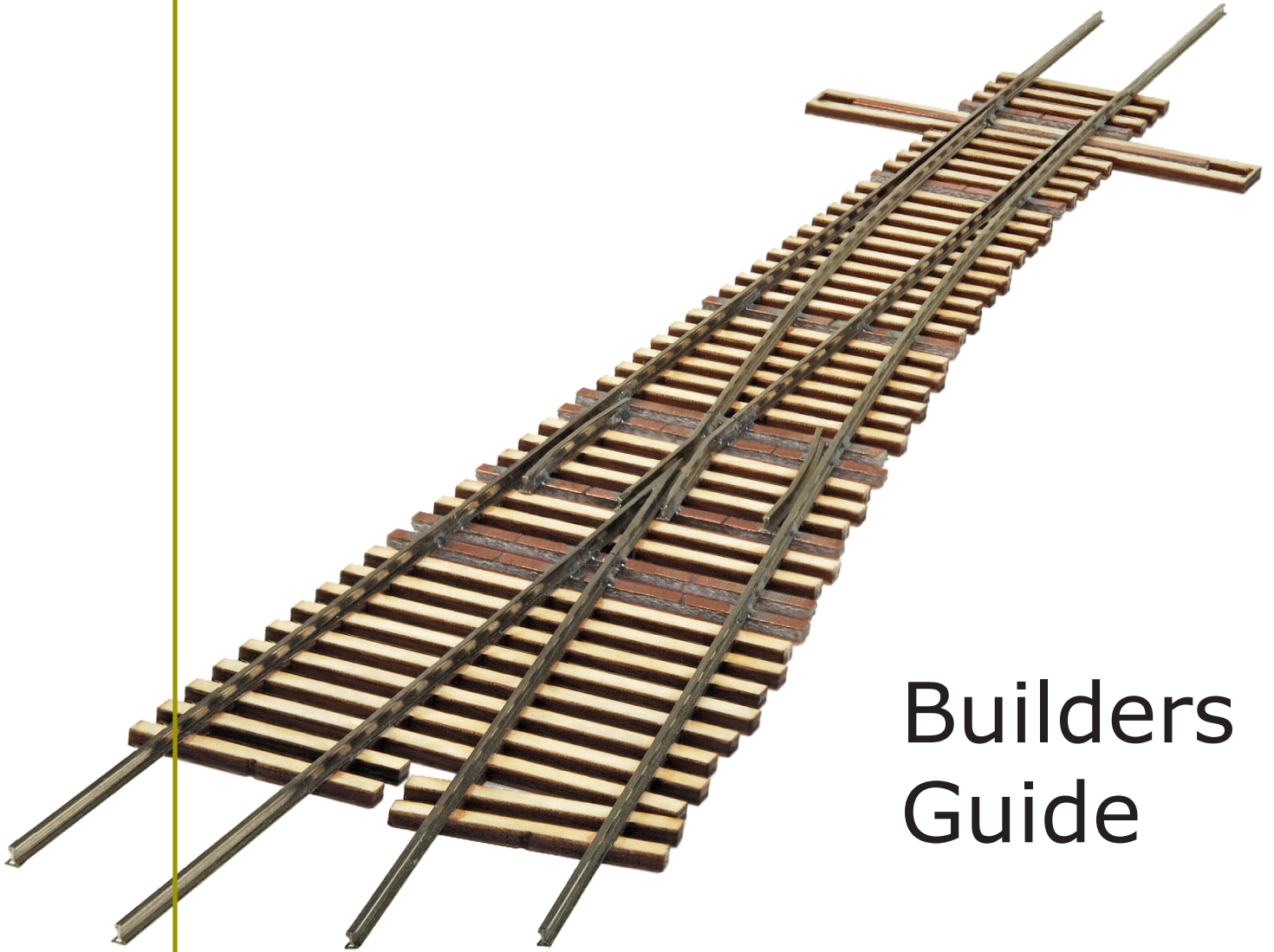


# Building Turnouts Using Fast Tracks Assembly Fixtures



## Builders Guide



# FAST TRACKS



Since 2003

## **Fast Tracks Builders Guide UG01**

The latest version of this Builders Guide is always available for download from the Fast Tracks website at:  
[www.handlaidtrack.com/documents](http://www.handlaidtrack.com/documents)

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## Thank You For Buying Fast Tracks Products!

Fast Tracks was born out of my frustration with building accurate and reliable turnouts by hand. I just felt that there had to be a better way. So after a lot of experimenting and trial and error I came up with a solution that worked so well, that I decided to offer track assembly fixtures for sale to other model railroaders.

I have spent a lot of time 'sweating the details' and have worked hard to produce the highest quality product possible. If you are not 100% satisfied with your Fast Tracks product, or are not getting the results that you expected, then please contact me directly at [service@fast-tracks.net](mailto:service@fast-tracks.net) and I will try and help you out, or arrange to refund your money.

If you are happy with your Fast Tracks product, then please tell your friends! Despite our hyper-linked and over-connected society, I still rely mostly on satisfied customers and word of mouth to promote my products.

You will always find the latest version of these instructions on the Fast Tracks website at [www.handlaidtrack.com/documents](http://www.handlaidtrack.com/documents) . I would suggest that you bookmark this address in your browser so that if you ever misplace or wear out these instructions you will be able to download another copy from our website.

We also maintain an online discussion forum about Fast Tracks products on our website at [www.handlaidtrack.com/forums](http://www.handlaidtrack.com/forums). There you will find a host of information & advice from myself and other customers. Why not drop by and tell us how you are making out with your hand laid track project?

Also, [Fast Tracks is on Facebook!](#) If you are a Facebook user, join our Fast Tracks page as I frequently update it with what is going on here during the day.

Again, thank you for your purchase. And please do not hesitate to contact me if you have any questions or problems with your product. I will do my best to reply within one business day.

Tim Warris & the staff at Fast Tracks  
[service@fast-tracks.net](mailto:service@fast-tracks.net)  
[www.fast-track.net](http://www.fast-track.net)



## **Switch Types**

The instructions provided in this document applies to:

- **Turnouts**
- **Curved Turnouts**
- **Wyes**

### **Curved Turnouts**



To build a curved turnout, simply follow the instructions in this document. The only difference is that you need to curve the rail to match the curved rail slots before you insert the rail into the assembly fixture.

Our Rail Roller rail bending tool makes this very easy and is highly recommended. You can learn more about the Fast Tracks Rail Roller on our website at: [www.handlaidtrack.com/rail-roller](http://www.handlaidtrack.com/rail-roller).



### **Wyes**

To build a Wye, simply follow the steps detailed in this document.

## **Soldering Techniques**

We highly recommend that you carefully review and practice the soldering techniques detailed in our soldering videos and Soldering Techniques document (AN01) before you begin. You will find the videos and document on the DVD that was included with your order or on our website at [www.handlaidtrack.com/documents](http://www.handlaidtrack.com/documents).

## **Weathered Rail Warning**

We do not recommend the use of weathered rail for building trackwork using the Fast Tracks Assembly Fixtures. The weathering effect that is applied to the rail makes it very difficult to solder the PC Board ties to the rail. If you have weathered rail on hand, we suggest you use it for other areas of your layout and purchase non-weathered rail for building turnouts.

## **Related Documents**

The following documents are referred to in this document and will be needed during construction. You may want to print copies of them now.

These documents will be included on the documentation DVD that you received with your fixture, or you can download the latest version from our website at: [www.handlaidtrack.com/documents](http://www.handlaidtrack.com/documents).

- **Using The Fast Tracks PointForm Tool** - UG10
- **Filing The Stock Rail With The Fast Tracks StockAid Tool** - UG18
- **Using Fast Tracks PC Board Ties** - UG09
- **Using The Fast Tracks Rail Roller (Curved turnouts only)** - UG12
- **Developing Good Soldering Techniques** - AN01

## **NMRA Compliancy & MMR Certification**

Turnouts built with Fast Tracks tools and following the instructions provided in this document and in our **Using Fast Tracks Assembly Fixtures** video will be NMRA compliant.

Fast Tracks tools may be used to construct trackwork for your Civil Engineering certificate, however you should always confirm NMRA compliancy by checking the turnout using your NMRA track gauge.



## **Building a Turnout in a Fast Tracks Assembly Fixture**

This document details the construction of a turnout using a Fast Tracks assembly fixture, tools and supplies.

There are 10 parts to building a Turnout including:

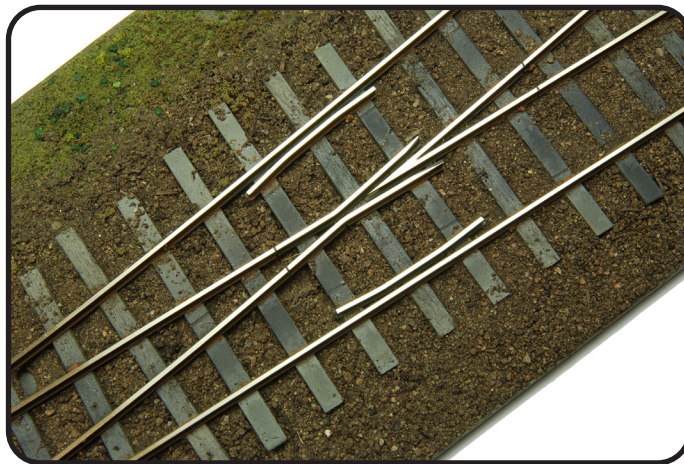
1. Form The Guard Rails
2. Form & Solder The Frog Points
3. Prepare & Insert The PC Board Ties Into The Assembly Fixture
4. Prepare & Install The Stock Rails
5. Prepare and Install The Switch Points
6. Install The Guard Rails & Frog Points
7. Complete The Switch Points
8. Re-Enforce The Frog Points
9. Cleaning The Turnout
10. Isolate The Frog
11. Install The Turnout Onto QuickSticks Wood Ties

We will cover each of these parts in detail. You should plan to spend approximately 2-3 hours building your first turnout. With practice you should be able to get construction time down to as little as 45 minutes.

This document may seem a bit intimidating, but it really isn't. We have just included lots of images so you can see exactly how each step is completed.

In addition to this document, we have also produced a series of videos that describe how to build a turnout switch. These videos will be on the DVD that you received with your product, or you can watch them online on our website at:

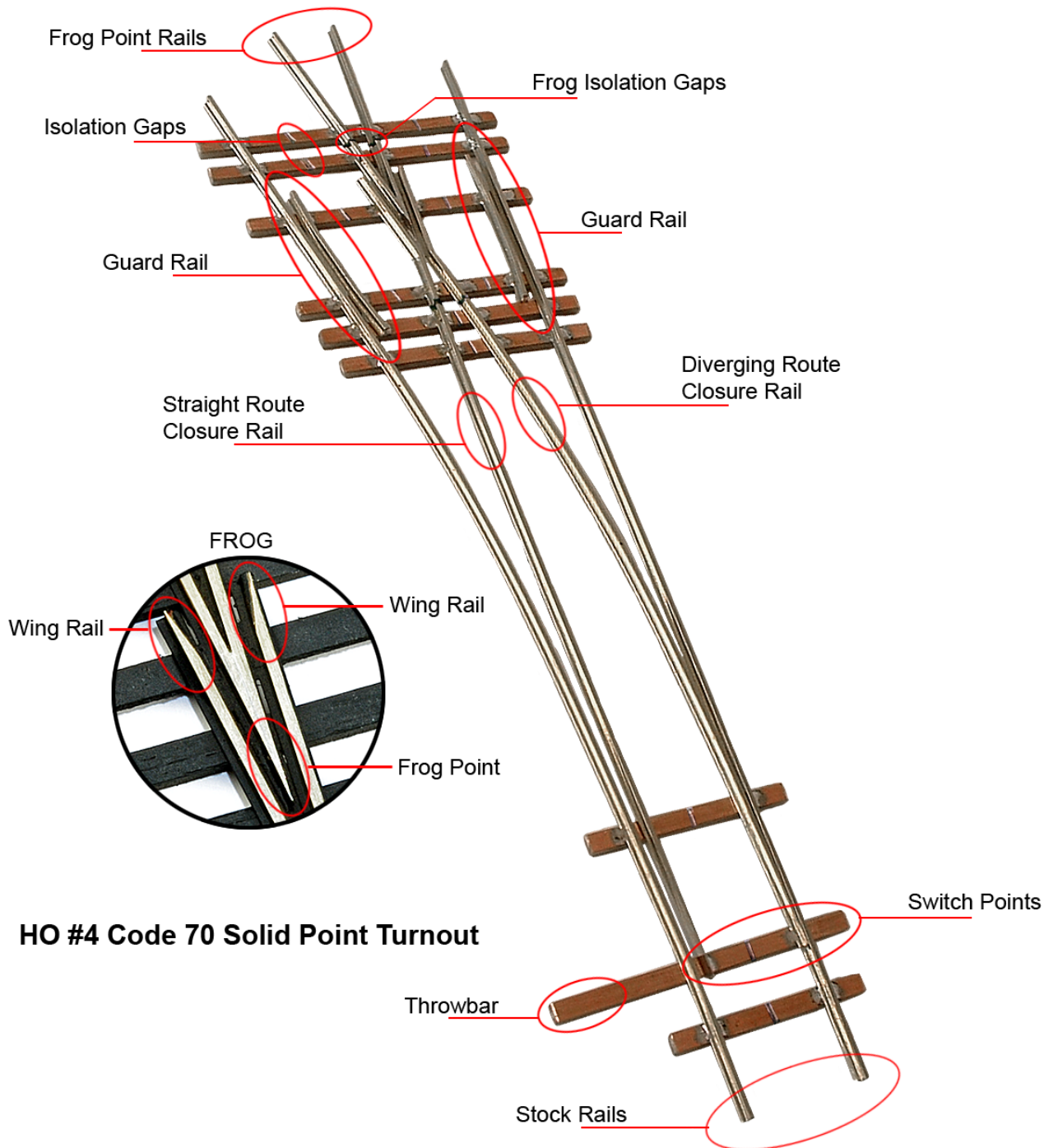
[www.handlaidtrack.com/videos](http://www.handlaidtrack.com/videos)



Close up view of the frog point area in an **On30 Turnout**. This turnout was built using the tools and techniques described in this document.



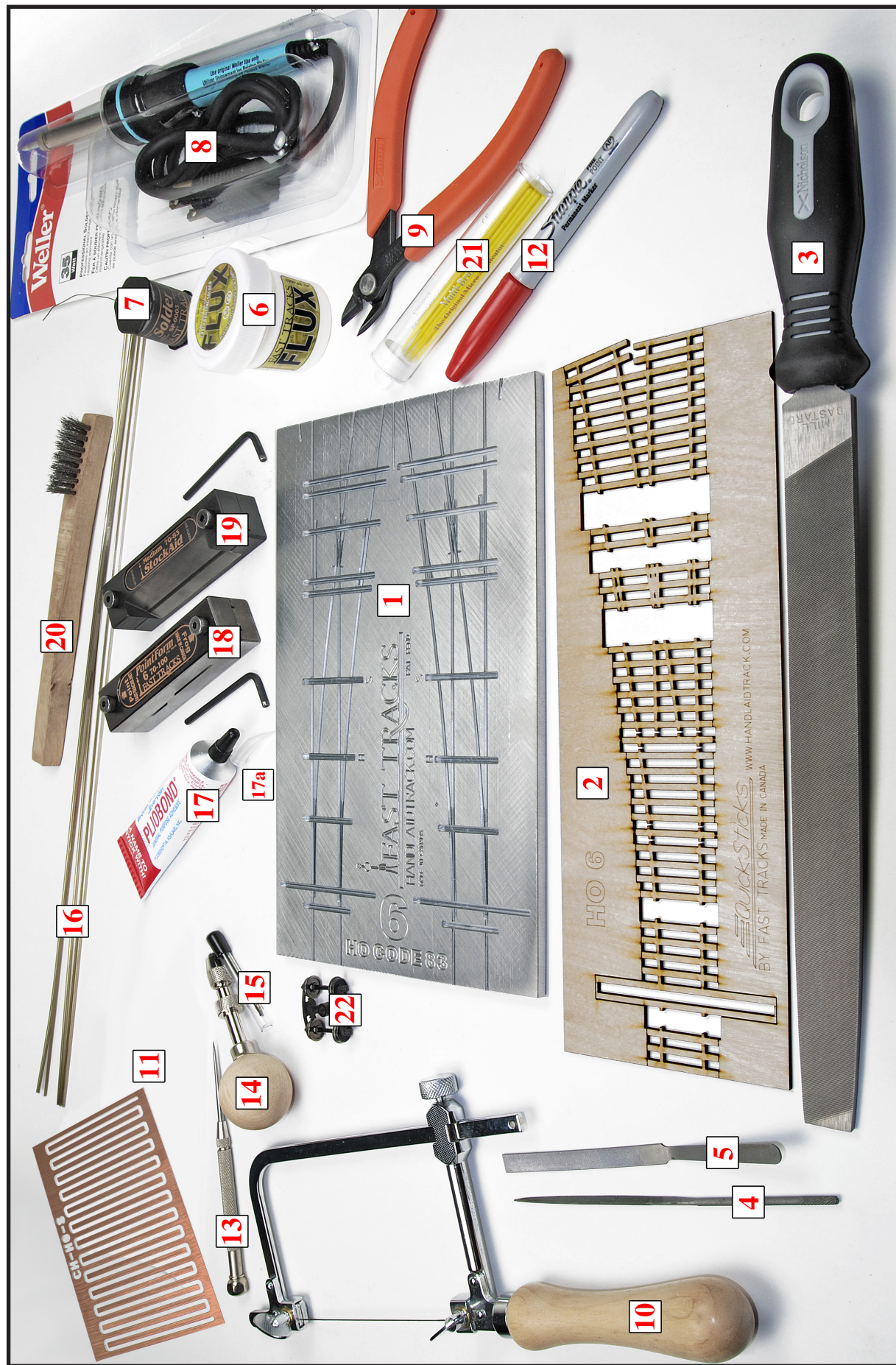
# Turnout Terminology



**HO #4 Code 70 Solid Point Turnout**



# Tools & Supplies That You Will Need



## **Tools & Supplies You Will Need**

1. Your Fast Tracks Assembly Fixture (A standard turnout fixture is shown in the tools image on the previous page.)
2. QuickSticks wood ties
3. A sharp, 10" mill cut file ([TL-0007](#))
4. Small triangle needle file ([TL-0002](#))
5. Points file ([TL-0016](#))
6. Fast Tracks own Track Building Flux Paste ([SP-0063](#))
7. Small diameter (.020") solder ([SP-0003](#))
8. 35 watt or higher soldering iron with pencil tip.
9. Xuron rail cutters ([769-2175B](#))
10. Jewelers Saw ([35-750](#)) and fine tooth ([43 TPI](#)) blade (Consider the high end [Knew Concepts Saw](#))
11. [CopperHead](#) PC Board ties
12. A sharp point marker
13. Scriber ([TL-0010](#))
14. Hand Drill ([TL-0024](#))
15. Throwbar drill bits ([TL-0031](#))
16. [Rail](#)
17. Pliobond adhesive ([SP-0001](#)) with micro-applicator tip ([SP-0023](#))
18. [PointForm](#) points filing tool
19. [StockAid](#) stock rail filing tool (Optional, but highly recommended)
20. Wire brush ([TL-0038](#))
21. Micro applicator ([TL-0025](#))
22. Wheel set
23. A copy of the track template for the turnout you are building. (Not shown) You can download the most recent version of the template from our website at [www.handlaidtrack.com/track-templates](http://www.handlaidtrack.com/track-templates)



## Part 1 - Form The Guard Rails

The first step in the construction of any turnout built in a Fast Tracks fixture is to form the guard rails. We will make these, and set them aside until later in the build.

Image 1

Located on one end of each fixture will be three small grooves used to shape the guard rails. (Image 1) The longest of the three grooves is used to cut the guard rail to length.

To form a guard rail, start with a length of rail that has the end cut square and slide the rail into the longest groove. (Image 2).

Using rail cutters, cut the rail flush to the end of the fixture.

(Image 3) (Image 4)

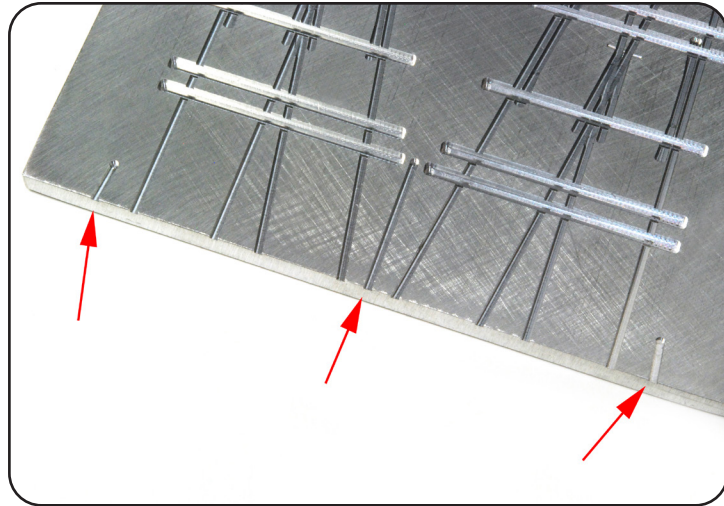


Image 2

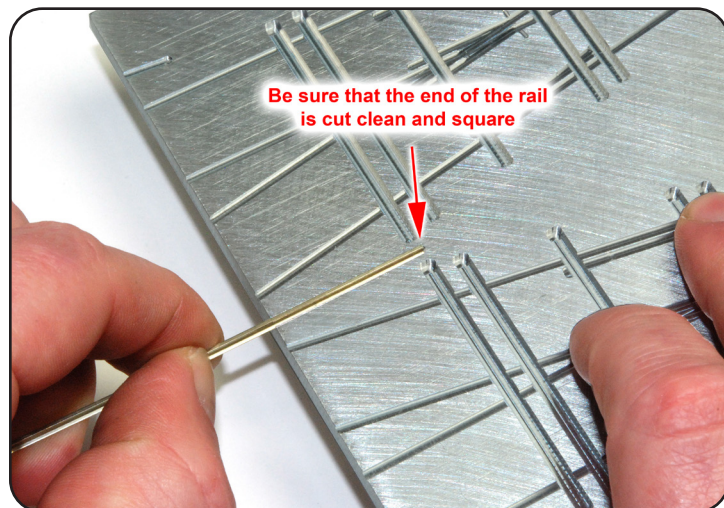
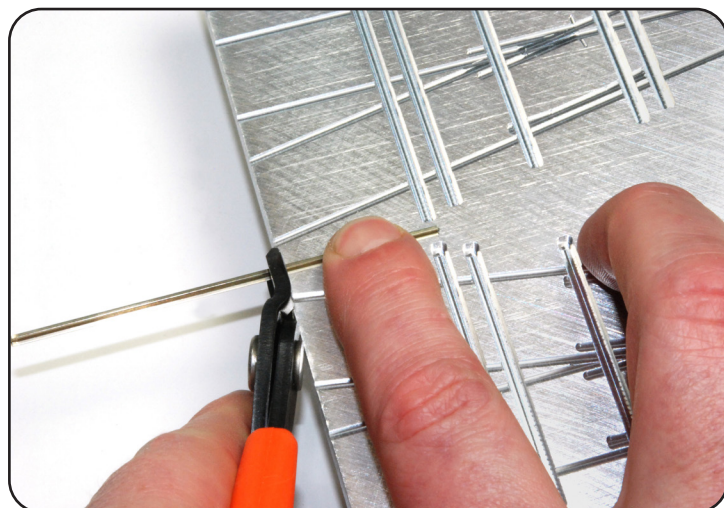


Image 3



### Click The Images For A Larger View!

If you are viewing this document on your computer and you have access to the internet, click on any image for a larger, high resolution version.

Image 4

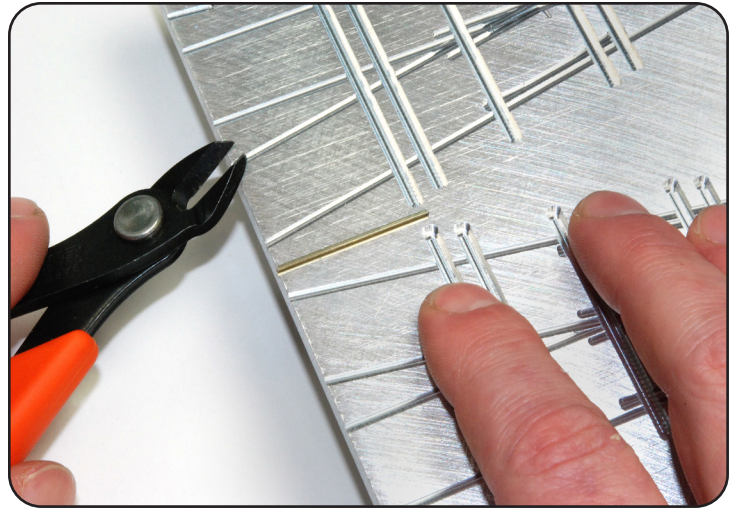


Image 5

The ends of the guard rails need to have a slight bend to keep the wheel flanges from striking the sharp end of the rail.

The short grooves on the end of the fixture are cut on a slight angle and are used to aid in bending the ends of the guard rail.

Slide the length of rail that you cut in the previous step into the groove and bend it slightly so it is square with the end of the fixture. (Image 5)

Repeat this process using the opposite groove for the other end of the guard rail. (Image 6)

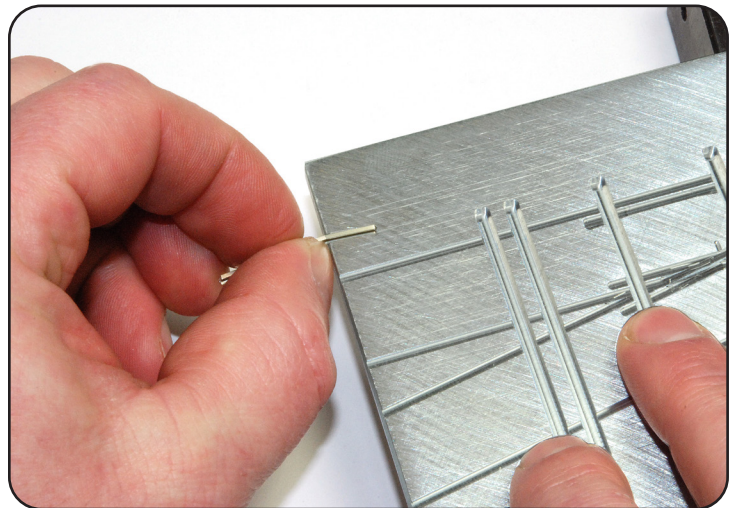


Image 6

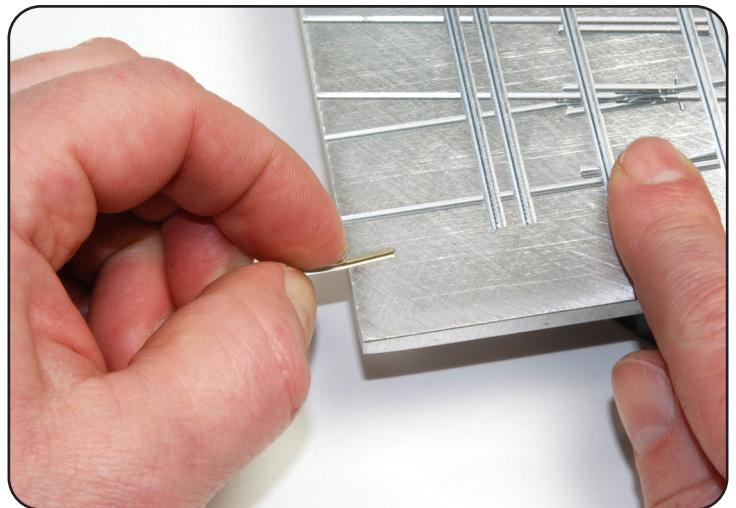




Image 7

Confirm that the guard rail fits properly into the guard rail groove in the fixture. (Image 7)

Repeat these steps to form a second guard rail and set them aside. (Image 8)

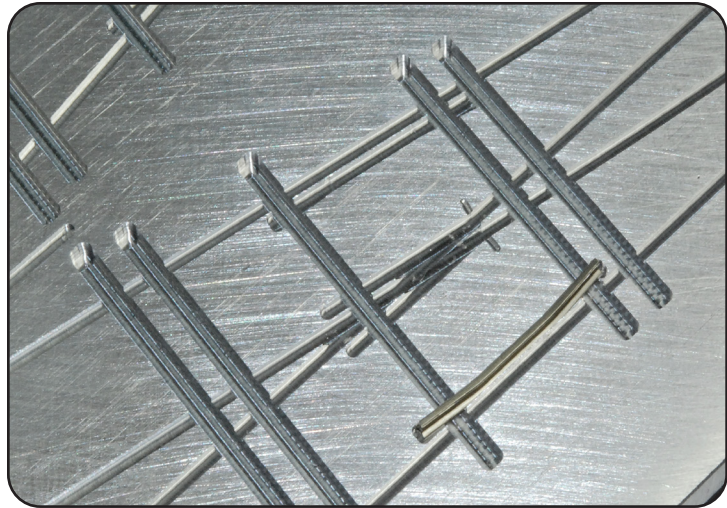


Image 8



**Z scale** frog points



## Part 2 - Forming and Soldering The Frog Point

It is much easier to form and pre-solder the two halves of the frog point before adding the PC Board ties to the fixture, so we will do that now.

Forming the frog point rails is best done using our PointForm tool. This will ensure perfectly formed frog points that are nice and sharp — the key to high performance trackwork. (Image 9)

If you will be using QuickSticks laser cut wood ties to complete your turnout, you can use the QuickSticks to help you determine the length of the rails for the frog. The goal is to ensure that the rails are long enough to extend well past the last tie in the turnout. (Image 10)

Place the QuickSticks under the fixture and line up the throwbar tie pocket in the fixture with the head ties on the QuickSticks. (Image 10).

Cut two lengths of rail long enough to extend past the last tie of the QuickSticks. Be generous, it never hurts to have extra rail when it comes time to install the turnout.

If you are not using QuickSticks, be sure to cut the frog point rails a few inches past the end of the fixture to ensure that the frog point rails will extend to the end of the turnout ties.

Image 9

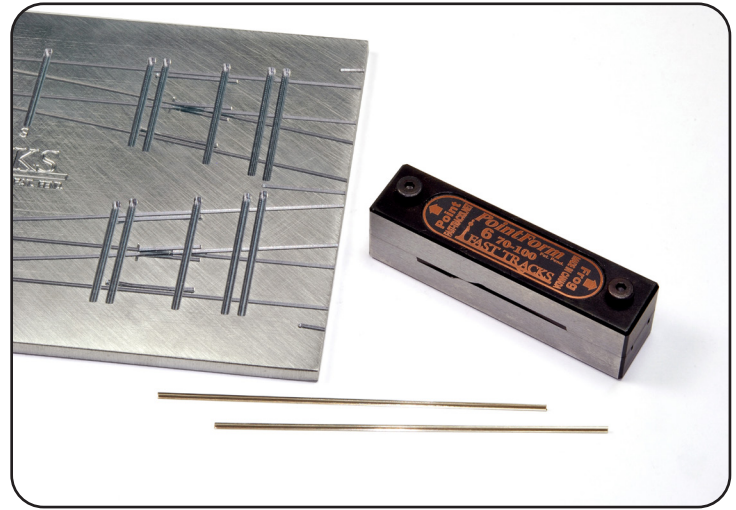
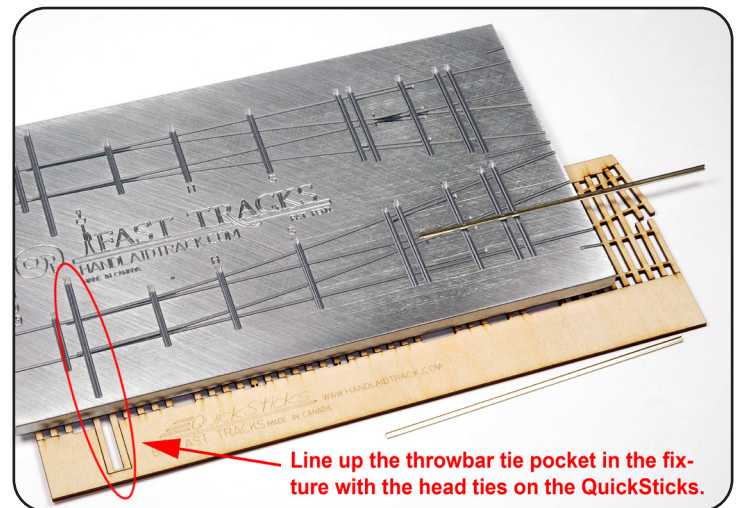


Image 10



**Completed HOn3 Turnout.** Can you spot the PC Board ties?

Image 11

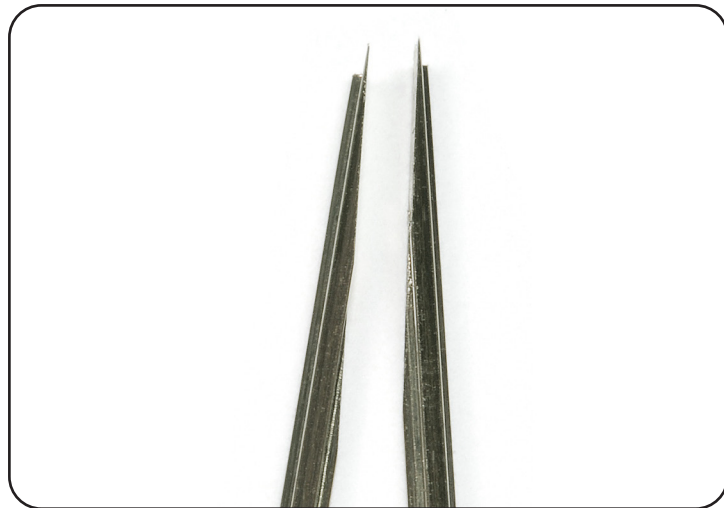
Using the PointForm tool or method of your choice, form both halves of the frog point rails (Image 12) Detailed instructions on how to use the PointForm tool can be found in the Using The Fast Tracks PointForm Tool Builders Guide and in the How To Use The PointForm Tool To Build Switch Points video. Both the Builders Guide and video can be found on the DVD that came with your Assembly Fixture.



When you are finished you should have two symmetrically shaped points as shown in (Image 12).

Image 12

Place the two frog point rails into the fixture and slide them forward until they meet. Do not push the points too far into the fixture or the rail will want to "roll" over. It is very important that the rails are sitting perfectly flat on the bottom of the rail groove in the fixture. (Image 13)



Apply a small amount of flux on top of the points in preparation for soldering. (Image 14)

Image 13

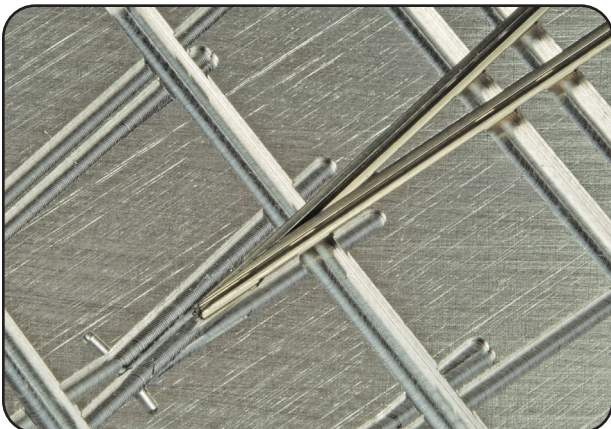


Image 14

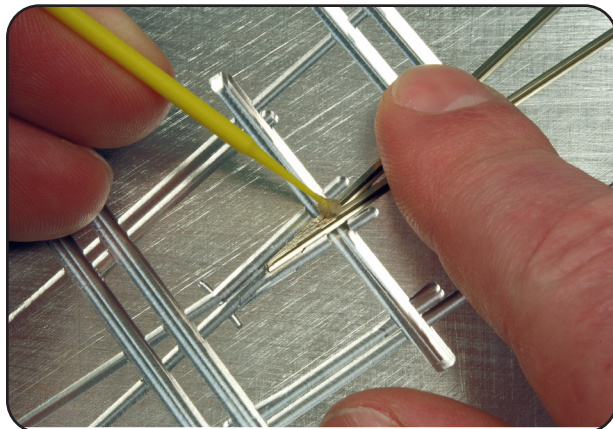




Image 15

For more information about fluxing and soldering the points, watch the soldering videos that are included on the DVD.

Solder the two halves of the frog point together by applying heat and soldering directly to the top of the rail. The fixture may act as a bit of a heatsink, so extra time may be required to get a good bond. (Image 15)

After applying a bit of solder to the top of the rails, let the iron rest on the rail for several seconds. The result should be a smooth, watery flow of solder that will wick its way between the rails halves, forming a solid bond. (Image 16)

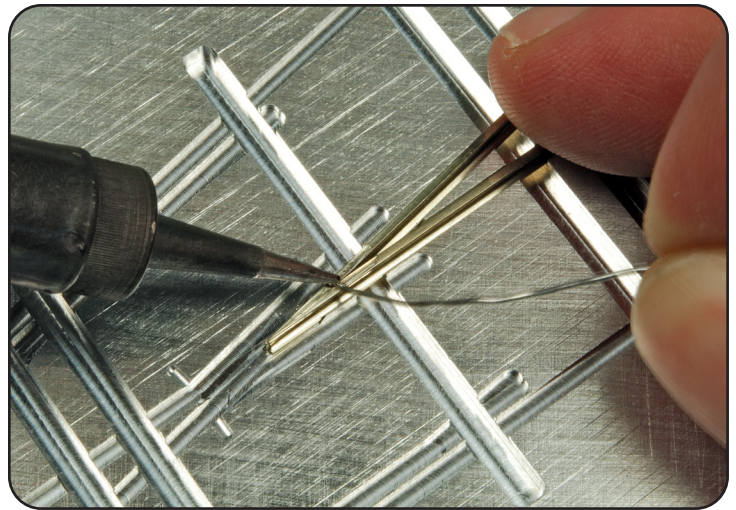


Image 16

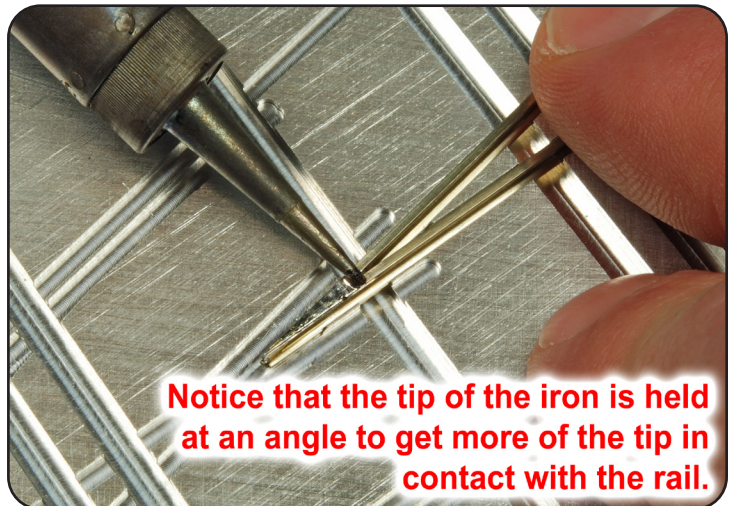


Image 17



Image 18

Remove the frog point from the fixture. The resulting assembly should be a solid, single piece frog point. (Image 17)

Solder buildup from the previous step will need to be removed from the top of the rail.

Using a large, flat file, carefully remove the solder from the rail head. Apply light pressure and several strokes to gently file the rail flat. Be careful not to be too aggressive as you want the final piece to remain flat. (Image 18)

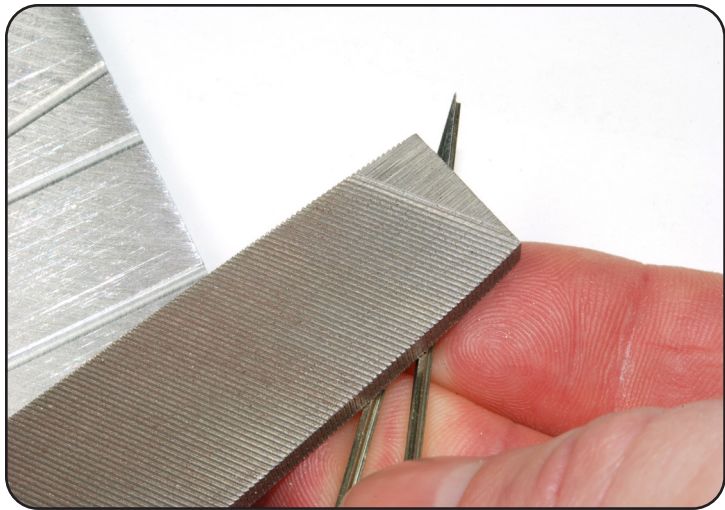
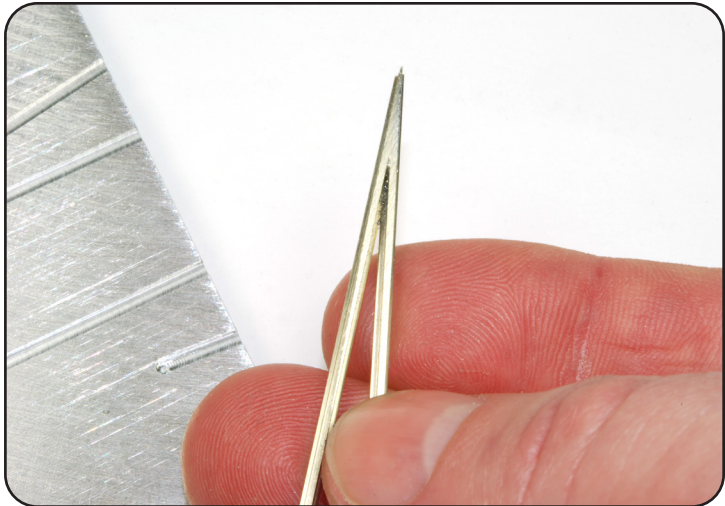


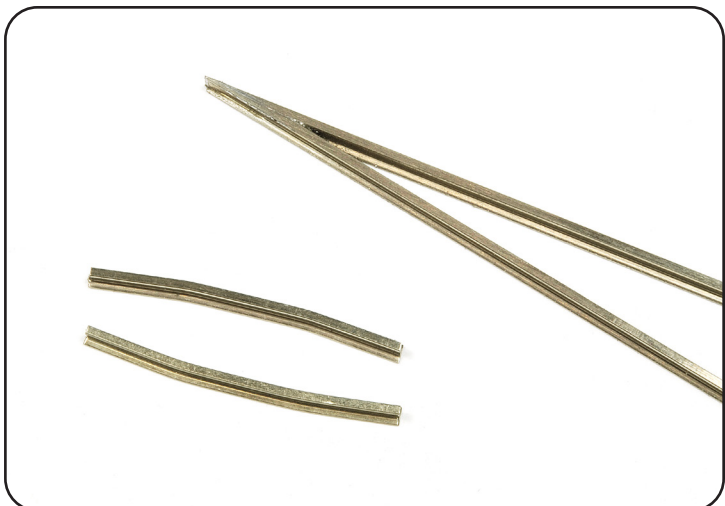
Image 19

If you end up with some small scratches in the top of the rail, you can easily smooth them out with some fine (400+ grit) sandpaper. (Image 19)



Set the completed frog point aside, along with the guard rails formed in Part 1. (Image 20)

Image 20





## **Part 3 - Prepare & Insert The PC Board Ties Into The Assembly Fixture**

A bit of care when working with PC Board ties will pay off in the long run. Be sure to check out the sidebars in this document for more information about using PC Board ties to ensure best results.

### **Wash Your Hands!**

The residue on our fingers is quite acidic and will leave very noticeable fingerprints on the surface of the copper ties. If the trackwork isn't painted fingerprints will corrode the copper over time. A quick hand wash before working with the ties will help prevent corrosion problems.

All PC Board ties used in turn-out construction need to have a gap cut into the copper surface to ensure DC and DCC compatibility. It is critical to cut these gaps and confirm that there are no electrical shorts in the trackwork ***before*** installing them into place on your layout! Once the PC Board ties are soldered

into place and the trackwork added to your layout, it will be nearly impossible to locate a missed, misplaced or shorted gap in the PC Board ties. So take your time in locating and cutting the isolation gaps in the PC Board ties.

Included on the Fast Tracks DVD that you received with your order will be a complete library of track template drawings for each piece of trackwork that we produce. The track template drawing will provide the location of all the necessary gaps that you need to cut into the rails and PC Board ties.

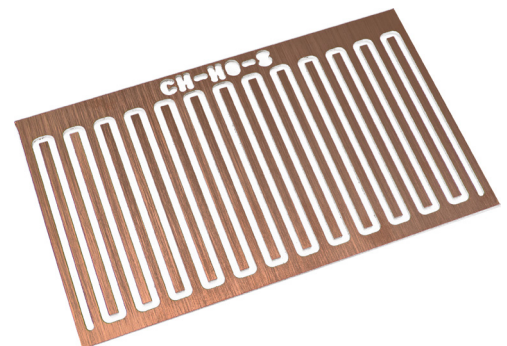
Locate the track template on the DVD for the size and type of turnout you are building and print it out now. (Image 21) If you cannot find the track template that you need on the DVD, you can download a copy from our website at: [www.handlaidtrack.com/track-templates](http://www.handlaidtrack.com/track-templates)

Image 21



### **CopperHead PC Board Ties**

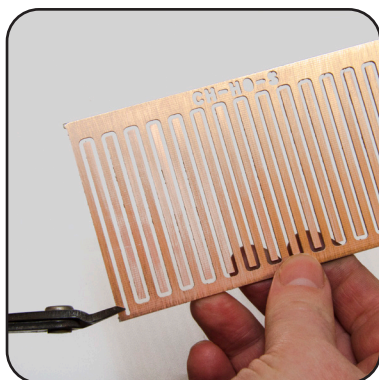
CopperHead PC board ties are routed from solid PC board material, producing a precise, clean PC board tie. These require much less clean up as the edges are nice and crisp.



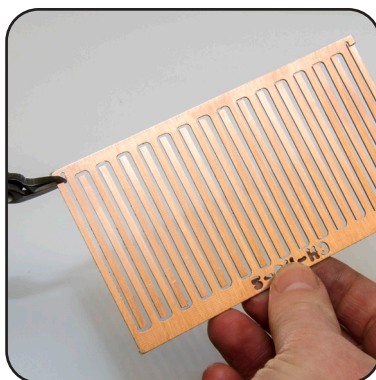


## Working with CopperHead PC Board Ties

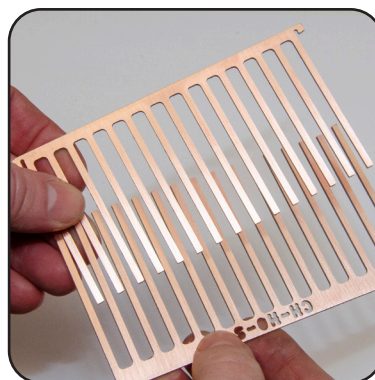
In 2013 Fast Tracks introduced CopperHead PC Board Ties. These ties are routed from solid PC board material to produce a higher quality and more precise tie. To use these ties they need to be removed from the "frets" to which they are attached. This is easily done using Rail Cutters following the steps outlined below.



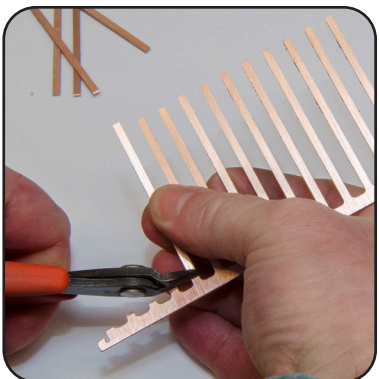
Using rail cutters cut through the last tie on the fret.



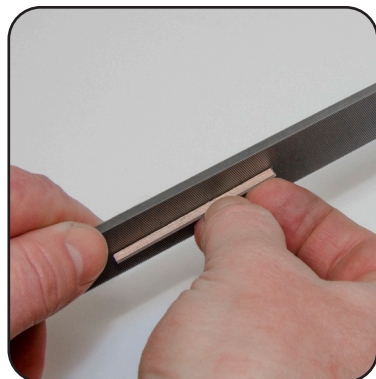
Rotate the fret of ties around and cut the tie on the opposite end.



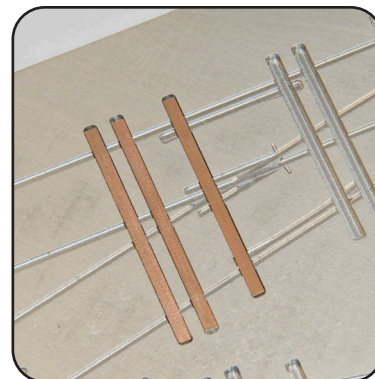
Separate the two halves of ties.



Snip the ties from the fret using rail cutters.



Lightly file across the top and sides of the tie to remove any burrs.



Ties are ready to use in your Fast Tracks fixture.



Image 22

The PC Board ties that we have available are longer than required and will have to be cut to length to match the pocket in the fixture.

Using the Track Template, or the fixture itself, mark the length of the first PC Board tie. This can be done with a marker, scribe, or the end of a triangle file as shown in Image 22.

Using rail cutters cut the tie to length. (Image 23). As the PC Board ties are made from soft copper and fiberglass material, it is safe to use your rail cutters to cut PC Board ties.

Cutting the PC Board ties will leave a small burr on the cut end which can effect the performance of the fixture. (Image 24)



Image 23

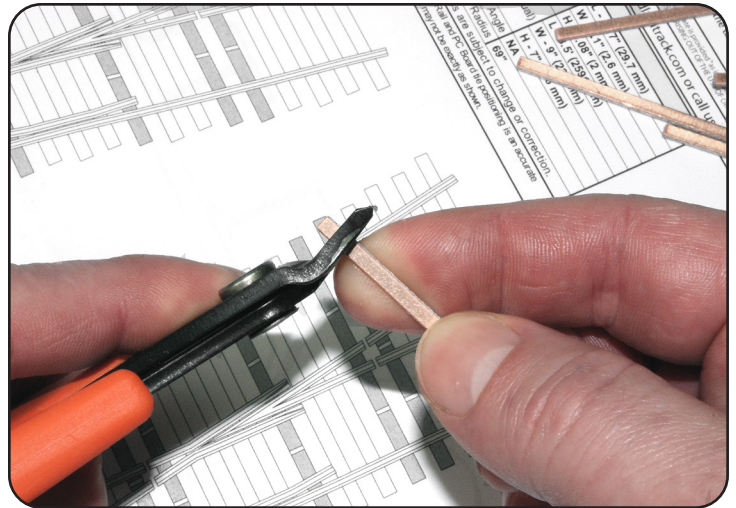
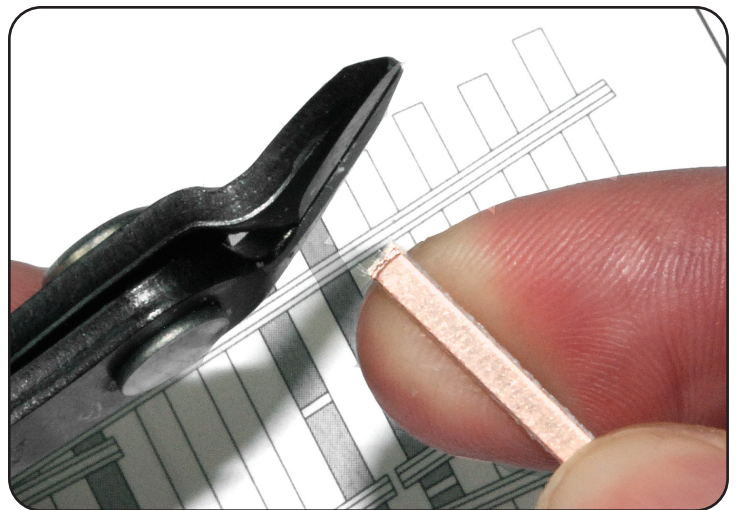


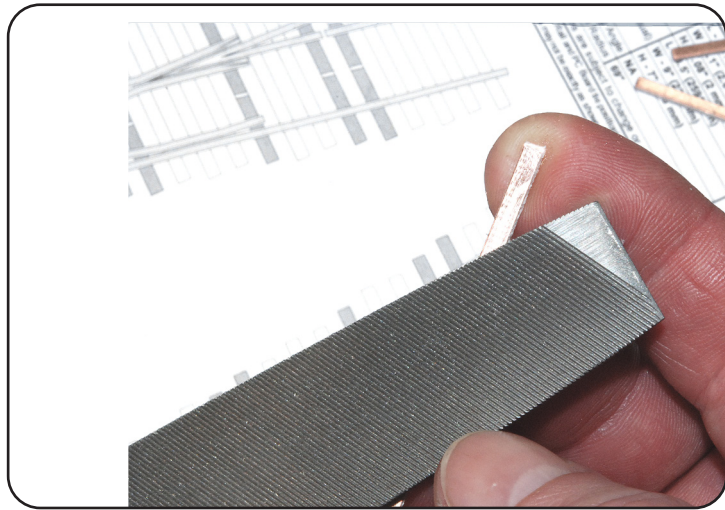
Image 24





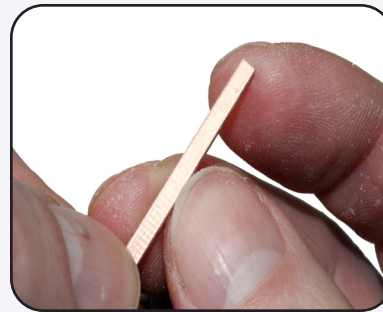
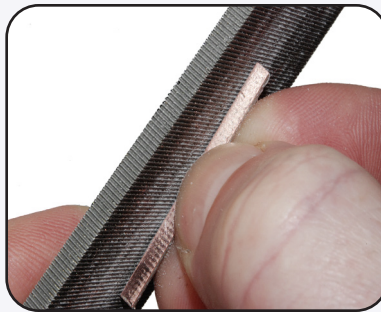
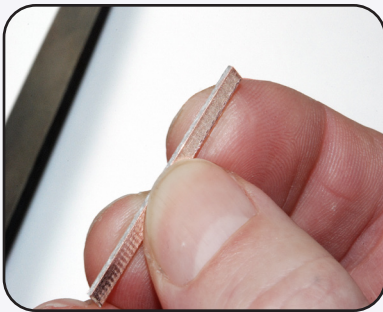
To remove this burr, use a flat file and lightly file the top surface of the PC Board tie to smooth out the burr. This step will also lightly polish the tie which will aid in the soldering process. Lightly file both the top and bottom of the tie.

It may also be necessary to file the end of the tie a bit so that it will fit into the fixture. (Image 25)



Filing the edges of PC Board ties to help disguise them in the finished trackwork.

A quick pass with a file along the edge of the tie will create a smooth edge and aid in blending the PC board ties in with the wood ties of a finished turnout. (If using the new CopperHead PC Board ties this step isn't necessary)



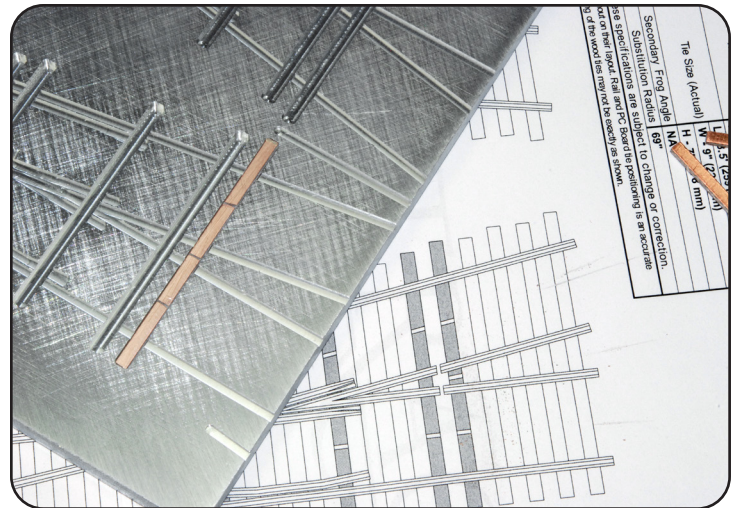
After cutting the tie to length and filing off any burrs, the next step is to cut the isolation gaps into the tie. Referring to the track template, locate the position of the gaps for each tie. (Image 26)

Every tie will require at east one gap and possibly more.

Using a triangle file carefully cut the gap at the proper location by filing the tie with the edge of the triangle file. Be sure to cut all the way through the copper cladding. (Image 26)



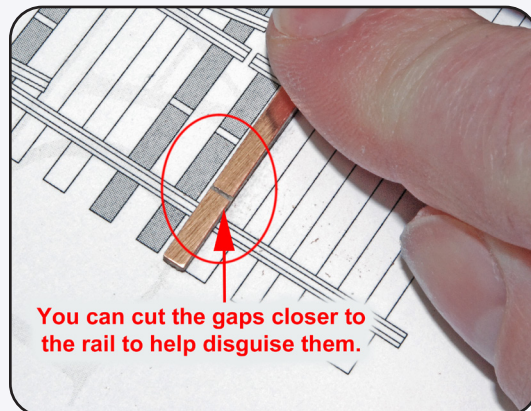
Place the prepared PC Board tie into the appropriate pocket in the fixture. (Image 27) and repeat this step for all the PC board ties in the turnout.



Cut the isolation gaps close to the edge of the rail.

It isn't necessary to cut the PC Board tie isolation gaps at the same location shown on the Track Template. We simply drew the gaps at these locations for clarity. The gaps can actually be cut anywhere between the rails.

To help blend the gaps into the finished trackwork, you can cut them closer to the edge of the rail. Just be careful to leave enough space for soldering.



## ⚠ CAUTION



IT IS VERY IMPORTANT THAT YOU ENSURE THAT THE ISOLATION GAPS ARE CLEANLY CUT AND THAT THERE IS NO CONDUCTIVITY BETWEEN THE TWO HALVES OF THE TIE.

FAILURE TO ENSURE COMPLETE ISOLATION CAN RESULT IN AN ELECTRICAL SHORT, WHICH CAN CAUSE EQUIPMENT PROBLEMS, OVERHEATING AND THE RISK OF FIRE.

WE RECOMMEND THAT YOU CONFIRM THAT THE ISOLATION GAP HAS NO SHORTS BY TESTING WITH A CONTINUITY TESTER.

If you are constructing a *Solid Switch Point*, place a PC Board tie in the pocket marked "**S**".

If you are constructing a *Hinged Switch Point* turnout, then add a tie at the location marked "**H**".

If your fixture only has a single pocket marked "**H/S**", then place a PC Board tie in that pocket regardless of the type of turnout point you are using.

Not sure which pocket to use? Read the sidebar about Hinged vs. Solid Switch Points.

Still not sure? Then use the Solid Switch Point method and put the tie in the **S** pocket.

## **Part 4 - Preparing & Installing The Stock Rails**

Both the straight and curved stock rails require a section of the base of the rail to be removed to allow the switch points to tightly close against the stock rail.

There are a number of techniques for removing the base of the stock rail, but the easiest and most accurate method is to use our StockAid filing tool.

We will only provide a brief overview of filing the stock rails using the StockAid tool here. For more in-depth information, refer to our **Filing The Stock Rail With The Fast Tracks StockAid Tool** document (UG18), or you can watch our **How To Use The StockAid Tool To File The Stock Rail** video. This video is included on the DVD that you received with your Assembly Fixture, or you can watch the video on our website at: [www.handlaidtrack.com/videos](http://www.handlaidtrack.com/videos).

### Hinged vs. Solid Switch Points. Which Type Should You Use?

All moveable switch points require some type of hinge. The simplest type is a solid point hinge, which is built by simply soldering the switch points to a PC Board tie that has been placed far enough back from the throwbar tie to allow the rails to easily flex.

Solid switch points have been proven to work extremely well for most turnout types and is our recommended method for building turnouts. A well formed solder joint is more than strong enough to reliably operate for many years.

However, there are some instances where the point rails may be too short to allow flexing, which will put too much stress on the solder joint. This usually happens with specialized switches such as slips or 3-way turnouts.

In these cases you need to use a hinged point. This document only details the solid point building method. If you need to build a hinged point, refer to our Building Hinged Switch Points Builders Guide.



Image 28

Starting with the straight stock rail, cut a length of rail long enough to extend about 1" past the end of the last ties in the turnout you are building.

If you are using our laser cut QuickSticks, line these up next to the fixture using the throwbar ties as a reference and cut the rail to length. (Image 28)

Place the rail into the fixture and mark the ends where the base of the rail is to be removed. This will be between the end of the switch points at the throwbar, and where the stock rail and the point rails diverge. Arrows A & B in Image 29.

Image 30 is a tight shot showing where the two rails diverge (A), this is the end of the area that needs to be removed.

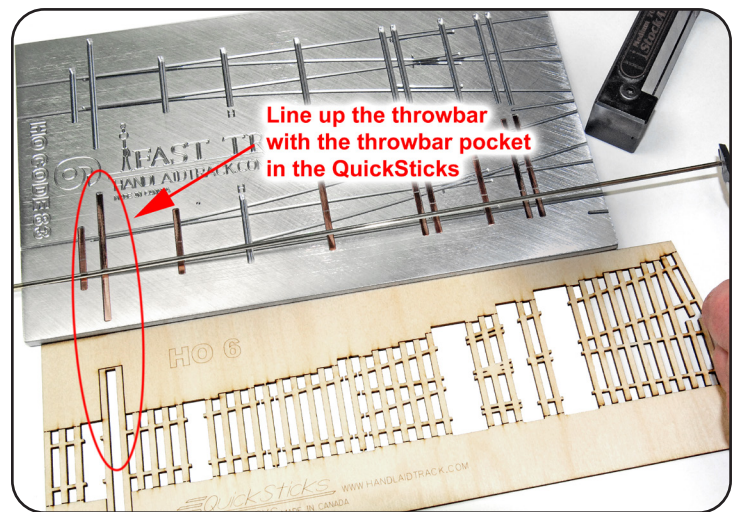


Image 29

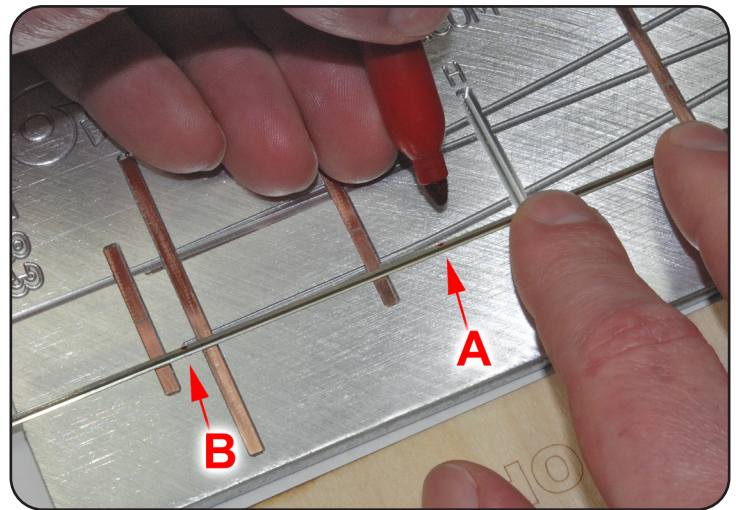


Image 30

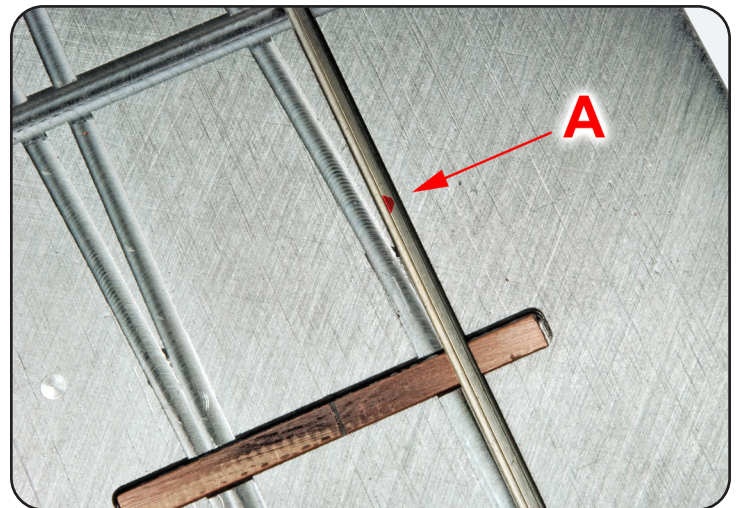


Image 31

For clarity, it is best to mark the area to be removed with a marker. (Image 31) This will help you to position the rail in the StockAid tool.

Slide the rail into the StockAid tool, lining up the switch point end (End B in Image 29) of the area to be removed against the edge of the tool. (Image 32)

Now gently file the base of the rail flush to the face of the StockAid tool. One end of the rail is to have a sharp edge, the other tapers out. (Image 34) (Image 35)

To avoid file 'chatter', file up from the bottom of the StockAid tool in one direction only. (Image 33)

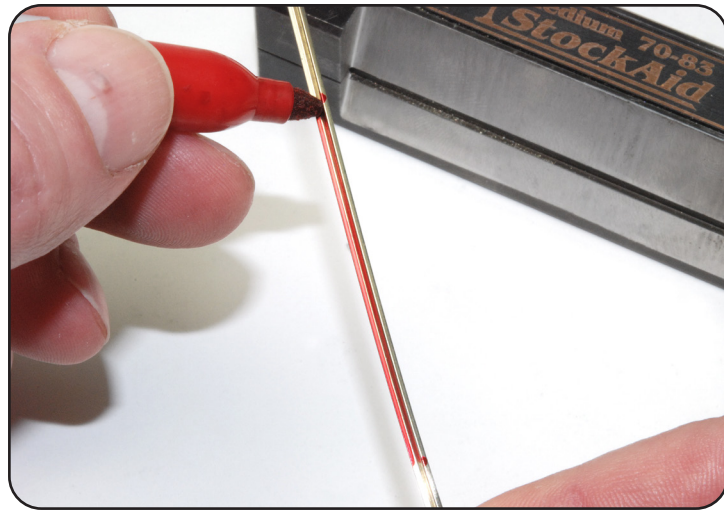


Image 32

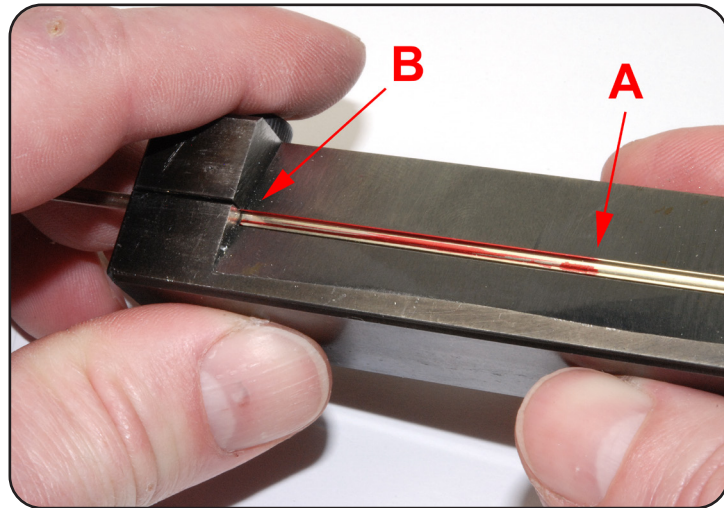


Image 33

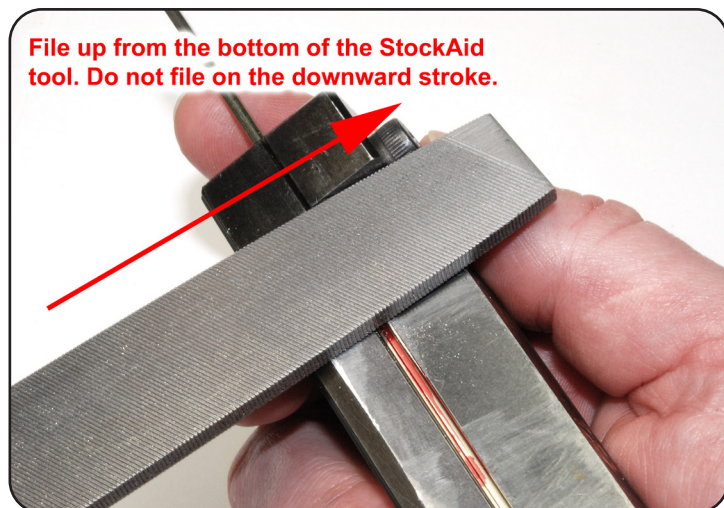




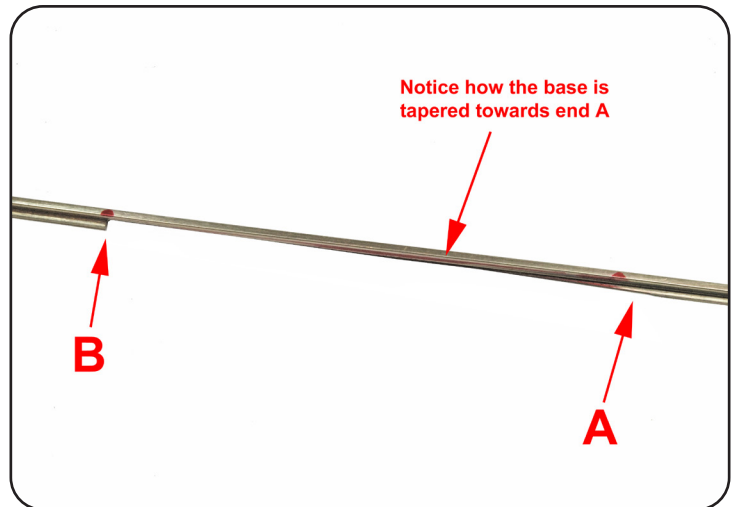
Image 34

The sharp end is where the switch points will end (End B), and the tapered end is where the switch point rail diverges from the stock rail. (End A) (Image 34)

Image 36 shows the completed



Image 35



**HO Turnout** finished with gapped PC Board ties and QuickSticks.

Image 36

stock rail aligned to where it will be inserted into the fixture.

It is best to flux and solder one tie prior to soldering the rest. This will help stabilize the rail in the fixture while you are working.

If you have not already done so, we highly recommend that you watch the soldering videos included on the DVD that you received with your fixture or kit. These videos contain lots of juicy tips on how to solder trackwork like a pro.

Reliable, smooth running trackwork depends on high quality soldering work, so spending time practicing and developing your soldering skills on some scrap pieces of PC Board ties and rails will pay off with reliable and great looking trackwork.

Position the stock rail into the fixture and start by soldering the tie in the "S" pocket first (or "H" pocket if you are building a hinged point turnout). Apply a very small dab of flux on both sides of the rail where the base of the rail meets the PC Board tie. (Image 37)

Remember, only use the tiniest amount of flux, keeping in mind that wherever the flux is, the solder will follow.

Now, while ensuring that the rail is sitting flat onto the top of the PC board tie, solder it into place. (Image 38)

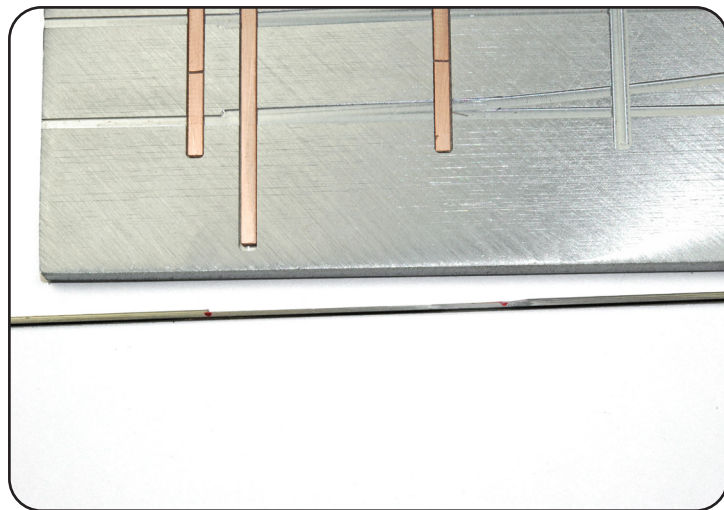
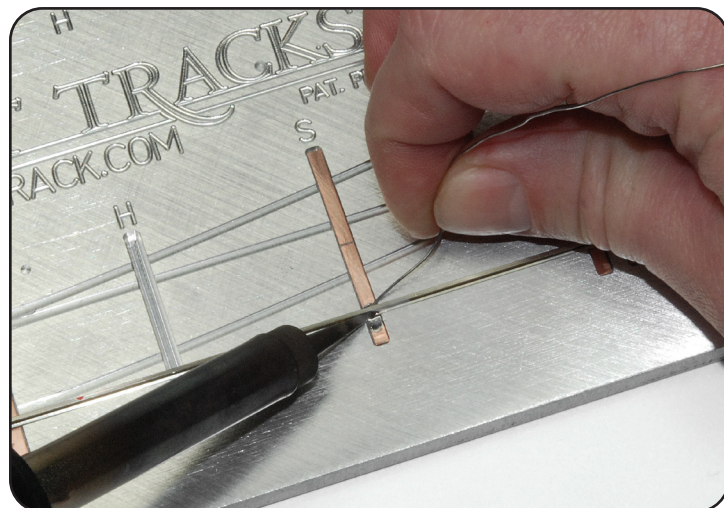


Image 37



Image 38





With the S pocket tie finished, flux and solder the remaining ties to the stock rail. To avoid interference with rails that will be added later, **DO NOT** solder the locations shown by the arrows in Image 39.

Image 39

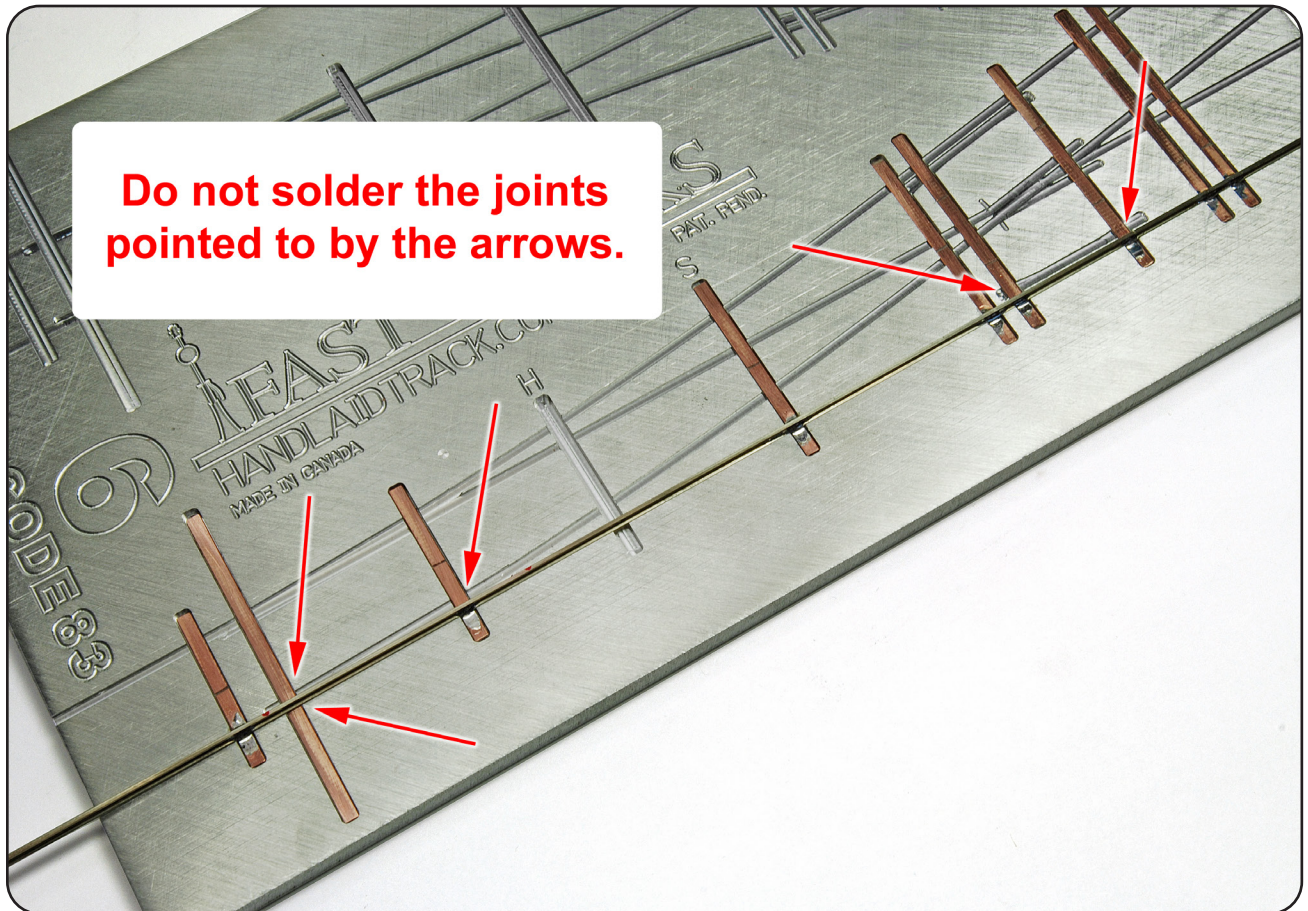


Image 40

With the straight stock rail complete, we will now form and install the curved stock rail. The steps for the curved stock rail is similar to the straight stock rail, with the added step of pre-forming the rail to match the curvature of the diverging route.

Cut a piece of rail the same length as the straight stock rail, being sure that it extends past the last tie of the turnout. (Image 40)

As before, mark the location of the base of the rail that needs to be removed. (Image 41) (Image 42)

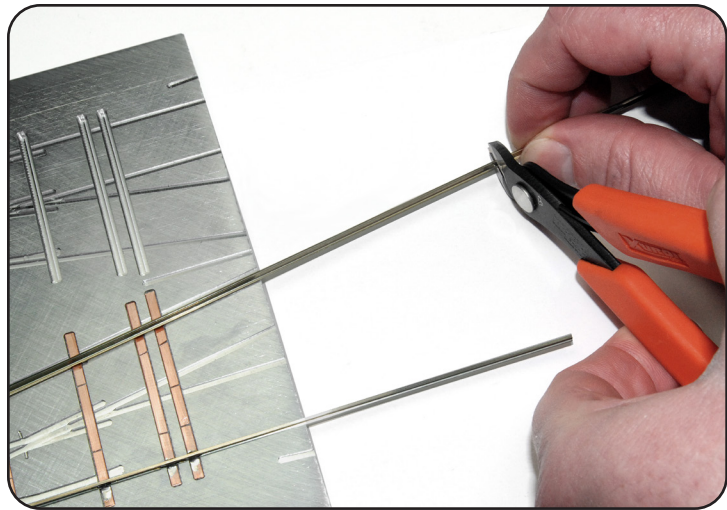


Image 41

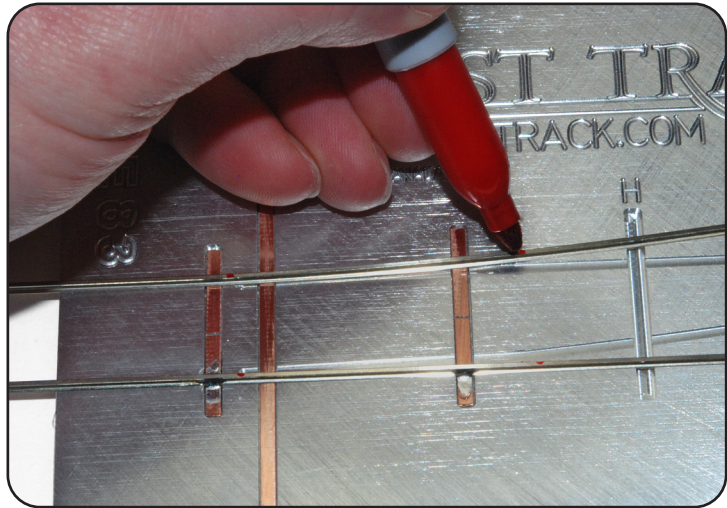


Image 42

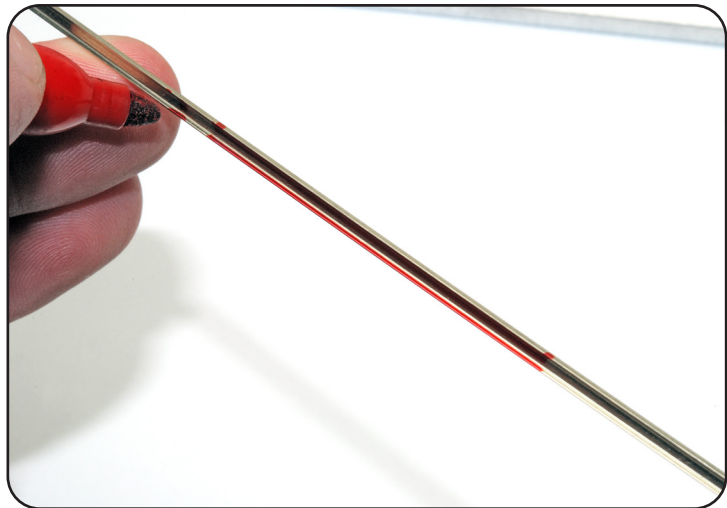




Image 43

Remove the base of the rail using the same technique that we used for the straight stock rail.

The curved stock rail needs to be formed into a gentle arc and have a slight kink formed where the switch points will sit against it. This kink is a very small bend that needs to be pre-formed prior to soldering the rail into place.

(Image 43) shows rail being gently curved to match the curvature of the diverging route. This can be done by lightly bending the rail with your fingers.

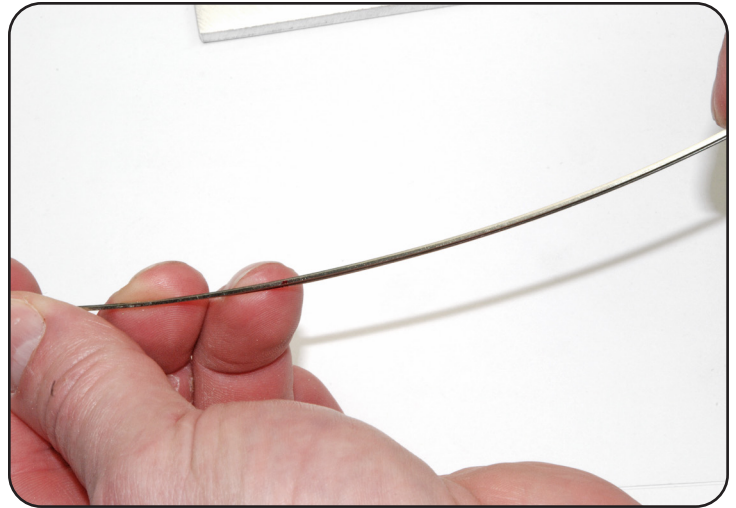


Image 44

(Image 44) shows the small kink bent into the rail. When complete, the curved stock rail should closely match the groove in the fixture.

Place the rail into the fixture, ensuring that the end of the notch in the base of the rail lines up with the end of the switch point location. (Image 45)

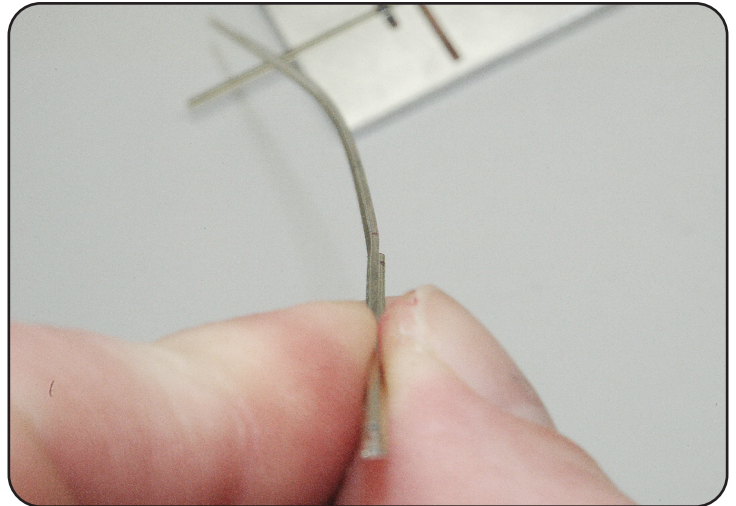
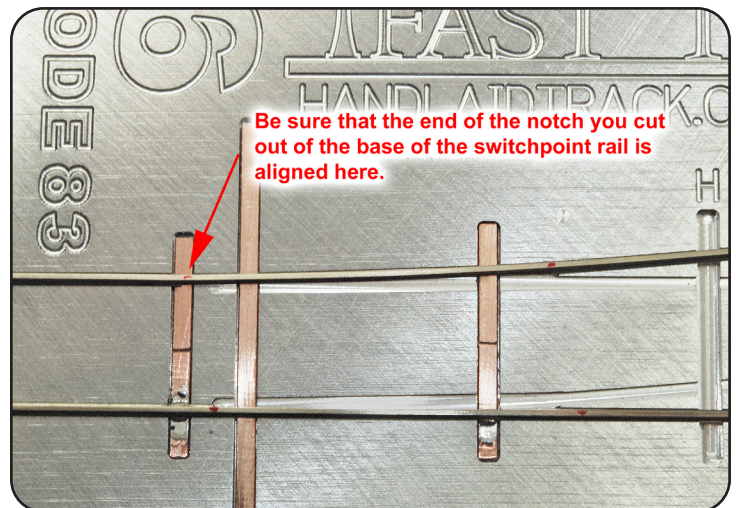


Image 45

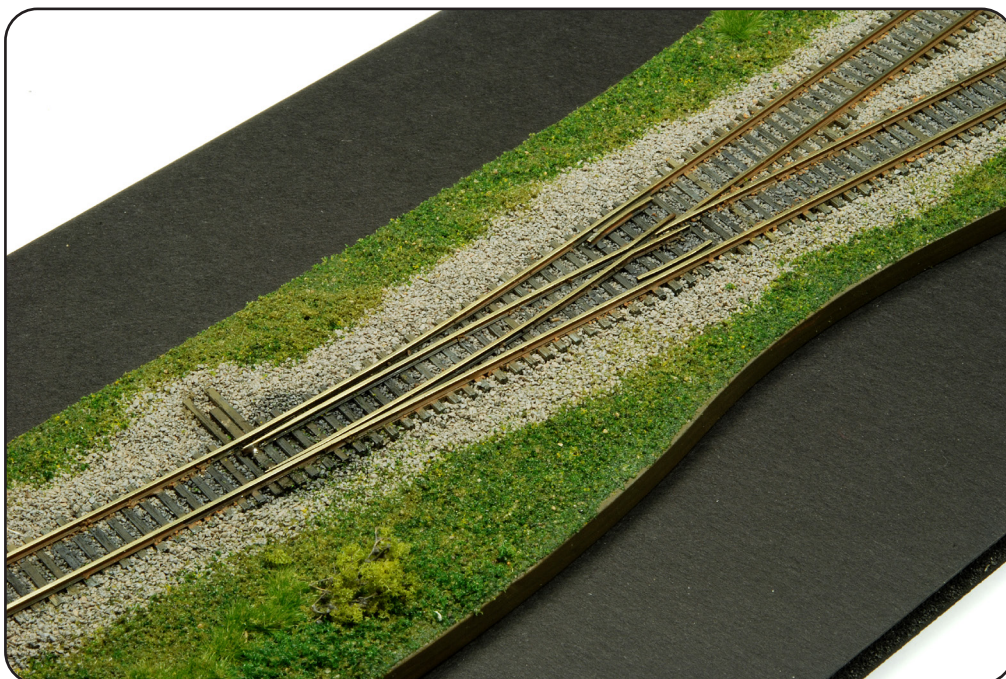
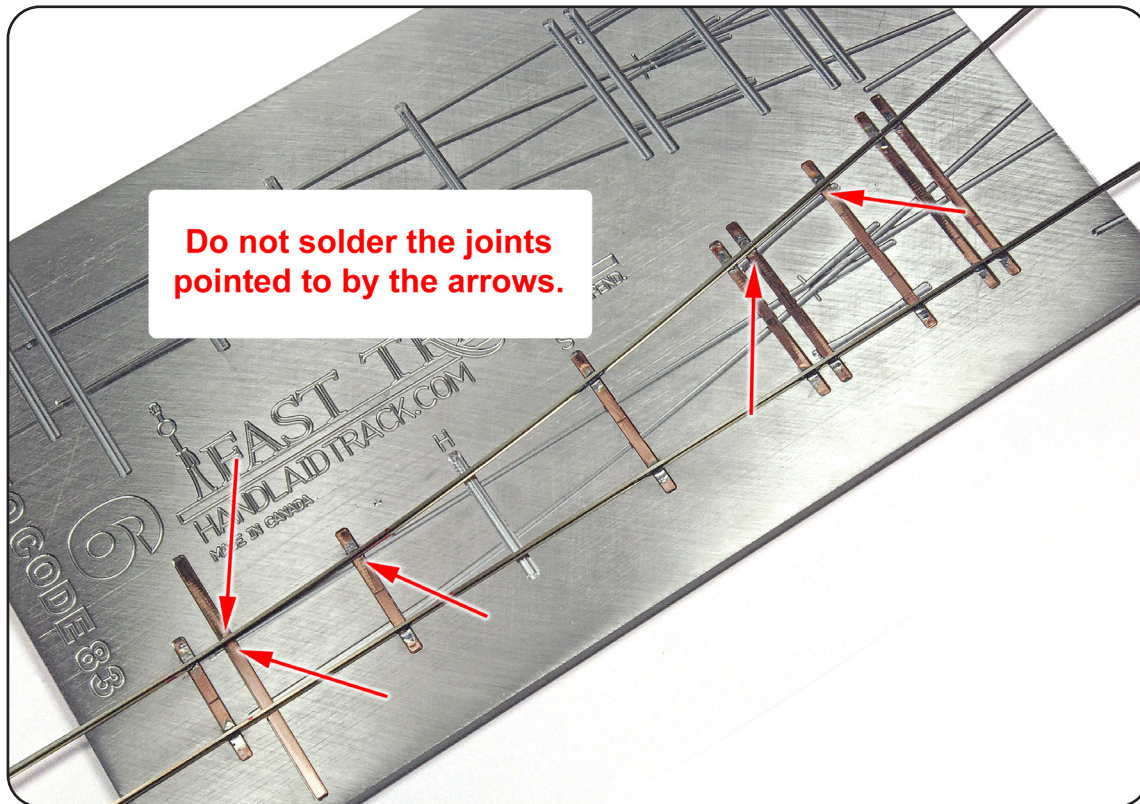




As was done with the straight stock rail, solder the rail to the "S" tie first, then solder the remaining ties. Do not apply solder in the locations marked with arrows in (Image 46).

The stock rails are now complete.

Image 46



**Z Turnout** built with code 40 rail.



## Part 5 -Preparing and Installing The Switch Points

This step details building a turnout using solid switch points. To learn more about the differences between solid and hinged switch points, see the sidebar on page 19.

A turnout with solid switch points uses a single piece of rail for the switch points, closure rail and wing rail. We will start with forming and installing the straight rail.

Cut a length of rail that is at least 1" longer than needed. This rail will extend from the end of the throwbar to the end of the wing rail. (Image 47)

File a switch point on one end of the rail. (Image 48) The simplest method to form a switch point is to use our PointForm tool. For details on how to use the PointForm tool, see the **Using The Fast Tracks PointForm Tool** (UG10) Builders Guide, or watch the **How To Use The PointForm Tool To Build Switch Points** video that is on the DVD that was included with your assembly fixture.

After filing the point, place the rail into the fixture, lining up the end of the switch point with the end of the throwbar tie. (Image 49)

Image 47

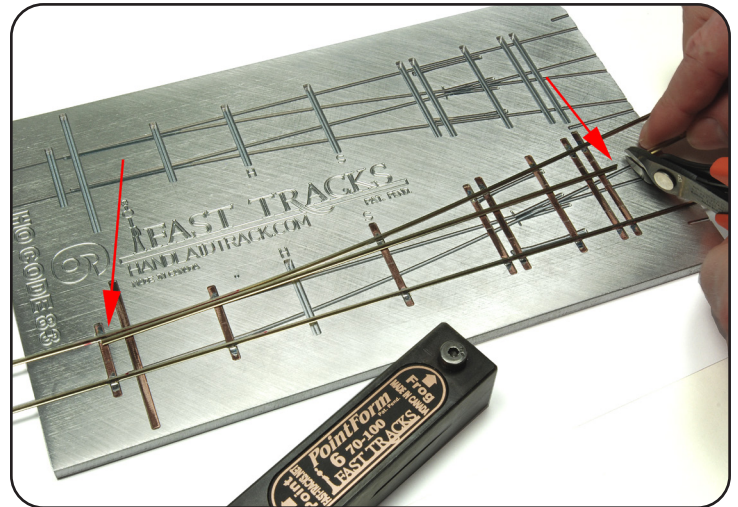


Image 48



Image 49

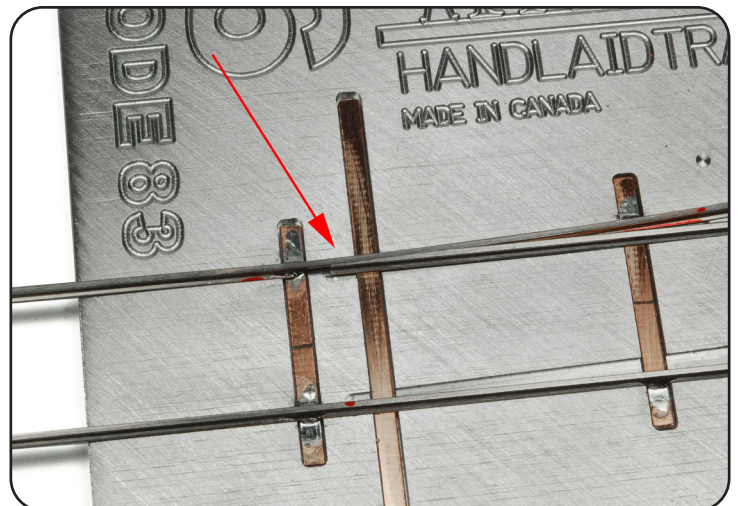
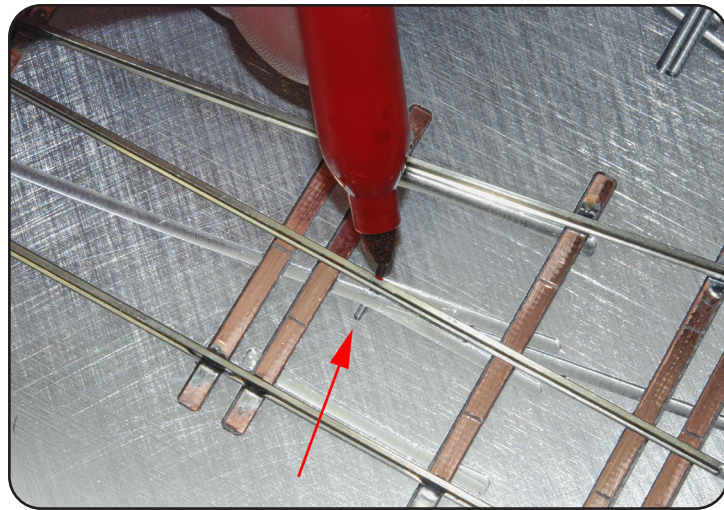


Image 50

With the points located at the throwbar, mark the location of the bend in the wing rail. Most fixtures will have a registration mark that shows where the bend for the wing rail is to be made. Mark this location carefully on the rail. (Image 50)



Using the edge of a triangle file, file a notch at this location. Creating a notch here will allow the rail to bend sharply, thereby improving operation. (Image 51)

You can also use a pair of rail cutters to cut this notch in the rail by cutting out a small "chink" in the base of the rail. (Image 52)

Image 51

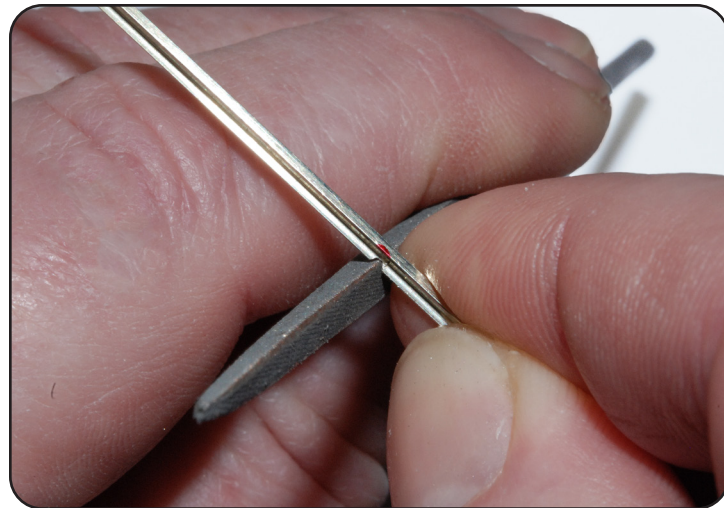


Image 52

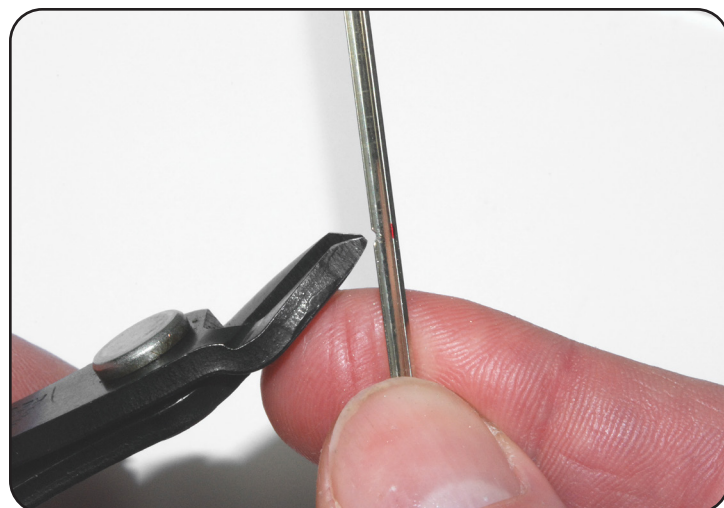




Image 53

Bend the rail right at the notch that you cut into the rail. (Image 53)

Confirm and adjust the bend by placing the rail into the fixture. (Image 54)

Using the fixture as a guide, mark the end of the wing rail and cut it to length. (Image 55)

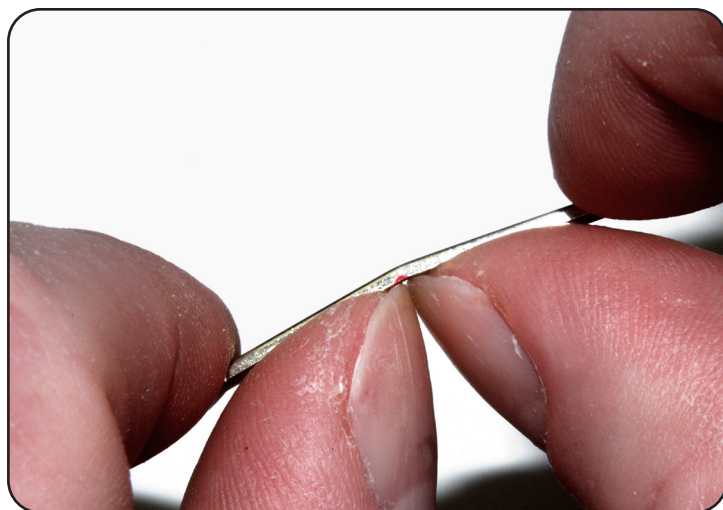


Image 54

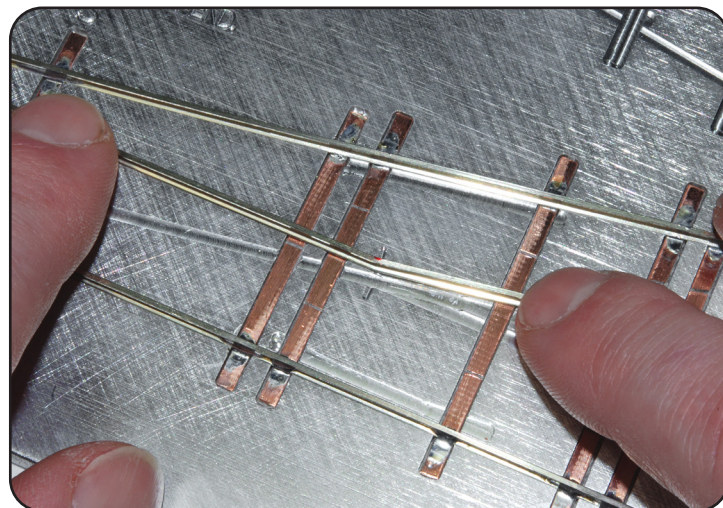


Image 55

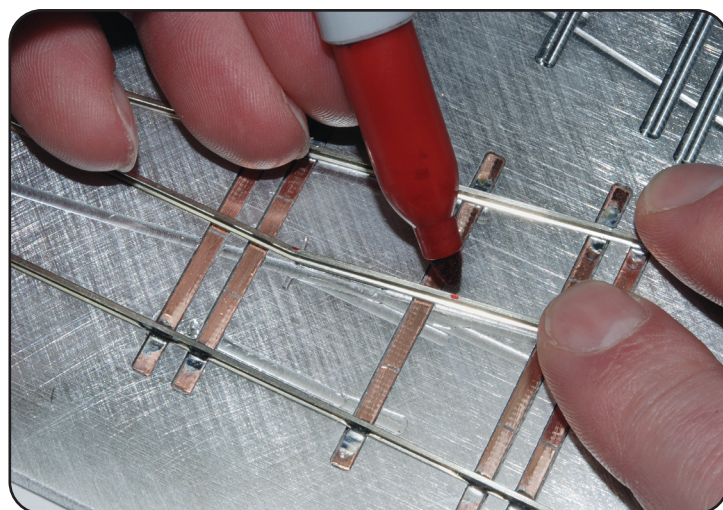


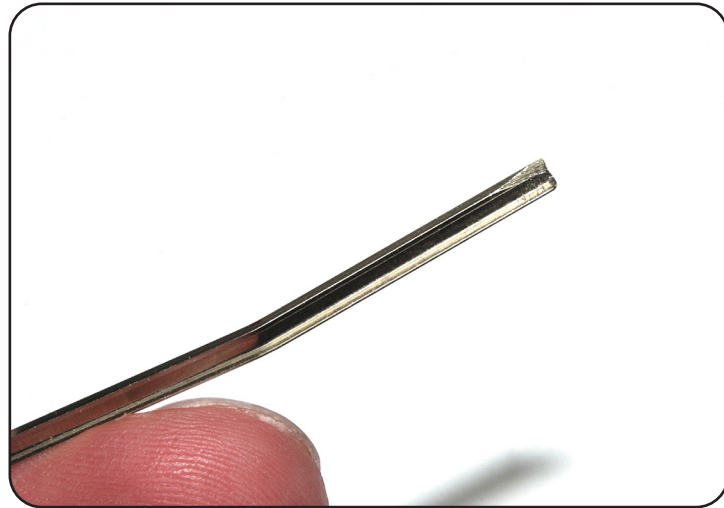
Image 56

The inside edge of the wing rail needs to be beveled to keep wheel flanges from striking the sharp edge of the wing rail. This bevel is a compound angle, slightly angled down from the top of the rail and slightly angled from the end of the rail. (Image 56) (Image 57)

Image 71 on page 37 shows what the wing rails should look like when they are soldered into place.



Image 57



**On30 Turnout.** Finished with QuickSticks. Notice the rustic arrangement of the ties.



Image 58

As with the stock rails we will solder the closure rail to the "S" tie first, then complete the rest of the soldering. (Image 58) (Image 59). Be sure that the rail is sitting flat on the "S" tie when the solder hardens, it is critical that the rail is sitting flat on the tie.

Complete the remainder of the solder joints. Do not apply solder at the locations shown in Image 60.

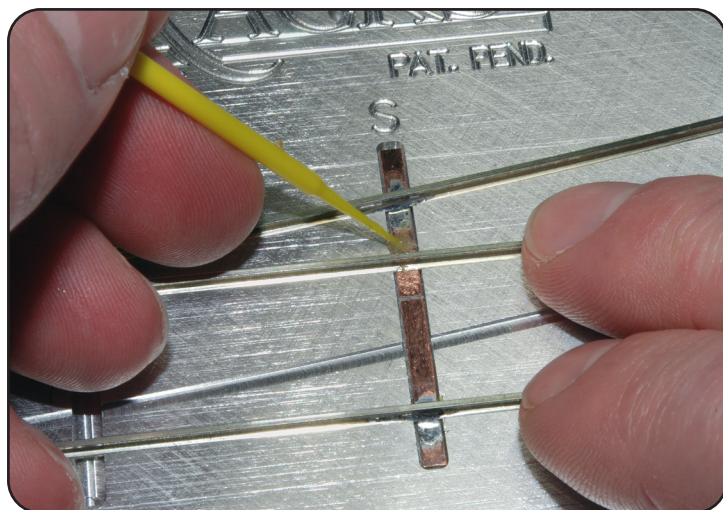


Image 59

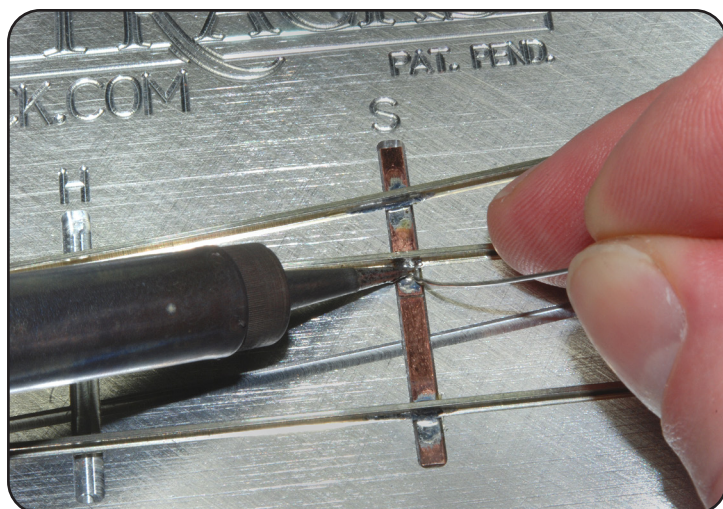


Image 60

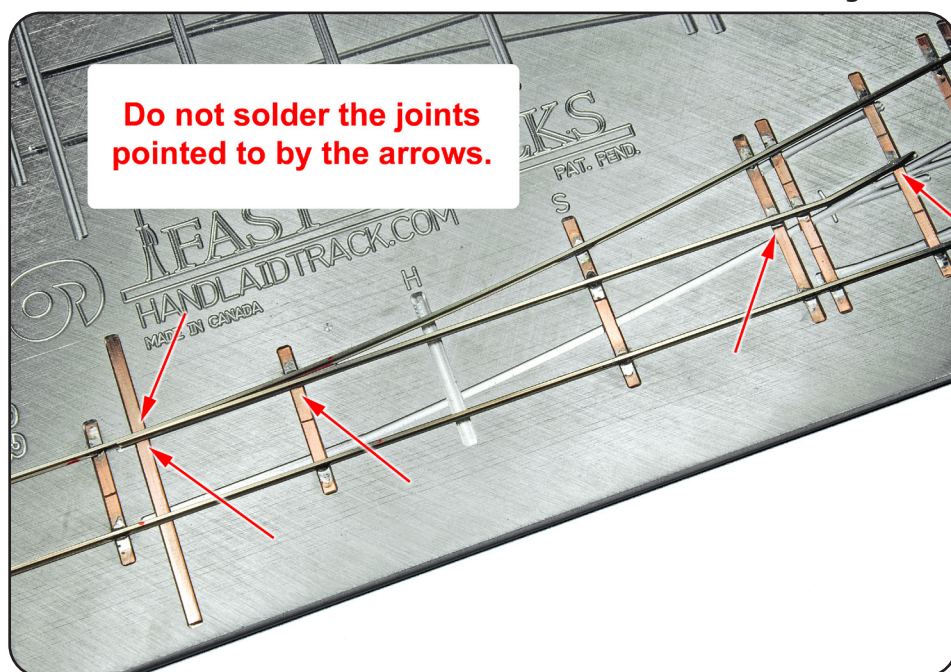




Image 61

Next, we will form and solder the curved, or diverging switch points into place. This process is similar to the previous step, but with one critical difference in that the diverging rail **must** be pre-shaped to match the curvature of the turnout. (Image 61)

Cut a length of rail and file the switch point onto one end. Gently form the rail to a slight arc to match the fixture as closely as possible. (Image 62)

The diverging point rail is slightly curved with straight sections on either end. The point end is straight along the switch point (Image 62 - A), which blends into the curved center section (Image 62 - B), and then is straight again (Image 62 - C) as it leads into the wing rail. The straight and curved sections formed into the diverging point rail are subtle but important. Pre-forming this rail carefully will ensure the curvature remains consistent once the turnout is removed from the fixture. (Image 62)

Once this rail is complete we will solder one switch point to the throwbar. We will solder the opposite one in place after the turnout is removed from the fixture.

To ensure the switch point does not get accidentally soldered to stock rail, slip a small piece of paper between the switch point and the stock rail. (Image 63)

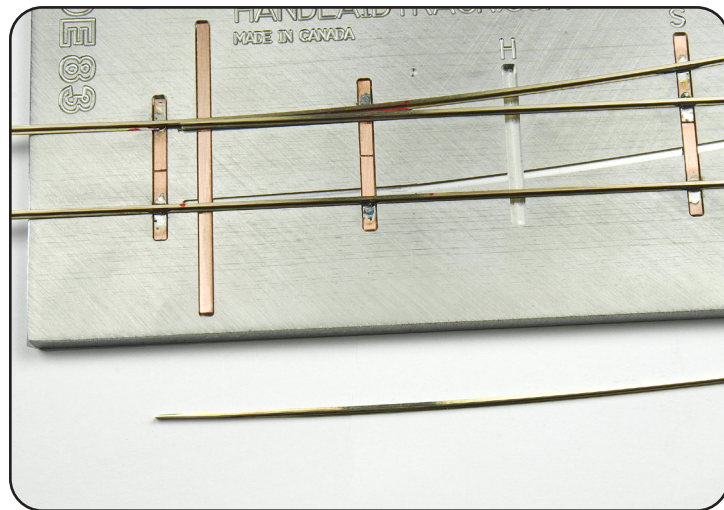


Image 62

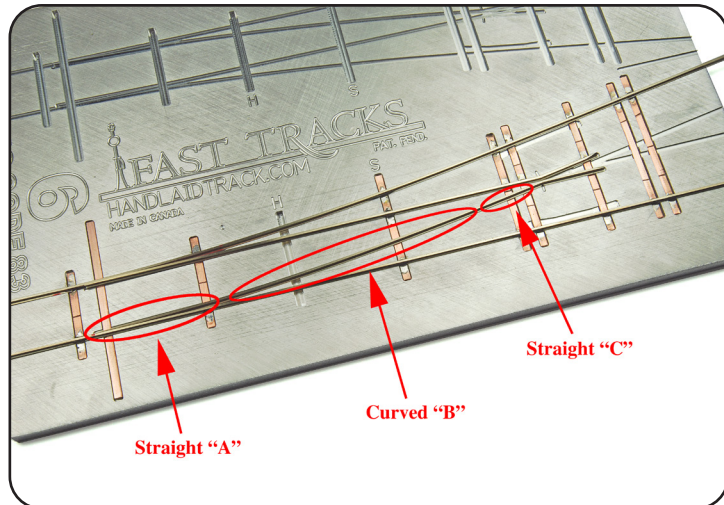


Image 63

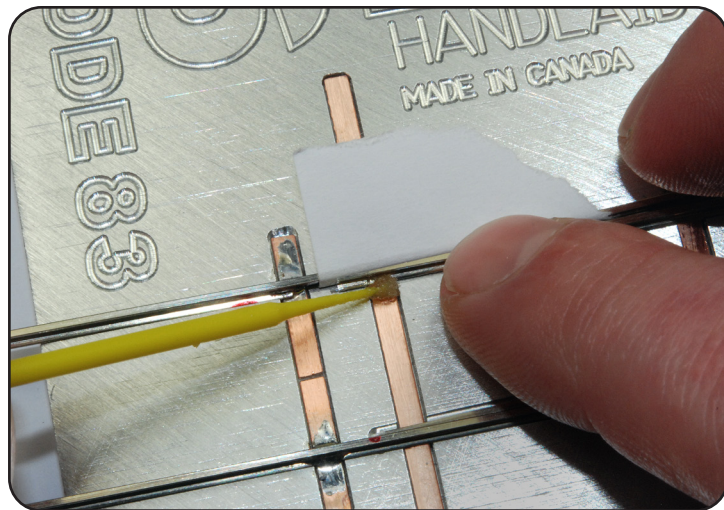
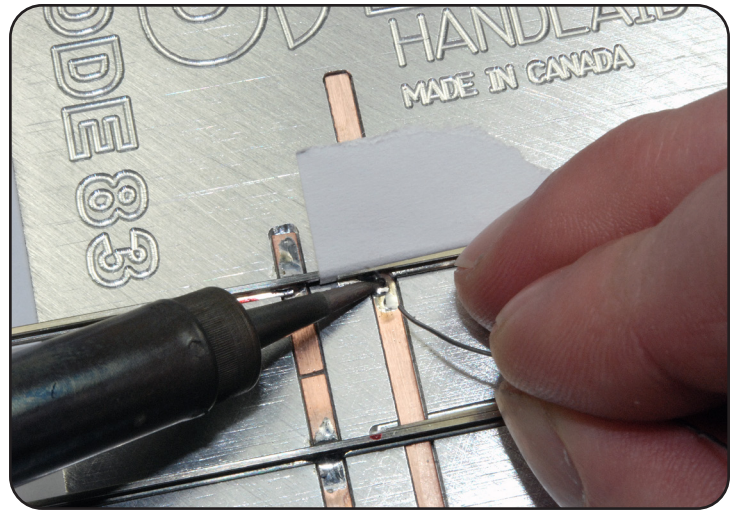




Image 64

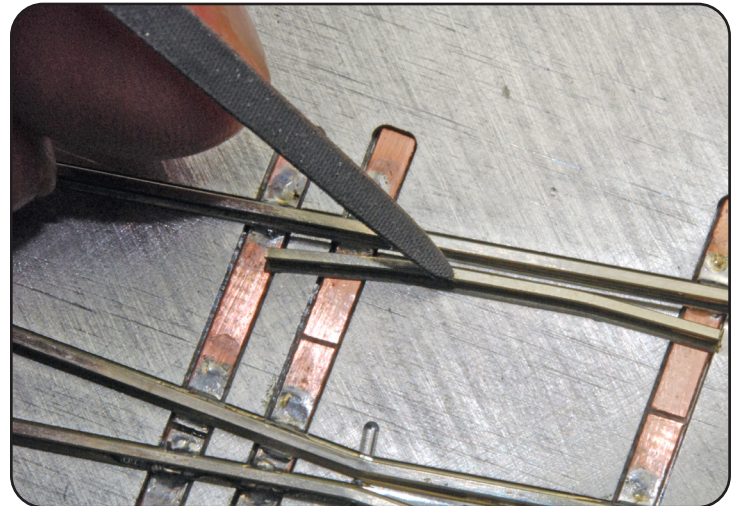
Carefully flux and solder the switch point to the throwbar. Take your time and be sure to create a well formed solder joint here as it will have to endure the stress of being moved back and forth. (Image 64)



## **Part 6 - Installing The Guard Rails & Frog Points**

Image 65

Place the guard rails that you made in step 1 into the guard rail grooves, being sure that they are properly fitted and sitting flat onto the PC Board ties. Flux and solder them into place. (Image 65)



Now place the frog points that you constructed in Part 2 into the fixture. Usually there will be some back and forth movement of the points in the fixture which can effect turnout performance. The best way to determine the optimal position of the points in the fixture is to use a wheel set from a train car, being sure that the wheels are in gauge before you use them.

Image 66

Roll the wheels through the turnout with the points in various positions to find a location that does not bump or click as the wheels roll through the frog. Make a mental note of this location. Typically setting the points as far forward as possible will be the best position, but confirming this with a set of wheels is best option. (Image 66)

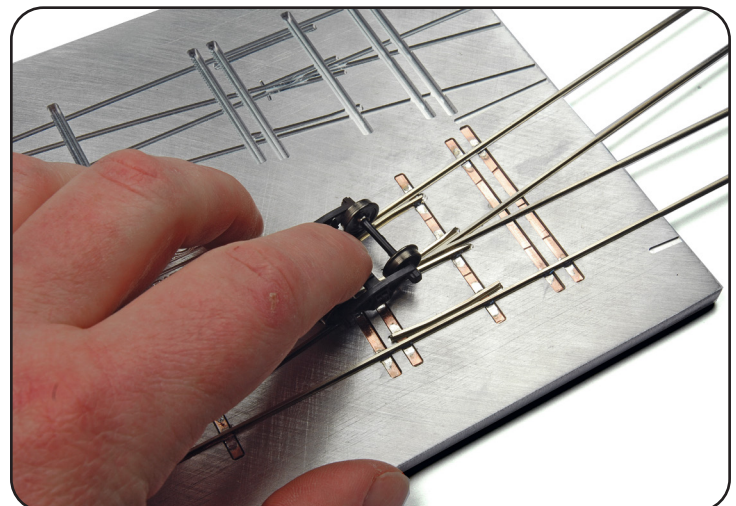




Image 67

Once you are happy with the performance of the points, flux and solder them into place. Again confirm that they are sitting flat on the PC Board ties. (Image 67)

With the frog points soldered in place the turnout is ready to be removed from the fixture. (Image 68) Usually the turnout can simply be lifted straight out, but if it is tight, carefully pry up under the rails until it pops out. (Image 69)

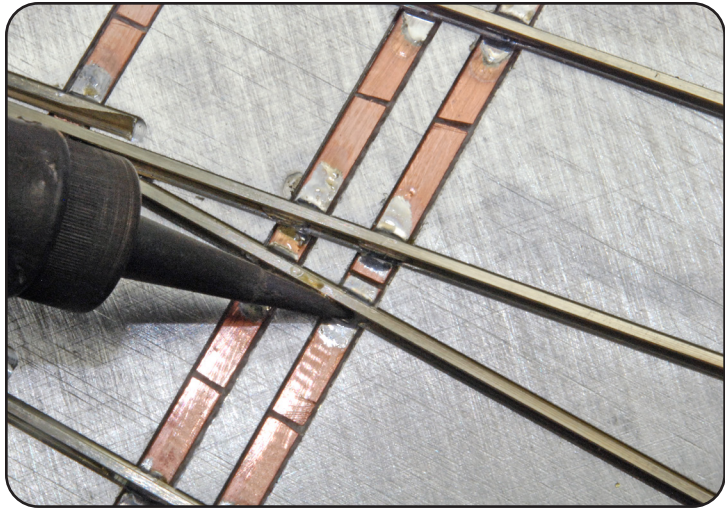


Image 68

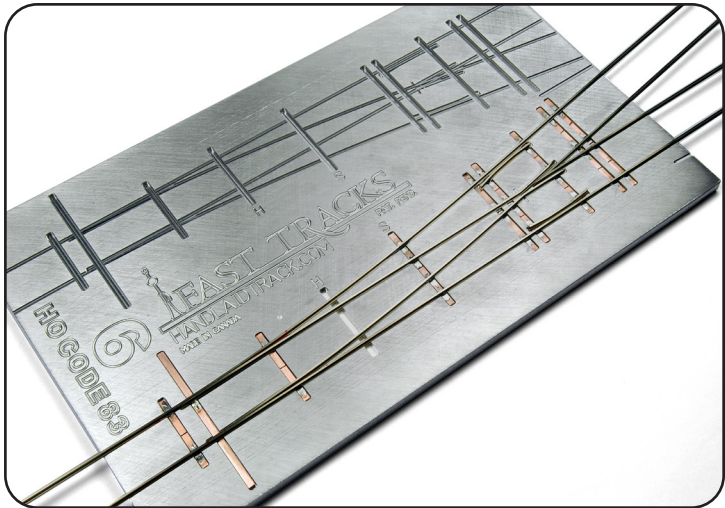


Image 69

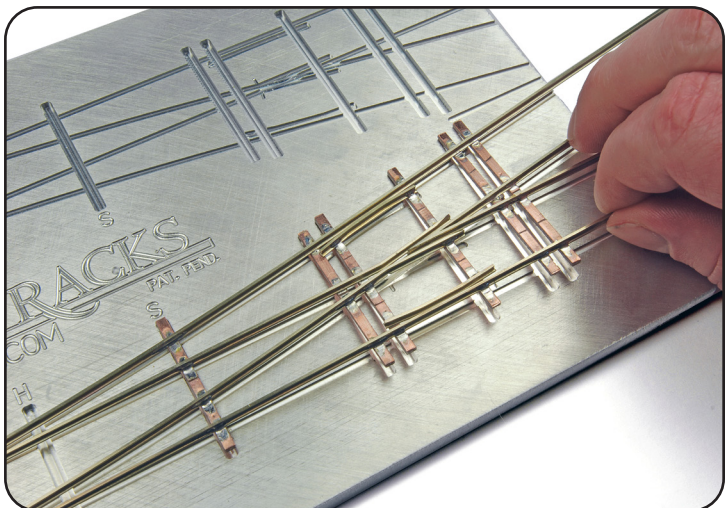




Image 70

Inspect the turnout confirming that all of the solder joints are solid and complete. If not, return the turnout to the fixture and re-solder the bad joints. (Image 70)

Image 71 provides a good shot of what the finished frog point and wing rails should look like. Notice how the ends of the wing rails are beveled.

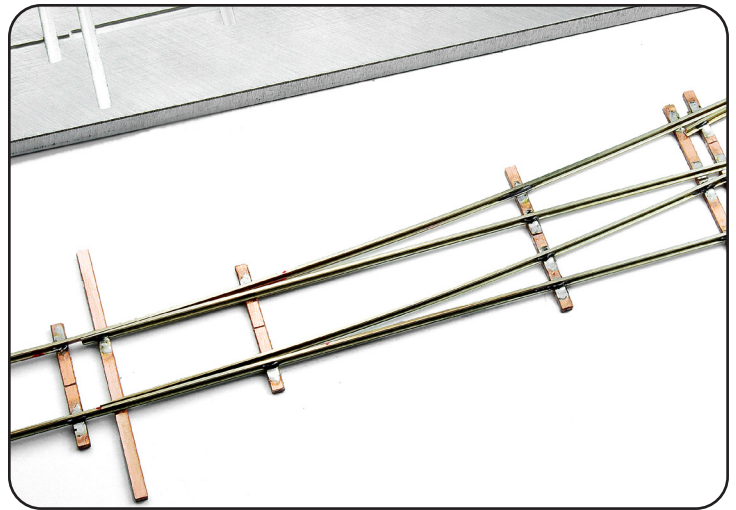
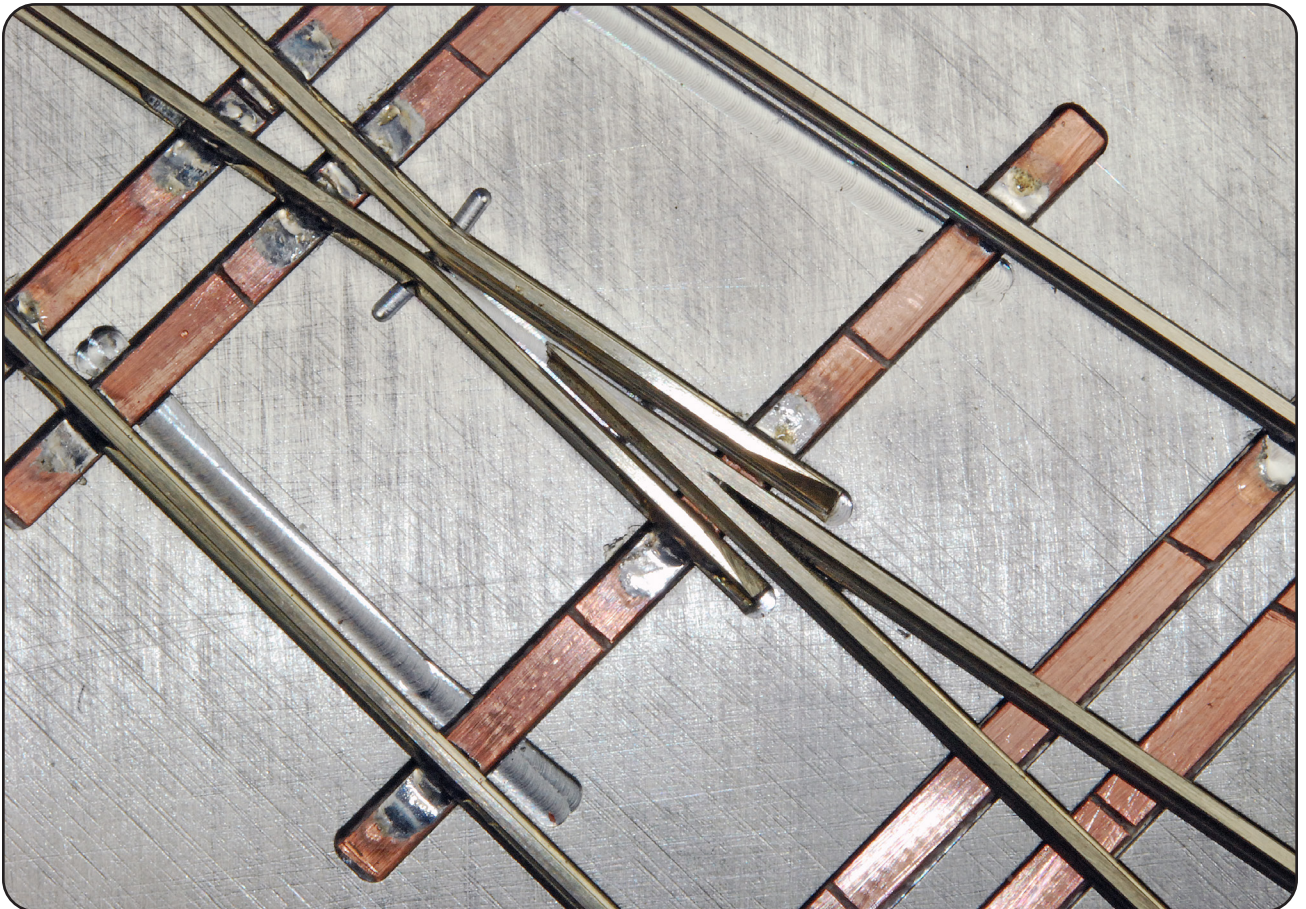


Image 71





## Step 7 - Completing the Switch Points

With the turnout removed from the fixture, the throwbar and switch points can now be completed.

While soldering the turnout in the fixture we only soldered one of the switch points to the throwbar, so we will solder the other side into place now.

To properly position the switch points, insert a scrap piece of PC Board tie material between the un-soldered switch point and the stock rail (Image 72), then solder the switch point to the throwbar. (Image 73)

This method will work well for turnouts being used with under the table switch machines, but if you are using ground throws, it is best to solder the switch points to the throwbar after the turnout is installed into place on your layout.

Soldering the switch point to the throwbar after installing the turnout on your layout allows the spacing to match the larger movements that is typical with most ground throws.

Image 72

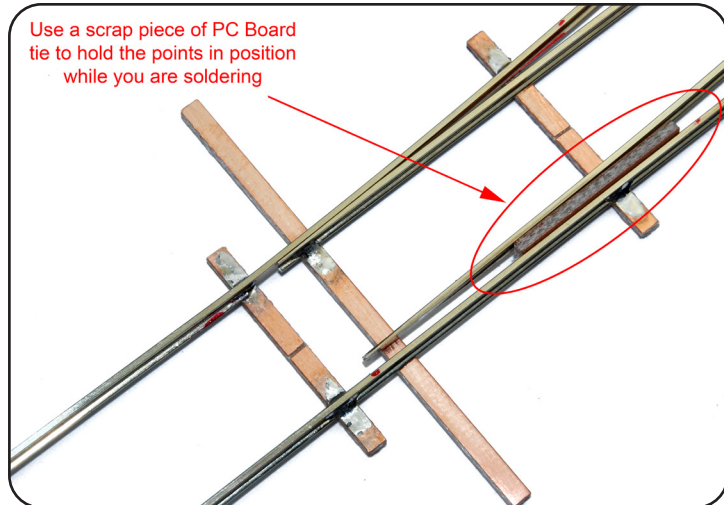
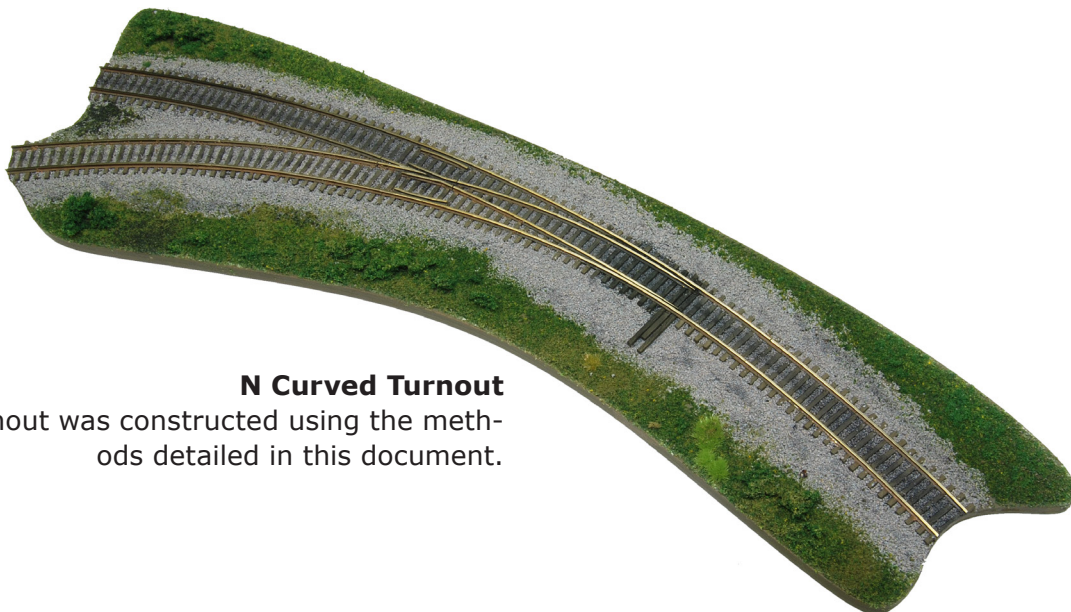
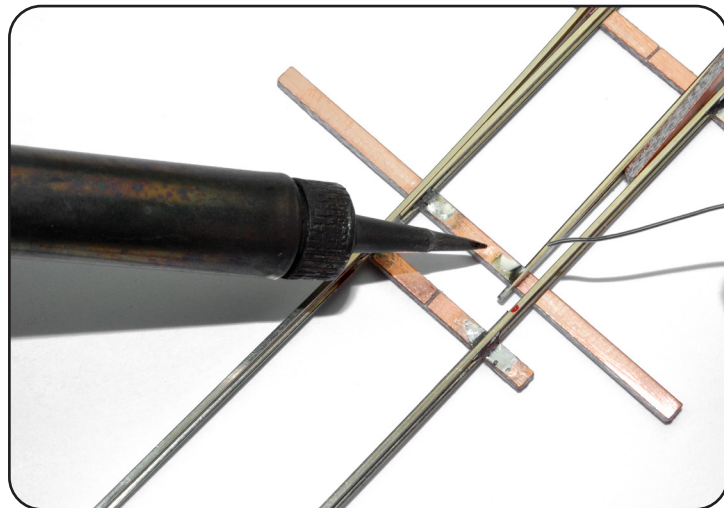


Image 73



### N Curved Turnout

This turnout was constructed using the methods detailed in this document.



Test the operation of the switch points in both positions. (Image 74) (Image 75) to be sure that the points close snugly against the stock rail. If they do not, carefully reheat the soldered joints and adjust the points.

If you are using a switch machine to operate the turnout, you will need to drill a small hole in the throwbar for the switch machine wire connection. This is best accomplished using a small hand drill. To ensure the hole is centered in the tie, first drill a small pilot hole. (Image 76)

Image 74

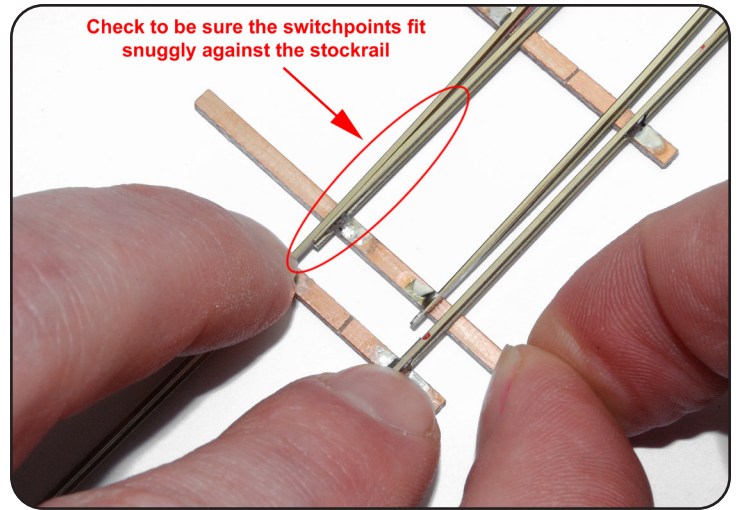


Image 75

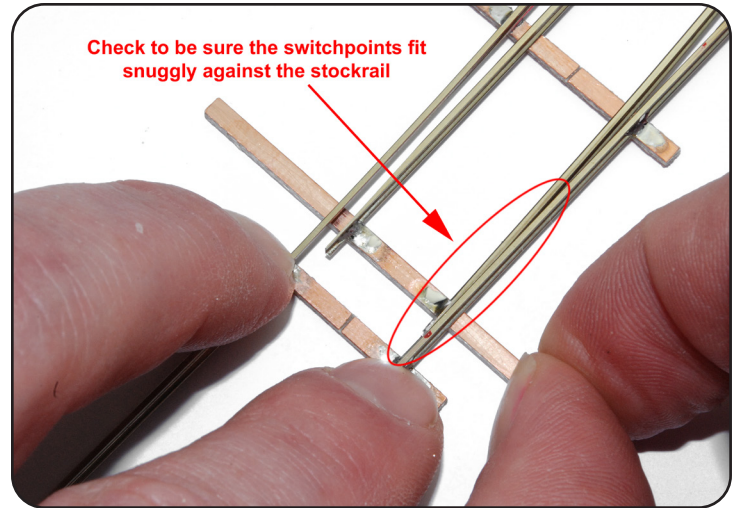


Image 76

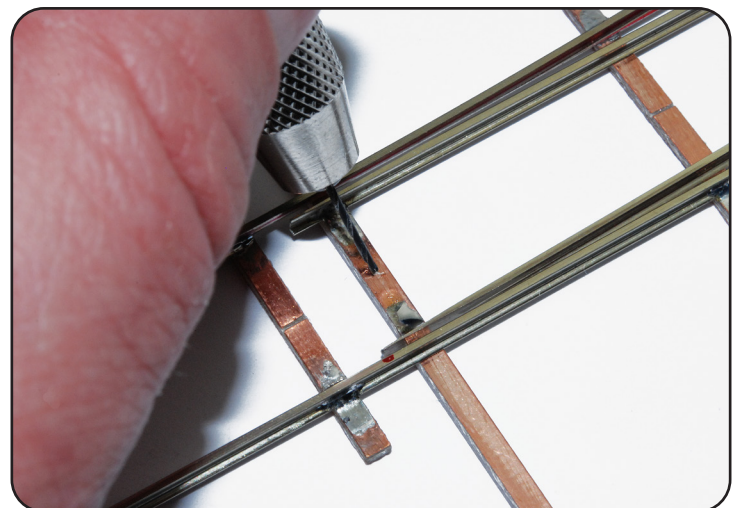


Image 77

To drill the pilot hole, carefully start the hole in the center of the tie, then drill completely through the tie. (Image 77) Pre-drilling a pilot hole makes centering the hole on the tie much easier.

With the pilot hole drilled, switch to a drill bit that matches the size of the wire used to connect the switch machine to the throwbar and carefully re-drill the hole to full size. (Image 78)

The throwbar tie will need to have an isolation gap cut into it in the same way that we cut the gaps into the PC Board ties. Using a triangle file, carefully cut a gap in the copper coating of the throwbar tie.

Since cutting a gap at the center of the tie would cause it to overlap the hole drilled for the metal switch machine wire, it might be possible to create a short, so it is best to file a gap on both sides of the hole. (Image 79) (Image 80)

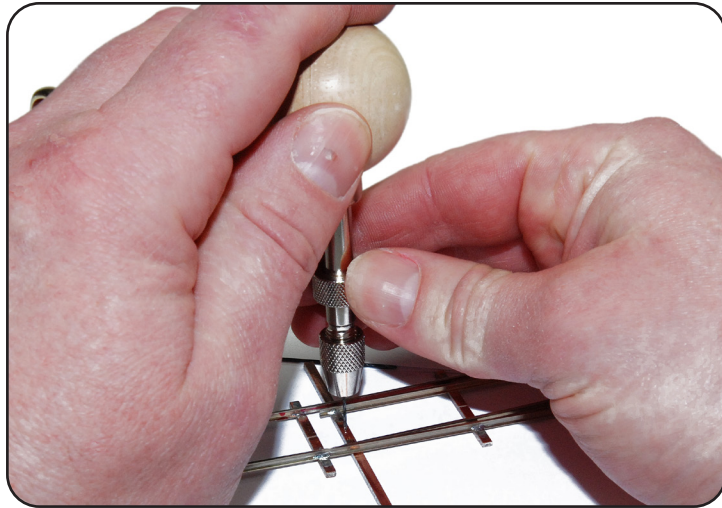


Image 78

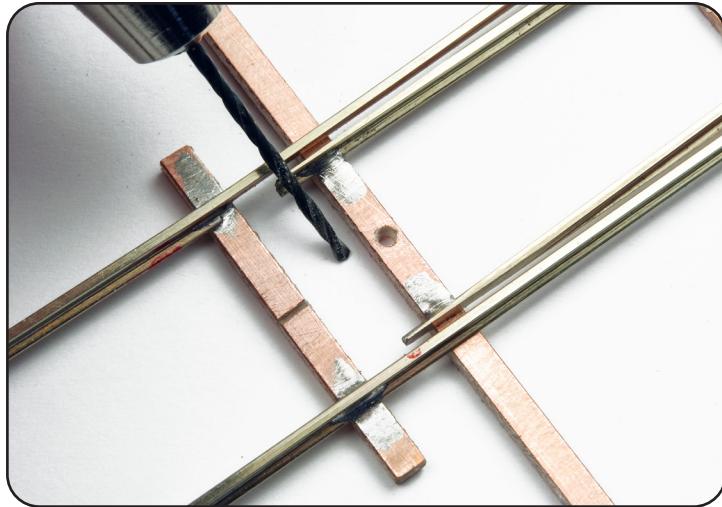


Image 79

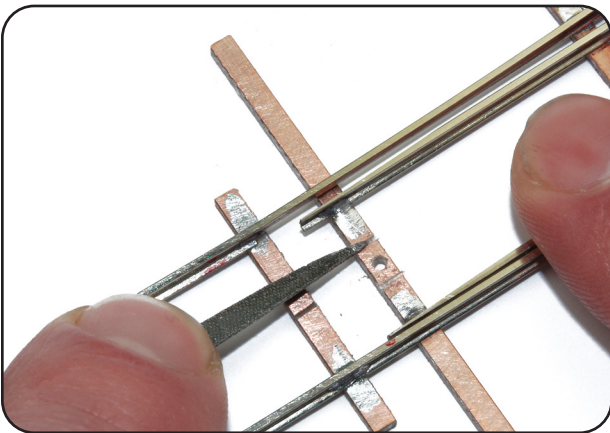


Image 80

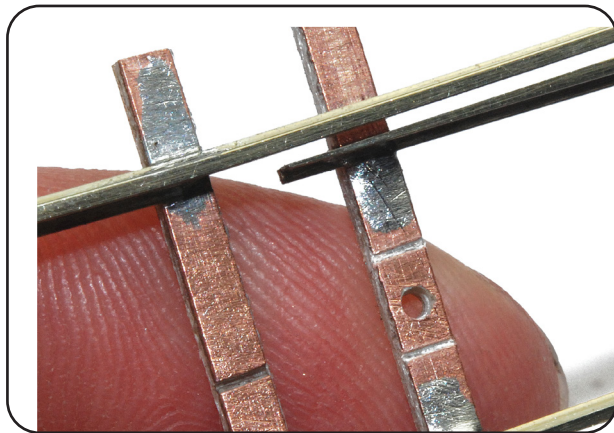




Image 81

To prevent equipment picking the end of the switch points, you need to 'blend' the points with the stock rail using a small file. In addition, the outside edge of the switch point can sometimes cause a bit of interference with equipment, and should be filed off. (Image 81)

Using a small, flexible file (our [TL-0016 Points Finishing File](#) is excellent for this), gently smooth out the end of the switch point to blend it in with the stock rail. (Image 82)

The result should be a sharp point with a bit of a rounded over top. This will prevent any wheel flanges from being able to catch the end of the switch points. (Image 83)

Repeat this process for the opposite switch point.

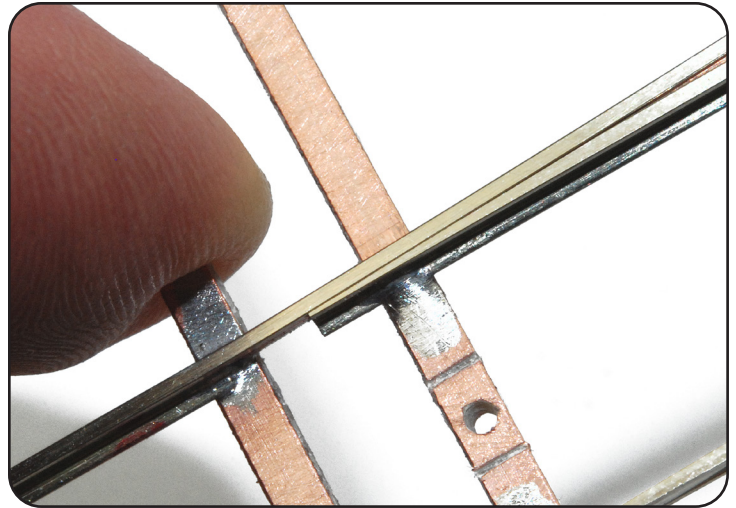


Image 82

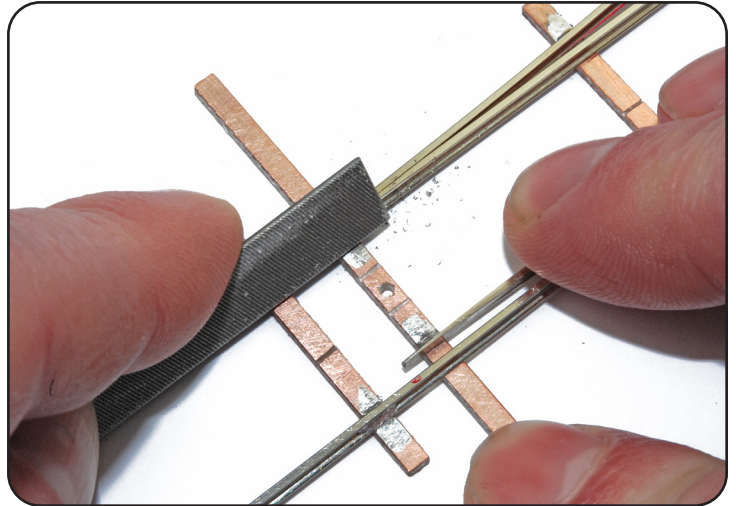
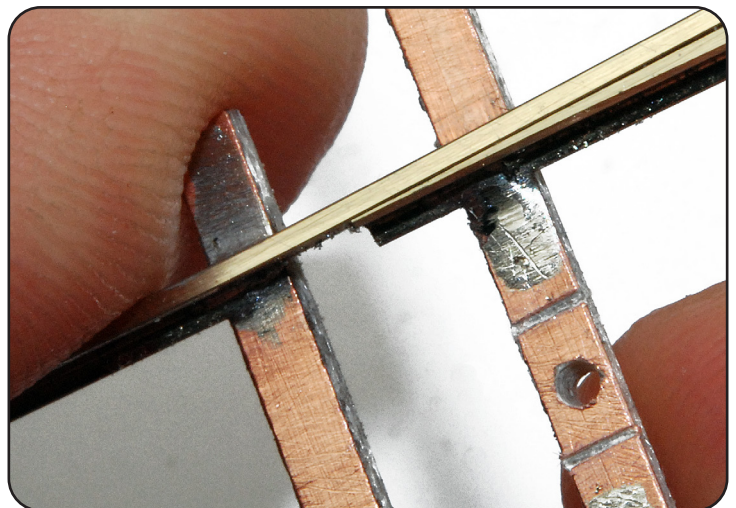


Image 83



## **Part 8 - Re-Enforcing The Frog Points**

It isn't possible to solder the very end of the frog point onto a PC Board tie. As a result it can sometimes lift up a bit causing interference with equipment. (Image 84) This problem is exaggerated in this image to illustrate what is happening, but even the slightest lifting of the top of the frog can cause unreliable operation.

Fortunately, there is an easy way to solve this problem.

Flip the turnout over and set it onto a flat surface. (The back of the fixture works well for this.) Apply a bit of flux to the bottom of the frog points. (Image 85)

Apply heat and solder the area where the flux was applied. As the flux melts it will draw the melted solder between the frog point and the PC Board tie locking them into place. Only leave the heat on the rail long enough to melt the solder. If you dwell too long it is possible to melt the solder joint and separate the rails from the ties. (Image 86)

Once soldered the frog will be very solid and will stay flat. (Image 87)

Image 84

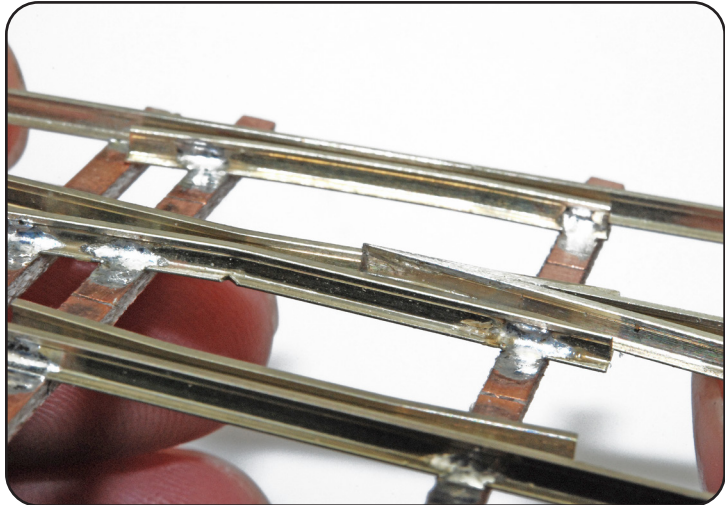


Image 85

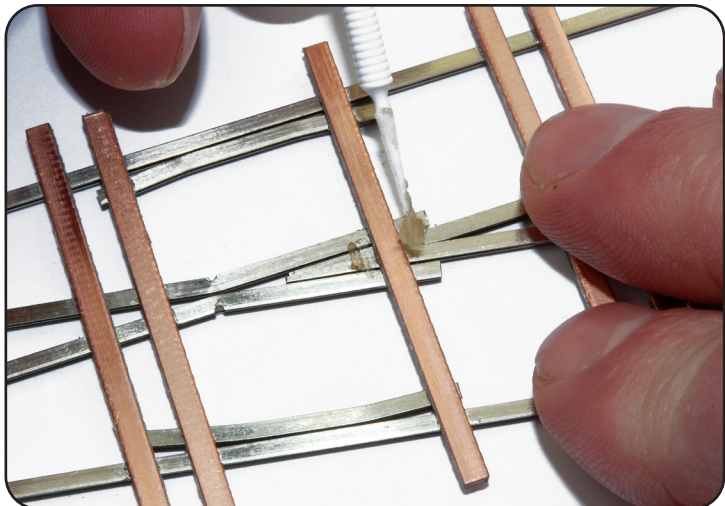
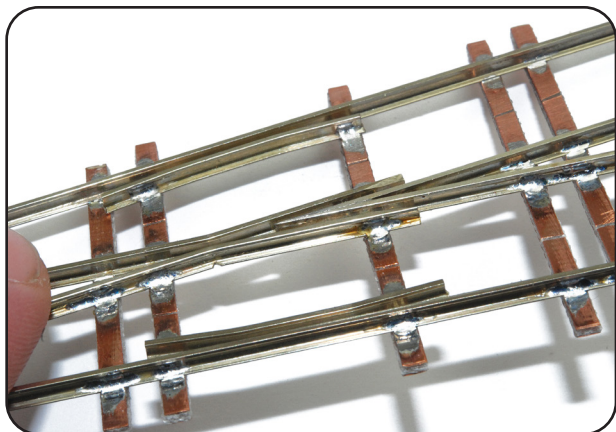


Image 86



Image 87





## **Part 9 - Cleaning the Turnout**

It is very important that the turnout is thoroughly cleaned when you are finished soldering. Failure to clean the flux residue from the turnout will result in some corrosion over time if it is left unpainted.

The most effective way to clean the turnout is to scrub it with a fine wire brush. Cleaning the turnout with a wire brush will do a number of things.

- It will remove all traces of flux from the ties and rails.
- It will polish the PC board ties making it easier for paint to stick to the surface.
- It will help smooth out the solder joints, making them all but invisible once the turnout is painted and installed in place.

We recommend a fine, stainless steel brush with thin bristles for this task. (Image 88) The wire brush that we offer on our web-site at [www.handlaidtrack.com/tl-0038](http://www.handlaidtrack.com/tl-0038) have been specially selected for it's specific bristle stiffness and is highly recommended for cleaning soldered trackwork.

If you look closely at the newly built turnout shown in Image 91 on page 44, you will see the flux that needs to be removed on the rail and ties.

To clean the flux off the rails and ties, very briskly and thoroughly brush the turnout with the wire brush. (Image 89)

The cleaned turnout should be shiny with all traces of flux removed. (Image 91 on page 44)

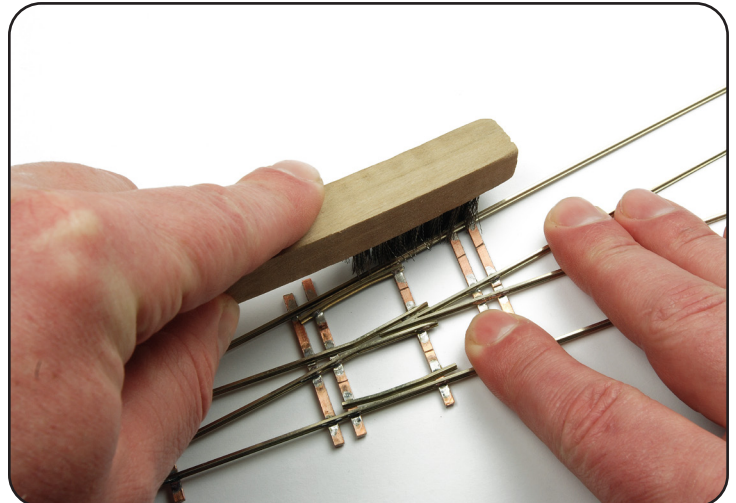
Don't forget to turn the turnout over and clean the area that we soldered under the frog.

To complete cleaning, you may also want to wash the turnout with soapy water as well.

Image 88

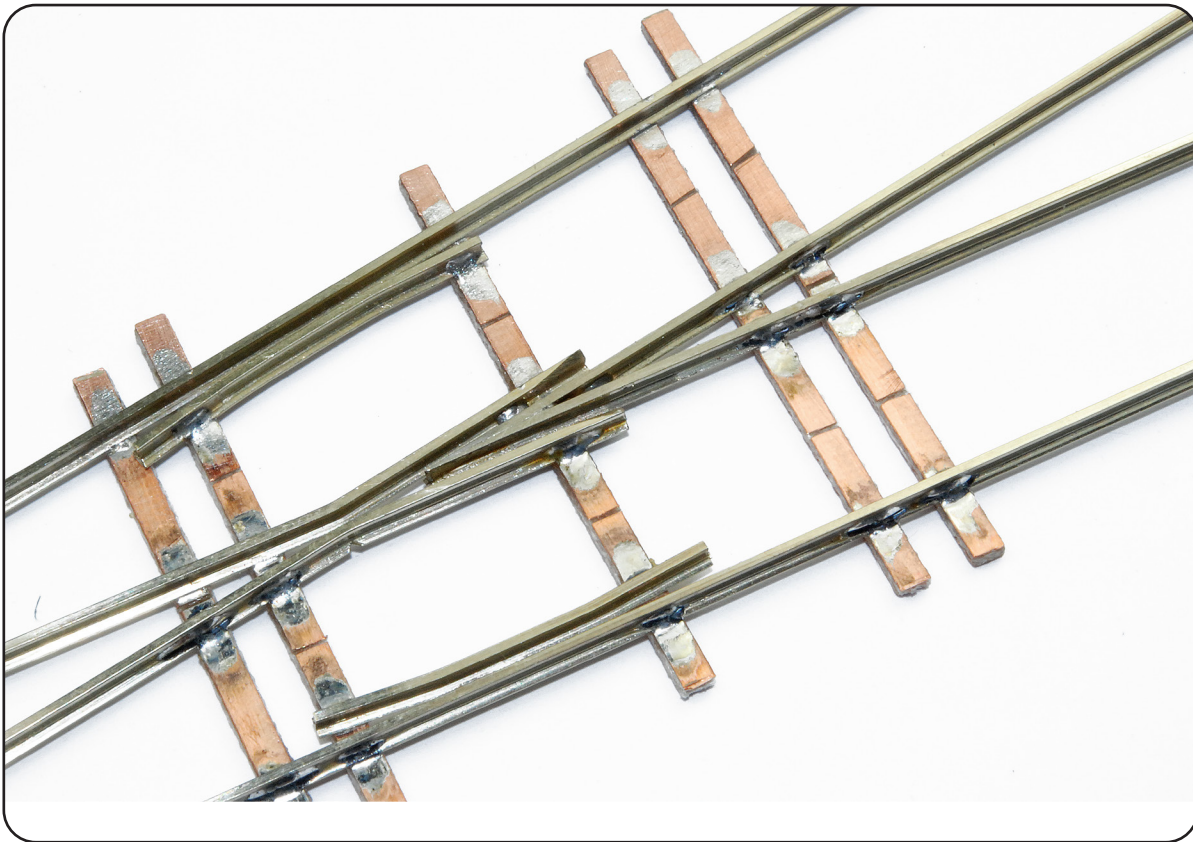


Image 89



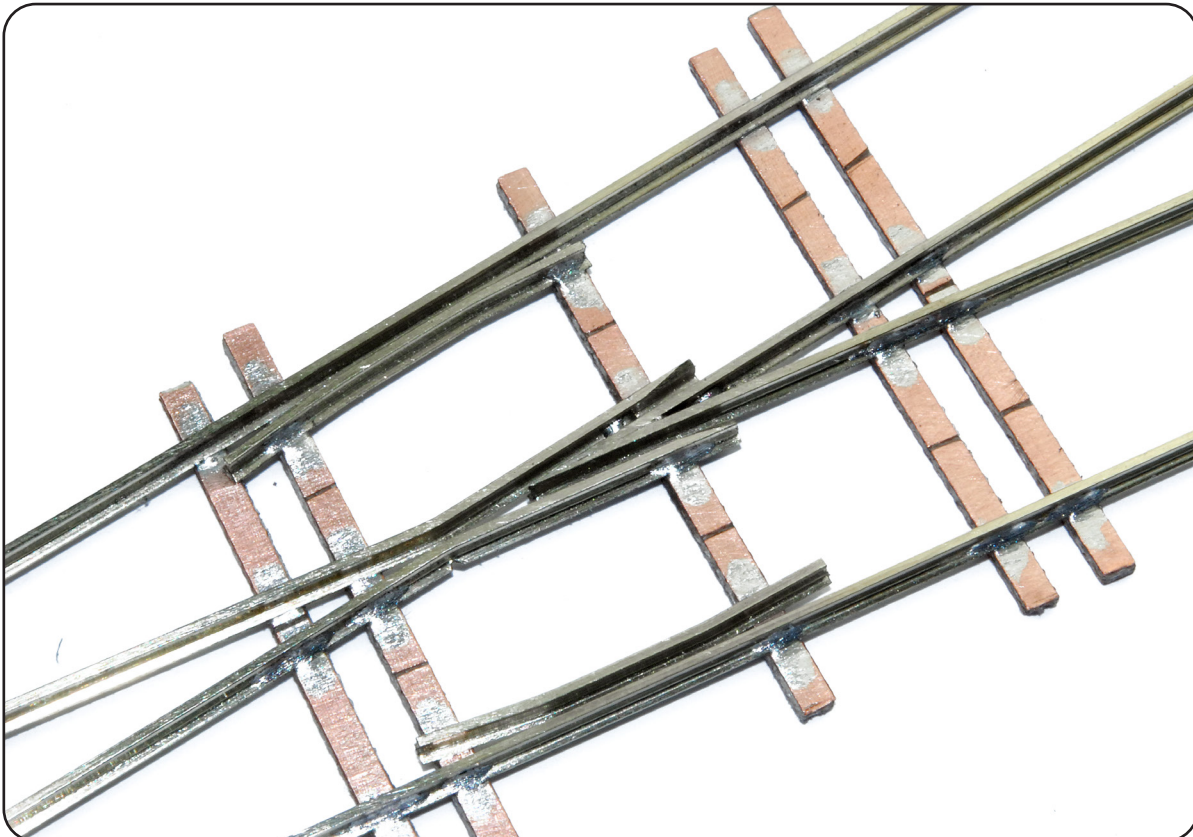
**Before Cleaning**

Image 90



**After Cleaning**

Image 91





## Part 10 - Isolating the Frog

In order to make the turnout DC and DCC compatible, it is necessary to electrically isolate the frog from the rest of the turnout by cutting gaps into the rails above and below the frog.

If you will be finishing the turnout using single piece wood ties, then you should cut the gaps just before installing the turnout onto the wood ties, as the turnout can be very fragile after the gaps in the rails are cut.

If you will be finishing the turnout using Fast Tracks laser cut QuickSticks, then it is better to glue the QuickSticks in place (Step 10) before cutting the rail gaps.

There are a couple of ways to cut these gaps. One is to use a Moto-Tool with a ceramic cutoff disk to slice through the rail. This works fairly well but has a couple drawbacks. The first is the amount of heat that is generated when rail is cut with a cut-off disk. If you are not very careful, the rail can get hot enough to melt and weaken the solder joints that are close to the gap you are cutting. Another issue is the risk of nicking the opposite rails with the cut off wheel. While this probably won't cause any operational issues, it does create an unsightly mark in the turnout.

Image 92



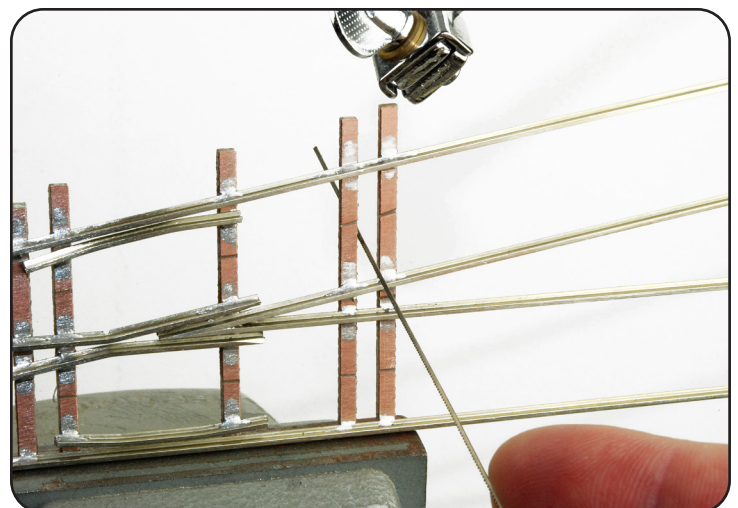
As an alternative to the Moto-Tool, we recommend the use of a jewelers saw and very fine blade to cut the gaps in the rail. (Image 92)

The blade in the saw is removable, allowing you to slip it between the rails so you can carefully slice through the rail without any danger of damaging adjacent rails.

Image 93

The location of the gaps that need to be cut into the rails are shown in the corresponding printable tie template that matches the turnout you are building.

To start, clamp the edge of the PC Board ties into a vise. Remove one end of the blade from the saw and slip the blade between the rails. (Image 93)



Now re-lock the blade back into the saw and carefully slice through the first rail. (Image 94)

Once through the first rail, continue on and slice through the adjacent rail. (Image 95)

When you are finished, remove the saw blade and inspect the cut for any burrs. (Image 96)

Even the smallest burr can cause a short in the turnout that can be very hard to detect after it is in place on your layout. So be very sure that these gaps are cleanly cut.

Image 94

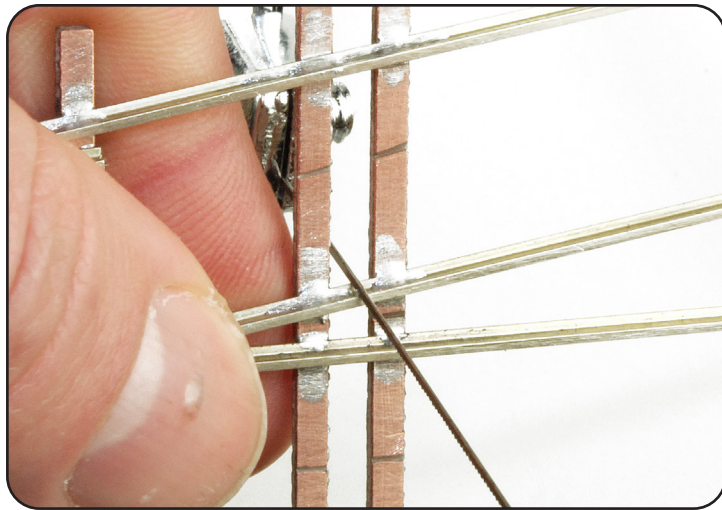


Image 95



Image 96

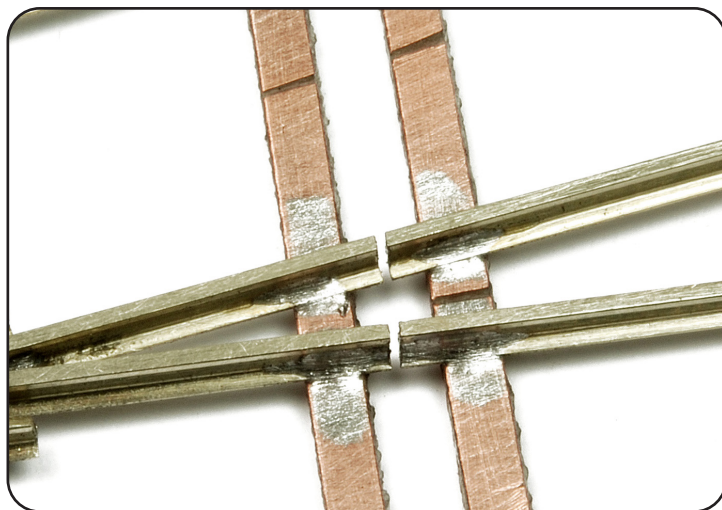




Image 97

Repeat this process for the rail gaps below the frog. (Image 97)

At this point it is wise to check the turnout for shorts using a continuity checker or a multi-meter. There should be no continuity between the frog and the rest of the turnout. (Image 98)

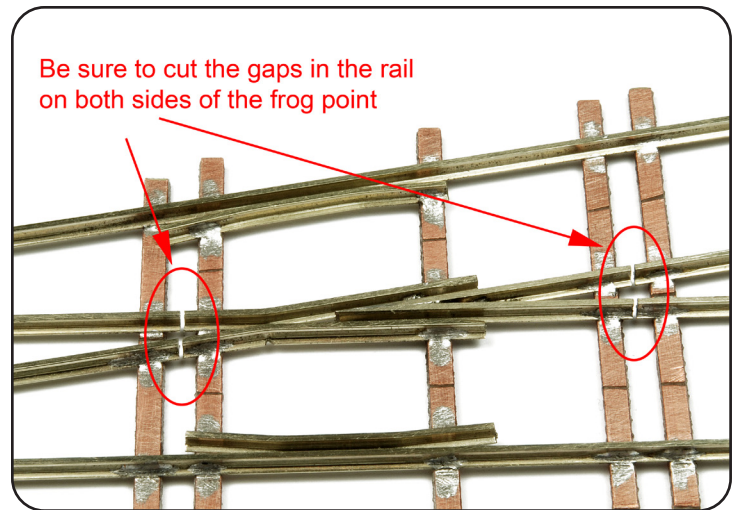
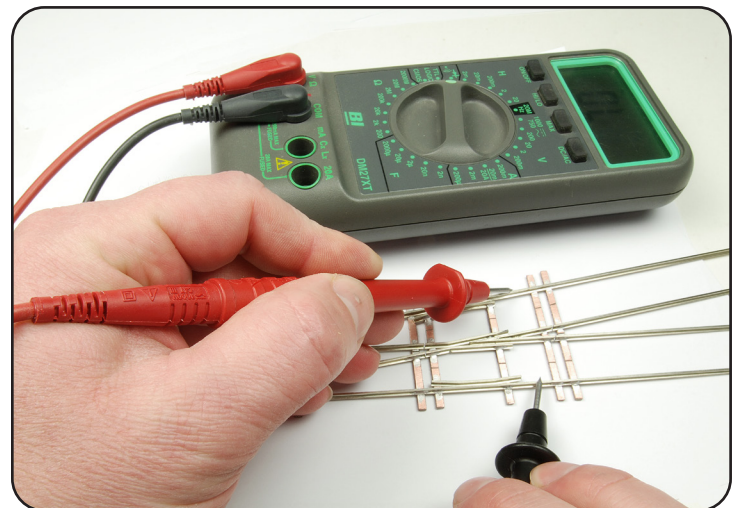



Image 98



<h2>⚠ CAUTION</h2>	
	<p>IT IS VERY IMPORTANT THAT YOU ENSURE THAT THE ISOLATION GAPS ARE CLEANLY CUT AND THAT THERE IS NO CONDUCTIVITY BETWEEN THE TWO HALVES OF THE TIE.</p> <p>FAILURE TO ENSURE COMPLETE ISOLATION CAN RESULT IN AN ELECTRICAL SHORT, WHICH CAN CAUSE EQUIPMENT PROBLEMS, OVERHEATING AND THE RISK OF FIRE.</p> <p>WE RECOMMEND THAT YOU CONFIRM THAT THE ISOLATION GAP HAS NO SHORTS BY TESTING WITH A CONTINUITY TESTER.</p>

## Part 11 - Installing The Turnout Onto QuickSticks Wood Ties

Completing the turnout with wood ties is fast and simple if you use Fast Tracks laser cut QuickSticks wood ties.

Image 99

The QuickSticks tie assembly is simply glued to the rail using Pliobond, a contact type adhesive that cures to an incredibly strong bond if cured with a bit of heat. (Image 99)

Most QuickSticks will have two removable ties. One of these ties will need to be removed depending on whether you are building a solid point or hinged point turnout. To determine which tie to remove, place the turnout skeleton on top of the QuickSticks aligning the throwbar between the long wood head ties. (Image 100)

To remove the tie, press down or twist it to break it free. If necessary you can use rail cutters to cut the tie free. (Image 101)

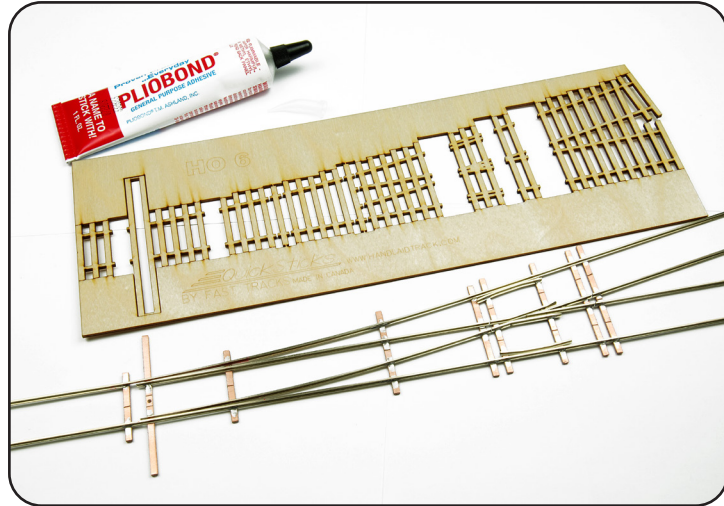


Image 100

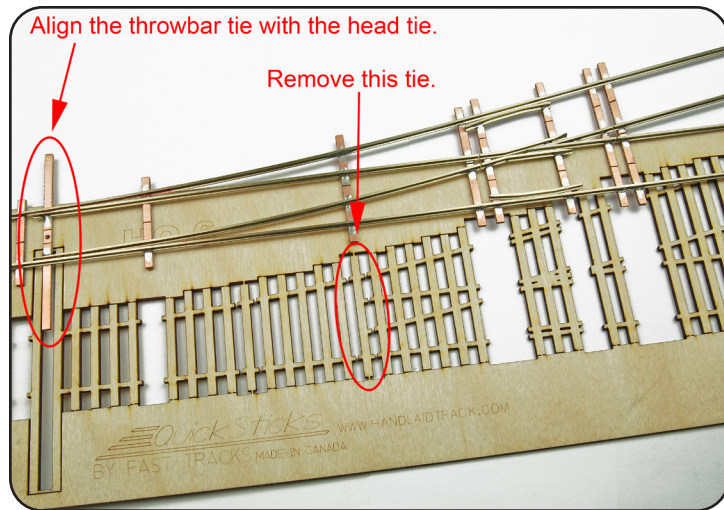


Image 101

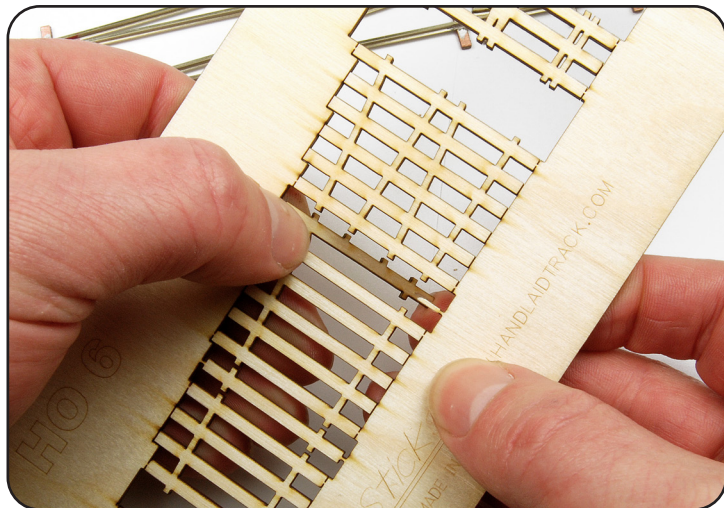




Image 102

With the tie removed, the turn-out skeleton will now fit onto the laser cut ties. (Image 102)

Prepare the Pliobond adhesive by giving it a good shake. (Image 103) Over time the solids will settle in the tube, so shaking it prior to use will ensure good performance from the adhesive.

Included with the Pliobond purchased from our website will be a small micro applicator tip that is pressed onto the end of the tube. (Image 104) This tip makes it easy to apply a very thin bead of adhesive to the rail.

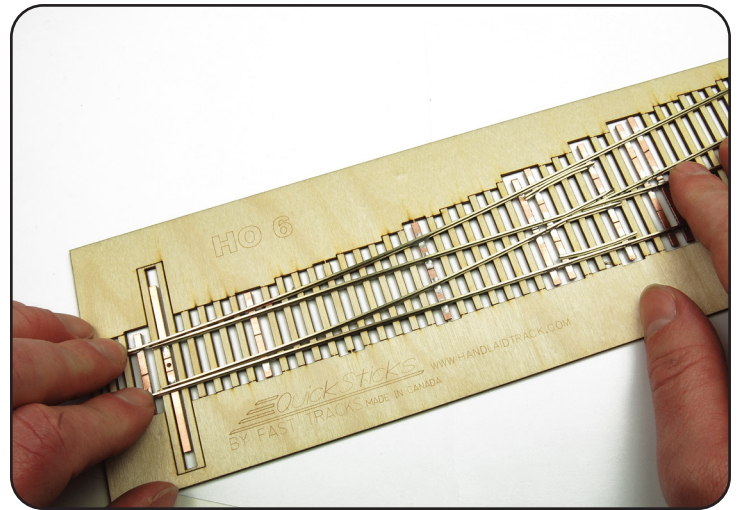


Image 103

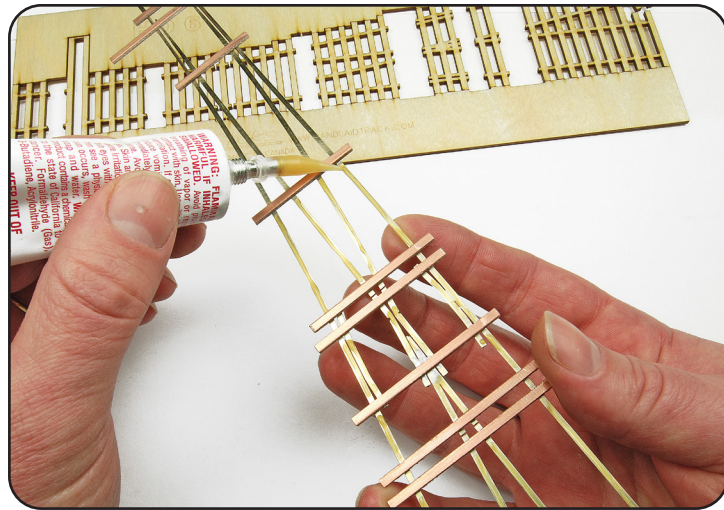


Image 104



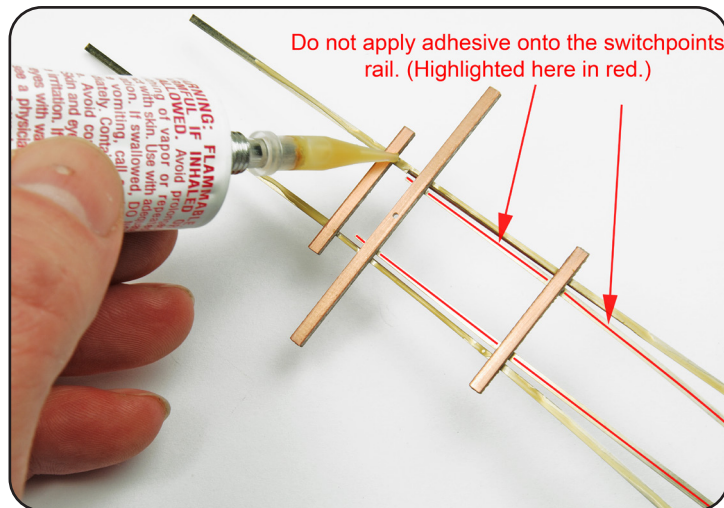
Image 105

Carefully apply a bead of Pliobond adhesive to the base of each rail except on the bottom of the moveable points. Any glue here will interfere with the performance of the turnout. (Image 105) (Image 106)



Contact type adhesive such as Pliobond, requires the adhesive to be applied to both surfaces being joined so set the turnout aside and apply a bead of Pliobond adhesive along the webs between the wood ties of the QuickSticks. Apply Pliobond to all of the areas with webs. (Image 107)

Image 106



When you are finished with the Pliobond, you should store it in an upright position with the tip up so that the adhesive drains out of the tip. The tip should be capped with a small pin or nail.

Image 107

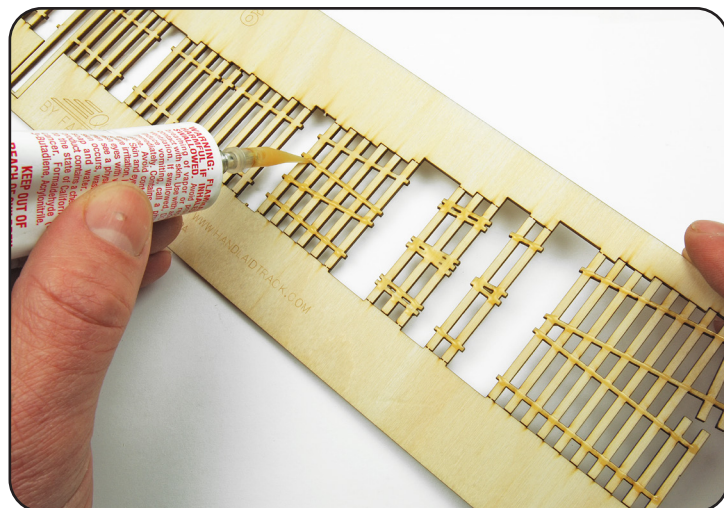




Image 108

The liquid in the adhesive has to evaporate a bit before joining the two pieces together. This only takes about 2 to 3 minutes.

Inspect the turnout and Quick-Sticks to confirm that most of the liquid has dried. The surface should be dry to the touch, but slightly tacky. (Image 108) (Image 109)

Carefully place the turnout onto the ties, again using the throw-bar tie to align the turnout to the ties. Once in position, apply a bit of pressure to the rails behind the points to set the bond. (Image 110)

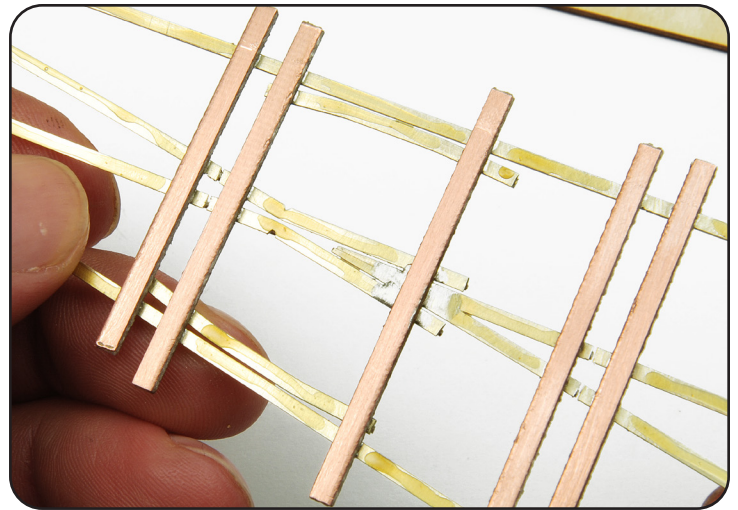


Image 109

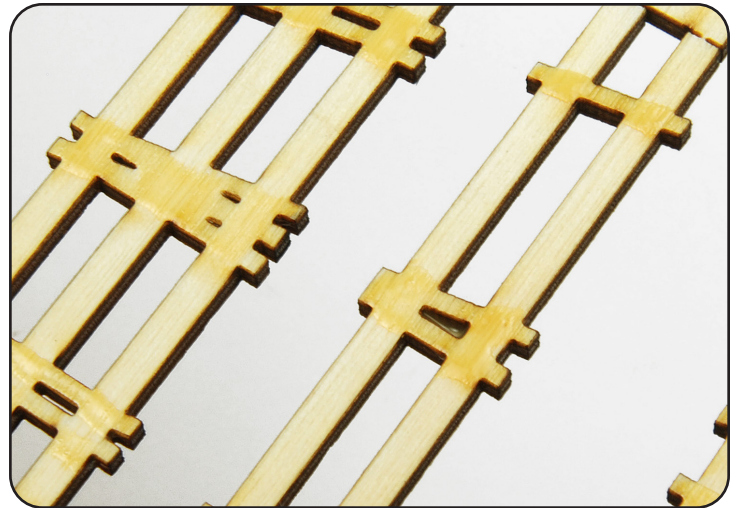


Image 110

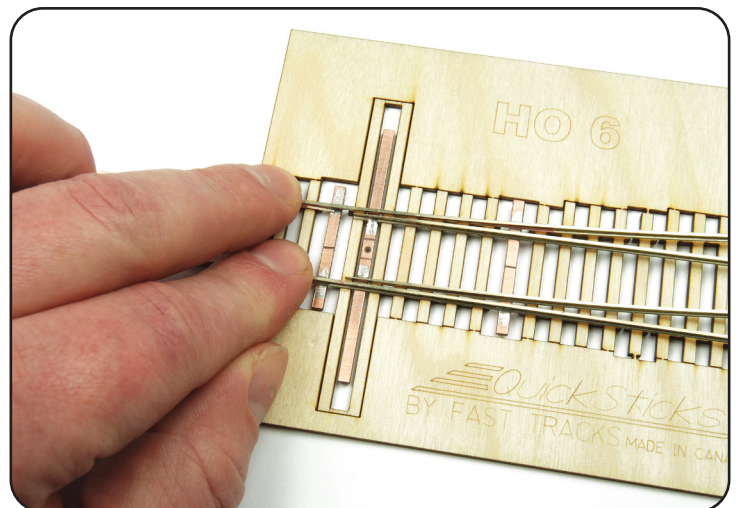


Image 111

Gently set the turnout on top of the QuickSticks being careful to line up the rail with the webs between the ties. (Image 111)

Once the turnout is positioned in place, apply pressure to join the turnout to the ties. (Image 112)

Now carefully line up the rail at the end of the turnout up with the webs between the ties. This will help to ensure that the track is positioned in gauge. You may want to confirm that the track at the end of the turnout is in gauge using a track gauge. (Image 113)

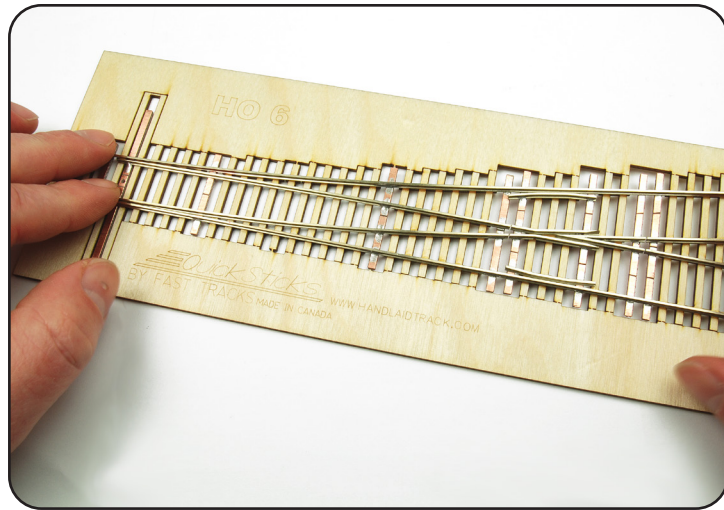


Image 112

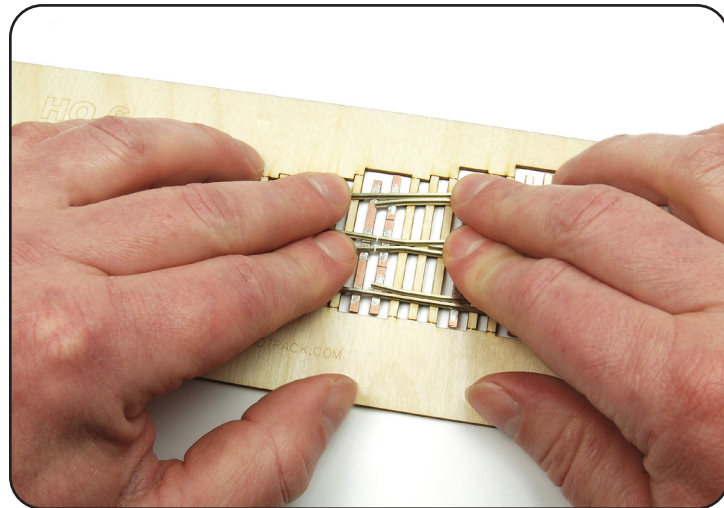


Image 113

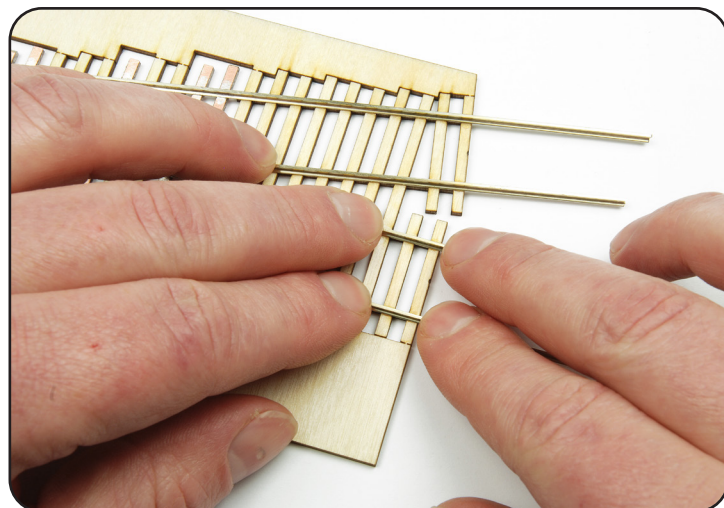




Image 114

Once the turnout is bonded to the ties, applying heat to the base of the rail will cure the bond. Using a hot soldering iron, place the tip of the iron onto the base of the rail for a few seconds. Repeat this process for every 4th or 5th tie.

The heat from the iron will cause a reaction in the adhesive that vulcanizes the bond, making it extremely strong and durable. (Image 114)

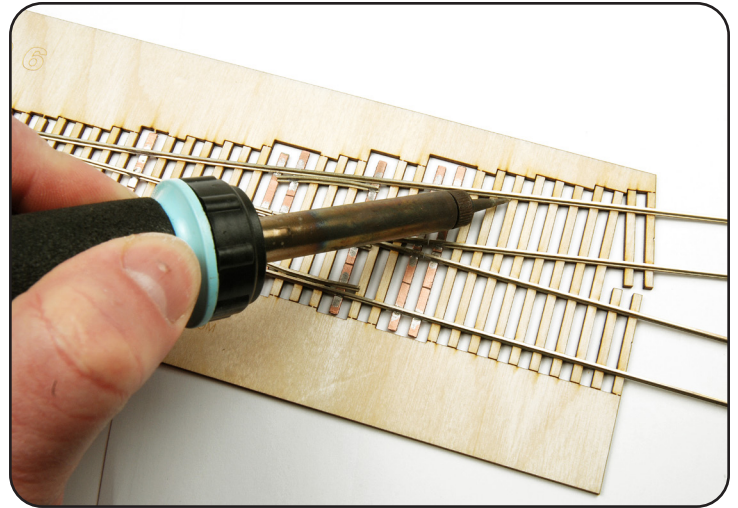
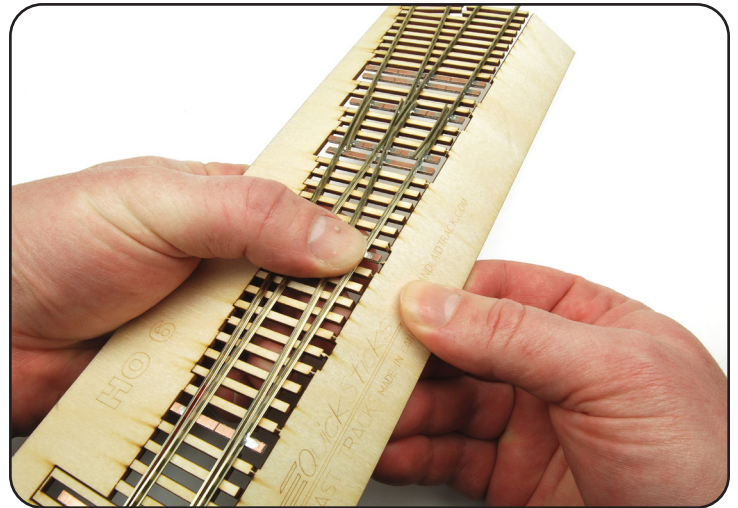


Image 115

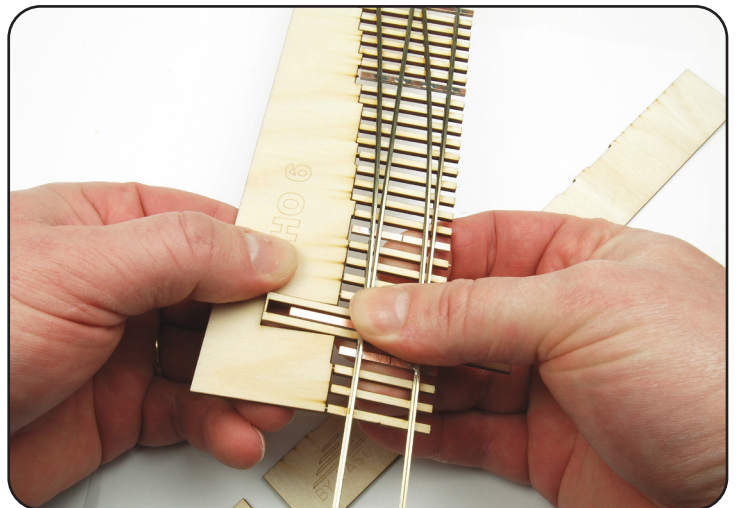
Now that the ties are fastened to the turnout, the outside of the QuickSticks can be removed. The outside frets are held to the ties with small tabs that can easily be broken by holding the turnout firmly, and flexing the plywood base until the tabs break free. (Image 115)



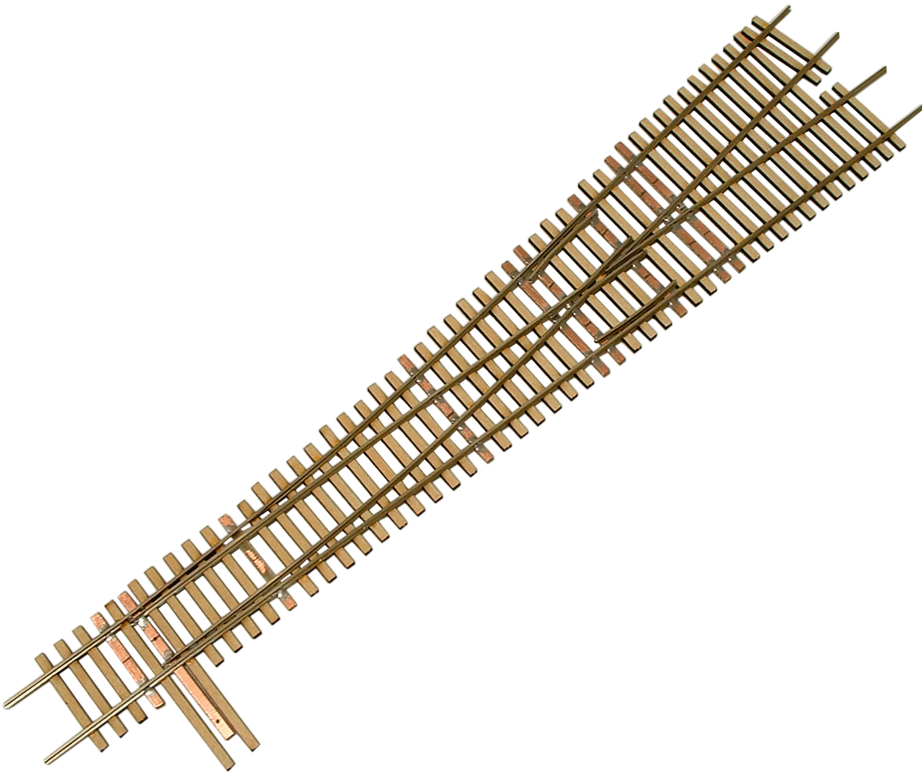
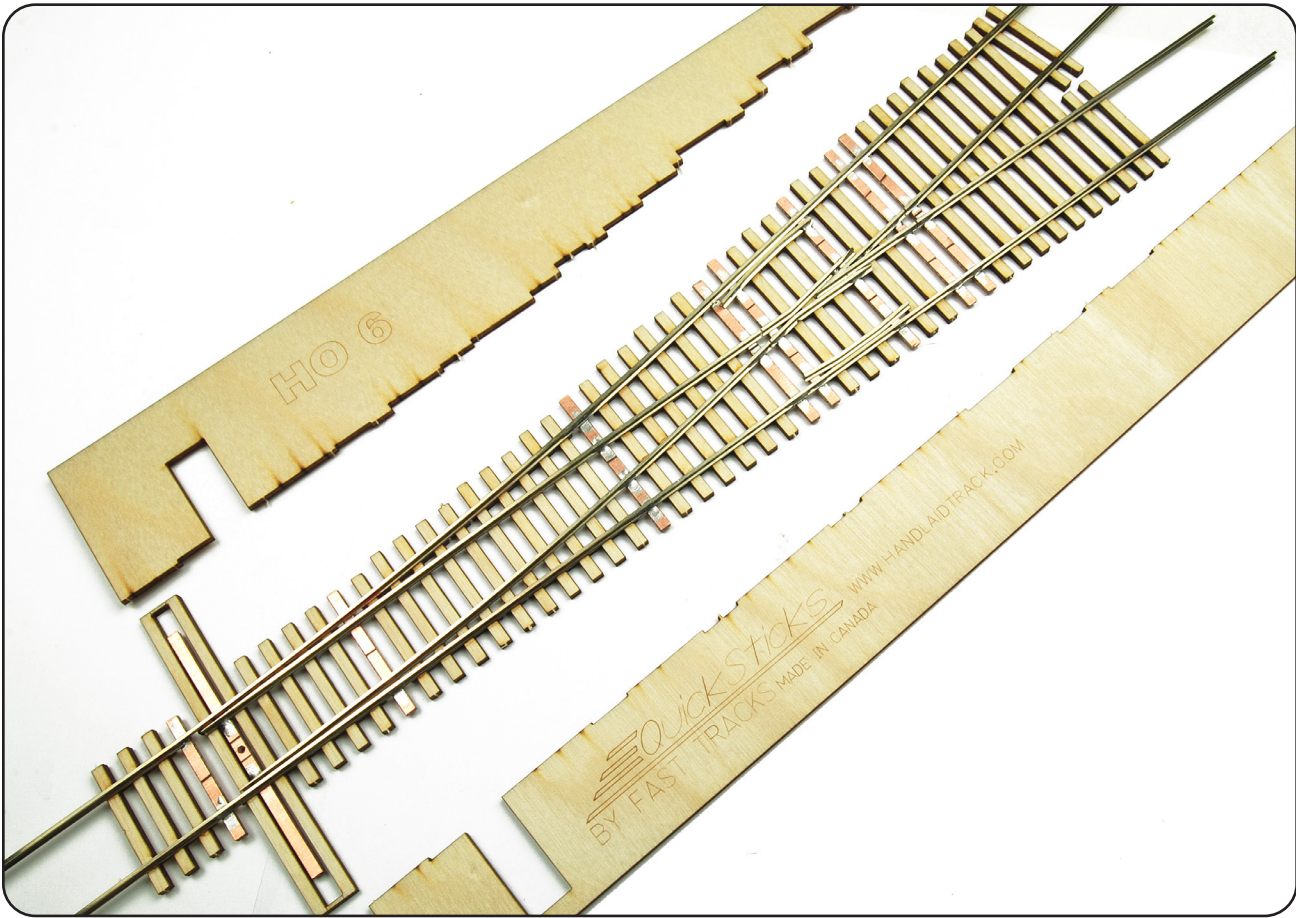
Repeat the process for the other side of the turnout. Be sure to support the head ties to ensure that they do not break off of the turnout. (Image 116)

Should any ties break free from the rail while you are removing the fret simply press them back into place and reheat the rail to reset the bond.

Image 116

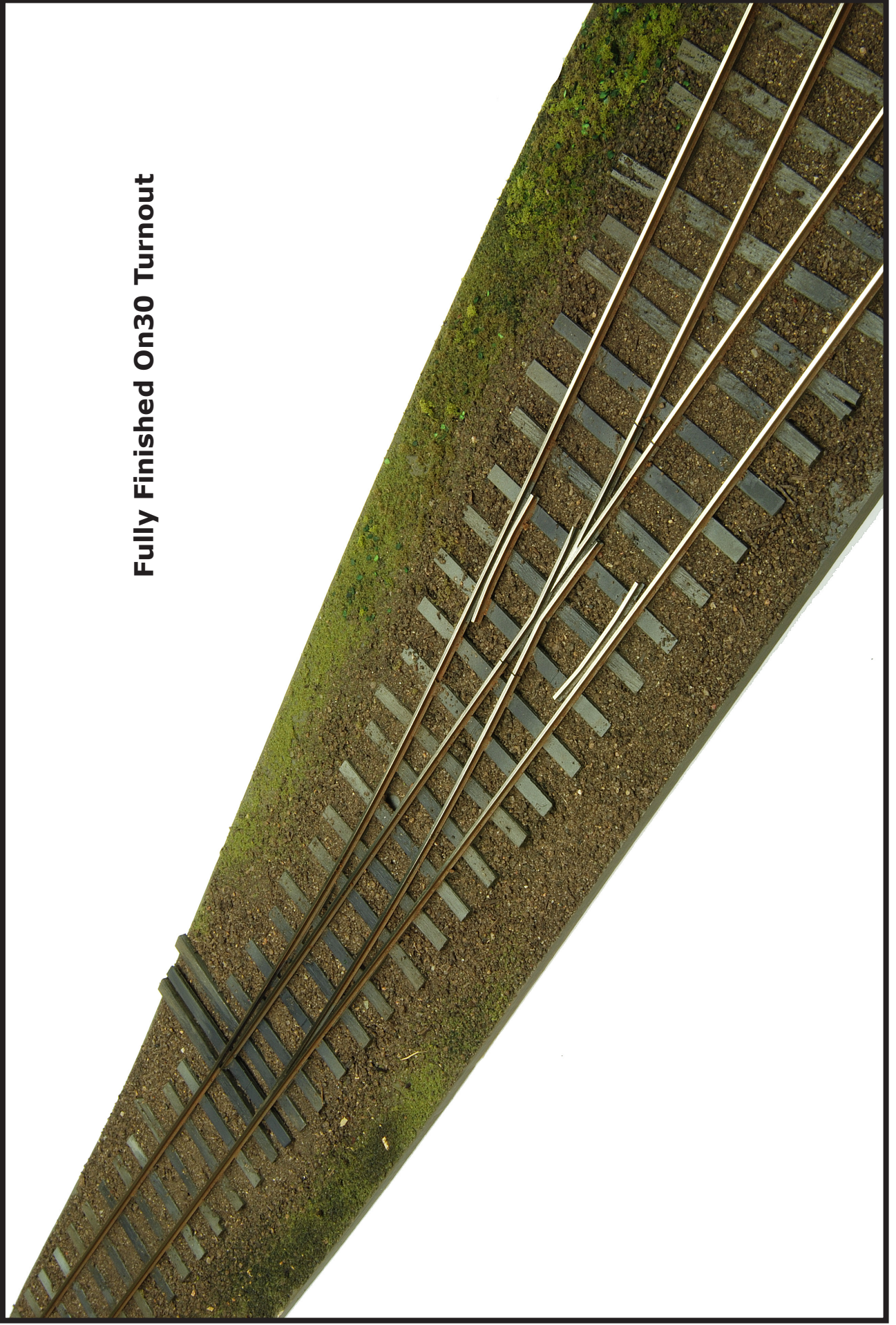


**You Are Finished!**





**Fully Finished On30 Turnout**





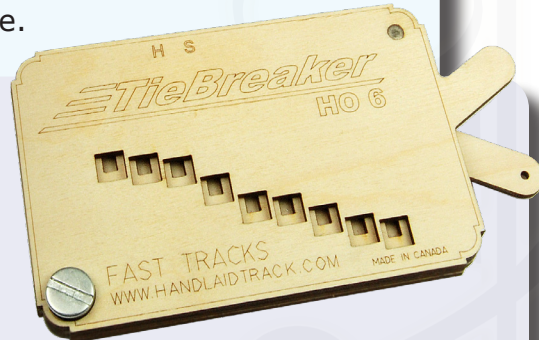
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